Faster paste waxing!  
Easier paste waxing!

Once around with one-step J-wax cleans and waxes your car!

Start right in waxing!  
Johnson's new J-wax does the cleaning work for you!

No extra cleaner needed — nothing else to buy!

J-Wax has just what paste wax needed—a built-in cleaner! The exclusive J-Wax formula goes to work fast. Cleans while it waxes—saves you hours of work. J-Wax replaces grime with a glistening coat of wax. Tough wax. Hard-finish wax that protects your car in any weather.

J-Wax puts more wax on your car—leaves more wax on your car than other one-step waxes. And J-Wax goes on smoothly, easily—evenly. Leaves no dull spots or streaks. You are sure of more all-around protection with J-Wax in any weather—from bumper to bumper, including the chrome!

Look for Johnson's J-Wax in this new key-opening can. Only J-Wax guarantees sealed-in freshness. It's the fastest, easiest way to genuine wax protection—paste wax protection.
FREE booklet shows how and where to use

MASONITE
PEG-BOARD
PANELS AND FIXTURES

When you send for Masonite's colorful, illustrated booklet, you'll get dozens of ideas for putting these sturdy, easy-to-paint panels to work for you. It has ideas for organizing tools by your workbench...for ending "closet clutter"—for bringing more efficiency to the kitchen...ideas for every room in your home.

More than 70 specially designed metal fixtures and Masonite Peg-Board panels (including heavy duty panels for garage and tool shed) are on sale at your lumber dealer's.

AS SEEN ON HOME WITH ARLENE FRANCIS

MASONITE CORPORATION
Dept. PM-6, Box 777, Chicago 90, Ill.
In Canada: Masonite Corporation, Gatineau, Quebec

Please send me your free 16-page booklet with ideas for using Peg-Board panels and fixtures.

Name: ___________________________  This One

Address ___________________________

City: _____________________________

Zone: _____________________________

Masonite Corporation—manufacturer of quality panel products.

JUNE 1957
The new Torsion-Aire suspension system*, only on Chrysler Corporation cars, is the riding advance of the year. It isolates road shock—takes curves flat—eliminates jolting dive on stops. This is engineering leadership. Plymouth, Dodge, De Soto, Chrysler and Imperial.

*Another big reason why *The Switch is On* to the cars of *The Forward Look*
In This Issue...

His Cameras Spy on Life’s Secrets - - - 65
France Is Harnessing the Tides - - - 85
We Chase the Jets on Film - - - 91
The Owners Report on the ‘57 Buick - - - 98
Musical Museum - - - 110
Professor of the Outdoors - - - 118
Push-Button Bakery - - - 133

For the Craftsman...

“Field Kitchen” for Week-End Campers - - 145
Install a Through-the-Wall Air Conditioner - - 153
Oil-Barrel Oven - - - - 161
Decorate With Mosaics - - - - 163
Build the Sea Knight — Part II - - - - 166
Protect Yourself Against Windstorm Damage - - - - 174
Boat Camping for the Sportsman - - - - 185
Machining Metal Tubing - - - - 192

Regular Departments...

Detroit Listening Post - - - - 76
Keeping Up With the Atom - - - - 139
Solving Home Problems - - - - 158
How Would You Do It? - - - - 198
Shopping for Tools - - - - 200
On the Market for Do-It-Yourselfers - - - - 202
Clinic for Homemakers - - - - 208

Next Month...

Nowadays you can buy a prefabricated home complete with swimming pool, patio and outdoor-living area, in smart, modern design or colonial style, ranch type or two story. One of the most exciting developments in housing is revealed in a July article on “How the Prefabs Got That Custom Look”
Give your car, your furniture a professional polish with Thor's model 36 car and home polisher—only $39.95.

Thor car and home polisher
Shines things brighter, makes work lighter

Now you can brighten up the old bus (or that new one) and not wear yourself out in the process. All you need is Thor’s popular model 36 car and home polisher. This Thor SpeedPolisher is light (only 4½ lbs.) and easy to handle. Let’s even an amateur turn in a professional polish job and save money.

Thor’s model 36 is useful inside the house, too. Perfect for polishing furniture: Give your car and your furniture a professional polish job with this durable, quality-built Thor SpeedPolisher. Just $39.95. For complete versatility around the home workshop, be sure to see the complete kit at $49.95. The kit includes accessories so that the basic power unit becomes a drill, a sander, a paint stirrer and a wire brushing machine.

See these and the complete line of Thor SpeedTools at your nearest hardware dealer. SpeedWay Manufacturing Co., division of Thor Power Tool Company, Prudential Plaza, Chicago 1, Illinois.
TRIPS WITHOUT SLIPS...

Week ends ... vacations ... plan your family motor trips ... without slips.

Item: Be sure you take your car jack, lug wrench, other tools. You could miss them a lot ... later. Flashlight, paper towels, etc., can come in handy.

Start early: Ask "Mr. Service"... your nearby Texaco Dealer... for a special Texaco Touring Service routing for best routes ... to avoid detours. Have him check your car ... tires, battery, filters, fan belt and other potential trouble spots. His Marfak chassis lubrication will give you smoother, quieter riding, easier handling.

Invitation: Stop where you see those green and white Texaco Registered Rest Room signs ... you're always welcome.

And, on the road, let Texaco Dealers give you their famous "Circle Service" for clear vision and safer driving.

Here's "slip" that safeguards...

It's Marfak chassis lubricant! Lubricates perfectly yet clings to vital points. Seals itself in to protect against road dirt, dust and water. Lasts longer for "cushiony" riding, easier handling, bearing wear protection. Get Marfak. See your Texaco Dealer ... the best friend your car has ever had.

TEXACO DEALERS IN ALL 48 STATES

Texaco Products are also distributed in Canada, Latin America, and Africa

THE TEXAS COMPANY

JUNE 1957
ACROSS THE DESK

To the Editor:
I have just read your article, "Build Your Own Swimming Pool," in the March issue. I am enclosing photographs of the swimming pool we built in our back yard.

Pertinent facts:
Size, 12 by 20 by 7 feet deep.
Kiddy pool, 4 by 12 by 3 feet deep.
Cinder-block construction (reinforcing rods and concrete in block cavities).

(Continued to page 8)
5 reasons why ACCOUNTING

offers you MORE MONEY... and SUCCESS!

**REASON #1.** If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Even back in "depression years," accountants earned more than many men in other major professions.

**REASON #2.** The demand for accountants is great—everywhere. All businesses must have trained accountants to cope with ever-growing requirements. It's a profession offering wide opportunity—always—to the man who knows.

**REASON #3.** You can fit into any business, anywhere in the country—because accounting principles are universal. Think what this means in terms of security and independence!

**REASON #4.** Accounting is open to all. Any man or woman of good intelligence, who enjoys figure work and is willing to follow LaSalle's systematic "problem method" plan, can readily qualify for a highly profitable, enjoyable lifetime career... and he doesn't have to finish his training before beginning to "cash in."

**REASON #5.** Without losing a day from your present work, you can prepare in spare hours at home, at low cost, under LaSalle's step-by-step "Problem Method" of "learning by doing." This famous plan accounts for LaSalle's remarkable record of having trained one out of every 13 of all Certified Public Accountants in the U. S. and of having put many thousands of others into high-paying careers.

Send today for Free Sample Lesson and "Accountancy, the Profession That Pays." Learn about the several great fields of opportunity... and LaSalle's time-tested plan for helping men and women to rapid advancement, higher income, greater prestige and professional standing. The coupon below will bring this information to you—without cost or obligation.

**MAIL THE COUPON—NOW**
Member, National Home Study Council

---

**GET FREE SAMPLE LESSON**

LaSalle Extension University
A Correspondence Institution
Dept. 664H, 417 S. Dearborn St., Chicago 5, Ill.

Please send me for free of all cost or obligation, a sample lesson in Accounting... also, your latest illustrated book, "Accountancy, the Profession That Pays."

Name: ____________________________ Age: ______
Address: __________________________
City, Zone, State: ____________________

---

LaSALLE
417 S. Dearborn St.,
CHICAGO 5, ILL.
JUNE 1957
NOW...YOU'RE "SET" FOR SAFER TRAVEL

...thanks to ATOMIC ENERGY

A MATCHED SET of Dunlop AccuRated tires is greater-than-ever protection against premature tire failure. The precise, atomic-powered action of Accu-Ray® produces a stronger, safer tire with an exact amount of protective rubber uniformly applied to every cord ply. No dangerous ply chafing or internal heat build-up. Better balance, new stability and comfort for mile after mile of safer driving.

Your Dunlop dealer will give you the "inside story" that makes Dunlop your best tire value today. He has a complete selection of Dunlop tires in Nylon or Super Hi-Test Rayon.

(Continued from page 6)

Floor of pool, 6-inch-thick reinforced concrete.
Wood-slat rustic fence 6 feet high obtained from sawmill nearby.
Blue morning glories cover fence.
Wire-mesh safety fence and gate around pool.
Flagstone border.
Water obtained from deep well.
The kids and I dug the pool with the shovel-and-wheelbarrow method. Tough work — two months digging — but a lot of fun. Help from mason contractor in laying blocks and cement work. Total cost approximately $750 and worth every penny.

Joseph W. Scheld,
Ansonia, Conn.

To the Editor (From "Down Under"): 

Re Mr. Burggraf’s article, “The World’s Toughest Car Test,” in February. Congratulations on a most interesting story, the like of which we Aussies would like to see more.

However, some of Mr. Burggraf’s statements regarding our "roo," as we call them [kangaroos], would stand correction. For some eight years I worked as a ringer, the same as your cowboy, on New South Wales and Queensland sheep and cattle stations and I have seen thousands of these marsupials but never, as stated on page 188, 10 feet in height. One seven-foot red buck was quite a legend in his district.

Five hundred pounds in weight? Very doubtful.

But the statement "...frequent the center of the continent in packs numbering hundreds of thousands" is entirely incorrect. Under certain conditions mobs of 500 may be seen in the semi-arid belt, but this would not happen once in 10 years.

J. Inall,
Regentville, N. S. W.,
Australia

Editor’s Note:

Looks like we may have to go to Australia ourselves for the answer. Roland Burggraf, author of the article questioned, is with the Sydney, N. S. W., Sun.

To the Editor:

In the March issue of PM I read the letters from the people concerning the 1957 automobiles. It seems to me that most of these are aimed at Chrysler Corp., and as there is no answer to this in the book, I want to put in my two bits.

I think the Chrysler cars are distinctive and beautiful. They are different from those of the past and I predict the '58 Chevy

(Continued to page 10)
Picture yourself going places

You've done it often. Call it day-dreaming if you like, but you've seen yourself in a bigger job - giving orders and making decisions - driving off in a smart new car - buying your family a fine home.

There's nothing wrong with dreams. But how about making them come true? You can do it, if you're willing to try!

Look around you. The men who are going places are the trained men. They've learned special skills that bring them better jobs and higher pay. It's the men without training whose dreams never come true.

What are you going to do about it? Just wait and wish? If you really want to succeed, you can get the training you need by studying at home in your spare time. International Correspondence Schools offer you a course in just about any field you choose, giving you the practical plus the bedrock facts and theory. No skimming or skipping! And you'll be earning while you learn. Students report better jobs and more pay within a few months.

Look over the list of subjects in the coupon below. Pick out the one that interests you most - the one that holds the greatest future for you. Then mark the coupon, and mail it today. Find out what I. C. S. can do for you. It costs only a stamp or postcard, but it's the first step if you want to go places!

FREE BOOKS


For Real Job Security—Get an I. C. S. Diploma!

L. P. S., Scranton 9, Penna. Member, National Home Study Council

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 54953F, SCRANTON 9, PENNA. (Partial list of 257 courses)

Without cost or obligation, send me "HOW TO SUCCEED" and the opportunity booklet about the field before which I have marked X (plus sample lesson):

ARCHITECTURE and BUILDING CONSTRUCTION
Air Conditioning Architecture Arch. Drawing and Designing Building Contractor Building Estimator Carpenters and Millwork Carpenter Foreman Heating, Electrical and Decoration Painting Contractor Plumbing Reading Arch. Blueprints

ART
Design and Art Magazine & Book Illus. Show Card and Sign Lettering Sketching and Painting

AUTOMOTIVE
Automobiles Auto Body Rebuilding and Refinishing Auto Engine Tuneup Auto Technician

AVIATION
Aviation Engineering Technology Aircraft & Engine Mechanic

BUSINESS
Accounting Advertising Business Administration Business Management Cost Accounting Creative Salesmanship Managing a Small Business Professional Secretary Public Accounting Purchasing Agent Salesmanship Salesmanship and Management Traffic Management

CHEMICAL

CIVIL ENGINEERING
Civil Engineering Construction Engineering Highway Engineering Professional Engineer (Civil) Reading Draw. Blueprints Structural Engineering Surveying and Mapping

DRAFTING
Aircraft Drafting Architectural Drafting Drafting Machine Design Electrical Drafting Mechanical Drafting Sheet Metal Drafting Structural Drafting

ELECTRICAL
Electrical Engineering Elec. Engr. Technician Elec. Light and Power Practice Electricity Practical Lineman Professional Engineer (Elec.)

MECHANICAL
Mechanical Drafting Mechanical Engineering Metalworking (Machine) Professional Engineer (Mech.) Quality Control Reading Shop Blueprints Refrigeration and Air Conditioning Tool Design Tool Making

HIGH SCHOOL
High School Diploma

RADIO, TELEVISION
General Electronics Tech.

JUNE 1957

Name __________________________ Age ________ Home Address __________________________
City __________________________ Zone ________ State ________
Occupation __________________________ Working Hours____ A.M. to P.M.

Canadian residents should send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Canada. . . . Special tuition rates to members of the U. S. Armed Forces.
and Pontiac will fall in with the same type of design. I think the design of these cars is far advanced to the present Buick and Olds. These cars haven't changed in the last five years stylewise. I say let all companies go their own way in design, but let's get them to put them together better.

David Welch, Sacramento, Calif.

**Album of Chevies**

Ed Cole's office in Detroit is uncluttered and businesslike, as befits the office of the sharp-thinking, young engineer who is General Manager of Chevrolet Division. Obviously out of place is the bright yellow-and-red toy bus that stands on a table looking, at first glance, like any other toy bus. But, Ed quickly points out, it is not at all like any other toy bus.

The bus is made up of 14 thin slices of (Continued to page 20)
For Good Pay—A Job with a Future
Be a Skilled Technician

Growing Need for Trained Technicians in these Two Fields

Electric Appliances
Get into a field where there is important work and opportunity for the trained man.
Millions of electric appliances are sold every year. Every wired home now has an average of 8. Many of them need service and repair. Owners pay well to have them fixed quickly and properly. This is your opportunity for a better job, your own part time or full time business. N.R.I. can give you the training you need, at home, in your spare time.

Learn and Earn with Tester N.R.I. Sends
Soon after starting you will be able to earn extra cash fixing toasters, clocks, fans, vacuum cleaners, etc., for neighbors and friends. Keep your job while learning and earning. Put spare time to work for you. Work in your basement, garage, spare room. You’ll be amazed how easily, quickly you, too, can start earning many extra dollars. N.R.I. shows you how. Even before you finish training your spare time earnings may pay for the course and equipment. You need proper training to service today’s automatic appliances. With this course you get parts to build professional type, multi-use Appliance Tester. Takes guess work out of servicing. Mail coupon for FREE Catalog and Sample Lesson. See how easy it is to learn...Find out about N.R.I.—a school that for more than 40 years has been training men through home study, for success, good pay jobs.

N.R.I. Supplies Kits to Learn by Doing
You Get Practical Experience
Enroll with N.R.I. and LEARN-BY-DOING. Training includes lots of parts to build actual equipment. Use it to practice what you learn from our easy to read, well illustrated lessons. Shows equipment you get, how you use it to learn quickly, become a trained technician.

40 Years Experience Backs N.R.I. Training

Television-Radio
Bigger than ever and still growing fast. That’s why Television-Radio has special appeal to ambitious men not satisfied with their jobs, their present earnings. More than 4,000 Radio and TV stations now on the air. More than 150 million homes and auto Radios. 40 million Television sets. Color TV promises added opportunities. For trained men there are good jobs, bright futures, security and prosperity in Television-Radio Servicing or Broadcasting. Soon after enrolling, many N.R.I. students start to earn $10, $15 a week extra in spare time fixing sets. Some make enough extra to start their own TV-Radio shops. N.R.I. training is practical—sets quick results. N.R.I. lessons are easy to understand, well illustrated, teach you basic principles. And you also LEARN-BY-DOING by practicing with kits of equipment which “bring to life” things you read about in the lessons.

Find Out What TV-Radio Offers You
N.R.I. is the oldest and largest home study TV-Radio school with thousands of successful graduates. N.R.I. instructors—specialists in home study training—devote full time to providing you with effective training. You get personal attention, helpful advice from experts. Mail coupon for Catalog and Sample Lesson FREE. Cost of N.R.I. courses now available on easy terms. Address: NATIONAL RADIO INSTITUTE, Dept. 7FA, Washington 15, D. C.

SAMPLE LESSON AND CATALOG FREE
MAIL NOW—NO OBLIGATION

NATIONAL RADIO INSTITUTE
Dept. 7FA, Washington 15, D.C.

☐ Send FREE Sample Lesson and Catalog on TV-Radio Training.
☐ Send FREE Sample Lesson and Catalog on Electric Appliances Servicing Course. (No salesman will call. Please write plainly).

Name:

Address:

City: 

State: 

Accredited Member, National Home Study Council

JUNE 1957
HANDSOME NEW 1957 GENOVA WATER & SHOCK RESISTANT WATCH

CHALLENGES COMPARISON WITH WATCHES THAT COST UP TO $49.95!* WHILE SUPPLY LASTS!

OUR greatest watch bargain since 1947! Handsome, rugged 1957 Genova water and shock resistant timepiece—engineered to rigid Swiss precision standards—yours at a money-saving bargain price, not an ordinary watch, as radically different from other low cost watches as night and day! Bang it! Jolt it! Wet it!

RUNS UNDER WATER!
MULTI-PROTECTED! Resists shocks at work or play. Sealed-in safeguard gasket resists water, grime, dust. Yes! It actually runs under water!

WE CHALLENGE YOU TO COMPARE IT WITH EXPENSIVE WATCHES!
* Yes...compare the Genova with watches selling for $49.95 for its elegant, very thin design, its modern applique dial, its smart, distinctive looks, its truly durable construction! Don't let our low price confuse you. The Genova is precision-made and electronically time-checked for satisfying performance. Even if we were to charge you TWICE the price, we couldn't give you a more accurate timepiece!

ONLY 25,000 AVAILABLE!
This ad will appear in over 100 magazines and newspapers reaching 60,000,000 people. Better order yours NOW—before they are sold out! LIMITED—one watch per family so we can please as many new customers as possible. Mail coupon for 10-day trial, YOUR MONEY REFUNDED promptly if not completely satisfied. And remember, you receive the famous THORESEN watch guarantee of FREE service, FREE oiling, FREE adjusting, FREE labor. See unlimited Guarantee Certificate above. This guarantee comes to you IN WRITING and is good not only for one year or five years—but for the lifetime of this firm. We stand behind our product!

THORESEN, Inc., Dept. 6-F-261
585 Water Street, New York 2, N. Y.
RUSH handsome, rugged 1957 Genova Deluxe—at only $8.98 plus 90c excise tax! Total: $9.88. My money refunded promptly if I am not satisfied. Include your famous Unlimited Guarantee Certificate.

☐ Check or money order enclosed. Send prepaid.
☐ Send COD, plus postal fees. I enclose $1 deposit.

PRINT NAME
ADDRESS
CITY & ZONE
STATE

☐ Check here for Genova with metal expansion band. Only $9.12 more. Total: $11 tax paid. (No. 262)

WE'VE SOLD MORE THAN 200,000 WATCHES IN RECENT YEARS—BUT THIS IS OUR GREATEST VALUE! We will be swamped with orders. Don't lose out. Order your watch NOW! Remember, we have a full-time Jewelry & Watch Repair Department to service your watch—not for 90 days—but for the lifetime of this firm! WE STAND BEHIND EVERY WATCH WE SELL! Mail coupon.

MAKE DARING WATER TEST AT OUR RISK!

If, at any time in 5 years, the Genova watch fails to function properly after immersing in water for ONE HOUR, we will replace it with a watch of equal value.

THORESEN, Inc., 585 Water St., N. Y. 2, N. Y.

- Precision-Made in Switzerland by Craftsmen Famed for Their High Standards of Workmanship!
- Water and Shock Resistant!
- Built-In Shock Protector!
- Anti-Magnetic!
- Luminous Dial!
- Stainless Steel Screw-Back!
- Center Sweep Second Hand!
- Built to Take Rugged Abuse!
INVENTORS

Learn how to protect your invention. The U. S. Patent Laws provide that any new and useful art, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if the act of invention is involved. Therefore, every inventor with a valuable invention should take advantage of the Patent Laws and proceed for patent protection in order to safeguard his rights.

A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

The Patent Laws were enacted for the benefit of the inventor to give him protection for the features of his invention which are patentable. These features must be properly and concisely set forth and claimed in a formal application for patent, in order to comply with the requirements of the Patent Laws. For that reason, unless the inventor is familiar with patent matters, he should engage a competent registered patent attorney or agent to represent him. We are registered to practice before the U. S. Patent Office and are prepared to serve you in the handling of your patent matters.

A specially prepared booklet entitled “Patent Guide for the Inventor”, containing detailed information with respect to patent protection and procedure, together with a “Record of Invention” form will be promptly forwarded to you without obligation upon request.

CLARENCE A. O’BRIEN & HARVEY JACOBSON
Registered Patent Attorneys
71-F DISTRICT NATIONAL BUILDING
WASHINGTON 5, D. C.

JUNE 1957
Tense, Nervous Headaches Need This Relief

A survey shows 3 out of 4 doctors recommend the famous ingredients of Anacin to relieve pain. Here's why Anacin gives better total effect in pain relief than aspirin or any buffered aspirin:

- ACTS INSTANTLY: Anacin goes to work instantly. Brings fast relief to source of your pain.
- MORE EFFECTIVE: Anacin is like a doctor's prescription. That is, Anacin contains not one, but a combination of medically proven ingredients.
- SAFER: Anacin simply can not upset your stomach.
- LESSENS TENSION: Anacin also reduces nervous tension, leaves you relaxed, feeling fine after pain goes. Buy Anacin Tablets today!

I'll Send You This Handsome SAMPLE CASE—FREE

and Show You how To Make Up to $3.00 in a Day

WHITE, RED or BLACK Handwriting Sample Case packed with 100 beautiful sign-writing and engraving fabrics. Take orders from friends, fellow-workers, others, for fine quality, made-to-measure clothes. Pocket big cash profits in advertising. Become wearing our suits and overcoats but makes more orders. We make it easy for you to earn more orders, for us to earn more money. Satisfactory guaranteed. Enlarge your business. Send name, address, and age—today! J. C. FIELD & SON, INC., Harrison & Throop Sts., DEPT. J-1716 CHICAGO, ILLINOIS

SHORTHAND IN 6 WEEKS

Famous SPEEDWRITING shorthand. 120 words per minute. No symbols; no machines; use ABC's. Easiest to learn, write and transcribe. Low cost. For business and Civil Service. Over 350,000 graduates. Typing available. 34th Year. Schools in over 400 cities. Write for FREE booklet to:

SPEEDWRITING
Dept. 1906-7
58 W. 42 St., N.Y. 36, N.Y.

REAL ESTATE BE A BROKER

PAYS BIG! SEND FOR FREE, BIG, ILLUSTRATED CATALOGUE NOW! Graduate report making substantial incomes. Start and run your own business quickly. Men, women of all ages, learn easily. Course covers Sales, Property Management, Appraising, Loans, Mortgages, and related subjects. STUDY AT HOME or in classes. Write TODAY for free booklet. No obligation. Approved for World War II and Korean Veterans.

WEAVER SCHOOL OF REAL ESTATE (Est. 1936)
2222 W. 91 St., Kansas City, Mo.

ALLIED SUPPLEMENT

Send for our special Supplement No. 165 featuring the complete line of KNIGHT-KIT Hobby, Hi-Fi, Amateur, and Test Instrument Kits. See hundreds of special values in Hi-Fi systems and equipment, recorders, Amateur gear, test instruments, parts, tubes and tools. FREE—send for it today.

ALLIED RADIO WORLD'S LARGEST ELECTRONIC SUPPLY HOUSE

Send following KNIGHT-KITS:

- $83 Y 282
- $83 Y 243
- $83 Y 295
- $83 Y 299
- $83 Y 247

(All prices Net F. O. B. Chicago)

Name
Address
City
State

POPULAR MECHANICS
EVER see a man get to first base in his job and then "die"?

He camps there, waiting for something or someone else to advance him. And all too often, he just waits... and waits...and waits.

In the competitive game of business and industry, it's every man for himself. You advance on your own. And the best way to get ahead is to make yourself better qualified than the next guy.

But how? For the man with a family to support, a job to hold down, there's no more sensible method than spare-time training with I.C.S.

It's convenient! It's fast! It's low in cost! And it works!

Give us the chance to prove this and we'll send you three helpful and valuable books—free! We'll demonstrate the I.C.S. method with a sample lesson—we'll show you in an illustrated catalog how quickly and thoroughly you can master any of 257 courses. And you'll get the rewarding career guidebook, "How to Succeed."

Don't just sit there! Mark and mail the coupon!

For Real Job Security—Get an I. C. S. Diploma!  I. C. S., Scranton 9, Penna.  Member, National Home Study Council

INTERNATIONAL CORRESPONDENCE SCHOOLS

BOX 18953F, SCRANTON 9, PENNA.

Without cost or obligation, send me "HOW TO SUCCEED" and the opportunity booklet about the field BEFORE which I have marked X (plus sample lesson):

ARCHITECTURE and BUILDING CONSTRUCTION
- Air Conditioning
- Architecture
- Arch, Drawing and Designing
- Building Contractor
- Building Estimator
- Carpenter and Millwork
- Carpenter Foreman
- Heating
- Interior Decoration
- Painting Contractor
- Plumbing
- Reading Arch. Blueprints

ART
- Commercial Art
- Magazine & Book Illustration
- Show Card and Sign Lettering
- Sketching and Painting

AUTOMOTIVE
- Automobiles
- Auto Body Rebuilding and Refinishing
- Auto Engine Tuneup
- Auto Technician

AVIATION
- Aero-Engineering Technology
- Aircraft & Engine Mechanics

BUSINESS
- Accounting
- Advertising
- Business Administration
- Business Management
- Cost Accounting
- Creative Salesmanship
- Managing a Sales Business
- Professional Secretary
- Public Accounting
- Purchasing Agent
- Salesmanship
- Salesmanship and Management
- Traffic Management

CHEMICAL
- Analytical Chemistry
- Chemical Engineering
- Chem. Lab. Technician
- Elements of Nuclear Energy
- General Chemistry
- Natural Gas Prod. and Trans.
- Professional Engineer (Chem.)

CIVIL ENGINEERING
- Civil Engineering
- Construction Engineering
- Highway Engineering
- Professional Engineer (Civil)
- Reading Struc. Blueprints
- Structural Engineering
- Surveying and Mapping

DRAFTING
- Aircraft Drafting
- Architectural Drafting
- Drafting Machine Design
- Electrical Drafting
- Mechanical Drafting
- Sheet Metal Drafting
- Structural Drafting

ELECTRICAL
- Electrical Engineering
- Elec. Eng. Technician
- Elec. Light and Power
- Practical Electrician
- Practical Linemen
- Professional Engineer (Elect.)

MECHANICAL and SHOP
- Diesel Engines
- Gas-Elec. Welding
- Industrial Engineering
- Industrial Instrumentation
- Industrial Metallurgy
- Industrial Safety
- Machine Design
- Machine Shop Practice
- Mechanical Engineering
- Professional Engineer (Mech.)

HIGH SCHOOL
- High School Diploma

RADIO, TELEVISION
- General Electronics Tech.

Name
Address
City, Zone, State

JUNE 1957

Canadian residents send coupon to International Correspondence Schools, Canadian, Ltd., Montreal, Canada. Special tuition rates to members of the U. S. Armed Forces.
Let AUDEL Guides Help You Earn A BIGGER INCOME!

Read MECHANICS GUIDES for profit

Every Mechanic can Step up his Skill with AUDEL'S GUIDES. Containing practical inside information in a handy form. Covers facts and figures illustrated and explained. Books sent to you for 7 DAYS FREE EXAMINATION. Send no money. Nothing to pay postman. Check books wanted — mail today.

MAIL ORDER
AUDEL, Publishers, 49 W. 23 St., New York 10, N. Y.

Check NOW! You can look over any guide in your own home. Start the easy payments if satisfied.

MAIL THIS TODAY

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Employed by</td>
<td></td>
</tr>
</tbody>
</table>

SAVE SHIPPING CHARGES! Enclose Full Payment With Coupon and we pay shipping charges.

RAZOR BLADE PLANES
3-WAY CURVE LITTLE GIANT
FLAT PLANE
JUST USE A DOUBLE-EDGE RAZOR BLADE

FOR JOBS OTHER PLANES CAN'T DO
FOR SHORT CURVES AND SHAPING
FOR LONG CURVES AND FLAT SURFACES

ONLY $9.50 each at HARDWARE DEALERS
If not yet available in your area, you may order by mail. Include 25c additional handstamp for postage. DEALERS WRITE FOR INFORMATION

WILSON BROS., Dept. PM-6
SPRINGFIELD, MISSOURI

$6,000-$10,000 YEARLY OPERATING AUTO RADIATOR SERVICE SHOP

World's largest radiator shop equipment mfr. will act as responsible individual in setting up radiator shop. Opportunity to own successful profitable business. First year average $5,000 to $10,000. Garage or service station can operate a dept. Over 1,000 INLAND shops now operating. As little as $295 down for equipment starts you. INLAND will finance balance and furnish training. Write to...

INLAND MFG. CO., Dept. PM-6, 1108 Jackson St., Omaha 2, Nebr.

LEARN PLASTICS
COMPLETE LOW COST SHOP METHOD HOME TRAINING NOW AVAILABLE
Get in on Big Money opportunities in Plastic molding, casting, forming, carving, etc. Earn as you learn with Interstate's professionally prepared course. All plastic materials furnished. WRITE FOR FREE BOOKLET DEPT. C-3, PORTLAND 13, OREGON

ENGINEERING DEGREE IN 27 MONTHS

INDIANA TECHNICAL COLLEGE

MAKE MONEY AS A LOCKSMITH

B.S. Degree. Aero., Chem., Civil, Elec., Mech., & Electronic Eng'ng. Radio & TV, B.S. degree in Radio & TV, etc. Licensed to practice in Indiana. Physics, Humanities, Chemistry, etc. Many industrial plants, offices, government agencies, large industrial centers, colleges, etc. Demand for qualified locksmiths in all fields. Career for the future...

FREE BOOKLET NOW!

LEARN AT HOME FROM LICENSED SCHOOL. EVERYTHING SUPPLIED BY US. Send for FREE BOOKLET NOW!

INSTITUTE OF LOCKSMITHING, Dept. F91
15 PARK AVENUE, RUTHERFORD, NEW JERSEY

How To Hold FALSE TEETH More Firmly in Place

Do your false teeth annoy and embarrass you by slipping, dropping or wobbling when you eat, laugh or talk? Just sprinkle a little FASTEBETH on your plates. This two alkaline (non-acid) powder holds false teeth more firmly and more comfortably. No gumminess, gooey, pasty taste or feeling. Does not sour. Checks "plate odor" (denture breath). Get FASTEBETH today, at any drug counter.

POPULAR MECHANICS
INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are your laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you:

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

McMORROW, BERMAN & DAVIDSON
Registered Patent Attorneys
PATENTS • COPYRIGHTS • PATENTS
135-F VICTOR BUILDING, WASHINGTON 1, D. C.

JUNE 1957
DeVry Tech Specializes in Training Men

IN THEIR SPARE TIME AT HOME TO BECOME

Electronic Technicians

Did you ever stop to think how much your happiness depends on having the right job? Getting your bills paid, living the life you want, doing the kind of work you like...?
The right job (a promotion) with your present employer, or a good job with a new employer, would help solve such problems for you, wouldn't it?
DeVry Tech, with a successful 26-year record of training men for industry, offers you a real opportunity for a better job or your own profitable service shop... in one or more branches of the fast-growing field of Electronics.
We can show you a way to a more interesting and brighter future without interfering with your present job. We can give you all of this in your spare time at home... or in our well-equipped Chicago or Toronto training centers.
Find out how Electronics may give you a brighter and more profitable tomorrow. It will cost you nothing to get the facts. Fill in coupon below. We think this information is worth a postage stamp, don't you?

NO PREVIOUS TECHNICAL EXPERIENCE, NO ADVANCED EDUCATION REQUIRED

Live-Wire Employment Service
DeVry Tech's Placement Department is in contact with some of the best-known employers in the Electronics field. The service is free to all graduates - and DeVry Tech's record in helping to place men has been outstanding.

DRAFT AGE?
We have valuable information for every man of draft age; so if you are subject to military service, be sure to check the coupon.

A SAMPLE LESSON FREE!
See for yourself how DeVry Tech trains you for real opportunities in Electronics. We'll also give you a free copy of an interesting booklet, "Electronics and YOU."

"One of North America's Foremost Electronics Training Centers"

DeVRY TECHNICAL INSTITUTE
CHICAGO 41, ILLINOIS
FORMERLY
DeFOREST'S TRAINING, INC.

MAIL COUPON TODAY
DeVry Technical Institute
4141 Belmont Avenue, Chicago 41, Ill., Dept. PM-6-N
Please give me a FREE Sample lesson and your booklet, "ELECTRONICS AND YOU" and tell me how I may prepare to enter one or more branches of Electronics as listed above.

Name _____________________________
Address: ___________________________
City _____________________________
State _____________________________
Age _____________________________
Send coupon to DeVry's Canada Training Center, 626 Roselawn Avenue, Toronto 12, Ontario.
African wood, all hinged together at the back so they open like a family album.

And that's what it is—a family album of Chevrolets. Precisely carved into each page is a faithful representation of one Chevy body style, faithful down to name plates and upholstery design.

Creator of this most unusual catalogue of cars is a young Dane, Sven Hojberg of Copenhagen (home city of PM's two Scandinavian editions, by the way). Hojberg, a wood carver by hobby only, used a sharp knife, some sandpaper and an obviously well-trained talent to make this display which he sent to Cole as a gift. It took about 500 hours of spare time to make it.

To the Editor:

Your article, "Beachcombers of the Woods," in the March issue has motivated numerous requests for additional information. We welcome this interest but to those of us who had to read and answer these letters it was obvious that the readers were overoptimistic of the possibilities. . . .

These many by-products of the forests should not be compared to drift material which comes to rest on the beach and is considered free for the taking by beachcombers. Minor forest products, such as decorative greens, cones, medicinal material and the like, are just as much a crop to the forest landowner as timber which is grown and harvested for saw logs, pulpwood, firewood and poles. Therefore, persons collecting or harvesting by-products of the forest must recognize ownership, abide by Federal, state and local requirements, and must obtain permission or negotiate for a price with the owner.

Another important item which is of direct concern to the novice collector is markets and harvesting know-how. Too often the beginner, lacking business ability and collection know-how, gets into trouble with the landowner or has no sale for the product. Believe it or not, this is generally a highly competitive business and unless the beginner is correctly advised, disappointment, heartaches and hard feelings may be the result. For example, the article mentions cork at $2 per pound ( presume this is quinine cork). This was probably one of the all-time highs during the war years. This past summer the price was about 25c per pound in the vicinity of Portland. We have been advised that there is no market for quinine cork at the present time. Demand and price vary.

Thomas H. Burgess,
Assistant Regional Forester,
U. S. Forest Service,
Portland, Ore.
GOOD NEWS for men who need GOOD JOBS!

BE A TRAINED MECHANIC IN
AIR CONDITIONING
AND REFRIGERATION

Why let the high cost of living get you down when there's such good money to be made in the Air Conditioning and Refrigeration field! Yes, this old, established, but fast-growing industry needs thousands of trained mechanics to install, repair and service the 150 million refrigeration units in use today. And the industry is growing! Last year, over 3 million refrigerators, 1 million freezers and 2 million air conditioners were sold. Small wonder there's a shortage of trained men! And those who are in the field earn top wages, work steady, put money in the bank!

Train at home in spare time for a better job in this uncrowded industry. For complete information, fill out and mail coupon. Do this today.

Great new way to learn by practicing at home with real equipment!

At left, Mr. Anderson demonstrates the commercial type, heavy-duty, 1/4 h.p. refrigeration high-side which you build as part of your training.

You get sound experience by training with CTI kits

Why leave home or give up your job to attend a resident school? Train at home in spare time! CTI sends you easy-to-understand instruction and 23 training kits. You get all parts and tools to build a 1/4 h.p. refrigeration condenser. You do 10 service and trouble-shooting jobs—build a freezer, refrigerator, air conditioner or milk cooler. You get practical training-intensive experience. (Two of the 23 kits are shown at left.) Act now: Mail coupon! No obligation.

An opportunity for a business of your own!

Students often build up a list of customers which includes not just homes, but office buildings, shops, food stores and industrial plants. They contract to do servicing on a fee basis, or simply answer calls. The Air Conditioning and Refrigeration field offers plenty of opportunity for independence. Own a shop—Be the boss!

MAIL COUPON TODAY FOR 2 FREE BOOKS

COMMERCIAL TRADES INSTITUTE
1400 GREENLEAF AVENUE DEPT. R-366
CHICAGO 26, ILLINOIS

Push me your booklet, Success in Air Conditioning & Refrigeration, and Sample Lesson. Both FREE.

Name

Age

Address

City

Zone

State

“TRAINING YOU CAN TRUST”

JUNE 1957

Copyrighted material
INSURED TIRE SERVICE

FREE

INSURANCE POLICY given with each tire sold. We guarantee the amount of service you pay for.

YOU CAN'T LOSE!!

Super Quality — Rugged Performance - 6 Months Insured Service
600x15 $3.60 670x16 $4.40 700x16 $5.20 750x16 $6.40 800x16 $7.30
650x15 $3.00 670x16 $3.85 700x16 $4.65 750x16 $5.65 800x16 $6.55
700x16 $2.50 750x16 $3.60 800x16 $4.60 850x16 $5.60

Supreme Quality — Nothing finer - 12 Months Insured Service
600x15 $5.25 750x16 $6.45 800x16 $7.45 850x16 $8.45 900x16 $9.45
650x15 $4.50 700x16 $5.35 750x16 $6.25 800x16 $7.15 850x16 $8.05
750x16 $3.50 800x16 $4.35 850x16 $5.15 900x16 $6.05 950x16 $6.95
800x15 $2.50 850x16 $3.25 900x16 $4.00 950x16 $4.75 1000x16 $5.50
900x16 $2.00 950x16 $2.60 1000x16 $3.20 1050x16 $3.80

GIANO BALLOONS — $ for $1.25
Surplus US Govt. (New Overage)
Neoprene Weather-Test Balloons.

FOR FUN IN THE back yard; at parties, picnics, etc. Young & old love 'em.

FOR ADVERTISING—Attracts crowds to civic events, business openings, trade shows, fairs, Paint on sales messages or names for mailers.
FOR PROMS—Makes any dance more festive, Ideal for high school or college affairs!

Approx. Inflated Sizes
3 ft. dia. $49.00.  (SPECIAL 3 for $1.25)

Postage paid on prepaid orders. Calif. residents add sales tax.

VOLUME SALES CO., War Assets Division
3520 Sunset Blvd., Dept. PM-57, Los Angeles 26, Calif.

NOW NO ONE CAN KEEP
A SECRET FROM YOU!

20x40x60x
20x40x60x

TELESCOPE

Amaze your friends! Special. Order now.
Buy the best! Top quality! Get it here. Only
See what they get that you don't! See it all. Get
No strings—no obligation. Carry it anyw
Bring home the stars. Anywhere! Get t
Clean in your hand, camping trips, can be used


BUILD YOUR OWN
AIR CONDITIONERS

FROM SIMPLE REFRIGERATION & AIR CONDITIONING BOOKS

1. "HOW TO BUILD A More Efficient Air Conditioner"
2. "HOW TO BUILD AN Automotive Air Conditioner"
3. "HOW TO BUILD A Refrigeration System"
4. "HOW TO BUILD An Electrostatic Precipitator"
5. "HOW TO BUILD A Low Cost, High Efficiency Air Conditioner"

FREE INSTRUCTIONS TO ALL WHO ORDER BOOKS!

I. J. STONE, Dept. B-6-4 1610 Oak St. Santa Monica, Calif.

SAVE THOUSANDS OF DOLLARS
"HOME-A-MINUTE" KIT
Not Something To Fool Around With!
Let's be frank. Isn't it ridiculous to pay thousands of dollars in cash for a new 
home, or even to pay thousands of dollars in first-class materials when you 
can build your own, almost because it saves thousands of dollars for you. This is the 
actual cost of building it? Why NOT design and build your own Home, Kit, Flats, Etc. Best buy ever, Etc. Better than buying po
with dozens of fiber partitions, Doors, Windows, Kitchen Cabinets, made to fit inch scale as in blueprints. THEN, BELIEVE IT OR NOT, YOU, THE LAYMAN, who knows nothing about building, can make out your own cost-saving, labor-saving chart to local prices.

These kits are available at all hardware dealers, so you can get a kit and start building your own Home. They should never cost you more than a fraction of the cost of buying a kit from the manufacturer. The kits are available in 2 sections.

B. D. HALL & CO. Milwaukee, Wisconsin

POPULAR MECHANICS
How To Get Into Commercial Art
by Walter J. Wilwerding

Do you like to draw? If you do, you may have talent enough for a money-making career in commercial art or illustrating.

Trained artists are wanted. Openings have increased about 50% in the last five years, according to a large employment agency. Earnings? Up, even for beginners. Limited only by skill, training, experience.

You must have talent, of course. Secondly, you should have special schooling—in the fundamentals of art and the requirements of the commercial art field itself.

Special Training Available
You won't have to move from where you live, or spend full time, to get the education you need for a career in commercial art. Art Instruction, Inc.—a school with over 40 years' experience teaching commercial art—will tutor you right in your own home, by mail.

Over the years, more than two hundred thousand men and women have enrolled with this home study art school. Many former students are now earning from $150 a week to over $50,000 a year.

Ray Tollefson, shown here, is a former Art Instruction student. He heads up a large and successful commercial art studio.

Over 40 Years of Art Teaching
Art Instruction, Inc. has been teaching art for over 40 years. It's now the world's largest home study art school. The teachers are professional artists with experience in advertising art, illustrating and cartooning. As a student you get lesson assignments based on the illustrated art textbooks that come with your course, together with drawing supplies.

You do your lesson work at home, in your spare time. You go as fast as you like, or take all the time you need.

Your work is reviewed by professional artists; then returned to you with corrections and suggestions. You get individual attention, personal guidance.

You study basics, then specialize
You start by sketching in outline to study shape. You go on to proportions and shading, basic figure drawing, composition. Training in the fundamentals of art is followed by specialized work.

A Way to Test Your Talent Free
First you need to decide whether you have enough natural talent to be as successful as you'd like in the commercial art field. I suggest you take our Art Talent Test. This was devised by professional artists as a test of natural talent. A copy will be mailed you free and without obligating you in any way.

You take the Test at home. It's simple, yet it will tell the professionals whether you have the necessary talent for commercial art.

To Help You Decide
Take this Test at home and we will send you a free estimate of your talent at no obligation to you. This will help you decide whether to consider further training for a career in commercial art.

Clip the coupon below and send today for this free Art Talent Test. It could be your start towards a fascinating and profitable career.

ART INSTRUCTION, INC. STUDIO 6137
500 S. 4th St., Minneapolis 15, Minn.
Please send me your Talent Test, without cost or obligation. (Please Print)

Name__________________________ Age________________
Address_______________________ Phone_________________
City__________________________ Zone________ Phone_________________
State__________________________ Occupation_________________
RCA offers you the finest training at home in Radio-TV electronics, TV servicing, Color TV

SEND FOR THIS FREE BOOK NOW!

The instruction you receive and equipment you get (and keep) will start you on your way. Pay-as-you-learn. You pay for only one study group at a time. This 52 page book contains complete information on Home Study Courses for the beginner and the advanced student.

RCA INSTITUTES, INC.
A SERVICE OF RADIO CORPORATION of AMERICA
350 WEST FOURTH STREET, NEW YORK 14, N.Y.


JUNE 1957
Inventors

Take these necessary preliminary steps promptly to protect your invention by applying for a United States patent—

Sketch and describe your invention. Sign, date and have this disclosure witnessed by two people who understand your invention. Have us make a preliminary search among U. S. patents already granted for similar types of invention. We then report to you on the probable patentability of your invention and recommend your further course of action.

Write for our instructive booklet, "Patent Protection for Inventors" and our convenient "Evidence of Invention" disclosure form. No obligation.

TELEPHONES
and ALL SUPPLIES

Room to room, house to gar-
age, private telephone service.
HANDSET CRADLE TELE-
PHONES (2) Complete outfit
with 100' wire, 2 dry cells,
instructions. $3.50

WORM HARVESTER — Dan
Mac Magneto—gathers fish-
worms by electricity. Com-
plete with instructions. $6.50
Free illustrated bulletin "AA-14"

TELEPHONE REPAIR & SUPPLY CO.
Dep. AA-14 • 1760 Lunt Ave., Chicago 26, Ill.

FIX OUTBOARD MOTORS

POWERMOWERS, AND ALL SMALL
2 & 4-CYCLE GASOLINE ENGINES

Repair your own equipment or MAKE EXTRA MONEY
in this growing field. Fully illustrated, easy-to-under-
stand, Home Study Course. Write for FREE information.

LINCOLN TECHNICAL INSTITUTE
SUITE 6-E, 472 MARKET STREET, NEWARK 5, N. J.

BUILD YOUR OWN OPTICAL INSTRUMENT

"FUN with OPTICS"

TELLS YOU HOW
Just cost $2 exciting pages! Wonderfully illustrated.
Shows you how to build telephoto lenses, telescopes, mi-
croscopes, close-up camera lenses, artist drawing projec-
tors, slide viewers, binoculars, reflex scopes, etc. Plenty of
diagrams—any 10-year-old can easily follow the instruc-
tions. We can furnish, the lenses, prisms and parts you'll
need. Right now—order your copy of "FUN with OPTICS."
Just send your name and address, along with only 50c in
coin. EDUARD SCIENTIFIC CO., Barrington 30, New Jersey.

FREE BOOK

START YOUR OWN BUSINESS AT HOME...SHARPEN
HOUSEHOLD, GARDEN AND SHOP TOOLS IN SPARE TIME

Now you can turn spare time into Big Cash Profits with
new Belsaw Sharp-All. Sharpen knives, scissors, shears,
snips, ice skates, mower blades, hedge trimmers, grass
whips, axes, chisels, screw drivers, scrapers and saws...jus-
t about any household, garden and shop tool. Your
own CASH business with no inventory. No
calls to make. No experience needed.

Learn how easily you can start your own
spare time business. Amazing low cost easy-
payment plan. Send postcard for FREE BOOK.

BELSAW SHARP-ALL CO
717 Field Bldg. Kansas City 11, Missouri

SAVE MONEY

• HAVE FUN
WITH

THESE PM
BOOKS

1/2 PRICE SALE!

First come, first served! 50% off during
the month of June only on most of the
Popular Mechanics books listed below.
These are books that actually never go
out of date. They contain useful ideas
for home kinks and shop notes that are
as time- and money-saving as when
they were first presented. Circle the
books you want. They will be sent
prepaid. We will refund correct amount
if short of any titles.

WRITE IN TOTAL AMOUNT OF ORDER HERE

IMPORTANT: MINIMUM ORDER $1.00

Clip and mail this ad with check or money order to—

POPULAR MECHANICS PRESS, Dept. 657
200 E. Ontario St. • Chicago 11, Ill.
Pyroil "B" add to oil 12 oz. can $55c ... $1.00 in Canada at your service station

GET NEW CAR PEP . . . NOW!

Cats Need A Tonic Tool

Manufacturers of
Super Lubricants + Flex-O-Fix
Chomp and Silver Bullet Oil Filter Cartridges
World Famous Since 1929

SHEET METAL BRAKES
Forma angles, looks, pans, etc. Quick centering clamp. All steel construction.
15-18 gauge steel $28.00
16-17 gauge steel $37.00
18-24 gauge steel $42.00
Floor stand $8.00
15-17 gauge Volder $6.00
18-24 Pan and Box brake $7.50
18-25 Adjustable Bender $11.50
9" x 3" Guide with Sheet 3 1/2 gage steel $16.50
9" x 3" Guide with Sheet 3 1/2 gage steel $16.50
ORDER DIRECT OR SEND FOR FREE CATALOG

VYKE MFG. CO., P-4156 Jason St., Denver, Colo.

Free! 1/53 GERMANY
Giant and midget-sized STAMPS: hated Hitler heads; blood-red swastikas; inflation issues with pre-war face of millions of dollars; Allied and Russian Occupation issues; birds, animals, newspaper stamps - all different, guaranteed worth $1.96 at Catalog prices. EXTRA: Free booklet, bargain lists, and other fascinating offers for your free consideration. Send for mailing list. Jamestown Stamp Co., Dept. 666, Jamestown, N.Y.

RUPTURED
BE FREE FROM TRUSS SLAVERY
Now there is a new modern Non-Surgical treatment designed to permanently correct rupture. Now all Non-surgical treatments are so certain, that a Lifetime Certificate of Assurance is given. Write today for our New FREE Book that gives facts and tells why you paid a painful and expensive surgery, and tells how non-surgically you may again work, live, play and love and enjoy life in the manner you desire. There is no obligation. Excelsior Hernia Clinic, Dept. 1936, Excelsior Spgs., Mo.

OUR AD HAS BEEN IN THIS MAGAZINE LONGER THAN ANY OTHER TIRE CO. NEARLY EVERYONE BUYS FROM STANDARD. 50 Years of Combined family experience in High Quality tires. "We Have No Rent to Pay. That is Why We Can Undercut All Competition.

23 YEARS AT THIS ADDRESS
TUBE FREE WITH EVERY PASSENGER TIRE
Our entire stock of very slightly worn "EXTRA" MILEAGE "TOP" GRADE tires (Written Insurance Guarantee). SEND CHECK EVERYBODY MAY DEDUCT 10% OFF TIRE

FREE: If you buy 2 or more Passenger 4-ply tires, WE GIVE ONE FREE, on your order. Does not include N.W. or Truck Tires, or Snow Tires.

12 MOS. WRITTEN GUARANTEE WITH EVERY TIRE


*EXTRA SPECIAL TOP QUALITY all size 4-ply pass. $7.92 Extra Factory Tested Tug. pipe. FREE TIRE with any 4-ply tire over $3.00. GIANT TIRE SALE.

Thousands of tires shipped all over the U.S.A. All tires shipped F.O.B. Philadelphia. Send Check with this ad. 12% OFF with this ad. STANDARD 834 N. Broad St., Philadelphia 30, Pa.

Make your interest in AUTO MECHANICS & DIESEL PAY OFF!
OUR FAMOUS SHOP METHOD HOME TRAINING PREPARES YOU FOR BIG TIME PAY AT HOME IN SPARE TIME

YOU GET AND KEEP ALL THIS EQUIPMENT

Top quality Socket Wrench with Fittings. Real professional tools you'll use during your lifetime career in repairing all types of engines, from foreign cars to big diesel jobs.

Nearly 60 million cars and trucks on our roads! If you could talk to owners of garages, service stations and car dealerships (as we do every day), you'd realize America's DESPERATE NEED FOR TRAINED MECHANICS.

Take your choice—One modern course prepares you for Auto-Mechanic jobs, Airplane Mechanics, Farm Machinery Repair, all Diesel Jobs, Experimental Labs, Government Work, Engine Specialties, etc. A qualified, ALL-AROUND Mechanic always has a good job.

Every phase is Shop-Tested! Streamlined lessons, diagrams, manuals are easy to understand. Earn as you learn. Free Graduate Employment Service.

RESIDENT TRAINING AT LOS ANGELES! If you wish to take Resident Training at Los Angeles, in our big, modern Shops & Labs, check special box in coupon for full information.

APPROVED FOR GI TRAINING
NATIONAL SCHOOLS
Los Angeles 37, California

MAIL NOW
NATIONAL SCHOOLS, Dept. DB-67
400 S. FIGUEROA ST.
LOS ANGELES 37, CALIF.
Send for FREE Auto-Diesel Opportunity Book and Sample Lesson.

NAME ___________________________ AGE ________

ADDRESS ___________________________ CITY ___________ STATE ________

□ Check if interested ONLY in Resident School Training at Los Angeles

VETERANS: Give date of discharge ________

JUNE 1957
Home Operators Take Over Huge Rubber Stamp Profits

Men and Women Everywhere Now Can Start in a Big-Pay Business at Home in Spare Time

The multi-million dollar Rubber Stamp business is now being taken over by small, home operators throughout the U.S. Men and Women who operate this inexpensive machine can turn out large numbers of Rubber Stamps with special wording of all kinds. Material costing only 2¢ makes a stamp that sells for $1.80. The machine is easy for anyone to operate. It molds as many as six Rubber Stamps at a time, each with different wording such as names, addresses, notices, stock numbers, prices and other "copy" needed by offices, factories and individuals. At full capacity, it can earn as much as $9.20 an hour for the operator! You don't need experience to get into this big profit business at home. We supply everything, including complete instructions and eight ways to get orders for stamps coming in fast, just making up to $9.20 in one hour right away. We'll mail full particulars FREE and no salesman will call. Be first in your locality. Rush coupon today to Rubber Stamp Div., 1512 Jarvis Ave., Dept. R-2-H, Chicago 26, Ill.

Rubber Stamp Div., Dept. R-2-H FREE!
1512 Jarvis, Chicago 26, II.
Please rush full particulars about the little machine that can get me started in the profitable Rubber Stamp business at home in spare time. Everything you send me is FREE and no salesman will call.

Name
Address
City
Zona State

WARN HUBS on your 'Jeep'

STOP FRONT DRIVE WEAR

in 2-Wheel Drive!

Over 100,000 now in use! That is real proof of their many advantages and rugged dependability. Warn Hubs on 4-wheel drives make steering easier, increase power, speed in high; add life to gears, tires, because the front drive stands still in 2-wheel drive—there is no drag! Use free-wheeling 2 w.d. or tractive 4 w.d. as needed, automatically, as you shift, with Warn Lock-O-matics, through fingertips controls with Warn Locking Hubs. Factory approved. Iron-clad guarantee. Models for all 4 w.d.s. to 1½ tons. See your dealer now! Write for free literature.

WARN MFG. CO.
Riverton Box 6064-A6
Seattle 88, Wash.

WARN SUPPLIES
BARGAINS

$50,000.00 INVENTORY

of QUICK LIQUIDATION

Supplies home-bundles of them for

home, shop, factory, farm and outdoor use. New items, used items, recov-

erred items—all at tremendous savings—

all priced for quick sale.

Page After Page of Values

This big catalog shows you over 1000

amazing money saving values. Write for your

copy today. Send 10c in envelope for catalog.

Send today! SEND TODAY FOR YOUR COPY

STARK'S

212 W. Madison St.

CHICAGO 6, ILL.

8½" THE FINEST AUTHENTIC SCALE MODELS

1957 AUTOMOBILES

For Men, Single Drivers and Adults Collector


PRODUCTS INTERNATIONAL, Box 123, Canton, O.

$10,000 REWARD

if correct use of my new body building course fails to build you a "HE-MAN" BODY

DAN LURIE BARBELLS

Scientific! Fastest, surest method ever devised —beats all other training methods. Results guaranteed. Special low price: 50 lb. set $8.98 100 lb. set $14.98 200 lb. set $41.96 300 lb. set $55.98 400 lb. set $61.98 14per 50 lb. F.O.B. Deposit required.

Send FREE Catalog

TV Strong man DAN LURIE

478-311

JEEP OWNERS

RE-Power Now with your choice of three famous V-8 engines

FORD — CHEVROLET

CONVERSION KITS now available to fit ALL 2 and 4 Wheel Drive "Jeep" Wranglers. Satisfaction guaranteed. Price $195. Write for complete kit or cylinder head conversion kits, with instructions. Send $50.00 down and we will ship complete kit. C.O.D. Send money order for prepaid shipments. Write for complete details.

HOOSIER MACHINE PRODUCTS CO.
313 S.E. 6th St.
Phone 476
Pendleton, Oregon, U.S.A.

BIG STINKY FLY TRAP

Gracious Outdoor Living BEGINS with
World Famous BIG STINKY FLY TRAP.

TRAPS. Now years for only $3.95 postpaid in USA — 3 for $9.95.

Mysterious — Fascinating — Incredible — Really Works

Rinse 1 or 2, 3, Big Stinky Outdoor Fly Traps, standard size complete with 8 oz. fluid.

8 oz. $3.95 10 oz. $5.95

My check 1 Money Order 2 for 5 oz. 3 for 10 oz. 1 for 8 oz. enclosed.

BIG STINKY, P.O. Box 235, Waukesha, Wis.

MAKE UP TO $20 A DAY WITH

EASISHARP

Big profits in your spare time sharpening scissors. We show you how to start.

Write for FREE EWS-41S gadget. We will have you making money in 90 minutes.

This is your chance to earn some extra cash in your own business and a steady in-

come. Sharpen a pair of scissors in less than two minutes. You can operate it yourself. Weight only 10 lbs. Every house, barber, school can operate it. Write today for FREE EWS-41S gadget.

MONEY IN YOUR POCKET

SALES PLAN FREE

tailor, dressmaker—everyone uses scissors and all need sharpening in four others a year. Write for FREE EWS-41S gadget.

SERR-EDGE MACHINE CO., 9731 Lerain Ave., Cleveland, Ohio
BUILD YOUR OWN WINDOW FAN

Save 1/2 or More
Enjoy Cool Comfort

ORDER TODAY—A factory-packed fan kit containing frame, well-engineered and shaft assembly, two pulleys, and belt, plus easy assembly instructions. You use your own 1/6 HP or larger motor and lumber for frame. Iowa Residents add 2 1/2% Sales Tax. If cash, with order, we prepay shipment. If C.O.D., send 25% deposit.

Send for FREE complete Fan and Parts Catalog.

KLOPPENBORG FOUNDRY & FAN CO.
211 MARQUETTE STREET DEPT. PM57 DAVENPORT, IOWA

LEARN MEAT CUTTING


Thousands of successful graduates. Our 35th year! Send NOW for FREE catalog. No obligation. GI approved.

NATIONAL SCHOOL OF MEAT CUTTING, Dept. 50-5, Toledo 6, Ohio

GET LATEST OFFICIAL AIRCRAFT PHOTOS

SPECIAL INTRODUCTORY OFFER!
1. 4 3/S x 5 photos, world's fastest jets.
2. 4 3/S x 5 World War II planes.
3. 4 1/S x 5 of Rockets, Missiles.
4. 1 8/S Boeing B-52 Jet Bomber.
5. 8x10 Lockheed F-104A Starfighter. Only 25¢ a set. Send 5¢ for all 5. (52 value)

Illustr. CAT. with order. Money back guar.

AVIATION PHOTO EXCHANGE

DEPT. F 8 BOX 75044 LOS ANGELES 5, CALIFORNIA

CABINET MAKING
LOW COST HOME TRAINING COURSE FOR BEGINNERS & ADVANCED CRAFTSMEN

Make money. Learn skills and secrets of fine woodworking and tool use. Professionally prepared shop method training tells and shows how. Covers everything. Easy to master.

INTERSTATE TRAINING SERVICE

DEPT. F 3, PORTLAND 13, OREGON

START YOUR OWN MONEY-MAKING BUSINESS

Clean rugs on customers' floors—upholstery in their homes—even painted walls—with highly efficient electric machines which are making big money for others and giving them independence. Write today for complete information. It's FREE!

VON SCHRADER MFG. CO., Dept. 610 "R" PL, Racine, Wis.

UNMATCHED SPEED FOR OUTBOARDS

Of all makes of 7½ HP and up on racing boats and fast runabouts is provided with the famous Michigan AQUAJET propellers. No re-building of lower unit necessary. Each wheel specifically engineered for motor on which it is to be used. Other propellers for superior water skiing, cruising, general operation. Also complete line of skis, speedometers, boat accessories, described in our 1957 catalog. Send postcard for FREE copy. Michigan Wheel Co., Dept. P-5, Grand Rapids 3, Mich.

Engineers Needed!
—say national industrial leaders
Become a MECHANICAL ENGINEER or ENGINEERING TECHNICIAN at MSOE in Milwaukee

Yes, engineers are needed—and for every professional engineer, industry also requires five trained engineering technicians.

Choose MSOE to prepare yourself for a worthwhile career in mechanical engineering or technology.

Complete laboratories, and field trips to some of the largest and most progressive industrial plants in Milwaukee—machine shop of the world.

Courses approved for veterans—A non-profit institution of higher learning.

Governing board and advisory committees of leading industrialists.

Previous educational, practical, and military experience evaluated for advanced credit.

Choose from these courses—MECHANICAL ENGINEERING

B. E. Degree in 36-42 mos. Options in plant engineering, industrial engineering, design.

ENGINEERING TECHNOLOGY

Associate in Applied Science Degree in 18 mos. Options in air conditioning, industrial engineering technology.

TECHNICAL SERVICE

Service certificate in 6 mos. Optional study in refrigeration or metals fabrication.

A complete series of courses in Electrical Engineering in electronics or electrical power, is also available.

TERMS: OCTOBER, JANUARY, APRIL, JULY

MILWAUKEE SCHOOL OF ENGINEERING

Mail coupon for more information

Milwaukee School of Engineering
Dept. PM-657, 1025 N. Milwaukee St.
Milwaukee, Wisconsin

Please send me the new illustrated career booklet on Mechanical Engineering and Technology. (Please print)

Name __________________________ Age ______
Address _________________________
City ___________________________ State ___________
Eligible for vet. educational benefits? Yes ___ No ___
Discharge date ____________________

JUNE 1957
AMAZING! Secret Spy CAMERA
It's a CAMERA! It's a LIGHTER! ONLY $2.98
Complete with roll film
TAKE PICTURES UNDETECTED!! Now you can take pictures while lighting your own or someone else's cigarette—WITHOUT BEING SUSPECTED!! Others think you're just lighting the lighter, but actually you're taking pictures without their knowledge! It's a perfect light-er that has this amazing camera hidden. It's a dependable lighter in addition to being a precision-made camera. You will take beautiful, detailed pictures at a moment's notice. Same size as an ordinary cigarette lighter; fits vest pocket.

High quality lens takes close-ups or distance photos that enhance beautifully. Allows you to get natural, unposed pictures at parties, home or out-of-doors. No complicated adjustment necessary; easy to operate camera takes 20 photos per roll, that can be developed anywhere. Comes to you complete, ready to operate. Send check, money-order or cash. Add only 25¢ each order for postage and handling. No C.O.D.'s please.

SPECIAL—Extra Film, 4 rolls for only $1.00
TODD PRODUCTS CO., 1355 S. Walton Ave., Dept. 474, Chicago 5, III.

GIAN T 6 FOOTERS
59c

Wow! Genuine Neoprene government surplus (never used) ... giant 6 ft. across, 21 ft. around ... at a fraction of original cost. Durable. Can paint on advertising messages, inflate and fly. Visible for miles. Great for attracting crowds to fairs, openings, school proms, gas stations. Fun for young and old in backyards or picnics. at the beach, etc. use as water markers & buoys. Order today, only 50¢ each. Special: 2 for $1.00; 5 for $2.00; 13 for $5.00. No C.O.D.
P.O. Box 27104, Dept. PM-657, Hollywood 27, Calif.

STOP BREAKING THERMOS BOTTLES
Now handy carrying harness fits any size thermos. Handy to carry in your hands or over your arm. Made of ton braid with nickel plated steel fasteners. YOU CAN'T AFFORD TO BE WITHOUT THIS HANDY DEVICE.

PRICE $1.00 POSTPAID
WENNEL PRODUCTS CO. 139-3 Rd. St. Barberton, Ohio

BRONZE FOUNDRY
Schools • Home Workshops • Inventors
Make your own castings of aluminum, copper, bronze, silver. Foundry sets are available in three sizes including 2400 Deg. F. blast furnaces. $25.00; $35.00 and $46.00 f.o.b. Marysville or Lakewood. Free Circular.

KANSAS CITY SPECIALTIES CO. P.O. Box 7543, Lakewood, Colo.

PLEASE SEND ME

for the time checked. I am enclosing...

1 year $3.50
2 years $6.00

name

address

city

state

Hand this order to your newsdealer or send it to POPULAR MECHANICS 200 East Ontario St. Chicago 11, III.
FOR OLDER MEN

Troubled with GETTING UP NIGHTS, Pains in BACK, HIPS, LEGS, Tiredness

If you have these symptoms then your troubles may be traced to Glandular Dysfunction — a constitutional disease. Medicines that give temporary relief will not remove the cause of your trouble. Neglect of Glandular Dysfunction often leads to premature old age and sometimes incurable malignancy.

The past few years men from over 3,000 communities have been successfully treated here at the Excelsior Institute. They have found soothing relief and a new outlook in the future of life. The Excelsior Institute, devoted to the treatment of diseases peculiar to older men by NON-SURGICAL methods has a NEW FREE BOOK that tells how Glandular Dysfunction may be corrected by proven NON-SURGICAL treatments. This book may prove of utmost importance in your life. Write today. There is no obligation.

Excelsior Institute, Dept. B929, Excelsior Springs, Mo.

1957 CATALOG

BOAT KITS
WOOD and FIBERGLASS

EASY TO BUILD — DESIGNED for professional results by the amateur. World’s largest selection of top performance, latest design, props, skiffs, runabouts, sailing boats, cruisers. 8 to 28 ft. Mahogany decks, frames. FREE FREIGHT. SEND FOR FREE CATALOG.

Boat Plans-Patterns-Frame Kits

Includes fiberglass points, accessories

Build over 50 modern boats from large scale plans, available with FULL-SIZE patterns, new FREE-FAB

Your best buy for Amateurs. SEND 10c FOR CATALOG.

Tanebara, N. Y.

IT’S EASY...

MAKE MONEY IN PHOTOGRAPHY

Pay your college or high school expenses. Increase your income 200% and more. Make a new and valuable business for yourself. If you are over 17—good pay and fascinating work awaits you in the thriving field of photography. You can learn the trade here. Write TODAY for your FREE Book — LEARN-BY-DEAL. Also Resident Photography courses for those who cannot or cannot afford to travel. Write TODAY for your FREE Book — LEARN-BY-DEAL. Also Resident Photography courses for those who cannot or cannot afford to travel. Write TODAY for your FREE Book — LEARN-BY-DEAL.

New York Institute of PHOTOGRAPHY — 47TH YEAR

710 W. 33rd St., New York 1, N. Y.

MECHANICAL DENTISTRY

To make Crowns, Plates, Bridgework, etc., for Dentists. Easy practical way to learn mechanical dentistry at home. Your time and materials. All equipment materials included with course. Low tuition.

Write today for your FREE Book — MECHANICAL DENTISTRY. A new and money making profession that is not affected by machine age.

MCCABIE SCHOOL OF MECHANICAL DENTISTRY

201 W. Broad St., Dept. 66, Philadelphia, Pa.

Also Eshelman TRACTORS.

Riding

ROTA TILLERS

Rotary

MOWERS.

at amazing savings. Write for Free Literature

You Practice with Tune-Up Kit and Tools

Only CTI sends this professional Tune-Up Kit. It includes a Compression Tester, a Vacuum Gauge and Fuel Pump Tester, an Ignition Timing Light, and a portable steel case. Instruments locate engine troubles quickly, help you get valuable practice.

Here is your chance to have tools to practice and for experience, and to earn money to help pay for your education. Write today for your Tune-Up Kit and the set of tools as part of your training at CTI, no extra cost.

MAIL COUPON TODAY!

COMMERCIAL TRADES INSTITUTE

1400 Greenleaf Ave. Dept. A-553

Chicago 26, III.

Send your Auto Mechanics book and Sample Lesson. Both FREE.

Name__________Age__________

Address___________________________

City__________________Zone________State__________

A Trade You Can Learn at Home

Now hear this: if you want to earn big money or open a shop of your own! The auto industry is America’s greatest number wonder! There are over 60 million cars and trucks on the road, and a third are in the "heavy repair" classification. Each year, over 7 million new vehicles are produced. As a result, there’s a severe shortage of skilled mechanics—and too few are training to fill the vacancies. What an opportunity for you! Yes, you can have one of those high-pay, steady, life-long jobs. How? By training at home in spare time!

The CTI Shop-Method Home Training Plan gets you ready for success in months—not years. You get easy-to-understand picture lessons, as well as valuable tools and a tune-up kit (see below). You learn to repair engines, transmissions, brakes, and the various systems—cooling, lubricating and electric. And that isn’t all: If you want additional training in Diesel Mechanics or Body-Fender Rebuilding, you get it (without extra cost). Why not get all the facts? You can, by just filling out and mailing the coupon. We’ll send two FREE BOOKS that show how you can fit into America’s No. 1 industry.

High School Course at Home Many Finish in 2 Years

If you did not or cannot finish high school, here is your opportunity. Study in spare time at home. Go as rapidly as your time and abilities permit. Course equivalent to residential school—prepares for college exams. Standard texts supplied. Credit for subjects already completed. Single subjects if desired. Diploma awarded. Be a High School graduate. Start studies now. Free Bulletin. Write today.

AMERICAN SCHOOL, Dept. HA45

Drexel at 58th, Chicago 37, Illinois

JUNE 1957

I EARN CASH DOING REPAIR JOBS WHILE I TRAIN!

CTI training in Auto Mechanics is so practical that many students do repairing in spare time, earn up to $15 a week and more. CTI training pays its own way!
**RUSH LAST CHANCE COUPON below — YOUR NAME on it**

**I'll show YOU absolutely FREE HOW to GAIN UP TO 50 LBS. of MIGHTY MUSCLES.**

How to become a REAL HE-MAN like THOUSANDS of my pupils each year

Are YOU SKINNY like I was?

I'll reveal to you all my inside secrets that changed me from this 90 lb. weakling to the world's strongest man and athlete says George Jowett

**WORLD'S GREATEST BUILDER OF HE-MEN**

My once skinny pupil, John Sill, says:

"I gained 60 LBS. of MIGHTY MUSCLES."

**NEW MODEL 400 SIMPLEX LAWNMOWER SHARPENER**

Many Exclusive Features

The NEW SIMPLEX is the fastest, most accurate straightedge lawn mower grabber ever built...gives you all these advantages:

- Grinds all mowers—rect type, rotary, hand or power, any size.
- No disassembly—simple peel and go, all remaining parts in engine, support bar rotates.
- Grinding head fits both horizontally and vertically, turns 90° for 6 bed knives.
- Fast, positive adjustments. Sturdy support on steel base with leveling screws.
- Rough, long life construction and many other bonuses.

Get the facts on the new SIMPLEX 400 before you buy any sharpener.

Send for free brochure today.

The Fete-Roet-Heath Company

Dept. PM-6 • Plymouth, Ohio

3" "PALOMAR, JR." TELESCOPE
60 & 120 Power—An Unusual Buy

Assembled ready-to-use! You'll see the rings of Saturn, fascinating Planet Mars, huge craters on Moon, rings of Jupiter in detail. Aluminized and overcoated 3" diameter high-speed F/10 ventilated mirror. An Optional Finder Telescope is also included. Sturdy, hardwood, portable tripod. Order by stock No.—Send check or M.O., $75.00—Money-back guarantee! Shipped No. PM-1250H...$29.50 f.o.b. Barrington, N.J.

EXPLORE FOR TREASURE!

**HIGH SCHOOL DIPLOMA**


SOUTHERN STATES ACADEMY
Box 144-A St. E. Atlanta, Georgia

**You Can Be a Local Manufacturer of CAVITEX SUPERFINE MASONRY**

Local production explains why Cavitec can offer so much in quality for so little money, yet so generous in profit potentials. It's a case of streamlined manufacturing—processing local materials for local building—cutting out the high costs of freight and distribution.

Cavitec creates new standards of beauty—in size, proportion and color. "Puts emphasis on the horizontal." Coco-red design for lighter weight and greater insulation values. Available in 8-inch and 4-inch. Hundreds of territories are available to men looking for a local manufacturing enterprise. Franchise privileges. Responsible operators can obtain basic equipment on attractive rental terms. The Cavitec industry is sponsored by a million-dollar company backed by fifty years of experience and reputation. Available on wire or write to me for "Opportunity, Unlimited" and tentative reservation of territory.

**W.E. DUNN MFG. CO.**

409 W. 24 St., Holland, Ohio

In Canada

Dunn Masonry Machinery, Ltd.
844 Dunoon Highway, Cooksville, Ont.

**NEW POPULAR MECHANICS FLOW VAMAC**

32

**EXPLORE FOR TREASURE!**


**YOU CAN BE A LOCAL MANUFACTURER OF CAVITEX SUPERFINE MASONRY**

Local production explains why Cavitec can offer so much in quality for so little money, yet so generous in profit potentials. It's a case of streamlined manufacturing—processing local materials for local building—cutting out the high costs of freight and distribution.

Cavitec creates new standards of beauty—in size, proportion and color. "Puts emphasis on the horizontal." Coco-red design for lighter weight and greater insulation values. Available in 8-inch and 4-inch. Hundreds of territories are available to men looking for a local manufacturing enterprise. Franchise privileges. Responsible operators can obtain basic equipment on attractive rental terms. The Cavitec industry is sponsored by a million-dollar company backed by fifty years of experience and reputation. Available on wire or write to me for "Opportunity, Unlimited" and tentative reservation of territory.

**W.E. DUNN MFG. CO.**

409 W. 24 St., Holland, Ohio

In Canada

Dunn Masonry Machinery, Ltd.
844 Dunoon Highway, Cooksville, Ont.

**PUMP WATER FAST!**


Irrigate, Fertilize, Tank, Draw Well Water. Heavy duty #8 pumps 7000 gph. 1250 gph. at 3/4" high or 1600 gph. from 25' well. Rustproof alloy metal. 5" blade impeller. 1" min. 1 1/2" outlet. Standard pipe threaded. Will not leak or $1195.00. Iron clad guarantee. Send check, M.O., or send C.O.D. IN U.S.


**POPULAR MECHANICS**

S W E D E S B O R O T. N. J. E R S E Y
Train in Great Shops of COYNE for better jobs in

ELECTRICITY · TELEVISION
ELECTRONICS
RADIO—COLOR TV

TWO TOP OPPORTUNITY FIELDS

Whether 17 or up to 45 years of age, train the Coyne way for a better job and a real future in ELECTRICITY-ELECTRONICS or TELEVISION-RADIO, fields that offer a world of opportunities. Train on real, full-size equipment at COYNE where thousands of successful men have trained for nearly 60 years—the largest, oldest, best equipped school of its kind—established 1899. No advanced education or previous experience needed. Employment service to graduates.

START NOW—PAY LATER—Liberal Finance Plans and Easy Payment Plans. Also part-time employment help for students. Training in Refrigeration and Electric Appliances can be included.

D. W. COOKE Jr., President

A Technical Trade Institute Operated Not For Profit

500 S. Paulina Street, Chicago, Ill., Dept. A-7-72H

ELECTRICITY · RADIO · TELEVISION · REFRIGERATION · ELECTRONICS

COYNE ELECTRICAL SCHOOL
FOUNDED 1899

NEW 18 ft. OFFSHORE CRUISER KIT

ONLY $399

17 Models as low as $42.00 (freight incl.)

Fiberglass boot covering kits, marine supplies, etc.

TAFT MARINE WOODCRAFT

Dept. PH-557 · 436 9th Ave. N.E. · Minneapolis 21, Minn.

MONEY in WORMS

Big money made raising cichlids, hybrid red wagglers and 12 inch African fishworns—sell by mail. We teach you how to raise and where to sell. Free literature. Write today and get our 8-page booklet, "How to Raise Fishworns." 10c. S&H.

CARTER WORM RANCH, PLAINS, GEORGIA

Get into... PLASTIC LAMINATING AT HOME!

Get ORDERS and CASH from your mailman—do work in SPARE TIME at home—or expand into FULL TIME business. Send coupon for Free Facts about the newest and most fascinating of all home operated businesses. For the first time a simplified machine brings the fabulous profits of Plastic Sealing and Plastic Laminating within the reach of the small operator. Anyone can learn to operate the machine in a few minutes' practice—then with our Magic Mail Plan can get mail orders pouring in daily with cash in every envelope. No canvassing—no selling. We even supply the circulars you mail to bring back cash and orders. Don't waste a minute. Mail coupon today. We'll send you FREE and postpaid, pictures, prices, details, and all the facts you need to start. Mail coupon and get started today.

Make $20 to $30 a Day by...

MAGIC MAIL PLAN!

WARNER ELECTRIC CO., 1512 Jarvis Av., Dept. L-10 H, Chicago 26, III.

At no cost to me, please rush complete details postage prepaid. I am under no obligation.

Name:

Address:

City:________________ State:________

Copyrighted material
CONVERT YOUR CAR INTO A BED
Save on Overnight Trips—Rest In Solid Comfort

QUICK, EASY CONVERSION
Works on all 2 and 4-door sedans, club coupes, convertibles, station wagons. Fits all Ford, GM, Chrysler & Studebaker products—does not affect time. You save—normal functions or appearance. GUARANTEED to work when installed by instructions. PAY $14.95 in Cash for itself in 3 nights lodging. IDEAL for hunters, fishermen and travelers. Delighted users everywhere.

State make, model, whether 2 or 4-door
SEND CASH, CHECK OR MONEY ORDER TO:
CAR BED CO., 600 MAGNOLIA AVE., PANAMA CITY, FLA.

Finish HIGH SCHOOL AT HOME
Complete 4 Yrs in 12 Months
Learn More! Earn More! Enter professional or technical schools. Advance Socially. Live a Happier, Fuller Life. Individual Courses or complete schedule. WRITE FOR SCHOOL BULLETIN.

ACADEMY FOR ADULTS

YOU BUILD 'EM—WE SELL 'EM
EARN UP TO $50.00 A DAY AT HOME
Participate in our national sales and sub-contract plan—Build, Sell, Earn. Earn full time—full time. You assemble actual business and cases for photographers, musicians, salesmen, and all types of portables. We supply complete instructions—materials—tools—everything. No previous experience necessary. Free details. Abaris Casework, Dept. AG, 807 W. Bonita Blvd., Los Angeles 12, Calif.

"SEA KNIGHT"
A Build-It-Yourself PLYWOOD CRUISER
Designed Especially for PM Readers

Beautiful design—roomy open cockpit. Hatch in forward deck, and with two aboard it makes 20 m.p.h. with a 35-hp. motor. At a cruiser, runabout or utility boat, it will give you many hours of wonder-ful outdoor enjoyment for a minimum investment of time and money. Complete, fully detailed plans only $10.00. Order below today!

POPULAR MECHANICS PRESS, Dept. 657
200 E. Ontario St., Chicago 11, Ill.

Send complete set of seven large-size blueprints for "SEA KNIGHT" Cruiser, including plans for easy-to-make boat trailer.

Name
Address
City
State
Zone

Copyrighted material
FACTORY-NEW BRILLIANCE FOR CAR CHROME

Here at last is the car-owner's answer to all automotive problems - SPEEDPLATE. It actually plates NEW METAL as you brush. And the plating you apply becomes an INDESTRUCTIBLE part of the bumper, grille or trim itself. How your car will shine! You'll be mighty proud when you remove ugly rust spots and reslate metal to a NEW SPARKLE. - when you bring new, gleaming beauty to worn, dull, even blistered chrome areas of your car. This fast economical method of brush-plating gives FACTORY-NEW BRILLIANCE that bonds itself onto your car. It forms a hard, sparkling surface that defies all elements!

BUMPERS - GRILLWORK - ALL CAR TRIM RESTORED TO NEW BRILLIANCE!

Here is your own restoring tool for your car... simply attach SPEEDPLATE'S flanges to your car's battery, then dip SPEEDPLATE Brush into plating solution. Place PLATE WITHOUT REMOVING PARTS FROM YOUR CAR. Works on all makes - yet uses less battery juice than the tiniest light on your car.

CAR DEALERS & SERVICE STATIONS - Make Big Profits with Special HEAVY-DUTY OUTFIT!

FACTORY RESULTS and Big Volume Business can make Terrific Profits For You with this Heavy-Duty Outfit. Do your own restoring without removing bumpers or grillwork! Increase the value of your cars - make them sell faster. Price our OUTFIT Electroplates on current from standard 12 volt battery. ORDER COMPLETE - Only $34.95 with enough material to plate dozens of cars! You quickly make back cost on your very first job! Reorder instructions always available from us at rock-bottom cost to you. MONEY-BACK GUARANTEE. Order Now - If C.O.D. send $5 deposit.

ACCOUNTING

Learn Business Administration
Bookkeeping, secretarial and allied subjects at home in your spare time or attend nationally approved regular school sessions. Book giving complete details on courses, plans, rates and employment opportunities. C.I. approves. Hills BUSINESS UNIVERSITY AND EXTENSION SCHOOL 425 W. MAIN ST. OKLAHOMA CITY 2, OKLAHOMA

Catalog of 3100 Novelties 10¢

Send 10¢ for amazing catalog of novelties, live animals, scientific supplies, hobbies, puppets, planes & boats, games, magic tricks, joke articles, unusual seeds, gadget making, cameras, optical goods, gadgets, radio, phonograph records, musical instruments, stamps, coins, puzzles, fortune books, comic books, maps, hobbies, passers, banks, smokers' gadgets, artists' supplies, printing sets, engineers' supplies, fifites, sports, books, games, plants, etc. Send 10¢ (or 3 for 25¢) for a free sample.

YEAR AFTER YEAR, SINCE 1915 - THE BLATT FAMILY PROVED: A Million words couldn't SAVE YOU MORE $ (not receipts or rebates). Don't be misled by "Free Offers," Discounts & "Rent" stories.

FINER TIRES Value 12 Mo. $5 1/250 W. $1 Slightly 1/250 $1 Ex. 1/250

Heavy Duty Truck Tires, Goodyear. Larger Wear, 20,000 Miles Type.
600-15(4) $4.50/750-15(4) $5.25/750-20 $5.75/750-20 $11.37
600-14(4) 7.75/700-17 11.75/700-17 18.87/700-20 19.75/700-20 19.75/700-20 15.90

"I'll Never Ship a Tire I Wouldn't Use Myself." - Marvin Blytt

Send Co. or Money Order for Return, Proof, or Refund. No Refund. No Return.

JUNE 1957
MAKE BIG PAY!

Make big pay in the construction industry as an operator of Bulldozers, Draglines, Back Hoes, Scrapers, and Motor Graders. Learn these skills NOW! Contractors need operators of earthmoving machines and pay high wages to their graduates. Don't be satisfied with just a job... learn a career!

Write TODAY for FREE School Catalog, no obligation, to either address

National School of Heavy Equipment
P.O. Box 8243, Dept. D-15
Charlotte, N. C.

Western National School of Heavy Equipment
P.O. Box 527, Dept. D-15
Weiser, Idaho

BE A CLAIM INVESTIGATOR

INVESTIGATE ACCIDENTS! Many earning $750 to $1000 a month. Thousands of insurance companies, airlines, steamship lines and Government Offices need Claim Investigators. Also big opportunities for your own spare time business. We train you at home. National Placement Service FREE of extra charge. Bill King writes: "Your course has paid off for me with large earnings. You can quote me—your Adjuster Training Course is worth many times the cost." Write TODAY for FREE book.

UNIVERSAL SCHOOLS
University Park, Dept. PM-6, Box 5025, Dallas 5, Texas

CONCRETE BLOCK HOME PLANS

$2500 RANCH HOME

Build your own 28'x48' Ranch Home complete for $2500. No block cutting necessary. Underfloor forced air heating. Contains 12'x20' living-dining room, 10'x12' kitchen, 12'x12' bedrooms, 12'x13' den with fireplace, 11'x12' bathroom, bath, six closets, utility room, storage room. 30x26 blueprints scale 1/4" = 1', instruction book, and material list for $3.00.

pad. Money back guarantee. $1900 DUPLEX. 24'x36'. Each side contains 11'x17' liv. room and kitchen, 10'x11' bedroom, bath, five closets. Plans $2.00. $1500 GARAGE APARTMENT. 22'x34'. liv. room, 2 br., two baths. Double garage below. Plans $1.00.

MEMBER ARKANSAS HOME BUILDERS ASSOC.

BAILEY BUILDERS, 7608 Harmon Drive, Little Rock, Ark.

I MADE $1,622.00 FIRST MONTH

WITH YOUR
LONG-NEEDED INVENTION

CYCLO Wonder Tool Pays You Big Initial Profit...Plus Repeat Sales Supplies

Every filling station, garage "goes wild" over amazing new patented, portable CYCLO Wonder Tool! World's first and only practical car polisher, with genuine "human hand action," but 800 times more efficient! Automatically makes professional out of unskilled man at once! Your customers make double profit in their CYCLO... they get combat proven "human hand action"... they rent CYCLO to public for big plus profits. Many customers order 2... up to 10. FREE to you - PROOF OF SALES!

YOU Get Big Double Profit! Tool make huge profit on each Cyclo, and even more on continuous repeat business! Only 30 Cyclos a month can hand you $30,000 business first year, and much more each following year. Billage of Indiana made $1,222.60 first month, predicts he'll make $50,000.00 this year. Many Cyclo Exclusive Distributor Franchises still open. FREE to you - PROOF OF SALES. Write TODAY for free facts of Cyclo Wonder Tool, tremendous double-profit Distributor Plan, and special Guaranteed Demonstrator Offer.

CYCLO, 3816 Dahlia St., Dept. WS-K, Denver 1, Colo.

INVENTORS

PROTECT YOUR INVENTION BY A U.S. PATENT. SEND FOR FREE "INVENTION RECORD" FORM AND "PATENT INFORMATION EVERY INVENTOR SHOULD HAVE." CARL MILLER REGISTERED PATENT ATTORNEY WOOLWORTH BLDG., 36th FLOOR, 67A NEW YORK CITY

INVENTORS


C. A. SNOW & CO.
REGISTERED PATENT ATTORNEYS
428 SNOW BUILDING WASHINGTON 1, D. C.

INVENTORS

Send for PATENT INFORMATION Book and INVENTOR'S RECORD without obligation

GUSTAVE MILLER
67-PM WARNER BUILDING WASHINGTON 4, D.C.

INVENTORS

Whether an invention is patentable can be substantially determined by a search of the U.S. Patent records. Without obligation, write for information explaining the steps you should take to secure a patent.

JOHN N. RANDOLPH
Registered Patent Attorney
201 Columbian Building, Washington 1, D. C.

INVENTORS

If you want to market, or sell, your invention for cash or royalties. Write for our Free Booklet. Send no drawings. We also welcome hearing from firms, or private capital, wishing to review inventions in any field. We will be glad to send notice of our clients' inventions.

GLOBAL MARKETING SERVICE
2420 77th Ave. Dept. PD
Oakland 5, Calif.

INVENTORS

I shall be pleased to furnish you, upon request, with full information relative to patent procedure without any obligation on your part.

PATRICK D. BEAVERS
Registered Patent Attorney
934 Columbian Building Washington 1, D. C.

PUBLICATION FORUM
Shrinks Hemorrhoids
New Way Without Surgery

Science Finds Healing Substance That Relieves Pain—Shrinks Hemorrhoids

For the first time science has found a new healing substance with the astonishing ability to shrink hemorrhoids and to relieve pain—without surgery. In case after case, while gently relieving pain, actual reduction (shrinkage) took place.

Most amazing of all—results were so thorough that sufferers made astonishing statements like "Piles have ceased to be a problem!"

The secret is a new healing substance (Bio-Dyne*)—discovery of a world-famous research institute.

This substance is now available in support or ointment form under the name Preparation H.* Ask for it at all drug counters—money back guarantee. *Reg. U. S. Pat. Off.

$8,750 FIRST YEAR IN YOUR OWN BUSINESS

Start part time if you wish. We locally train you, furnish everything to start you in auto upholstery, upholstery on location by world-wide process. Quickly established. No shop needed. Just 2 average jobs a day bring $8,750 net profit in year. Employ others and multiply profits. You will be only service in town receiving National Advertising, Parent's Seal, 25 other regular services. Easy terms, mail now for free booklet.

DURACLEAN CO., 7-168 Duraclean Bldg., Deerfield, Ill.

FREE "How To Start Your Own MAIL ORDER BUSINESS"

Earn from $10,000 to $20,000 spare time. We'll put you in business and furnish you with everything needed. Exclusive new catalogs every three months. Offer your customers our one item free for every two they buy. Free advertising and no stock for you to buy. We ship for you under your own name. No experience required. Write today for free booklet and franchise data.

MAIL ORDER ASSOCIATES, ROCHELLE PARK, NEW JERSEY

TESTS BLOOD PRESSURE free

at home with guaranteed results. Check yourself daily with a simple aneroid gauge. It's not as easy as a doctor's, but it does the job accurately. An illustrated 12-page booklet tells how to test and what to do to avoid or diminish the damaging effects of high blood pressure. There are types of dependable service in a reliable organization which now includes professional stethoscope for accurate testing. Complete new tester only $8.75 with 200 free testers for just $22.50 free. Write today.

RESEARCH SPECIALTY CO. 2035-A N. Western Ave., Chicago 47, Illinois

LAW FREE BOOK THE LAW TRAINED MAN

Write today for a free copy of illustrated law book, "THE LAW TRAINED MAN," which shows how to earn the professional Bachelor of Laws (LL.B.) degree through home study of the famous Blackstone Law Course. All necessary books and lessons provided. Moderate cost; convenient monthly terms. Write for free law training book today.

Blackstone School of Law, 225 N. Michigan Ave. Dept 50-A Chicago 1, Ill.

75 POWER TELESCOPE $3.98

VARIABLE EYEPICE 25X-45X-75X — BRASS BOUND NEW! Three magnifications. Perfect microscope. 25 power for ultra-high magnifications with 45 and 75 power for extra-long range. Guaranteed to bring distinct objects, people, sports, etc., keenly to the eye. For boys, girls, hobbyists, vertical or horizontal. Editable for any eyepiece. 20" long. Complete, close to 1 ft., brass, 4 sections. Close to 1 ft., brass, 4 sections. Close to 1 ft., brass, 4 sections. Close to 1 ft.

HEAVY CONSTRUCTION EQUIPMENT OPERATORS, TRAINING SCHOOL FOR CIVILIANS—Road Building, Terracing, Land Clearing, etc. Reservations accepted now.

FREE EMPLOYMENT HELP

Start your career with Greer by checking your interest, age, and mail coupon for complete information at no obligation.

NAME, AGE

TOWN, ZONE, STATE

Established 1902 — Over 50,000 Graduates. 35 years of continuous trade school experience to guide your training.

GREER SHOP TRAINING

Box F, 2236 S. Michigan Ave. Chicago 16, Illinois

JUNE 1957 37
Guide Your Boy or Girl Into Clean, Constructive Interests...

Help Them in School and Through Life...

Fully Develop Your Youngster's Natural Talents...

... with LEARNING THAT LASTS THROUGH LEARNING BY DOING

ANGEL PATRI* Says—

"I believe these books are wonderful achievements. I tried to think of some one field of human activity that the books did not cover and could not find one unless politics and religion could be counted, and this collection of the world's work was no place for them. I believe that teachers of handcrafts, parents wishing to share their children's interests and forward them, all youth leaders, would find them invaluable. The sections that deal with games and sports are very good. Educationally, they are 'Learn by Doing' aids and that is the highest praise I could give any such books."

* Famous author, columnist, counselor on child training and behavior

Here is a once-in-a-lifetime opportunity to give your children a headstart in school... in life... in the art of living! Now, with publication of Popular Mechanics Junior Do-It-Yourself Encyclopedia, you can guide your boy and girl into constructive, worthwhile interests, encourage and help them to acquire valuable knowledge, self-confidence and poise... and they'll love you for it!

This remarkable set contains everything growing boys and girls want to know about and do. Read these typical comments from leading educators: "The wealth of material presented is fascinating... the most comprehensive collection of practical informative material ever assembled in book form for children. My chief feeling as I looked through the set was regret that I did not have something of the kind when I was a child... "It (the set) appears to be entirely unique. I am sure that any boy or girl will find many things of interest in this set and will also learn a great deal from it."

Yes, this set is unique, for it gives your child a rare educational advantage—learning that lasts through learning by doing. Yet these volumes don't look like "teaching" volumes at all. They cover hundreds of subjects to intrigue and delight any child (a few illustrated at left). They're easy to read, with large type, thousands of pictures and diagrams, and each one has immediate interest for children sixteen, twelve—as young as eight years old! Here, indeed, next to parental care and love, is the best possible assist you can give your boy and girl in their crucial formative years. It's easily worth many times its $19.95 price, in lifetime dividends for them and for you. Easy terms if desired. See coupon below.

FREE! Handsome 12-volume book rack as shown included free in this introductory offer. Also Free! Each volume gold stamped with child's name if you enclose full remittance of $19.95. See details below.

Send No Money! MAIL COUPON TODAY!

IMPORTANT: Popular Mechanics Junior Do-It-Yourself Encyclopedia is available now by direct orders addressed to this magazine. You will not be able to buy it anywhere else. Place your order below today.

POPULAR MECHANICS PRESS
Dept. 657
200 E. Ontario St., Chicago 11

Ship at once, charges prepaid. Popular Mechanics Junior Do-It-Yourself Encyclopedia is a 12-volume set. Each volume with $2.50 value library book rack, under plan as indicated. For full particulars, send $19.95 encased. Gold stamp each of the 12 volumes with name as lettered without extra charge.

Send for free examination. I will remit $4.95 in full payment of $19.95. I will, therefore, until a total of $19.95 is paid or return the books and rack to you in good order and will owe nothing.

Name:
Address:
City:
Zone:
State:

PRINT NAME FOR GOLD STAMPING HERE...
WHOLESALE

START YOUR OWN
HOME-IMPORT BUSINESS

Make big profits on thousands of exotic imports.

No experience or investment in products needed. Fa-
mous world trader guides men and women—shows you
how to pocket profits before ordering. How to get free
ads, how to start full or part-time home mail-order
business or take volume orders from stores. Export
opportunities also. Full details, booklet and list of 125
importers showing how to make big foreign profits.
ALL FREE. Air mail reaches you overnight. Write Mr.
H. F. MELLINGER, Dept. 8256
5171 Westwood, Los Angeles 24, Calif.

Be an industrial designer

Combine your design abilities with technical aptitudes in Industrial
design training at Art Center School in California. Work under prac-
ticing professionals for upper level jobs as automotive artists, product
and package designers. Design offices, stores, models, showrooms, shop-
ing centers. Constant demand for graduates. Recent placements with
Ford, G.M., Kaiser Aluminum, G.E., Raymond Loewy and other lead-
ing design studios. 700 students. Co-op. Accredited, B.P.A. Degree.
Four-year course can be completed in 2 yrs. It starts by year-round
training. New terms Feb., June, Sept. Enroll early. Write Mr. John
for new catalog. 5353 West 3rd St., Los Angeles 5, California.

ART CENTER SCHOOL

MEN WANTED

Earn $100 Per
Week and up

AUTO DIESEL MECHANIC

FREE

AMAZING NEW BOOK

"HOW TO ANSWER ADS"

Never before have you seen anything like this.
Tell you in simple language the secret way to
answer ads. Get you quicker replies—better re-
sults. Answers to every question on time and money and it’s ABSOLUTELY FREE.

Subscription for 2 years. Every reader of adver-
tising should have this booklet. Send a postcard
address to G. H. WEGNER, P. O. Box 531,
Mechanics Magazine, Room 600A, 204 East
Ontario Street, Chicago 11, Ill.

LEARN EARN MORE MONEY

YOU’RE IN BUSINESS RIGHT OFF—Complete up-
holsterer’s tools, materials, frames, all you need to
erarn in spare time while you learn AT HOME.
Expert State approved. Bop trainings, uphol-
syters, slip covers, etc. Big Opportunity Field
for women. Catalog, FREE. Write Today.

UPHOLSTERY

Upholstery Trades School, Dept. PH-312, 721 Broadway, New York 3, N.Y.

URANIUM ORE GOOD LUCK AND HEALTH CHARM

Uranium for wealth, atomic energy for power
and gamma rays for health. Uranium ore imbedded in plastic can be carried in pocket
or purse, on key or watch chain. Charm is as big as a silver dollar, is beautiful,
makes an attractive gift. Send $1.00 to:
LAFAYE-LEE CHARMS, P.O. Box 413, Mar Vista 66, Calif.

GROW ORCHIDS

BIG PROFITS SPARE FULL TIME

World’s most thrilling hobby—profitable home business.

With nature’s most BULGAR FLOWER, you can be in business in any area and in any season.
Grow orchids in your home, or on your porch, in your garden. Every order you get is like getting a check from the bank.

This 55¢
Book
FREE

for a limited time

M. HONNER, INC., Dept. M-67
351 Fourth Avenue, New York 10, N. Y.
Please send me New Easy Method Book.

Name ____________________________________________
Address ____________________________________________
City ____________ Zone ____________ State ____________

JUNE 1957

Copyrighted material
MAKE MORE MONEY
get into
TELEARAMA • ALL 8 BRANCHES OF
TELEVISION
ELECTRONICS
RADIO
IN ONE DYNAMIC, MODERN SHOP METHOD,
HOME TRAINING COURSE

You get and keep
ALL this modern, newest,
practical equipment!

 Registration
applied for

Parts to build a modern TV set,
including large screen Picture Tube.
Parts to build a powerful Superhet
Receiver, standard broadcast and
short wave.
Parts to conduct many experiments
and build — • Continuity Checker
• RF Oscillator • TV Circuits • Audio
Oscillator • TRF Receiver • Signal
Generator
Professional Multimeter
A MUST for all technicians

YOU COVER ALL
8 BRANCHES IN
ONE MASTER COURSE,
ONE LOW TUITION
1. Television-including color TV
2. Radio — FM & AM
3. Industrial electronics
4. Sound recording and
Hi-Fidelity
5. Preparation for FCC License
6. Automation
7. Radar & Sonar
8. Communications

Trade School for over 50 years, train you at home by Shop-Method,
for today's unlimited opportunities in ALL 8 BRANCHES of the Tele-
vision, Electronics, Radio industry.

YOU DO MANY PRACTICAL JOBS — including servicing, circuit anal-
esis. Build a modern TV set from ground up, with equipment kits we
send you, including a new large-screen picture tube and professional
Multimeter, at no additional charge. You receive an experiment less-
son with each kit. EARN AS YOU LEARN. Graduate Employment Service.

NATIONAL SCHOOLS
400 S. FIGUEROA ST., LOS ANGELES 37, CALIF.

GET FAST SERVICE — MAIL NOW TO
NATIONAL SCHOOLS, DEPT. KB-67
400 S. FIGUEROA ST.
LOS ANGELES 37, CALIF.
Rush free TV-Radio "Opportunity" Book and sample
lesson. No salesman will call.

NAME . BIRTHDAY
ADDRESS
CITY . ZONE . STATE .
Check if interested ONLY in Resident School Training at Los Angeles
VETERANS: Give date of discharge.

NEW DISCOVERY!
AMAZING NEW GLOW-PRINTING
OPPORTUNITY
FREE SAMPLES & HOME-PROFIT DETAILS
Send name and address and we'll rush samples
revealing details to you. Don't delay!
SCREEN-PRINT CO. DEPT. 26
15127 S. BROADWAY, LOS ANGELES 61, CALIF.

AMMUNITION
for a fraction of
regular cost

Reload a whole carton for the cost of a few
rounds of factory ammunition. Shotgun shells,
rifle and pistol cartridges can be reloaded
safely and easily with an inexpensive set of
famous IDEAL Reloading Tools. 164 page
IDEAL Reloaders Handbook . . . $1.00, post
paid. Free folder on request.

THE LYMAN GUN SITE CORP.
MIDDLETOWN, CONN.

AMAZING NEW "LIFETIME" RADIO
GUARANTEED TO WORK FOR YOUR LIFETIME! USES NO TUBES, BATTERIES OR ELECTRICAL PLUG-INS. Never runs down. SMALLER THAN A PACK OF CIGARETTES. RECEIVES LOCAL RADIO STATIONS.—MOST ANYTIME, ANYWHERE WITHOUT EXTRA CHARGES. Chromium crystal grille. Beautiful black-gold speaker-phone grill-plastic cabinet.

SEND ONLY $2.00 (mail, cash, check) post paid. Free Booklet. 

MIDWAY COMPANY, Dept. GPM-6, Kearney, Nebraska

BECOME AN EXPERT IN 
TRAFFIC and 
TRANSPORTATION
Traffic men earn $4,000 to $10,000 a year. Thousands of firms need experts on maps, tariffs, regulations. We teach you how to
make your living in a short time. Write for free book "Traffic and Transportation." 

LASALLE EXTENSION UNIVERSITY, 417 So. Dearborn St., Chicago 5, Ill.

NEW! HMS BOUNTY MODEL KIT!
Famed mutiny ship. Every de-
tail accurate — cannon, launch,
rigging. Precision plastic parts, cement, plans, 1454,
$2.98. For catalog, write Dept.
M6, 4223 Glencoe, Venice, Cal.

NEW DISCOVERY!
AMAZING NEW GLOW-PRINTING
OPPORTUNITY
FREE SAMPLES & HOME-PROFIT DETAILS
Send name and address and we'll rush samples
revealing details to you. Don't delay!
SCREEN-PRINT CO. DEPT. 26
15127 S. BROADWAY, LOS ANGELES 61, CALIF.

POPULAR MECHANICS
YOU'LL PROFIT

By reading and answering the classified ads in this section. Hundreds of opportunities for you to make and save money.

AUTOMOBILES, MIDGET CARS


1957 SUPERIGONITIONITER. Starting, pep, mileage $4.50. Vartijipers, Kaiser, Belshe. 809 Emlor, N. Y.


AUTO SUPPLIES AND EQUIPMENT

AUTO Accessory and parts catalog. 1957 edition, all new! 995 pages. Save up to 97. 75,000 items, including Hollywood accessories, speed equipment, rebuilt engines, all parts and accessories for all cars. Only $1.95, 75 cents refundable, $2.00. J. C. Whitney, 1919 FM Archer, Chicago, Ill. FREE

RING-Valve job while you drive, $6.00 prepaid. World's only product of its kind! Safe, proven, guaranteed. Literature, Tosalloy, Grantham, Penna.

AUTOMOBILE Safety strap. Metal to metal buckle: Nylon webbing in all standard colors; $7.00 plus 50c handling and postage. Breen's, Rutherford Ave., Charles- town, Mass. FREE

TIRES. Save up to 95. Good year, etc. Guaranteed not seconds. First line only. Write free price sheet. Busser Tire Co., 7340 Broadway, Lorain, Ohio. "NO-Kro" stops battery and cable corrosion. Lasts years. Liberal supply $1.00. Guaranteed. 20% on parts. Protected territories. No-Kro Company, Chanhassen. FREE


FREE! New catalog Speed, power, mileage increasing equipment. Discount Auto Engineers, Milford 5842, Penna. FREE

NEW and used parts at savings. Complete line of recreational and competitive models cars and trucks—1924 and later. Largest in the West. Army parts specialists. No catalog. Submit your needs for quotations. Past mail order service. Pioneer Auto and Truck Parts Co., 714 W. 12th Ave., Denver 17, Colorado.

JEPS And four wheel drive trucks need hubs that free wheel for two wheel drive and locking for four wheel drive. Guaranteed satisfaction. Tires exclusive. $39.00. Dodge Power Wagon, GMC 150 Series, 1 HCS Series, $46.50. See nearest tractor supply store, or order direct from Tractor Supply Co., 7200 North Halsted, Chicago 14, Illinois.

AUTO Air-conditioner, easy "make it yourself" booklet. $1 postpaid. Highway Air Conditioning, 15PM West 22, New York City.

CYLINDER Grinding in your car for new engine prices. Send for booklet telling how to do it yourself. Send $1.00 for booklet tried and true. Charles Helzel, 115-49-118 Street, Ozone Park, N. Y.

RETLIF Toilet paper filter adapters 30c. Zenick Products, Box 2461, Los Angeles 41, California.

RING-Valve job in minutes. $2.95 postpaid. Safe, proven, guaranteed. Literature, Helm Sales Company, Eden, Ind.


DO-It-Yourself ring and valve job in seconds. Only $0.60. Information free. James Engines, 1932-50th Avenue, Cicero, Ill.

SPEED Parts. Save 25%. Free cata
gen. Bell Auto Parts, San Antonio 10, Tex.


SIMPLE Gadget converts water into gas! Guaranteed Kit. $2.00, National. P.O. Box 606-L, Redwood City, Calif.

AUTO TRAILERS

SEE America! Rent travel trailer. $100 deposit, $40 weekly. Send 10c for Twin Lakes Times. Tells how you can travel U. S. at 1c per mile. See Miami! Rent mobilehome before buying. $60 deposit, $40 and up weekly. Make capital gains investment. Purchase Miami land. $2500. Lot 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20. Established 1943. Leased with income 6% yearly. Two 2500 tracts paid for 60 days. Miami's Twin Lakes. 9674 N. W. 10th Ave., Miami 56, Florida.

TRAILER BUILDING manual $1.00, Booklet 39¢. Karmakert, Box 1155, Milwaukee 1, Wis.


MARATHON Mobile homes are your an- swer to that vacation cottage, second fam- ily home, new tenant house. Models in- cluding King Size (10 ft. wide), 11, 12, 13, 14 ft. long. Other models 39 to 49 ft. 1, 2 and 3 bedroom—bathroom at a price. Details free. Write Dept. 100, Bar-Mac, Inc., Stratford, Wisconsin.


MOTORCYCLES, BICYCLES, MOTORSCOOTERS AND SUPPLIES

WHIZZER Motors, $200; midget race car reasonable; midget scooter $60; Cushman co-op priced $250. Send $25 for first class mailing for catalog. Send 25¢ for sample copy to: Mobile Home Park Directory $1.50. VE. W. 10th Ave., Chicago 5, Illinois.


MOTORCYCLES And supplies. all makes, new and used. Factory deal. Tell us your needs. Western Cycle Co., 813 Ohio, Wichita Falls, Texas. Our 32nd year.


PARTS For Cushman, Dodgebug, Sales-bury, etc. Send make, model, $2 for price list. Motor Scooter Parts Co., Dept. P4, Box 7211, Indianapolis 1, Indiana.

HARLEY - Davidson Used bargains. New, used parts, accessories for all models. Bulletin, catalog 28¢. Kouts's (Factory Dealer), 1129 East Lake St., Chicago, Ill. FREE


JUNE 1957 41
FREE. Below wholesale fishing catalogs. Planter's Mill Mart, Dept. 55, Box 8379, Chicago, Ill.

TENTS. Camping equipment; tremendous selection. Model tents, camping equipment catalog-handbook listing all national camping sites. Print name, address, phone, postal zone. Send 50¢, 95th Ave., Long Island City 1, New York.


BAIT Stolen? Bait thief detector! Tiny, adaptable, pocket size, weighs 4 oz., shows thief is nabbing, $1.00. Satisfaction guaranteed. Bite Lite, 8322 Sagamore, Kansas City, Mo.

FREE 152 Page fishing catalog. Includes latest "do it yourself" kits. Netercraft Company, 10 Center, Point Pleasant, Conn.

FREE—Giant 1957 wholesale sporting goods catalog. Lowest wholesale prices. Santa Fe Distributing Co., 1321 Main Street, Dept. DM, Kansas City, Mo.

BOOMERANGS — Guaranteed return. $2.50. Art Nelson, Box 28, Mission, Kans.


10 GAUGE Magnum 22" double barrels, full choke, new $125.00. Virginia Puskerv & Broads, 414 Farley, St. Louis 6, Mo.

POCKET Reel, casts, retrieves without pole, $2.98 guaranteed. Reddell-Reel, Box 1839, Fairmount, New Jersey.

CATCH FLIES everytime! Secret Indian bait scent guaranteed makes fish bite! 50c a bottle. King Company, Aschville, New York.

MOQUITO Headnets, two for $1.00. Insect bar, large, $3.00. Jungle hammock, insect and waterproof, $6.00. Army, new, postpaid, except c.o.d.s. Surplus Sales, Jacksonville, Fla.


CAMPING. Hunting, diving! Free equipment catalog. McCann Company, Tarrytown, N.Y.


RAISE Fish bait, worms and crickets for pleasure and profit. New illustrated books 1.00. E. F. Green, Aliceville, Ala.


RAISE Earthworms. Profitable, easy instructions 25¢. Lairs Hatchery, Box 84, New York City 11, N.Y.

HULA—Hula wigglers are better! Inquiry. Information free. Kean, Ladinia, California.


FREE! "$3,000 Yearly Sparetime. Backyard, Rainmaking Worms." Oakhaven-36, Cedar Hill, Texas.

BIG Profits raising earthworms. Literature free. Lund's Hatchery, Chatno, Calif.

BIOMICARCS, TELESCOPES, MICROSCOPES, MAGNIFIERS


AQUATIC Life—Oldest aquarium fish dealer in U.S. Cases Copy 20¢, Baltimore 6, Maryland.

BEAUTIFUL Golden collies—Greatest pet, barn, show, etc. Mail order. Kanon Kennels, 353 jury St., Tustin, Calif.

RAISE Rabbits successfully by knowing facts. 48 page illustrated book describing Housing, Rearing, Care, Marketing, etc. Price 2.50. 25 cents. "Baby Rabbit Accommodation", 36 Arfa Building, Pittsburgh, Pennsylvania.


FUR BEARING ANIMALS


MINK Raising information free. Complete. Lake Superior Mink Farm, Superior, E.E.I., Wisconsin.

FARMS, FARM LANDS, REAL ESTATE


OKLAHOMA! Farm land! Outlying Acres. Information free. Write: Armstrongs, Shook, Missouri.

FLORIDA. Nice homesteads, $345 at $10 monthly; goldfonder, Howard Vernon, DeLand, Florida.


FREE Brigham catalog! Farms, homes, businesses, resorts, retirement properties. Over 2900 values in 34 states. 37 years' service. World's largest real estate network. 7-MF Sto, Dearborn, Chicago 3, Ill.

MINNESOTA Waterfront tract $10 down. Norstarates, Box 645-T, Houston 1, Texas.


FLORIDA'S Most desirable wooded homesteads. 80 by 125 feet only $3240 at $10 monthly. Extra large Broward creek water front tracts at $23 monthly. Near famous Panama City gulf resort, unsurpassed fishing, boating, bathing. Hunting. Also acres garden farms and beach town houses. Brocket free. Wendell Wood, Fountain, Florida.


PoulTRY, FARM SUPPLIES

GUARANTEED. Surplus chicks, also pullets, wholesale, retail. C.O.D. Claude Caple, Newfield, N. J.

PROFITABLE OCCUPATIONS


FREE! "$3,000 Yearly Sparetime. Backyard, Raising Earthworms!" Oakhaven-36, Cedar Hill, Texas.

FREE Folio "$5,000-$45,000: Unlimited Vacations." No merchandise, UnKnown World. Hugger's sparetime! Hayling, Carlsbad, Calif.


BUY Wholesale! Discounts to 80% on Apparatus, cameras, binoculars, good houses, watches, tools, clothing, etc. Buy-Rite, Hawthorne 3, New Jersey.

JUNE 1957 43
CUBAN Beautiful views, colorful photographs, 13 for $1.00. R. Lloret, Box 431, Havana, Cuba.

PICTURES post cards made from your photograph. 1000, $12.00. Rauna's, 4154 Fifth Street, Philadelphia, Pa.


OUT-Of-Print books at lowest prices you name them. We have millions to choose from. No obligation. International Bookfinders, Box 500-P, Philadelphia 3, Pa.


RAE Magazines, Inc. 104, National, 1 year each, $1.50. San Antonio, Texas

BOOKFINDERS! All subjects. Send wants! Jaber Book Service, 183 Hazelwood Drive, Westbury, N. Y.


SAMPLE: 304 copy of "The Aquarium," George Page, 1832 Cleveland Ave., Nissea Falls 2, N. Y.

SHARP ELECTRIC wall plaques from bottle cap cases. $1.00. Campbell, 87 Poplar Ave., Brookfield, Wis.


Establish you in your own mail order discount business. Santa Monica, Ca. Big catalog. Only $19.95, fully illustrated. Envelopes printed with your name and ship your products. Includes housewares, silverware, etc., at discounts to 75% and 90% below retail. Topval Corp., Lindenhurst 317, N. Y.

MAGAZINE Subscriptions—Largest commissions, bonus, Qualified Agency, 45IVA Kings Highway, Englewood, N. J.

SOUVENIR Business runs to millions yearly! Tremendous profits! Season is here. Learn the world of Luggage, Giftware, etc. Manufacture Souvenirs. $3.00. National, P. O. Box 465, Chicago, Ill.

BOOKS, PERIODICALS, PICTURES, POSTCARDS

ACE Book finder—Please send me lists of books you want. No obligation. Charles W. Miller, 7852 S. Wrightwood Ave., Los Angeles, Calif.

BRITISH Book bargains. Any subject. Catalog free. Transbooks, Box 22-PML, Brooklyn 26, N. Y.

BE A magician! Large professional catalog of latest tricks. 35c. Ireland, C-109 North Dearborn, Chicago 2, Illinois.

FREE: Catalog. Only 10¢ trick novelles $1.00! Profits! 1740-W Market, Philadelphia 3.

COINS, TOKENS, CURRENCY

LINCOLN Cents 1910-S, 1913-S, 1921-S, 1917-S, 1919-S, all for $2.00. Box 34610, Los Angeles 34, California.

LARGEST Coin magazine, 130 pages. 28¢ per year, prepaid. The Coinshop, 1230-J Milwaukee, Chicago 31.

SAN Francisco mint closed! Made only five cents twice in San Francisco and great demand. One each, brilliant uncirculated for 25c. Free coin lists with order. Coin Companions, Inc., 621 White, Toledo 5, Ohio.


FREE: Foreign coin, banknote and coin collectors illustrated catalog to approval. With sterling silver content. Tatham Coino, Springfield 30, Mass.


COINS From Formosa, Vatican, etc. plus banknotes, silver certificates, foreign. Littleton Coin Co., Littleton 1, New Hampshire.

BARGAIN Lists, Indianhead cent, 10c. Economy Sales, 156-A Dean, Manhasset, Mass.

FREE: Profit and pleasure in collecting old coins. Send 10¢ for 50-page illustrated catalog. You'll be delighted with it and order many coins that you can use for gifts, building, Fort Worth, Texas. Largest performing institution in U. S. Established 45 years.


WILL wanted. Will to 1860. Will to 1864. $100.00. 1864, $150.00. 1861, Liberty head nickel (not buffalo). Big price for "key" coin. 1.00 for 44 for large coin folder. Max much must be copied. 10¢. Numismatic Co., Dept. 26, Fort Worth, Texas.

COIN Collectors! Magazine with price lists, 10¢. 50¢ yearly. Eagg, 229 So. 11th St., Newark 7, N. J.

SILVER Dollars hand shined with quick oil 15¢. Fordo, 328, Cascade 16.

DIFFERENT Uncertified coins, 1.00. Oddeh, Box 482, St. Louis, Mo.

TAKEN Any wooden nickels lately? Send 25¢ each. You will be surprised. 3353 Sagamore, Kansas City 15, Missouri.

INDIAN CENT, liberty nickel, barber dime and off center. 15¢ each. Silver three cent piece. S. B. Srego, Box 187, Jackson Heights 72, New York.


BARGAINS—$5 Gold 0.95; Ireland animal set 2.50; gigabyte 40-page bargain album 10¢; only one $1.00. Bebbee's, 4514 North 30th, Omaha 11, Nebraska.

10 DIFFERENT Indian cents and 5 Lincoln cents before 1901 $1.00. Price list free. Jerry's, Box 35C, Shouns, Tenn.
GIGANTIC Collection Free. Includes triangles, early United States, animals, commer- cials, cars, hot cars, hobo cards, Kickers pictorials, etc. Complete collection plus big illustrated magazine all free. Send $4 for free catalog. A. Lemp Co. Dept. PM, Toronto, Canada.

WOW! 135 All different Germany 10c. Zeppelin airship stamps, 2nd issue, high values. Big bargain lists and approvals including the great Alton Stamp, Dept. ADPMC, Jamestown, N. Y.


HOBBIES AND COLLECTIONS

130 NEW American military campaign ribbons, shoulder patches, includes purple heart, silver star, bronze star, wings insignia free with order. Twenty-five extra free with subscription or $2.25 prepaid. Money-back guarantee. Victorian Millinery Bazaar, Alamo Street, Los Angeles 1, California.


ARMY-NAVY-Marines-A.F. 45 military insignia, shoulder patches, books, campaign ribbons, battle stars, patches, ratings, etc. First year's subscription. Miles, 454 Michigan Pkwy. PM 48 West 27 St., New York City.

WANTED—Cigarette, tobacco cards. Write us! P. O. Box 50 East Baquer, Penna.

NAZI Instinct. 12 different $1.00. Medals, patches, armbands, flags, daggers, Juliets, etc. Famous dealer in Nazi items. Box 523, Victoria, B. C. 2, Canada.


PHOTOGRAPHY For pleasure or profit. Learn at home. Practical basic training. Long run, low start, free books. American School of Photography, 833 Diversey Parkway, Dept. 3442, Chicago 14.

BELL Kodak, Kodak, Kodak, Kodak! 40% discounts to 45%. Photo equipment, applian- cces. Free catalog. Mailers Mart, Box 135-KO, Buffalo 3, N. Y.


BUY Wholesale nationally advertised camera, film, supplies. No rebates or tax on products at big discount. Free "Wholesale Plan." American Layers, Hertel Statler Building, Buffalo 16-E, N. Y. 


PHOTO FINISHING

15 JUMBOS From any size roll developed 29c, with this ad only. P. Skrudland, Lake Geneva, Wis.

KODACHROME Processing—8mm roll or 35mm 20 exp. $1.25. Prompt service. Write for mail order Dept. PM, P. O. Box 30, Kingston, N. Y.

TRIAL Offer—3 Jumbos 35c, 12—35c. Limit two per order. Mail Order Dept. PM, Box 275, San Francisco 1, Calif.

12 EXPOSURE Rolls, 35c, Jumbo prints. Guaranteed service. Instant Photo Service, Dept. X, X, Box 13, Lincoln, Nebraska.

Two beautiful prints from each picture on roll. 8 exposure 40c; 12 exposure 50c. Thirty-five exposures 65c. Quick service. Lensphotos, Dept. J-4, Janesville, Wisconsin.

We Custom develop and print your films. Get the most beautiful, artistic, graphic ef- fort. Kradwell Photos Service, Greenville, Wisconsin.

QUALITY Kodak finishing. 8 exposure roll 46c; 12 exposure 60c; 16 exposure 70c. Registered. Guaranteed quality, 45 years continuous operation. Be a satisfied customer. Send for mailer. Mail Order Photo Service, Box 297, Watertown, Wisconsin.

5-HOUR Service on deluxe jumbo prints. 8-exposure roll developed and 8 jumbo prints 46c, 12 exposure 56c, 16 exposure 66c. 20 exposure $1.25. Jumbo deckle prints 46c each. Contact prints from your negatives. Mail Order Photo Service, P. O. Box 210, Oakland, California.

SUPERIOR Quality. Prompt service. 8 Jumbos in album 40c. 16 contacts 50c. Jumbo reprints 50c. Satisfaction guaranteed. Also complete color film finishing service. Write for free circulars and mail- ers. Fast-X-Foto, Box A, Jersey City, N.J.

30 WALLET Fotos From $1.00 on one pose, portrait or negative. All 10c for mailing. No copy negative charge. Send ad. Scott Wallet Fotos, P. O. Box 37, Athens, Tenn.

FAST—One day service. 8 brilliant oversize prints! Reprints 50c. Speed, satisfaction guaranteed. Picture, Box B, Box A, Jersey City, N. J.

ANY Size roll film (except 35mm.) Jumbo printed 50c per roll. Friendly Photos, Jacksonville, Alabama.

ENLARGING 5 heavy weight seven 5x7's or four 8x10's $1.00. Jack Coons, Huntington Mills, Luzerne County, Penna.


FREE Roll film with your first order. Send 50c and 1 roll film or negatives for reprints and you will receive one roll of guaranteed camera film free your size. Send ad. Cher-O-Kee Scout, Athens, Tenn.

COLOR Processing—High quality, fast service and color. We color 8mm Super- 8, 9mm, 16mm in five working days. Process $1.25. Send for complete price list and free mailers. Photo-Mail, Box 210FM, Madison Square Station, New York City, New York.

PARTICULAR? 8 Jumbos—35c, 12—50c, Special; 35mm., 36 exposures $1.10. Flash-Photo. Box 36M, Brooklyn 4, N. Y.

MOTION PICTURES AND SOUND EQUIPMENT

$5.00-16MM. Film, Video. Free cata- logues. International, Greenvale, N. Y.


FREE Catalog. Save dollars. Fresh stock. $2mm., $3mm., new and used equipment. Home processing equipment, Superior Bulk Film Company. 448 No. Wells, Chicago 12, Ill.

MOVIE CORNERS, catalog with sample film 10c. Garden, 690 Howard Avenue, Brooklyn 4, N. Y.

500 8mm., receiving-color., undated, fresh color, b. w., movie film! 8mm., 16mm. Free catalog! Ess-o-R, 47th Holly, Kansas City 12, Missouri.


MUSIC AND INSTRUMENTS


VIOLINMAKERS. Repairers. Fine tone wood, and all violin supplies. Send for free wholesale price list. Louis La Fleur, 414-MPM E. Baltimore St., Baltimore 2, Maryland.

ACCORDIONS. Wholesale to everyone. Save up to 60%! All national known brands. LaBarbera, 136 Del Prince, 29 South Cicero, Chicago 44.


SONOPHONES and lyrics wanted. Mail to- W. Irwin, Inc., 1850 Broadway, New York 10, N. Y.


CRISTAL Radio experiments write to Hulet, 865 Hope, Lakewood, N. J.


POEMS. Songs wanted! Rhyme it! Ben- gals or Jefferson, Chicago 21, Ill.

RECORDS Hi-Fi by mail. Big discounts. Noelsen, Box 211, Wall Street, New York City 5.

RADIO, TELEVISION AND ELECTRONIC FILM

CRYSTAL Radio experiments write to Hulet, 865 Hope, Lakewood, N. J.


ANYONE Can replace TV tubes, save expen- sive service calls. Instructions $1.00. Radio Television Service, Corsicana, Texas.

**BUSINESS OPPORTUNITIES**

**START PROFITABLE lawn mower business.**

**$20 P&I, also make operating stands or concessions at fairs and carnivals. Write: Globe Sales Co., Macon, Georgia.**

**Professionally sharpen lawn mowers into Riches!** Metro, Dept. P, Box 151, Oak Park, Illinois.

**FREE Manual: NATIONAL products wholesaler! George Lucas, Bellevue 5, Wash.**

**$10.00 PER Hour net profit in monogramming, embroidery, lace, PFG, and monograms.** F. H. Eyster, Centennial 10, New York.

**SKILL AND also manufacture, new, and used, 1001 features, M. M. E. Brand.** Address: Windsor, 436 No. Roose-velt Ave., St. Louis 12, Missouri.

**HIGH QUALITY imports at low low prices Bringing big profits to mailorder. 1 envelope out, 100 reply. Help you.** Rogers-Hansen, 505, West Virginia.


**MANUFACTURE and distribute newly developed windshield and glass cleaner. Your own label. $1.00 brings $4.00 worth mail order and complete plans. LuCo Products, Box 53, Caribou, Maine.**


**EARN TO $90.00 up weekly sparetime Mailorder operated. This business works! Tested. Free plan.”** Art Skirk, 1715 Julian, E. Cerrito, California.

**RENEWING Instructions, supplies, free samples, work.** Box 7122, New Orleans 19, Louisiana.

**NEW Snow cone machines. All prices.** P. O. Box 7803, Dallas, Texas.


**WHOLESALE—Thousands nationally ad- vertised mail orders. Amazonia—your net profits. Free, new plan. Associated Whole- sellers, 1105 New York Bldg, Des Moines, Iowa.**

**MOTELS. Free bulletin describing 70 motels. Continental, 804 Grand, Kansas City, Missouri.**


**START your own business for $20.00. We send you 15 samples of our best selling items. Send 25 cents. How many numbers you can do yourself. Money back if not completely satis- fied. Division Sales, 3341 W. Roosevelt Rd., Chicago 24, Ill.**

**HOW TO obtain needed capital fully exp- lained. Write Enterprise Bureau, 5A Bos- ton, Massachusetts.**

**CANDIED Popcorn and potato chip equipment. Exkins, Box 933-A, Springfield, Ohio.**

**PROFITABLE Future in your own mail order business. Free details. Zed Gwart- ney, Desert Hot Springs, Calif.**

**WANT to make big money at home? $10.00 profit in an hour with possible reorders. NICHOLS heavy goods. Dis- appear from clothing, fabrics. Steady year-round demand from cleaners, laun- dries, home folks, shops. Fast Fabricon, 1834-B Prairie, Chicago 19, Illinois.**

**RELIABLE Men, women wanted for prof- itable mailorder business. We have good packages. Box 105, Cayuga, Indiana.**

**WHOLESALE Catalogs! Discounts! to BOC: Dept. 20, Equipment, choice goods, cool- wares, jewelry, etc. Midwest 156-M.**

**OPERATE Mailorder fello business! Details. Ballard’s, 425 East Katherine, Pontiac, Massachusetts.**

**MAKE Flexible molds. Cast plaques, figurines, free sample. Tooker, 1045-P Farmington, Connecticut.**

**NATURAL Molding rubber, extra thick. Free sample. W. Wolfe, 1018-A Donald. Phila., Pa.**

**INTERNATIONAL Mailorder business. Complete setup service—Not just instruc- tions. Hermes, 152 West 42 New York City 36.**

**BIG Money raising fishworms and crick- etts. Free literature. Carter Farms, Plains, Georgia.**

**INTERESTED Mail order? Samples leading mail order magazines 10¢. Palm, Box 742, Citrus Park, Fl.**


**UNUSUAL Mailorder opportunity. Test- ed. Free supply everything. Girard’s, Arona, Calif.**

**WANT more business? Here’s an amaz- ing opportunity to increase your sales. Talk to thousands of interested readers of “Mech- anica Popularis.” Our Spanish Edition cov- ers the Latin American countries like a blanket. They’re real mailorder buyers and don’t mind an ad in our next issue. Classified Advertising De- partment. Americas Magazine, 200 East Ontario Street, Chicago 11, Ill.**

**VENDING Machines—No selling. Oper- ate from choice of coin machines and make amazing profits. 32-page catalog free Parkways Machine Corporation, Dept. 29, The Tinsley Building, New York 1, N.Y.**

**HOME Workshop books. Free catalog Popular Mechanics Press, 631 N. St. Clair St., Chicago 11.**

**MONEY IN saw and lawn mower sharpen- ing sparetime at home. Free book.** Carl L. Carlson, Columbia Heights, Minnesota.

**FREE Foli, "$4.00-$45.00. Unlimited Version.” Details free. No obligation, no responsibility. Unclaimed! Work home, sparetime! Bly- lings, Carlsbad, Calif.**

**$25 WEEKLY Cleaning venetian blinds. Patented machinery. Free literature. Rob- bin, 7213B, Indianapolis 1, Indiana.**

**$70 WEEKLY—Home, spare time. Sim- plified mailbookkeeping. Immediate in- come—easy! Audiata, 3427A, Los Angeles 24.**


**$1,000 MONTHLY Possible in collection agency business. Free literature. Write Cole Associates, Syracuse 2, N. Y.**

**TO $100.00 Weekly. Sparetime, home op- eration mailorder business. No invest- ment. No experience needed. wrenches. How to get started. Write Box 960 California 6, Los Angeles.**

**FREE Book "506 Successful Businesses. Home work. Expect something odd." Pacific Publications.**

**PLASTIC CLAPPS, molds, liquid rubber, platters, flocks, candle supplies. Catalog and information free. Blue Rapids Supply, Blue Rapids, Kansas.**

**BREED Rare tropical fish at home. Earn big money! Learn secret! Help fill huge demand. Amatuer opportunity? Free plan. Tropical Fish Breeders, Los Angeles 9, Calif.**

**MINK Raising information free. Complete. Lake Superior Mink Farm, Sup- perior, Wis.**

**COPUBLISH Mail Sale Advertiser, lead- ing mail order paper. Details, latest copy, direct. Vanroy Shirk, 548 Broadway, New York City.**

**LEARN Real estate by listening to records. Lee Institute, Brookline 44, Mass.**

I Want to send you proof of the wonder- ful power of your mail order classified pages. What’s your prediction? Write today. Included is a copy of possible. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Press, 200 E. Ontario St., Chicago 11, Ill.

**FREE “Franchise Profit Letter” de- scribed. Exclusive distributorships, agencies, operations. Write today. National Franchise Reports, 333 North Michigan, Chi- cago 2.**

**LEARN Photo-negative portrait retouching men, women. Excellent business. Full time at home. Easy, glamorous. Work for photographers by mail order. Full de- tails sent free. Duval, 100 So. Vermont, Los Angeles 4.**

**YOUR own name brand business. No investment; no inventory. Part time or full time. Sell famous brands of appliances, housewears, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc. over 1000 items. Join thousands of independent dealers. Full details for free catalog. Write H. B. Davis Corp., Dept. 11, 145 W. 46th St., New York 18, N. Y.**

**11,000 NEW Prospects daily. Baby record books, shoes, albums. Sell mailorder. Use our literature. Write: No-Co-Ro, Capitolia, California.**


**FIRE Cadillac, $10,000 yearly. Cars, appliances, coal stoves. Strateway, 6228E, Charlotte 7, N. C.**

**OPERATE Profitable mailorder business! Opportunities unlimited. Write: Thomas Bond, 1617th West Vernon, Phoenix, Arizona.**


**CASH from sawdust, seventies methods. Thoroughly tested. thirty minutes. For details write: eighteenth methods. Instructions 50¢ each. All three $1.00. Charles Company, 12-DKT, Oklahoma City, Okla.**

Be Appointed state notary public now. Write, Stationmen, Boerne, Texas.


---

**JUNE 1957**

47
INVENTORS—If you believe you have an invention you should first try to protect it. The firm of Mc Morrow, Ber- man, Barlow & Apap, in 50 State St., Rochester, N. Y., is qualified to take the necessary steps. They will send a patent booklet free. “How to Protect Your Invention.” We will also send you an “Inventor’s Pageant” booklet. No cost. They are yours for the asking. Mc Morrow, Berman, Barlow & Apap, Attorneys, 51-D National District Building, Wash- ington, D. C.

PATENT SEARCHES: Information and free forms on request. Evelyn B. Surles, P.O. Box 75, Washington, D.C.

INVENTIONS WANTED


INVENTIONS Wanted immediately for promoting on cash or royalty. Patented, unpatented, Free booklet outlines royalty rates, requirements. Write Kessler Cor- poration, 261 W. Firestone, Ohio.

INVENTIONS Wanted. Patented or patent pending. 26 years experience promoting inventions. Office Bureau, 3150 Meramee, St. Louis 18, Mo.


CASH Buyers for inventions. Write National Inventors Institute, Box 7007, Cleve- land 38, Ohio.

INVENTORS—Hundreds of manufacturers have requested our assistance in locating marketable new products. Complete information of American Inventors, Dept. 40-D, 635-P St. N.W., Washington, D.C.

INVENTORS. Don’t sell your invention patented or unpatented until you receive our offer. Write Cowgill, Box 298, Marion, Ohio.


PATENTS FOR SALE

For sale to an established manufacturer. Machine for stemming gooseneckers and currants, used on a fruit farm. Over forty years of perfecting and now ready for the market. Patent applied for. Box 601, Cooks, Kent.

MODELS: MODEL SUPPLIES


INVENTORS: Learn how to protect your invention with patent matters, he should engage a competent registered patent attorney or agent to represent him. He is responsible to the United States Patent Office, and must be registered. He is responsible to practice before the 8, United States Patent Office and prepare and prosecute his patent matters. “Patent Guide for the Inventor” containing detailed information concerning patent protection and procedure with “Record of Invention” form will be forwarded to you on approval—without obligation. Clarence A. O’Brian & Harvey Jacobson. Attorneys, 11A-D National District Building, Wash- ington, D.C.


QUALITY Leathercraft and 16 other crafts. Big sales, big success, big money. Free catalog. Russe Handicrafts, Box 20-D, Los Angeles, California.

LEATHERCRAFT. Send 30¢ for new 70-page catalog. A wonderful supply of kits, including metalcraft, enameling, ceram- ics, leathercraft, and other crafts. Reason- able. Since 1918. Sax Bros., Dept. PM-4, 1111 N. 3rd, Milwaukee, Wis.

D загадка для-дела, а также каталоги отвечают за вашу репутацию.

QUALITY Leathercraft and 16 other crafts. Big sales, big success, big money. Free catalog. Russe Handicrafts, Box 20-D, Los Angeles, California.

LEATHERCRAFT. Send 30¢ for new 70-page catalog. A wonderful supply of kits, including metalcraft, enameling, ceram- ics, leathercraft, and other crafts. Reason- able. Since 1918. Sax Bros., Dept. PM-4, 1111 N. 3rd, Milwaukee, Wis.


GRANDFATHER Clock plans, shop tested patterns dollar. Thousands built. Hurst with Delicious, Omega, Order today. Kuyper Clocks, Minneapolis 11, Minn.


I want to send you proof of the wonderful pulling power. Please send me this complete catalog. Write me today. Include literature if possible. W. J. Johnson, Advertising, Popular Mechanics Magazine, 200 W. Ontario, Chicago 11, Ill.

LEATHERCRAFT, Copper enameling, mosaic tile, shelter, metal tooling, beaded, embossed, leather. Complete plan, Kiff, Kiff, Dept. 218, Studio City 1, Calif.

BUILD Miniature passenger hauling live steam locomotive with file and drill. We do machine work, you bolt it together. Catalog 50¢. 430 E. California, Calif.


JUNE 1957 53

MANUFACTURING

DESIGNING, Tools, dies, manufactur- ing. Pro Decco, Box 983, Cincinnati 1, Ohio.

MODELS — Small lot manufacturing. Metals, plastics, etc. Milburn, Burlington, Kentucky.

HOME CRAFTSMEN


NATIONAL Handicraft, 199 William Street, New York.


QUALITY Leathercraft and 16 other crafts. Big sales, big success, big money. Free catalog. Russe Handicrafts, Box 20-D, Los Angeles, California.

LEATHERCRAFT. Send 30¢ for new 70-page catalog. A wonderful supply of kits, including metalcraft, enameling, ceram- ics, leathercraft, and other crafts. Reason- able. Since 1918. Sax Bros., Dept. PM-4, 1111 N. 3rd, Milwaukee, Wis.

D загадка для-дела, а также каталоги отвечают за вашу репутацию.

QUALITY Leathercraft and 16 other crafts. Big sales, big success, big money. Free catalog. Russe Handicrafts, Box 20-D, Los Angeles, California.

LEATHERCRAFT. Send 30¢ for new 70-page catalog. A wonderful supply of kits, including metalcraft, enameling, ceram- ics, leathercraft, and other crafts. Reason- able. Since 1918. Sax Bros., Dept. PM-4, 1111 N. 3rd, Milwaukee, Wis.


GRANDFATHER Clock plans, shop tested patterns dollar. Thousands built. Hurst with Delicious, Omega, Order today. Kuyper Clocks, Minneapolis 11, Minn.


I want to send you proof of the wonderful pulling power. Please send me this complete catalog. Write me today. Include literature if possible. W. J. Johnson, Advertising, Popular Mechanics Magazine, 200 W. Ontario, Chicago 11, Ill.

LEATHERCRAFT, Copper enameling, mosaic tile, shelter, metal tooling, beaded, embossed, leather. Complete plan, Kiff, Kiff, Dept. 218, Studio City 1, Calif.

BUILD Miniature passenger hauling live steam locomotive with file and drill. We do machine work, you bolt it together. Catalog 50¢. 430 E. California, Calif.

FOR SALE—MISCELLANEOUS


HEARING aids batteries, wholesale. Free list. Rko, Box 51, York, Penna.

WANTED—MISCELLANEOUS

OLD Cabinetmakers tools, before 1875, and old stock. Angelo Cobb, 204 Rhine-
lander Avenue, Bronx 1, N. Y.

SCRAP Mercury (quicksilver) containers supplied—Tantahm, tungsten, silver, platinum. Metallurgical Products Com-
pany, East St. Louis 69, Stite & Morris Sta., Philadelphia 45, Penna.

QUICKSILVER. Sterling, silver solders, precision metal terminals. Ner-
wood, Massachusetts.

OLD Wireless gear, radio sets, radio tubes, etc. E. C. Selph, Box 861, New
Brunswick, N. J.

MISCELLANEOUS


YOUR Name wanted for huge mailing list. Address and send 25 to: Award Prod-
ucts Co., Ster. A, Box 284, Bakersfield, California.

FREE Stubby doors, windows and win-
dows with amazing new discovery. Last inductively cast. Send $1.00 re-

SAMSUNG telephones, catalogs, oppor-

MAKE-UP-extender eliminates. Gets flies, moths, mosquitoes, all flying insects. In-

CIGARETTE—Improved roller makes 20 cigarettes, 25 to 50c. Memberly, Box 829, Owensboro, Kentucky.

70 BIBLE Lessons, 56c, Bulletin, Box 87, Cathedral, New York City 25.

YOU can teach your child to swim. In-
struction booklet, $1.00. Swimming, Box 1222, Memphis, Tenn.

106 COMIC Books 5c, Details free. Box 1647, Uniontown, Penna.

LEARN while asleep! Details free. Re-
search Association, Box 610-MC, Omaha, Nebraska.

BOOKS: Hundreds of subjects. Big cata-
logue free. Mechanical Mechanics Press, 205-B 
East Ontario St., Chicago 11.

FRESH Kodak Film. 3 rolls $1.00. Sites 
250, 125, 125. Quality Pictures, Box 89-M, Philadelphia, Penna.

GROW Mushrooms. Cellar, shed, Spare.
full time, year round. We pay you $3.50 per 
Mushroom. Box 175, 2954 Admiral Way, Seattle, Wash.

I want to send you proof of the won-

JAPAN: Gifts by mail. Kimoones, light-
ers, pictures, jackets, toys, novelties, etc. Business instructions, $1.00. Send money orders. Clarence Yamagata, Room 202, Naka 5 Bldg., Marunouchi, Tokyo.

CLOGGED Drains, cesspools and septic tanks cleaned by new powerful chemical. 24-hr service. $2.00, including hood, tree roots, etc., without expensive digging and elec-
tric rodding machines. No pumping necessary. Small mess with water and poor down-
drain. Free details. Electric Drain Clean-
ing Co., Box 224, Miami, Florida.

10 BALL Pens, full-view. $1.00, re tract-
able pen 25c. Nucilus, 2400 Amsterdam Ave., New York 176, N. Y.

CYPRUS Knees. $5.00 dozen, up. De-
tails, Gippie's Givtware, DeLeon Springs, Florida.

INTRODUCTORY OFFER: "Vitamins 22-
$2.00 size—$1.00. Donte Chemical, Great Neck 17, N. Y.

SUPERBIMENTAL Mental power. Adult-
Details—34. Wisdom, 846 Sunnyside, Chi-
ago 6.

GERMAN Address lists! Anything manufact-
ured. 25¢. Burke Associates, Man-
chester, Mass.

REMODEL Your own home. Save hun-
dreds of dollars. New inductively cast. Send for your own. Written so you can understand it. Big by step instructions make it easy. Fully illustrated, 400 photographs, hun-
dreds of diagram-size pages. $3.50. Lit-
erature free. Popular Mechanics Press, 200-
RH East Ontario St., Chicago 11, Ill.

PUZZLE. Inexpensive Easiest puzzle contest helps. Allowable in all contests. Unique 
and impossible. $1.00. Unbreakable. Unique, Box 99, Mt. Vernon, Ill.

FREE! "$3,000 Yearly Sparetime. Back-
ward. Raising Free Worms!" Owkaven-69, Ced read Hill, Texas.

HOW To remodel, basement, attic. Book-

RECEIVE Magazine samples, mail, cat-
alogues, offers from everywhere. Get 
listed 25¢. Rorick, Cincinnati 26, Ohio.

YOUR Name wanted. We'll send 1000 
martellers, publishers, wholesalers your name, 
on our list one year 25c. Dixie Mailers, 
Kings, N. C.

18 FULL-size patterns. Save money with 
easy-to-use, professionally designed 
full-size patterns. Make money selling 
beautiful, useful furniture. Make modern 
step and cocktail tables; metal lamps; 
cupola; 12-foot footboard. All patterns 
test-built; sold with money-back guaran-
tee. Easy to follow. Make step by step im-
practical patterns today. Popular Me-
chanics Press, 200-HH E. Ontario Street, 
Chicago 11, Illinois.

BEAUTIFUL Portraits done in oils from 
photographs, Very reasonably priced. Free 
particulars. Elmer Brunow, 2452A No. 17 
St., Milwaukee 6, Wisconsin.

WANT More business? Here's an amaz-
ing opportunity to increase your sales. Talk 
to thousands of interested readers of "Me-
canica Popular." Our Spanish Edition cov-
ers the Latin American countries like a 
topographic map. They're real mailorder buyers. 
Classified rate 75¢ per word. Try an ad in 
our new Book Contest Magazine. AD-MAR 
Department. Popular Mechanics Magazine, 
200 East Ontario Street, Chicago 11, Ill.

250 POWER.....

Complete

Telescope Lens Kit

Compact Scope, explore the universe, planets, Moon Craters, New
Stars, etc. Complete Lens Kit consists of 80 inch focal length ground
and 10x magnification lenses for 30 gallon power. POWER, 150 POWER, 200 POWER, 250 POWER, and all necessary
accessories. Easy to make (or have step by step instructions. Tripod and mount not included.) Money back guarantee.

BUSSE SALES CO. Hartford, Conn., Dept. PM 58

FRANCHISES—Learn about the big profit field! Opportunities everywhere for dis-

tributors, dealers, agency opera-
tors. Write today for interesting giving free details.

NATIONAL FRANCHISE REPORTS, C-528, 353 N. Michigan, Chicago 1

college graduates get ahead faster!

You see it in your own city. They have higher incomes, advance more quickly. Grab your chance for a better life, Industrial growth... automation... technical advances create career opportunities for engineers, accountants, management experts. Share rewards availing college-trained men. Important

firms visit campus regularly to employ Tri-State College graduates in any quarter in this world-famed college. Approved

for veterans.

Bach. of Science degree in 27 months

In Mechanical, Civil, Electrical, Chemical, Aeronautical, Radio (TV-Elect-
tron), Engineering. For those who senses a R.S.A. In Business, Economics, Busi-
ness Accounting, Motor Transport Management major. Superior grades in attendance. Full duration. In technical fundamentals stressed: comprehensive courses with more profes-
sionals. In 150 hours. Short course. Instruction. Experience in industrial is-
cluded in 150 hours. Preparatory courses. Beautiful campus. Well-equipped, new and modern equipment. Institute, 305 Yankeetown, St. Mar. Earnest, capable students (whose time and budget re-
quite accelerated courses and modern methods are) are invited to write Jean McCarthy, Director of Admissions, for catalog and book "Your Career in Engineering and Commerce."

HURON COLLEGE

467 College Avenue • Angola, Indiana

JUNE 1957

55

LAURENCE WELK says:

"I Got My Start in MUSIC
This 'TEACH-YOURSELF' Way"

NOW it's easy to learn to play ANY instrument the same way famous stars have learned. But, here's the difference: If you don't know a single note now, we'll have you playing delightful pieces RIGHT AWAY—right from page 1 of your FIRST lesson! Make amazing progress. No special "Talent" needed. Learn at home in spare time, with- out LICKING your fingers. Only a "Teach-Yourself" book with Piano book in bottom. Just send $1.00 and you can play any piece you wish. 900.000 units 1.000.000 successful year.

WRITE FOR 36-PAGE ILLUSTRATED FREE BOOK—Just send this ad, with your name and address, filled in below. 2. School of Music, Studio A306, Port Wash-
ington, N. Y. (No obligation; no salesman will call).

Name

Address
LAWN AND GARDEN BOOK. Give your home a beautiful setting. This new PM book makes it easy! Features many valuable ideas and tips on landscaping, grading, drainage, soil testing and conditioning, lawns, flowers, vegetables, maintenance. Well illustrated, with a unique 32-page Buyer's Guide of Garden Tools and Power Mowers. 192 pages, 75¢.

HOW TO TEMPT A FISH. Must reading for every angler, whether you're an expert or just beginning. Contains scores of action shots, 16 pages in glorious 4-color and instructions from eminent authorities in the field on all forms of fishing and their best techniques. You'll read, too, of what equipment to use and where to fish. 144 pages, 75¢.

HOT ROD HANDBOOK. All about this popular sport and hobby. Gives you eyewitness, inside accounts of leading drag races; championship hot rods; how to build your own dragsters; how to hop-up 1957 engines; and— for the first time anywhere—a complete directory of U.S. speed shops. 160 pages, 75¢.

HOW TO MODERNIZE HARDWOOD FLOORS. Renovation of scuffed, soiled, old hardwood floors is made easy with this new PM booklet. 32 pages, 25¢.

HOW TO MODERNIZE WALLS AND CEILINGS. Ideas and instructions for modern treatments of walls and ceilings in PM's famous tell-and-show style. 32 pages, 25¢.

ASK FOR THEM TODAY!
MEN! THERE'S BIG MONEY IN NEW ALUMINUM ROOF COATING

For exclusive territory: booming full or part-time business use coupon to get FREE SAMPLE. Full details on today's newest sales sensation for factories, farms, schools, trailers, buildings of all kinds.

Users love all-weather defying Storm King Aluminum Roof Coating and Mobile Home Aluminum Trailer Coating. Ready-mixed. Easy-to-apply. No thinning. No heating. Leaves coating that's firm on top, pliable below; won't sag, run, or crack. Makes interiors 15-30% cooler! A natural for enormous, still-growing do-it-yourself market. A rapidly recognized must for thousands and thousands of roofs everywhere! Market only now being tapped, but there's no time to lose!

WARREN REFINING & CHEMICAL CO. (Est. 1901)
5151 Denison Ave., Cleveland 2, Ohio
Please send FREE SAMPLE and full details as outlined above.

Name ________________________________

Address ________________________________

City ___________ Zone _______ State ______

Swiss or American

Unique Swaynev System starts you making... 
repairs right away. Develops your skill... 
- step-by-step. Teaches modern methods... 
pros not sav. short cuts. Learn by personal... 
attendance or spare time home study.
Free Sample Lesson. No obligations.
Write today.

CHICAGO SCHOOL OF WATCHMAKING
2330 Milwaukee, Dept. 167, Chicago 47, I1.

REPAIR ANY WATCH

HOW TO MAKE

PAINTING AND RIGGING

FLAGPOLES—IT'S EASY!

A safe, sure glamorous business is yours for only a small investment. Men are needed everywhere to paint, repair and fly flagpoles. Without any previous training you can make BIG MONEY and travel to the four corners of the earth. We provide the know-how and proper rigging. Our low cost plan quickly, easily. 

The rigging is spliced by an expert of best Plymouth ma-

pilas. Ready for you to use.

UNITED RIGGING CO., 18 Field Point Road, Greenwich, Conn.

WERE-TO-BUY-IT INDEX

Source of supply appears after items commercially available

AUTOMOTIVE

Detroit Listening Post ........................................ 76
Jalopy graveyard grows in New York ..................... 79
Tiny bus carries five (California Texas Oil Co., Ltd.) 80
Madison Ave., New York City 17 .......................... 91
14-ton truck can expand to five times road size (Gernstalger Co., Wooster, Ohio) .................. 96

AVIATION

Huge "docks" shelter B-52 bombers undergoing repairs ....... 84
Mockup B-47 nose "flies" around world .................. 89
Bomber carries detachable pod to provide for various missions .... 105
British 1000-mile-per-hour jet fighter has two powerful engines .... 109

Hercules transport "flies" underwater (Lockheed Aircraft Corp., Marietta, Ga.) .......... 116
Experimental missile fired "backward" (Cornell Aeronautical Laboratory, Buffalo 21, N.Y.) ............. 116
P-51 becomes museum piece .................................. 117
Flight suit with built-in gear developed for Skyhawk pilots (Charles Aircraft Co., Inc., Santa Monica, Calif.) ........ 117

Ten-story mobile tower aids missile manufacture ............. 117
Templates 30 feet long from giant printer (Miller-Trolan Mfg. Co., Troy, Ohio) .................. 140

CONSTRUCTION

Special carriers move huge girders ................................ 83
Dome design for Oklahoma City's "church of tomorrow" .... 138
UNESCO headquarters in Paris to have two acres of glass .......... 138
Seats for 150,000—none behind a post .................... 209

FISHING

Depth regulator for trolling (Marine Research, Inc., P. O. Box 723, Fort Worth, Tex.) .................. 72
Shot dispenser (Varco Products Co., 1015 Juniper Ave., Boulder, Colo.) ........... 72

"Armchair" fishing gal. (L. A. Wilke, P. O. Box 5003, Austin 17, Tex.) .... 77
He fishes in comfort ........................................ 83

MISCELLANEOUS

Nylon ship propeller has longer life ................................ 70
Power saw has flexible shaft ................................ 79
"Vertical mulching" ............................................. 79
Bowmen collect cones to "breed" better trees .................. 71
Push of button pulls boat onto trailer (Tee-Nee Trailer Co., Linton, Ohio) ........... 72
High-speed TV office duplicator (Stanford Research Institute, Menlo Park, Calif.) ............. 73
"Village smithy" travels highways (Gorson at L'Allemand, Box 323, Ranch Station, Los Angeles 64, Calif.) ........ 73
Floor drainer covers wider area (Haynes Equipment Co., 62
Voorhis Lane, Hackensack, N. J.) .................. 78
Two-way fan eliminates drafts ................................ 78
"Flying" bananas start to market (United Fruit Co., 221 N. Charles Ave., New Orleans, La.) .................. 79
Train of equipment harvests forage on cattle ranges ........ 82
Homemade flame thrower thaws rail switch .................. 84
Chair becomes table ........................................ 90
"Flatop" haircut measured mechanically ..................... 90
Machine opens, stuffs, counts, seals, imprints, stacks mail (Pitney-Bowes, Inc., Stamford, Conn.) ........... 96
Designed for the handicapped ................................ 97
Zoo vacuum cleaner .......................................... 104
Hearing aid helps surgeons .................................. 105
Red-and-rotary power lawn mower introduced (La Orange and Garrison Inc., 30 E. Georgia St., Indianapolis, Ind.) .... 108
Lightweight passenger car has plastic interior (The Budd Co., 2450 Hunting Park Ave., Philadelphia 32, Pa.) .... 108

(Continued to page 60)

POPULAR MECHANICS
FREE New FAN-Shutter-Motor-Catalogue
Packed with the Largest Selection of Fan equipment
ATTIC FANS & DIRECT DRIVES
BUY FROM Mfr. and SAVE 50%
Attic Fans! Ex-

Buil Skilful Ex-

Towel! Shutter & Shutter Motors

No Fish Enemies, No More

Machines! IBM Electric &

Manual Typewriters & Typewriters
Attic or Window Fans & Fan Kit
includes: Steel Blade—2 Pulleys
—2 Bearings—2 Collars—Shaft

INSTRUCTIONS—Easy Assembly.

VISIT—OR SEND FOR
FREE COPY TODAY!

FREE POSTAGE. Order today. Dealers Invited.

ALBIN MACHINE
Dept. M. N. Y.
423 Broome St., N. Y. 13

ROOF FRAMING MADE EASY
WITH THE NEW SWANSON SPEED SQUARE
ALL PURPOSE SIMPLIFIED PRECISION MADE TOOL
Frame your roof as easily as your joint or stud. Send 50c
in coin, and you will receive rafter lengths booklet giving
all length ratios for any size building, with construction
folder. Framing a roof with The Swanson Speed Square and
its many other uses in framing. Indispensable for inside trim work
and home work shop. No carpenter, home owner, farmer or handyman
should be without this modern tool. Send today.
SWANSON TOOL CO., 9113 S. 53rd, Oak Lawn, Ill.

"MINIATURE MACHINE SHOP"
No Bigger Than A Typewriter, Outper-
forms Machines Many Times Its Size!
That's what a popular publication says
about UNIMAT in their 2 page feature
story in the May issue. If you want a reprint of this
story plus complete information about this amaz-
ing 10 in 1 combination precision tool write to:
AMERICAN EDELSTAAL, INC., UNIMAT DIV., Dept. 367, 350 B'way, N.Y. 13

RHEUMATISM
NEURITIS • SCIATICA • LUMBAGO
Why continue to suffer agonizing pains when
usual remedies have failed. Learn how
thousands have been treated by
an amazing new method which is fully ex-
plained in our New FREE Book. Don't wait.
Write today. No obligation.
EXCELSIOR INSTITUTE
Dept. 0906, Exelsior Sags., Mo.

SEE YOUR DEALER
Two steps to professional results in
your workshop: (1) check
POPULAR MECHANICS for
helpful "how to" suggestions;
(2) discuss your project with
your dealer. He knows the im-
portance of working with qual-
ity products. They're advertised
in POPULAR MECHANICS

Tag of Integrity

PM JUNE 1957

Amazing new Krafty Fish Caller
draws fish like crazy with its insect
buzzing sound! One twist of leak-proof
Eastman plastic case (4" long)—her-
metically sealed buzzer starts. Lower
your Krafty—and here comes the fish—
big fish chasing small ones away. Krafty
lasts for years (replace only small flash-
light battery.)

Fishermen everywhere are wild about
Krafty—like Walter J. Kessler, Direc-
tor of Special Services, Pabst Brewing
Co.: "Does all you claim for it...caught
more fish...had more fun!" For the big-
gest catches of your lifetime get Krafty
and get fish. Makes a wonderful gift!
Only $9.95 Postpaid
(For C.O.D. pay postman $9.95 plus C.O.D. fee)
Order now from
BIRCHKRAFT, Inc., Dept. PM
1696 North Astor St. • Milwaukee 2, Wis.

New PRECISION MAGNIFIER
FEATURING 3
DIFFERENT STRENGTH
OPTICAL LENSES
Quick interchangeable snap-in lens
sets of increasing strength (1 1/4, 2 1/4
and 3 1/2 power). The lenses are un-
breakable, scientifically accurate,
and molded together for permanent
local alignment. ROCKET is light,
in weight and is adjustable to any
head size. Both hands are free for
work. Additional lens sets of greater
strength will be available at $3 a set.
Squeinting is eliminated as both eyes
are used. Can be worn over your own
eye glasses. Guaranteed. Pull re-
fund if not completely satisfied.
ORDER YOURS TODAY

Useful for
Photographers
Hobbyists
Fishermen
Optometrists
Tool & Die Makers
Jewelers
Artists
Coin Collectors
Cartographers

Only $12.50

Standard Unbreakable Watch Crystals, Inc.
123 East 144th Street, New York, New York

Please send me
- Rocket Viewers with 3 interchangeable lens
- $12.50
- Money order enclosed
- C.O.D.

Name
Address
City
Zone State

U. S. Patents and Patents Pending
Photographed at Islamorada, Florida, Proving Ground
How can you eliminate heat and glare in your home, yet actually add usable light? What are the things to look for and demand when buying awnings? This new free booklet gives you all the answers!

Ray-O-Lite Translucent Fiberglas Awnings

RAY-O-LITE CORPORATION OF AMERICA
Dept. P-6 • 316 Peachtree St. N.E., Atlanta, Ga.
Send me free booklet on controlling sunlight.

NAME_________________________
ADDRESS_____________________
CITY__________________________
STATE________________________

FISHERMEN...OUTBOARD FANS

You're actually afloat in 60 seconds with the amazing new GLENCRAFT STOWBOAT!

In the water in 60 seconds...that's all it takes to unfold and launch the amazing Stowboat. So light you can carry it by hand...so easy to pack on top of a car. Durable, sea-worthy, it folds flat; sturdily constructed of marine plywood, vinyl coated, guaranteed leak-proof. 8 ft. model $225 • 10 ft. model $250
Includes rigging and oarlocks.
F.O.B. Bronx, New York

HIGGS MARINE SERVICE, National Sales Agent
300 Zerega Avenue, Bronx 72, New York
[Boxing up and sending to the address provided]

(Continued from page 58)

Telephone receiver amplifier can be carried in pocket (Remler Co., 2101 Bryant St., San Francisco 10, Calif.) 109
Homemade automatic sprinkler stops when rain falls (Specialty Sales Co., 8011/2 Houston St., Arlington, Tex.) 109
New tools for grooming your lawn 110
Experimental missile fired "backward" (Cornell Aeronautical Laboratory, Buffalo 21, N. Y.) 116
Seagoing trucks for Alaska 126
Globemaster hauls two 36-foot trailer homes to Greenland 128
Slatter surfboard gives "feel" of water ski (Fun Craft, Winamac, Ind.) 129
Weight "heard" on scales for blind (Lighthouse for the Blind, 4308 Capitol Ave., Dallas 4, Tex.) 129
Submarine lumberman 129
Pocket calculator easy to operate (Controller Calculator, Silver Bells, Ltd., 600 16th St., Oakland, Calif.) 132
Streamlined cycle looks like scooter 132
Getting cold feet? 140
"Pony express" by motor scooter 140

SCIENCE

Superstrong magnet "defies" microscope (General Electric Co., Schenectady, N. Y.) 72
TV aids study of cancer cells 78
U. S. bomber air-to-surface missile is "Rascal" 79
"Iron lung" on wheelchair goes with patient (J. J. Monaghan, 500 Alcott St., Denver, Colo.) 82
Plutonium fires with special gear 84
Antibiotic aids crops (American Chemical Society, 2 Park Ave., New York City 16) 90
Portable detector speeds up prospecting 90
Battleship guns become test chambers 96
Locally cactus starts industry 104
Will borazon replace diamonds? 104
Two-million-volt X ray 105
Ultrasomics rip cells 105
Fuel source in pond algae 108
Basis of life created in test tube 137
Tailor-made antibiotics 129
Insects due for fatal surprise (Hercules Powder Co., Wilmington, Del.) 216

Radio-Television, Electronics

New horizons in electronics—
Ionomac, a new loudspeaker (Dukane Corp., St. Charles, Ill.)
Small, high-voltage battery (General Electric Co., West Genesee St., Auburn, N. Y.)
A four-speaker bass-reflex enclosure 142

Craftsman and Shop Notes Index

FARM AND FARMING

Bag-eating hens discouraged by linseed swinging doors 204
Grain hopper set on legs dispenses ground feeds 204
Hot-water tank converted to stock-watering trough 204
Old iron wagon-wheel rims support farmyard feed rack 204

HOUSE AND HOME

Decor boards in free form 148
Light-radiating ceiling illuminates bathroom 149
Wax paper keeps tile from sticking to mosaic 152
Cork strips prevent buckling of hardwood floor 156
Solving Home Problems—
Paint-roller tray is container for storing brushes 158
Masking tape applied to book jackets 158
 Sticky tape holds thread on bobbins 158
Paper drinking cups used as molds 158
Plants removed from pots with slotted paddle 158
Lifting tab on milk-bottle cap replaced 158
Folded Turkish towel makes padded ironing surface 159
Cost books mounted over plastic coasters 159
Avoid shine on ribbon after washing 159

(Continued to page 63)

Popular Mechanics
STOPS VAPOR LOCK...GIVES INSTANT STARTS in any weather!

STEWART-WARNER electric fuel pump for cars, trucks, and busses!

- Delivers a steady, uninterrupted flow of gas to your engine from the moment you turn your key!
- Operates independently of engine!
- No bellows or rocker arms to wear!
- Heavy-duty construction. Weatherized finish, in bright green baked enamel!
- Models with single or dual pumps!
- Pump may be mounted under hood, on fire wall or fender panel, or on frame near gas tank.

STEWART-WARNER Instrument Division

24" ATTIC FAN KIT

Easy to assemble. Belt-driven. Blade, shaft, 2 self-aligning bearings, 3 pulleys, 2 collars, and V-belt. Everything you need, except frame and 1/4-hp motor, to make your own house cooler. Send for complete list of fan parts.

PENNA. WHOLESALE DISTRIBUTORS
104 N. 6th St., Phila. 6, Pa.

BUILD YOUR OWN HI-FI SET!
MAKE A TRANSISTOR RADIO!

THIS PM BOOK SHOWS YOU HOW to make almost any electronic device

192 pages of step-by-step instructions even the electronics beginner can follow. Tells all about:
- High Fidelity—What it is
- Specifications of component parts
- What to look for in equipment
- Simplified transistors
- TV and radio
- Radio—Television
- How to wire
- How to build servicing
- What is a schematic diagram
- All about electronics and general
- Simplified language
- How a vacuum tube works
- How to use radio tubes
- How to read diagrams
- How to build all sorts of devices
- How to build your own hi-fi set
- How to make a transistor radio
- How to wire and solder
- Short wave reception
- How to select Hi-Fi equipment
- Popular Mechanics Press, Dept. 657

FIX BROKEN WOODEN OR METAL FURNITURE WITH Plastic Steel®

80% STEEL — 20% PLASTIC

A DEVCON PRODUCT

AS EASY TO USE AS MODELING CLAY

A completely new way to make permanent repairs to furniture, toys, tools, models. Fixes leaking pipes, tanks, radiators, cracked engine blocks. Bonds to metals, wood, porcelain, glass, concrete and other surfaces... becomes hard and tough as steel in 2 hours... can be machined.

NEW HANDY HOME KIT 98c

Also $1.89 and $3.95 sizes at leading hardware and hobby stores. WRITE FOR FREE BOOKLET.

DEVCON CORPORATION
175 Endicott St., Danvers, Mass.
HOME HOBBYIST
Tools by UTICA

Wherever you see the most useful of all modern hand tools at work you'll find Utica pliers, wrenches, screwdrivers, etc. Hallmark of quality in hand tools since 1855! Precision made. Unconditionally guaranteed. At leading hardware stores everywhere!

UTICA DROP FORGE AND TOOL DIVISION
Kelsey-Hayes Co., Utica 4, N.Y.

"Use Utica ... the tools the experts use"

TRAINED MEN NEEDED!
BIG PAY!—GOOD FUTURE!

☐ DIESEL ☐ ELECTRONICS
☐ AUTO ☐ AUTOMATION

NEVER BEFORE has the opportunity been so good for the properly trained mechanic and technician to step into BIG PAY POSITIONS with rapid advancement and future security virtually assured.

YOUR SUCCESS depends on the quality of training you receive ... and the reputation of the school you attend. YOUR GUARANTEE we are giving the best in mechanical and technical training is proved by the fact ... we have a waiting list of good pay positions for our graduates, with leading companies throughout the United States.

RESIDENT SHOP TRAINING is easier and costs less than you may think! We provide you with housing and part-time jobs while in school, plus free nation-wide placement service for graduates.

Check subject above in which you are interested and mail for FREE BOOKLET

BAILEY Technical Schools
Veteran Approved

1634 S. Grand, St. Louis 4, Mo.

Name_________________________ Age_________________________
Street_________________________
Town_________________________ Zone_____________________
State_________________________

(Continued from page 60)

Bowl won't rock and roll ........................................ 159
Clamping joint between crossrail and stile of paneled door ... 159
Recipe holder ........................................................... 159
Screen door held at any angle by rubber-tipped prop.......... 160
Shelving conceals chimney for attic conversion ............... 160
Lavatory "step" for small children .............................. 184
Warm water for washing car ..................................... 184
Year-round uses for shellac in the home ........................ 188

PHOTOGRAPHY

Index card in negative file identifies cut-film type ............. 157
Two light-tight ventilators for cooling photo enlargers ......... 150
Adapter for cut-film holder handles off-size film .............. 188

TOOLS

Hinged tool tightens flooring before nailing in place ........... 152
Hand grinder fitted to lathe ....................................... 189
Shopping for Tools .................................................. 189
Builder's level ....................................................... 200
Setting tool ............................................................ 200
Bandsaw and belt sander .......................................... 200
Builder's square ..................................................... 200
Service kit .................................................................. 201
Masonry drill ............................................................ 201
Special chuck ............................................................ 201
Screwdriver ............................................................. 201
Lawn-mower sharpener .............................................. 201

MISCELLANEOUS

Bug catcher on car radiates gathers fish bait en route ...... 148
Boat-equipment locker .............................................. 150
Cool grip for hot cup ................................................ 152
Truck-size insecticide sprayer utilizes exhaust manifold .... 152
Removable "rumble seat" makes two-passenger tricycle ..... 157
Rowing-horn tied to gunwale can't be dropped overboard .. 157
New fence-post-treating method stops decay and termite damage ......................................................... 171
Rubber-stamp impressions tinted with metal powder ... 171
Section of wooden snow fence provides slipproof walk ... 180
Water-ski jump .......................................................... 180
Protect art-brush bristles with drinking straw ............... 188
Razor blade used for cutting stored safely in clip ............. 188
Altered boxes save work time ...................................... 186
Simple rack for C-clamps .......................................... 196
Simple ball-turning tool bit ...................................... 196
Torch carrier for flame cutting ................................... 197

WORKSHOP HINTS

Plane itself is fixture for honing blade .......................... 149
Subduing appearance of screws on cabinet hardware .... 149
T-base fitted with clips holds hand grinder in vise ........... 149
Magnet serves as cutoff stop ....................................... 171
Wood jig starts tap square in plastic ......................... 171
Pulling headless nails .............................................. 171
Rubber band cut from inner tube chippens split ends .... 184
Solder gun and slick shellac speed furniture refinishing .. 184
Dumpee quiet circular saw ....................................... 190
Hold-down for running molding ................................ 191
Post shelves add shop space ..................................... 191
Sandbag block lock ................................................. 191
Simple rack for C-clamps ....................................... 196
Wire solder on tape spool protected against dirt ............. 196

NOTICE:—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect of the developments reported herein. In the event that commercial use is to be made of any of the developments reported herein, it is suggested that legal counsel be consulted to avoid liability for patent infringement. It is not the purpose of this magazine to encourage patent infringement but, as indicated, it is the intention of this magazine to report on the latest developments in the mechanical arts.

How Is Your Science IQ?
Try the Quiz,
"ARE YOU SCIENCE Minded?"
Starts on Page 242

62

Copyrighted material
mobile homeowners say:

KOOL-SEAL ALUMINUM ROOF COATING
WEATHERPROOFS WITH ONE APPLICATION
Insulates... Beautifies... Lasts for years

For worry-free, all-climate roof protection, mobile homeowners tell us they are applying aluminum roof coatings like Kool-Seal, made with ALCOA® Aluminum Pigments.

DEFIES WEATHER
This roof coating is made with a tough asphalt base and has as its pigment brightly polished ALCOA Aluminum flakes. It remains firm on top, but soft and pliable beneath its protective shield of aluminum. It will not sag or run under tropic sun, or alter under frigid cold. It provides waterproof shelter, protects against surface deterioration.

TURNS BACK HEAT
Because aluminum turns back 70 percent of the sun’s heat, your mobile home can be as much as 15 degrees cooler this summer... warmer in winter, too. Because of aluminum's low heat radiating power, it acts like insulation, reduces interior heat loss.

EASY TO APPLY
Aluminum coatings like Kool-Seal come ready mixed... require no thinning or heating... are easy to apply with either brush or spray gun... adhere to any metal or composition roof.

LASTS LONGER
Aluminum flakes "leaf" to produce a brilliant metallic surface—literally a metal shield that protects the underlying asphalt vehicle from deterioration. This means long life and years of service for your roof.

STAYS BEAUTIFUL FOR YEARS
The soft, silvery finish is highly reflective... sets off any mobile home... lends a clean, prosperous appearance that lasts for years.

ALCOA does not make aluminum roof coatings. But we will gladly refer you to reputable manufacturers who do. Write today for our two free booklets, Painting With Aluminum and Aluminum Asphalt Roof Coatings Make Time Stand Still. Use the coupon.

Look at the aluminum-coated roofs in this community, a typical sight in the more than 4,000 mobile parks in the United States. Inset shows how easily Kool-Seal goes on. Kool-Seal is a product of Electric Paint & Varnish Company, Cleveland, Ohio.

---

Aluminum Company of America, Paint Service Bureau
1718-F Alcoa Building, Pittsburgh 19, Pennsylvania
Please send me your FREE booklets:
□ Painting With Aluminum
□ Aluminum Asphalt Roof Coatings Make Time Stand Still

I am interested in protecting

Name

Address

City Zone State

JUNE 1957
Get into your car with New Pride

Restore that NEW CAR FEEL with

Why drive a car that just "gets you there"—when it's so easy to have a car that's a thrill to handle... full of pep, performance and GO! Your Doctor of Motors—your skilled mechanic—knows how to bring back that satisfying "new car feel."

Doctors of Motors everywhere install Perfect Circle 2-in-1 Chrome piston rings to assure top performance. Perfect Circles are plated with thick, solid chrome that resists wear—more than doubles the life of cylinders, pistons and rings. For long life and responsive power with positive oil control, ask your mechanic to install Perfect Circle 2-in-1 Chrome piston rings in your engine! Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., 888 Don Mills Road, Don Mills, Ontario.

PERFECT CIRCLE
2-IN-1 CHROME PISTON RINGS

You'll be surprised how quickly and economically your Doctor of Motors can bring back a "New Car Feel" to your car!
For a time-lapse study of pollen, Ott focused 25 cameras on ragweed, some looking through microscopes.

John Ott, who cast aside his career as a Chicago banker to pioneer time-lapse movies of flowers bursting into bloom, has crossed another frontier. Now cancer cells visibly multiply and ragweed pollen touches off hay fever under his microscope.

**His Cameras Spy on Life’s Secrets**

By Clifford B. Hicks

Millions of televiewers look on John Ott as an old friend, always on hand to help them tackle their gardening problems. Millions of movie fans look on John Ott as a magician with a camera.

A few men—biologists, pathologists, chemists and other scientists—look on John Ott as a founder of a new scientific technique. And only this handful has seen his most significant work.

These scientists, usually unemotional in their approach, have gasped at the sights he has shown them. Vital life processes which occur over a period of days, weeks or months unfold on a movie screen in seconds. They watch cancer cells divide and

Ragweed pollen, exposed to nasal secretion of hay-fever sufferer, starts emitting tiny drops of liquid.
Scientists are excited about Ott’s films which show (upper left to lower right) cancer cell reproducing.

...redive, ragweed pollen react in the nasal secretion of a hay-fever victim. They watch light of certain wavelengths determine the sex of various plants.

They watch these spectacular sights through the magic of time-lapse motion pictures, taken through a high-power microscope.

John Ott is a pioneer of time-lapse photography. Today his time-lapse cameras are spying on living cells. In his basement laboratory at Winnetka, Ill., he speeds the passage of time a hundred-thousandfold.

Back in 1927 a 17-year-old lad bought a movie camera. First off, he decided he’d photograph the unfolding of apple blossoms on the tree in the front yard. To do the job, he figured he’d have to expose one frame of film every few minutes. Then when he projected the film the blossom would unfold before his eyes. This was to be just the opposite of slow-motion photography. He was going to speed things up.

His first try showed blossoms appearing and disappearing so fast he scarcely could see them. After several false starts he produced his first successful time-lapse sequence. On the screen, buds appeared, swelled and burst into spectacular bloom.

That was 30 years ago. The boy grew to be John Ott, Chicago banker, who puttered around taking films of his garden as a hobby. Because the time-lapse technique was new, he had to devise his own equipment, and finally succeeded in making it automatic. After any desired interval, timers would close the shutters in his greenhouse, snap on floodlights, expose one frame of film, turn off the lights and open the shutters again.

Shortly after World War II, Ott found himself with a series of time-lapse garden...
films so spectacular they'd make anyone gasp. Trouble was, few people had seen them. In 1949 one of the Chicago TV stations heard of the films and asked him to put them on the air. The reaction was immediate. So many viewers wrote letters that the station persuaded Ott to start the program, How Does Your Garden Grow? The program has been televised over as many as 40 stations throughout the country.

Soon Walt Disney became interested in Ott's time-lapse films. As a result the films have appeared in the Disney movies Secrets of Life and Nature's Half Acre, and on the Disneyland television show. (Recently Ott rephotographed the blossoming of an apple tree in his yard, this time for Disney. A lad appeared in this film, too—Ott's nine-year-old boy.) Ott also has shown his films on such TV shows as Zoo Parade, Today, The Home Show and Out on the Farm.

He is a man of incredible patience. When he wanted to show the formation of a bunch of bananas on the screen, he trained 10 cameras on a banana tree for 18 months. In a recent study of ragweed he had 25 cameras focused on the ragweed plants, some of them watching the formation of pollen through microscopes.

This quiet, scholarly man puttering...
Ott dusts pollen on pumpkin flower.Inset, taken through microscope, shows tubes growing from pollen grain

around his greenhouse appears the exact opposite of a television star or an eminently successful movie producer. Instead, he might be a soft-spoken scientist indulging in his hobby. This last impression strikes close to the mark, for Ott’s latest field is science. He is a man driven by the idea that time-lapse motion pictures, taken through a high-power microscope, can reveal the secrets of vital life processes hitherto hidden from man’s prying eyes.

Scientists peering through microscopes always have had difficulty in observing certain phenomena. Some activities, such as the splitting of cells, occur at unpredictable moments. Others gradually take place over a period of hours or days.

“It’s like watching the hour hand of a clock,” explains Ott. “You know it’s moving but you can’t see it move. Glance away for even five minutes, and you can observe that some movement has taken place. Yet if you watch constantly, your eye can’t detect it.”

“Similarly, a biologist trying to observe a vital life process often is frustrated because he can’t actually watch it occur. The change is just too slow. In such a situation,
a time-lapse movie is ideal. In minutes we can show a life process from beginning to end. We simply speed it up.”

Ott has designed his own equipment to speed up life. In his miniature laboratory for science studies, a high-intensity light is focused through the microscope slide. The microscope itself is a new phase-contrast type that splits the light beam, retarding part of the light. The result is much finer definition (important to photographic work) and no need for staining the specimen. The staining process frequently kills living specimens.

A special eyepiece on the microscope permits Ott to watch the specimen at the same time a frame of the film is being exposed. The camera is a rebuilt 35-mm. Bell & Howell with electric drive. The magazine holds 400 feet of film. Whenever Ott refocuses the microscope, the camera automatically moves too. He also has installed miniature motors which will move the microscope slide at the infinitesimal speed of 1/5,000 inch per hour.

Heart of the time-lapse system, of course, is the timer, which can be preset to expose one frame of film automatically at any interval from 10 seconds to 90 minutes.

Perhaps the most spectacular of Ott’s new scientific films shows individual grains of pollen fertilizing flowers. Before your eyes the grain of pollen produces a tube and through it the contents of the pollen are discharged into the stigma. Ordinary time-lapse movies go on from there to show a pollinated pumpkin flower developing into a full-size pumpkin in 30 seconds, changing from green to bright orange.

Another time-lapse study shows the effects of ragweed pollen on humans. Across the screen move spheres of pollen. They are swimming through the nasal secretion of a person who is not allergic. Nothing happens. Then similar pollen grains appear, this time in a culture taken from a sniffing hay-fever victim. Almost immediately the pollen starts emitting tiny drops of liquid. Until this film was available there was some doubt as to whether the pollen itself changed, or whether the only change occurred in the nasal passage of the hay-fever victim. The time-lapse films prove that the ragweed pollen emits some substance. It’s a film of profound significance in the study of such allergies.

Ott has become intrigued with the effect of certain wavelengths of light on plants. Light in a particular band will cause certain plants to produce flowers of only one sex. For example, a pumpkin exposed to a certain wavelength will produce all female flowers. The same plant, exposed to another wavelength, will produce all male flowers. Ott now is analyzing the effects of bands

(Continued to page 234)
"Vertical Mulching"

"Vertical mulching," a new technique in soil conservation, shows promise of increasing the water-storage capacity of the soil. In the technique, developed at Purdue University, a subsoiler opens up a channel in the soil 18 inches deep and 6½ inches wide at the surface. At the time the channel is opened, a forage harvester behind the tractor chops crop residue and blows it into the channel. Studies show that the crop residue holds the channel open to moisture penetration and prevents soil compaction for three to five years.

Power Saw Has Flexible Shaft

German woodcutters use a portable circular power saw that works at the end of a flexible shaft connected to an electric or gasoline engine on the cutter’s back. Safety guides on the saw frame grip the timber, which can be five to seven inches in diameter for one cut. Two handles give the worker greater leverage.

Nylon Ship Propeller Has Longer Life

Air bubbles which develop when the screw propeller of a ship churns through the water can have a damaging effect on the mechanism. A Danish factory hopes to eliminate this problem by developing a nylon screw propeller. One of the nylon propellers is now being tested in the waters near Greenland. Besides resisting the wear of air bubbles, it is much lighter in weight.
Bowmen Collect Cones To 'Breed' Better Trees

IT'S APPROPRIATE that foresters on a large British estate use bows and arrows to help grow better trees. After all, Robin Hood's Nottingham Forest is nearby.

The longbows are a means of pulling ladders and rope nets high into the trees so cones can be picked for controlled plantings.

Sharpshooting foresters, anxious to improve timber quality, collect the cones from the known superior trees. If they wait until the cones fall it is difficult to tell from which tree each cone dropped.

With his bow, a forester shoots an arrow so it carries a trailing fishline over a branch high up the towering trunk. With the line as a starter, he pulls a rope over the limb and follows this with a ladder and netting. The crew then clambers around the netting, picking the cones which are cultivated to provide superior-quality seedlings.

Forester aims arrow while helper holds spinning reel to pay out the line that will pull the light rope over the branch. The rope then hauls up the ladder, shown in lower-left photo.

Above, with the help of the ladder, a forester rigs the rope netting in position. Below, clambering over the net 100 feet in the air, the crew picks cones for future cultivation. The project is developing trees that produce top-quality timber.
Push of Button Pulls Boat Onto Trailer

All the boater has to do to load his craft on a new trailer is push a button. The boat then glides out of the water and onto the trailer, pulled by an electric winch. The winch is powered by a low-amperage motor which connects to the electrical system of the car. Available on one new make of trailer, the winch also can be installed on any other make or model and uses either a six or twelve-volt system. The winch is available in three capacities, to handle boats up to 1000, 1600 and 2000 pounds.

Shot Dispenser

Shot can quickly be installed on a fishline with the aid of a new plastic dispenser. The case holds a supply of 3/0 split shot. The fisherman simply dials a shot into position in a feeder slot, inserts the line and presses a plunger.

Depth Regulator for Trolling

Anglers can troll at any level with a new depth regulator on the line a few feet ahead of the lure. Fins on the regulator cause the lure to run deep or shallow, depending upon how the line is attached. The regulator floats when it is not in motion.
“Village Smithy” Travels Highways

Working out of a well-equipped, ¾-ton truck, traveling blacksmith J. W. Burton and his helper, Jerry Kardas, have shod hundreds of horses in southern California in the past four years. These men use stock shoes for ordinary jobs and make special shoes for saddle, gaited and harness horses and polo ponies. Horse-shoes weigh from 2½ ounces each for a thoroughbred to four pounds per shoe for a Tennessee walking horse. The “firm’s” equipment includes a 25-pound trip-hammer for roughing out shoes; a forge that can be manually or electrically driven, burning blacksmithing coal, to heat a shoe red-hot in two minutes, drill press and anvil. A portable emery wheel folds out over one side of the truck to grind and polish shoes and to make nippers for trimming hooves. A portable acetylene-welding outfit is used to braze shoes and puts borium facing on parade shoes to prevent slipping.

High-Speed TV Office Duplicator

Closed-circuit TV may become standard in office equipment used for high-speed, multiple duplication of communications. Test models now can reproduce 17,000 characters of elite type per second—equal to three 8½ by 11-inch sheets of paper. This electronic system consists of a transmitter-printer unit designed to occupy the same amount of office space as do current duplicating machines. Copies are printed directly from original documents (see photo right).
The Bus that Grew Into a Fire Truck

By Joe Van Wormer

WHEN THE FIRE DEPARTMENT of Bend, Ore., needed a new emergency unit, city officials decided to shop around for the best bargain they could get for their tax dollars. They heard that Pacific Trailways, an intercity bus company, planned to sell a 25-passenger bus that had seen more than a million miles of travel but had been completely overhauled. The city made a deal at a nominal figure and acquired a bus which grew into a full-fledged fire-fighting unit.

The Bend fire department has 16 paid employees and 35 volunteer firemen. The paid firemen did the conversion work in their spare time and within two months had the unit, known as the “City Service Truck,” in operation. The exterior of the

Members of Bend, Ore., fire department used their spare time to convert a bus into this fire truck

Seven ladders, ranging from 45-foot extension set down to 12-foot roofer, can be rolled out back door

bus was given a coat of bright-red paint. Ladder racks were built along the left side of the interior so the ladders could be unloaded through a rear door. Toughest part of the project was making new doors where the thin metal skin of the bus had to be framed and braced. The conversion was planned so that nearly all the equipment would be accessible from the outside of the unit.

Visiting firemen are startled by the amazing amount of equipment regularly carried in the former bus. All of it is vital in modern fire-fighting techniques. Seven ladders on roller racks range from a small, 12-foot roofer to a 45-foot aluminum extension set. Two gasoline-powered electric plants with enough wire and floodlights to illuminate a sizable area are carried in the baggage compartment. Also included as standard equipment are smoke blowers, self-contained air masks, resuscitator and inhalator, first-aid kit, tarpaulin salvage covers, axes, shovels, saws, mops, brooms, buckets, tubs and other salvage equipment.

Except for a public-address speaker, siren and flashing red light on the front, the outside of the vehicle still looks like a bus. But inside, it's as well-equipped as a modern emergency unit can be.

JUNE 1957
IF YOU HAVE ONE, don’t sell it. It will soon be a collector’s item.

The proud, dignified, undeniably handsome Continental Mark II is gone to wherever fine cars go when they die. And those that remain will, no doubt, be much sought after by the car collectors of tomorrow.

It just didn’t come off. Why? That is a question certain to be pondered for years.

Death was not due to any lack of publicity. No car was given more lavish press notices. It couldn’t be the price, because many buyers spend $4000 for medium-price cars these days. And when workers buy $4000 cars, certainly top executives can afford $10,000.

Perhaps the error was in too much emphasis on “dignity” and not enough on “sell.” Or maybe it was in looking backward, not forward.

So now the 1958 Lincoln (which will be all-new and beautiful) is to have a Continental series as its top line. There will be enough of the Mark II in the new design so you can tell it is a legitimate descendant, but the custom-built Continental concept is gone. The 1958 Continental will be just another Lincoln, and fine as that is, it’s no hand-rubbed Mark II.

The Continental will have a four-door hardtop among several body styles. It will be of unit construction as will all Lincolns. Rumor has it that the Continental series will be made to look different from other Lincolns by lengthening the hood. With unit construction, it is said to be possible to vary the relative proportion of the hood-to-greenhouse-to-rear-deck without great expense or complication. This may be the basis of a combined Lincoln-Continental design. Incidentally, it would seem that the “Mark” designation would have to go also. From 1958 on, it will probably be designated by the model year like more earthy machinery.

For Transportation Only

Studebaker-Packard (or is it Curtiss-Wright?) says it will soon have an “econ-
“Armchair” Fishing Dock

MANY FISHERMEN on Lake Buchanan, Tex., angle from an eight-sided, 100-foot-wide covered platform that floats in waters 10 to 25 feet deep. “Wells” are cut into the platform to accommodate several fishermen at a time. Anglers may fish from the sides or from one of two covered piers extending from the central “dock.” The owner baits the waters with alfalfa, corn and fish entrails from the cleaning block on the platform.

Entails of cleaned fish are swept from cleaning block to water
TV Aids Study of Cancer Cells

Closed-circuit TV enables cancer researchers to observe and take motion pictures simultaneously of chemical activity in living cells, making rapid diagnosis possible. Ultraviolet light is focused on a specimen under a microscope. A TV camera transmits the cell image to a TV monitor unit and an oscilloscope. Scientists then photograph internal cell activity.

Superstrong Magnet "Defies" Microscope

Iron particles small enough to be invisible under a conventional microscope are basic elements in a new superstrong magnet. By controlling size and shape of individual particles, this magnet can be made 10 times stronger than existing magnets. It can be molded in unusual shapes (see Christmas tree below) for various uses ranging from toys to aircraft instruments.

Two-Way Fan Eliminates Drafts

Drawing out stale air and blowing in fresh air in equal volumes, a new two-way ventilating fan eliminates drafts. Air change is 4140 cubic feet per hour. To warm fresh air, a one-kilowatt heater can be attached to the fan grille. A glass-fiber pad can be inserted to filter incoming air. An inner horizontal baffle separates pairs of inlet and outlet quadrants on the fan.

Floor Drainer Covers Wider Area

Through slits designed to draw water from a wide surface area, a new drainer is able to pick up liquid waste missed by conventional drainers. This drainer prevents an air cavity from forming. Pumping continues until all water is removed from flooded sections. Weighing five pounds, the drainer is heavy cast aluminum and can be attached to 1½ or 2-inch suction hose.
"Flying" Bananas Start to Market

"Airborne" cable systems enable Costa Rican plantation workers to move bananas to railroad shipping centers before shipment of the fruit to U.S. markets. Length of these conveyor assemblies varies from 5000 to 28,000 feet. Depending on terrain, the bunches move at 180 to 200 feet per minute along systems involving 51 to 191 towers which extend 16 to 80 feet in height. Cable carriers, in addition to moving fruit, are also used in the washing of bananas.

U.S. Bomber Air-to-Surface Missile Is "Rascal"

GAM-63 Rascal air-to-surface guided missile is supersonic rocket weapon used by long-range U.S. bombers. It could be used as a nuclear weapon.

Jalopy Graveyard Grows in New York

Scrap-iron output for the U.S. will increase several thousand tons as a result of New York State's compulsory insurance laws. This legislation has driven many worn-out cars from the highways to the junk heap of Academy Auto Wreckers, a private firm. Stripped of radios, heaters and other usable gear, the car bodies wait for shipment to a smelter, where they are melted into scrap iron. Eventually, this iron may find its way into the chassis and other parts of new cars.

JUNE 1957
Closed-circuit television shows traveler Pullman space available when clerk dials train's code number

Buy Your Railroad Tickets by TV
By Creighton Peet

RAIL TRAVELERS are selecting Pullman space from television screens in New York's Pennsylvania Station. Batteries of electronic brains sort information about available space and transmit it with lightning speed to the customer via closed-circuit TV.

The Pennsylvania's $900,000 system uses a dazzling array of humming instruments—105 television cameras and 101 receivers, 41 automatic ticket printers, 65 facsimile machines and 72 Telautograph units. Many of the TV receivers are on the ticket-selling counters where the prospective passenger can see for himself what Pullman or coach space on a particular train has already been sold. With 5183 seats available on cross-country trains leaving the station each day, it's expected that this installation will save vast amounts of time.

Here's how it works. Suppose you want a lower berth on a train leaving tomorrow evening for Chicago. You tell a clerk at a zigzag counter that fills most of one side of the concourse. He dials a couple of numbers on a spin dial in front of him. Immediately,
the TV screen on the counter flashes a view (from camera A in diagram) of the “availability board.” It looks like a timetable. The clerk runs his fingers along one column and reports, “Sorry, no more lower on that train . . . but there are still some on the train an hour earlier . . . and the train following.” In some cases, availability boards may be consulted as much as 16 weeks in advance.

When you have selected a train with the space you want, the clerk dials another two-digit number. Now the TV screen shows the rack (camera B in diagram) where coupons for the reserved space on the train are stored in slots, like theater tickets. In this TV picture, you also see the clerk servicing the coupon rack. He can talk to the ticket seller by a two-way intercom system. The proper coupon is pulled from its slot in the rack and placed in a facsimile machine.

In about seven seconds, a reproduction of this coupon is transmitted to another machine, a few feet from where you are waiting. The slip of gray paper on which all the reservation data has been “burned” electronically is now your ticket for the space you ordered.

Meanwhile, the ticket seller has pulled a 10-inch-long matrix—something like an Addressograph plate fastened to a long strip of metal—out of a nearby rack. It is inserted in a ticket-printing machine which instantly prints the required transportation ticket and

(Continued to page 226)
Train of Equipment Harvests Forage on Cattle Ranches

Western ranchers are using a train of equipment as a unit to harvest green chopped forage and grass silage. First comes a self-powered, pusher-type mower, then a chopper and blower and finally a self-unloading grass trailer. The operator sits high beside the engine that furnishes power for the entire rig. The trailer has slanting sides which tend to deposit grass in the center. When a truck draws up behind the trailer, a chain and bar conveyor moves the grass up and out of the trailer and transfers it to the truck. The trailer has a capacity of four tons.

"Iron Lung" on Wheelchair Goes With Patient

Thanks to a new portable "lung," some polio victims and other patients who require mechanical respirators now can attend the theater or go shopping. The patient sits in a wheelchair wearing the respirator, which fits snugly around the chest. The mechanism, which is battery-operated and about the size of a small suitcase, is installed beneath the seat of the wheelchair. The apparatus replaces an "iron lung" about the size of a large home freezer. With the aid of a nurse or attendant, the patient can leave the hospital or home and once more go on shopping trips or visit theaters and other places of entertainment.
Special Carriers Move Huge Girders

Prestressed concrete girders about 102 feet long, 11 feet high and each weighing 72 tons will be carried 30 miles to a building site. Master beam carriers have been designed to move them. Each girder is supported at either end above the carrier. Forty-two tires at each end help support the load.

He Fishes in Comfort

Ice fishing causes no hardships to Forest Throe of Burlington, Wis. Throe bought an old car and cut two holes under the back seat. When he arrives at the lake he chops holes in the ice, backs the car over them, removes the seat and fishes in comfort.

Tiny Bus Carries Five

Four children and a driver travel 20 miles per hour in a miniature bus, made by oil-company employees in the Persian Gulf. The vehicle has a 150-cubic-centimeter Piaggio engine and a four-speed gearbox with chain drive. The brake is hydraulic.
Huge "Docks" Shelter B-52 Bombers Undergoing Repairs

Portable "docks," costing $170,000 each, now are being used at Castle Air Force Base, Calif., to cover B-52 intercontinental bombers on which repairs are made. Individual docks are 190 feet long and 60 feet wide. The electrical power available at a dock is sufficient to light one full city block. Each dock weighs 350,000 pounds and can be broken into seven numbered sections for relocation.

Fight Atomic Fires With Special Gear

Firemen in Detroit, which has 55 plants and labs using atomic materials, now have special gear for fires involving radioactive materials: Geiger counter, self-contained oxygen mask, ionization tester, dosimeter and a transistorized Handie-Talkie set.

Homemade Flame Thrower Thaws Rail Switches

Frozen switches on a German railway are thawed with a flame thrower made from an insecticide sprayer, two-horsepower motor and ignited diesel oil. Fire spurs four feet at 950 degrees C. The unit uses 3 1/4 gallons of fuel hourly.
France Is Harnessing the Tides

By R. N. Hadden

Within the next decade, the world's first tidal-power station will start to supply electrical power to the people of France, thus realizing one of man's oldest dreams—harnessing the sea.

Plans for this huge power station are well advanced. It will be built on the estuary of the river Rance, where twice every day the tide rises and falls between 7 and 41 feet. When this power station is completed it will produce about 800,000,000 kilowatt hours a year, according to the French engineers who have been working on the project.

June 1957

How will this power station derive its energy from the tides? Simply by capturing the water behind the dam at high tide and then releasing it to turn the turbines. However, this is not quite as simple as it sounds as is evidenced by the diagrams on page 88.

The dam will be constructed across the estuary at a point where the distance from shore to shore is 700 yards. Turbines and generators will be located within the dam which will be 150 feet wide at the base. Giant sluice gates will be about 27,000 square feet in area.
RIVER RANCE
(SERVING AS BASIN)

LOCK ARRANGED TO ALLOW SMALL VESSELS AND FISHING CRAFT TO PASS AT CERTAIN PERIODS.

RAISING BRIDGE

FIVE SLUICES

NEW ROAD
This is how the tidal "harness" will operate: Shortly after low water the sluice gates will be opened. When the tide rises, water will rush through the gates and fill the channel above the dam. When the channel has been filled the sluice gates will be shut. The turbines will then be started up in reverse to act as pumps, the generators serving as motors. The power taken for this operation will be obtained from France's existing electrical network. More water will be pumped from the sea into the channel above the dam.

When the difference in level between the water behind the dam and the falling tide has increased to four feet, the pumping will be stopped. Three hours after high tide the turbines will again be started up, but this time to run as turbines. Electricity will then be fed into the country's power network. The turbines will continue to run until just after low tide when the levels below and above the dam will again be equal. The cycle will then be repeated, electricity being produced for 10 hours in every day.

The reason for the pumping operation may not be quite obvious at first. It has, however, been found from model tests, that the small amount of power absorbed in pumping, when the difference in water level is small, produces a much greater quantity of power when the same water flows through the turbines under a higher head caused by the falling tide. In other words, a small investment brings big dividends.

There is one apparent drawback to a tidal-power station if operated in this manner—its intermittent operation. This will not be a great difficulty in connection with the Rance plant because it will run in conjunction with a hydroelectric station. While the tidal station is shut down, the hydrostation will be running at a rate that would exhaust its water reservoir if its operation were to be continuous. When the tidal station is running, the hydrostation will be shut down—thus allowing water to accumulate in its reservoir.

The power station itself will be housed in a tunnel inside the dam. In order to preserve the beauty of the Breton vacation area, the top of the dam will be only a few feet above level of highest tides.

Several complex plans for the type and arrangement of turbines best suited to the situation have been considered and discarded by France's National Electricity Company. The present approved scheme calls for horizontal-axis turbines. This type permits using the units either as turbines or pumps. This offers many opportunities for choosing the best levels for greatest efficiency in operation.

The big advantage of a tidal-power station is that come what may, drought or fuel shortage, it will never lack water for its operation. Engineers say it will take about eight years to build the dam.
Mockup B-47 Nose "Flies" Around World

STUDENT NAVIGATORS in a mockup B-47 nose at Mather Air Force Base in California use a moving aerial photograph and an ultrasonic trainer to check their navigation on simulated flights around the world. They visually check the unrolling strip photograph of the ground until artificial weather obscures vision. Then they switch to a radar scanner. This ultrasonic trainer is electrically connected to a sound transceiver touching the surface of a nearby 38 by 11-foot tank of water. On the tank's floor is a relief model of the western coast of the United States. An ultrasonic sound head gives off high-frequency waves and echoes reflected to it from the underwater model are translated electrically into a typical radar picture, guaranteeing radar navigation for 1000 miles. The sound head moves across the tank with directional and speed settings made by the student to flight instruments.

JUNE 1957
Portable Detector
Speeds Up Prospecting

Powered by flashlight batteries, a portable electromagnetometer for prospecting metals is operated by two men simultaneously who can cover up to a five-mile line per day.

It was developed by Vaino Ronka of Toronto, Ontario, Can., patterned after the wartime mine detector.

Hunting for lead, zinc or copper, one man carries a receiver coil and equipment and the other a transmitter. They are connected by a 200-foot cable stretched taut between transmitter coil and receiver coil. In this way an electromagnetic field is set up between the coils and induces voltage to inform the prospectors when they pass over a metallic deposit.

"Flattop" Haircut
Measured Mechanically

Thomas Siemons of Wenatchee, Wash., is a barber who guarantees a perfectly level "flattop" cut. He uses a horizontal, swinging iron bracket equipped with two swivel-arms that hold a slanted clipper blade in level position. An adjustable vertical sleeve places the blade in the exact plane for a "flattop" haircut. With clipper attached to the blade, Siemons moves the apparatus in sweeping arcs to produce a haircut in five minutes less time than for the usual trim.

Chair Becomes Table

With a convertible backrest, a British tubular-steel chair has a dual function. Normally a lightweight straight chair, it becomes a chair-table combination when its plastic-covered backrest is flipped into a horizontal position.

Antibiotic Aids Crops

Duramycin is a new antibiotic compound to be used against diseases hampering bean, wheat and bluegrass crops. Named Duramycin because of its stability when subjected to heat, this antibiotic curbs growth of certain organisms and combats several yeasts and fungi, according to the U. S. Department of Agriculture.
Two dummies are rocket-ejected from a simulated-airplane sled traveling faster than the speed of sound

We Chase the Jets on Film

By Willis E. Harrison
Chief, Photographic Branch, Air Force Flight Test Center, Air Research and Development Command
As told to Thomas E. Stimson, Jr.

EMERGENCY LANDING! Emergency landing in 15 minutes! Get those cameras on the flight-line in a hurry!”

With this urgent command ringing in their ears, the four cameramen barely reached their stations at the edge of the runway when the crippled plane began its approach. It was an F-100 on a ferry flight and the pilot decided to land here at Edwards Air Force Base, Calif., upon discovering the nose wheel of his plane had not fully retracted.

We thought he would land on his main gear and roll out most of his momentum, then slowly settle onto the nose wheel.

But this didn’t happen. The pilot suddenly poured on full power, his nose pointed up, a wing hit the ground and the plane slammed over on its back, exploding in flames. He didn’t have a chance.

JUNE 1957
Rocket engine powers the supersonic sled. "Slippers" on each side grip the track rails during the run.

It happened so fast, to the human eye there was no telling what went wrong. But the movies would show us what happened. In addition to the four flight-line 16-mm. cameras shooting color at 700 frames per second, the accident was also covered by two space-position cameras on a hilltop four miles away. Projected at normal speed, these movies would stretch one second of time into half a minute on the screen. The accident could be analyzed foot by foot.

Films Tell Story

This is what they showed: The pilot made a normal approach and flare-out but at the last moment he decided to go around again. He snapped his throttle into afterburner for more power, then immediately cut it. He did this three times.

These enormous surges of thrust pushed...
his nose so high that the normal flow of air into the engine intake was reduced. A compressor stall occurred, causing a reverse flow of the flame. That ended it. In the motion pictures we could actually see the afterburner go into action three times, could see flame shooting from the intake when the engine lost its air.

It was apparent the pilot delayed too long his decision to go around again. We made extra prints of the film and sent them to all tactical units using the airplane so pilots would learn the importance of completing a landing once they were committed.

One of the main jobs of our photographic branch at Edwards is to make high-speed movies of routine events merely on the chance that something might go wrong. If nothing happens, hardly anyone bothers to view the film. But if there is an accident the experts gather in the projection room and run the film over and over. Often there is no other way of taking an accident apart and learning how it developed. Because of this photography designers are learning how to build better airplanes.

That's the reason we record every run made on our rocket-sled track. As many as 42 cameras have been used on a single test. Some are high-speed 16-mm. movie cameras shooting up to 8000 frames per second, others are 70-mm. outfits that make 50 sequence stills per second. Most of them are located on "camera row," 360 feet away from the track. The rest are mounted beside the track. They are tripped electrically by a cutter bar mounted on the sled.

This might have been disaster! High-speed photo catches rocket breaking from ejected dummy, helps analyze cause of the accident

Dummy's "brains" are in its chest, where complicated instruments relay information on what would happen to a man in the tests
Billows of rocket smoke indicate the supersonic speed of this test sled in a sequence of front-view photos showing how a rocket attached to the ejection seat of a lifelike dummy propels it from the sled's cockpit.

Any piece of gear, any part of an aircraft that needs testing can be mounted on a rocket sled and fired down the 10,000-foot track at speeds up to Mach 2, about 1500 miles per hour. Fantastic things happen at this brutal speed.

Once, a complete rocket sled broke away from the rails and became airborne. Observers said it flew like an airplane, but the high-speed movies revealed that it made a complete flip. The action happened so fast that no one could see it with the naked eye.

We've seen big rocket bottles rip loose from their mountings on a sled and take off in erratic, tumbling flight. They behave like a toy balloon that you blow up and release. There's no telling where they will go. One bounced across the ground three times and then roared over the head of a photographer.

To give you an idea of the speed of a rocket sled, if we place a camera at trackside one mile from the start and operate it at normal speed, only three feet of film will be exposed by the time the sled goes past.

Watching one of these supersonic runs is a unique experience. The rocket motor makes a tremendous roar. But it's absolutely silent approaching, for the sled is moving faster than Mach 1. There's a big crash when it goes by, a "close up" of the sonic boom you get from a supersonic airplane. The shock wave has a real punch and an inexperienced photographer is apt to duck.

The trackside cameras would be demolished if we left them unprotected. Each is encased in a box built of thick aluminum plates, with a glass port for the lens. Even this protection isn't always enough. The shock wave from a fast sled sometimes rips a camera box from its mounting and tosses it 30 feet away, popping all its rivets. We are now designing small armored block-houses for the cameras.

None of the photo staff has been hit by objects flying off a sled, although there have been a lot of near misses. Thick chunks of...
Plexiglas from shattered canopies and portions of ejection seats have slammed into the ground close by. Usually the photographers crouch in a ditch when a sled roars past, but on some occasions they must be stationed in the open.

They are top men, with split-second reflexes. Recently I assigned six of them to cover every aspect of a multiple-seat ejection from a sled that simulated the nose of a bomber. Three canopies would be jettisoned from the sled and three dummy pilots in ejection seats would shoot up into the air. At a safe altitude the seats would drop away and the dummies would descend by parachutes. The sled would be traveling 650 miles per hour.

One photographer was assigned to the first canopy, the next to the first dummy, and so on. Each would pick his own object as it left the sled and pan his camera to follow it to the ground. What made the assignment difficult is that at the moment of ejection, the air is suddenly filled with all kinds of debris. Shoes and helmets may be ripped off the dummies, and anything loose in the cockpit is whipped up into the air. It's hard to single out the object to be tracked. Nevertheless, each photographer did a perfect job.

Testing an experimental ejection apparatus is always spectacular. Quite often the test is a failure as far as the dummy is concerned. That's why sleds and dummies are used for studying a new idea and that's why high-speed pictures are made.

Most of the ejection studies today are concerned with escape from aircraft traveling 1000 miles per hour or faster. Eject a pilot traveling at these speeds and it's like

(Continued to page 228)
Machine Opens, Stuffs, Counts, Seals, Imprints, Stacks Mail

Handling 6000 mailing pieces hourly, a new machine can open and stuff envelopes, count, seal, imprint postage and stack mailings in a continuous operation. One worker can set up a job in minutes without a mechanic or toolkit. Minor adjustments are made by turning knobs, and a straight-line, self-centering feed eliminates alignment problems. Automatic signals prevent misfeeding. A detector forestalls jams, faulty insertions and mutilation of enclosures. Variable speed control makes difficult jobs possible through dialing of slower cycles. This machine can accommodate most envelopes, end-folded telephone and utility bills and items of different shapes.

14-Ton Truck Can Expand to Five Times Road Size

Starting with an inside area of 150 square feet, a 14-ton truck made of aluminum can expand in five minutes to 780 square feet—five times its on-the-road size. When a button is pushed, the truck’s sides move outward, while accordion-folded aluminum floors drop into place until an area large enough to seat 125 persons is available. With a trailer that can be drawn by any standard-truck power source, this vehicle’s potential uses range from a service vehicle for the armed forces to a mobile home.

Battleship Guns Become Test Chambers

Two United States battleship guns have been converted into high-pressure test chambers at the Navy Electronics Laboratory, San Diego, Calif. Sonar equipment, diving apparatus, and devices destined for deep-sea use will be tested. The guns are of 12 and 16-inch caliber. One third of each gun barrel was sawed off and a solid-fitting, watertight, airtight plug was machined for the “muzzle” end. The breech mechanism is reported ideal for insuring the chamber against leaks. An object to be tested is inserted in the gun barrel; the breech is closed and water pumped into the barrel to simulate a desired depth, controlled by gauges on the gun’s exterior.
Designed for the Handicapped

TO THOUSANDS OF DISABLED or partially disabled persons in Great Britain, the name of Emil A. Andre is synonymous with hope. Many of these people are polio patients, victims of accidents in the first stages of postoperative recovery or patients suffering from old-age ailments. Their common denominator is that each of these persons has limited use of the arms or legs. In his small plant at Tottenham near London, Andre makes devices to help these people eat, walk, exercise, play and meet everyday needs. Hospitals, such as St. Bartholomews in London and the Bristol Royal Infirmary, refer “problem cases” to Andre. For individual patients, he fashions working scale models, which he tests before completing the final product. A member of the British Red Cross Society, Andre has made a glassholder for the weak-in-arm, a “walker,” “walking skis” and a play table for the weak-in-leg.

Above, completely immobile patient rests on a three-in-one unit, which consists of a combination wheelchair, armchair and bed.

Right, young spastic patient finds her “walker” fun to use. This equipment provides support and allows leg movement.

Above, legs weak, a girl works at a play table with an attachment on the reverse side to keep her erect.

Below, “walking skis” promote normal gait in persons who have suffered the loss of leg functions.

Below, her hands still too weak to grasp a glass, this young girl gets her water by using an Andre-designed “glassholder.”
OWNERS REPORT:

HOW GOOD IS THE BUICK?

Owners say its best feature is its handling ease (47.0%), next comes its riding comfort (38.9%), third its styling (33.3%).

Owners complain most about poor gas mileage (20.1%), poor workmanship (14.5%), and body rattles (13.7%).

WHAT DO OWNERS THINK ABOUT INDUSTRY TRENDS?

Most of them approve. Only 12.3% register disapproval. Specifically, here’s how they feel about Buick’s design: 84.3% like its lowness; 79.7% like its length; 76.6% like its speed.

FOR MORE OF WHAT OWNERS SAY ABOUT BUICK READ THIS ARTICLE

Buick owners in 40 states (shaded on map at top of page) complain of poor gas mileage, praise handling
Owners Praise Handling, "Conservative" Styling

By Buick Owners

BUICK IS ALL NEW for 1957, but it’s unmistakably Buick. You have no difficulty identifying it because it retains much of its character from previous years. Whether this is desirable or not is a matter for argument. There are things to be said on both sides.

Among the Buick owners, there seems to be a strong feeling that certain makes have gone too far in styling. Of the Buick owners who rate exterior styling as the best-liked feature, 25 percent describe it as being "conservative" or "dignified" or use some similar term.

"I like the styling. Other cars look like rockets to me. I want a car that's down to earth."—Connecticut retired owner.

"It looks like an automobile and not like something that came from Mars."—New York sales manager.

"I like straight-line styling. No fantastic fins."—Ohio cafeteria worker.

"I like the nonradical style change. It keeps resale value up."—California pilot.

Owners also like the Buick's lowness, its front grille and open rear wheels.

"Car is built close to the road."—Ohio builder.

"I like the neat grille."—California telephone worker.

"Full-exposed rear wheels."—Colorado architect.

Among the least-liked exterior styling features are the three-piece rear window, the windshield shape, the front bumper and the rear-deck design.

"The three-piece rear window has good styling possibilities, but this is not the best that could be done with it. It leaks, too."—California pilot.

WHAT IS AN OWNERS REPORT?

Popular Mechanics sends questionnaires to 1000 owners of a different make of car each month. These owners are picked for us at random from coast to coast by an independent organization. The replies from owners are tabulated and compiled to provide readers with a summary of what the owners think of their new cars.

Next month's Owners Report will be on the 1957 Oldsmobile.
Evidence of why cars cost so much is Buick’s huge muffler system, shown in phantom. Cost of all parts of system: $100. Labor for installation is extra.

"Windshield curves too much, making it hard to get in and out the front seat."—Missouri sheet-metal worker.
"Front-bumper guards offer no protection."—California supervisor.
"Don’t like the lopped-off trunk."—Illinois technician.

**Best-Liked Features**

Topping the list of best-liked features among Buick owners is its handling ease. Second is riding comfort, third is exterior styling.

"I drive four miles to work each morning, back home at noon for lunch, back to work and home at night again. All in heavy city traffic. My Buick is a dream to handle. No stalling at stop lights, no sluggish starts."—Indiana drill-press operator.

"In rainy weather I have about a half mile of mud roads to drive over. It handles good on mud."—Oklahoma aircraft worker.
"Easy to handle in traffic."—Michigan engineer.

"The car is heavy enough for comfort on long trips."—Missouri superintendent.
"I am 71 years old and drive about 40,000 miles a year. I must have comfort and I find Buick affords it."—Maryland engineer.
"I like its dignified styling."—Connecticut salesman.

(Continued to page 218)

Special and Super dimensions are given on diagrams. The other models differ only by fractions of an inch.
The OWNERS' OPINION of the '57 BUICK

OVER-ALL RATING
Excellent  Average  Poor
60.9%  31.4%  7.7%

What should be changed?
Nothing at all  33.7%
Improve gas economy  9.2%
Better workmanship  9.3%
Easier to get in, out  6.0%
Better brakes  4.4%
Less horsepower  4.4%
3-piece rear window  4.0%

Best-Liked Features
Handling ease  47.0%
Riding comfort  39.9%
Exterior styling  33.3%
Power, performance  27.3%
Dynaflo  16.9%
Roadability  6.8%
Roominess  6.0%

Most-Frequent Complaints
No complaints at all  22.9%
Poor gas mileage  20.1%
Poor body assembly  14.6%
Body noises, rattles  13.7%
Hard to get in, out  11.8%
Brake troubles  9.2%
 Carburetor trouble  7.6%
Window fit, operation  7.2%

What Do Owners Think of Industry Trend in Auto Design?
Like current trend  83.1%
Don't like trend  12.3%
No answer  4.6%

BUICK SPECIAL

BUICK SUPER
An Engineer Analyzes the 1957 Buick

By Dale Kelly SAE, Registered Professional Engineer

MODEL TESTED: Special four-door hardtop with two-barrel carburetor, dual exhausts, Dynaflow transmission, power steering and power brakes. Wheel base: 122 inches. Tires: 7.60 by 15. Weight: 4410 pounds with gas tank half full (55 percent of this weight is on the front wheels, 45 percent on the rear).


ACCELERATION TIME FROM STANDING START IN SECONDS

<table>
<thead>
<tr>
<th>Time</th>
<th>0 to 20</th>
<th>0 to 40</th>
<th>0 to 60</th>
<th>0 to 80</th>
<th>1/4 mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition timed for regular gas (90 octane Research)</td>
<td>3.1</td>
<td>6.9</td>
<td>11.8</td>
<td>24.5</td>
<td>19.2</td>
</tr>
<tr>
<td>Ignition timed for premium gas (97 octane Research)</td>
<td>3.0</td>
<td>6.7</td>
<td>11.6</td>
<td>24.5</td>
<td>19.0</td>
</tr>
<tr>
<td>Ignition timed for super fuel (105 octane Research)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No improvement noted</td>
</tr>
</tbody>
</table>

FUEL ECONOMY IN MILES PER GALLON

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Steady 30 m.p.h.</th>
<th>Steady 50 m.p.h.</th>
<th>Steady 70 m.p.h.</th>
<th>Traffic Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition timed for regular gasoline (90 octane Research)</td>
<td>13.1</td>
<td>17.4</td>
<td>14.9</td>
<td>9.4</td>
</tr>
<tr>
<td>Ignition timed for premium gasoline (97 octane Research)</td>
<td>13.2</td>
<td>17.0</td>
<td>14.8</td>
<td>9.4</td>
</tr>
</tbody>
</table>

On the traffic route the car makes 10 full stops per mile and is driven fast enough to average 15 miles per hour.

ESTIMATED AVERAGE ANNUAL GASOLINE BILL: $189 for 10,000 miles.

SPEEDOMETER ERROR (Miles per hour)

<table>
<thead>
<tr>
<th>Speedometer speed</th>
<th>True speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.0 m.p.h.</td>
<td>29.5</td>
</tr>
<tr>
<td>50.0 m.p.h.</td>
<td>49.5</td>
</tr>
<tr>
<td>70.0 m.p.h.</td>
<td>69.5</td>
</tr>
</tbody>
</table>

ODOMETER ERROR

Odometer showed correct mileage within ½ of 1 percent.

DRIVER'S VISION (for an average driver—5 feet 9 inches tall)

Distance at which part of road in front of car could be seen (A in sketch) ........................................... 20 feet
Distance at which full width of road in front of car could be seen (B in sketch) ......................................... 25 feet

GROUND CLEARANCE (unloaded car)

Radius of worst dip that could be crossed (solid line) .................. 23.5 feet
Radius of worst hump that could be crossed (dotted line) .............. 20.0 feet
Deepest rut car could be driven ......................................... 6.9 inches
Curb clearance for door opening ......................................... 12.6 inches

MISCELLANEOUS

STEERING
Wheel turns from straight ahead to steer outside front wheel in a 100-foot-diameter circle: 0.65 turn Diameter of smallest circle within which wheels could complete a circle (curb-to-curb): 42 feet Diameter of smallest walled circle within which the entire car could complete a circle: 44.5 feet Steering-wheel turns, lock-to-lock: 4.0 turns Steering-wheel diameter: 17.5 inches

TRUNK CAPACITY
Number of standard cartons (1 cubic foot each) that could be packed into trunk: 11 cartons

CENTER OF GRAVITY (unloaded car)
Height of center of gravity: 21.5 inches

WATER RESISTANCE
Good. In splash-pan test, brakes and ignition were not affected and no water entered the body. In high-pressure car-wash test there was slight leakage at each of the doors, none in the trunk

OVER-ALL DIMENSIONS
Length: 208 in. Width: 75 in. Height: 60 in.

OBSERVATIONS
Buick has a full set of pointer-type gauges, preferred over warning lights by many motorists. However, only the speedometer has a proper numerical scale. Oil-pressure gauge, temperature indicator, and ammeter do not have any numbers at all. With engine running and battery low, the ammeter pointer, moving to extreme charge position, went completely out of sight. It indicated a slight charge when no current was flowing and read zero when radio alone was turned on.

Straight-line speedometer is novel, but because red line ends at an angle there is a three-miles-per-hour ambiguity, depending on whether it is read at the bottom, where the graduations are, or at the top, where the numbers are.

Buick is to be commended for providing an excellent jack and for building special jack points on the frame.


102

POPULAR MECHANICS
Test Driving the '57 Buick Special

By Floyd Clymer

THE TEST ROUTE was from Los Angeles to Yuma, Ariz., via San Diego, then along the U. S.-Mexican border, the Salton Sea (346 feet below sea level) over El Cajon Pass (4301-foot altitude) and back to Los Angeles—a total of 815 miles.

The two-door Special hardtop has the 250-horsepower engine of 364 cubic inches, the displacement used in all '57 Buicks.

There is minimum engine vibration. It has fast acceleration and pulling power. The speedometer hit 116 miles per hour on long open stretches, but it was optimistic by about eight percent.

The car is several inches lower than previous models. There is a solid feel to the body and stability has been improved. The center of weight has been lowered, which has improved the handling qualities. Wind noise at high speeds and body rumble have been reduced to a minimum.

There is, however, the same steering-wheel vibration that was noticeable in previous Buicks at above-average speeds over rough roads or pavement. This is caused by the rear-end unsprung weight of the torque-tube drive. The torque-tube drive does combine the rear axle and drive shaft into a rigid unit, which assures better rear-end alignment than Hotchkiss drive.

The car has an extremely soft ride but front-end "floating" is noticeable, with some roll on sharp corners. Nevertheless, the car is a good roadholder. I found roadability to be better than in previous Buicks tested. Coil springs on the rear give a soft ride but, with a loaded car or over sharp dips, there is a tendency to "bottom." However, rebound control is good.

Dynaflow no longer has the slippage or mushiness so evident on early models. The drive is positive enough to spin wheels on a dry pavement. The downshift is smooth and Low range provides excellent braking when descending steep hills. It has less "creep" than any transmission I have used.

I abused the brakes, both at high speeds and in the mountains. I have always felt that Buick brakes could be improved, and I haven't changed my mind, as there was some fading at high speeds.

The massive bumpers offer excellent protection. The rear bumper has openings at each end for the exhaust. This makes for dirty bumper ends—a no-good feature in my book. The gas-tank fill location is under a hinged lid in the center of the bumper, fine for fueling from either side.

Interior appointments are of high quality. Doors open and close easily. The instrument panel is new. Instruments are well arranged and located below a dull-finish cowl that has minimum reflection. The speedometer indicator is a horizontal ribbon in place of the customary needle. It has very little fluctuation. The new Safety Minder can, by means of a knob, be set to buzz when the car reaches any desired speed.

The heater is one of the best that I have ever used and heats quickly. The glove compartment is larger than average, with a lid that opens flat with indentations for four glasses—handy for drive-in eating.

Even though a full-circle horn ring is used, the speedometer view is unobstructed. I especially like the needle gauges for temperature, oil pressure and voltage. To me these are better than warning lights.

Another excellent feature is the location of the windshield-wiper control on the left side of the cowl ahead of the door.

All Buicks have some displacement. Horsepower differences are due to carburetion, compression ratios...
Lowly Cactus Starts Industry

Mescal cactus, once an unwanted plant, now is being processed into stuffing for car seats, cushions and carpet underpads by 85 workers in a modern factory at tiny Punto Colnett, Mexico. The workers at this $100,000 factory place severed cactus leaves on an endless belt (see photo at left) which carries them to a sorter for sizing, pressing between rollers and shredding. Fibers extracted are dried on racks (top photo), packed and shipped.

Zoo Vacuum Cleaner

Attendants use special vacuum cleaners to spruce up animals (left) at the zoo in Rome, Italy. Each cleaner has a suction brush that sucks dirt, dust and fleas from the fur of such beasts as the tapir at left.

Will Borazon Replace Diamonds?

Borazon crystals scratch diamonds and stay hard in temperatures at which diamonds burn. Officially named “cubic boron nitride,” each colored grain is about as hard as a diamond and withstands 3500 degrees F., while a diamond burns at 1600 degrees F. Borazon’s resistance to oxidation will make possible superior methods of mounting stones in industrial tools and may allow bits and wheels to be operated at higher speeds, according to General Electric Co., developer of borazon. Methods similar to those used in producing manmade diamonds were employed to make borazon.
Bomber Carries Detachable Pod to Provide for Various Missions

Detachable pods carried under the fuselage of the B-58 Hustler, America's first supersonic bomber, will enable this plane to perform a greater variety of missions, U.S. Air Force officials report. The Hustler has been designed to carry such pods, which are kept off the runway by the aircraft's stilt-like landing gear.

Ultrasonics Rip Cells

Sound waves, made to vibrate at 400,000 cycles per second, break apart disease-causing microbes in making vaccines. Dr. Giulio Bosco, University of Chicago scientist, isolates internal-cell material by operating a 2000-volt generator. The exposed cell body is processed for vaccines.

Hearing Aid Helps Surgeons

Transistorized hearing aids now are saving the lives of surgical patients. A microphone from the hearing-aid amplifier is placed inside the anesthesia breathing circuit. The sound of the patient's breathing then goes to an earphone, and the surgeon has a check on the patient's respiration.

Two-Million-Volt X Ray

Navy Ordnance engineers use a two-million-volt X-ray machine at Port Chicago, Calif., to inspect defense materiel. The machine, the largest west of the Alleghenies, is housed in a huge concrete building with a 66-ton door to shield radiation "scatter."
"Shot in the Arm" Balances Wheels

By Martin McAfee

How do you make a wheel balance itself? It’s a problem that has plagued the auto industry for years.

Now a Texas company claims to have solved the problem. It makes any wheel self-balancing simply by adding about 13 ounces of steel shot and some ethylene glycol to form an automatic balancer. The shot and the liquid in which it is suspended is retained in a welded channel around the drop center of the wheel. When a heavy spot develops in the tire or wheel putting the wheel out of balance, some of the shot is automatically thrown to the...
lighter side, counterbalancing the heaviness. Centrifugal force does the work, and the driver is unaware that the operation is taking place.

It's as simple as that, say the officials of the Self-Balancing Wheel Corporation, Perryton, Tex.

Only enough shot to counterbalance the heaviness moves to the lighter side. The remainder of this shot stays scattered around the channel awaiting a chance to correct subsequent imbalance.

The principle of the self-balancing wheel is not something new. But previous designs have usually involved circular tubes containing shot. These often became troublesome because they were easily damaged or knocked out of round. The channel must remain exactly centered around the wheel hub. Otherwise, the shot contributes to the imbalance.

For this reason the first and most important step in the production is the cutting of a precise groove a quarter inch above the bottom of the drop center. The loss of this small amount of drop-center depth interferes only slightly with mounting tires.

Major problem in mass-producing such a wheel is the accurate placement and welding of the steel band that forms the top side of the channel. This is done on a machine especially designed for the job. Then the liquid and shot are metered into the channel and the opening sealed.

The ethylene-glycol liquid is used to dampen noise and reduce wear on the shot. At speeds of under five miles per hour, there is a slight rustle as the shot moves around in the channel. Above that speed the shot is held to the outer surface of the channel.
Lightweight Passenger Car Has Plastic Interior

With a gleaming skin of stainless steel, a new railway car has the lightest weight per passenger of any car ever built in this country. The car, built by Budd, meets all the strength and safety requirements of the Association of American Railroads. It weighs only 595 pounds for each of the 88 passengers it will accommodate, compared with 1678 pounds per passenger for a conventional car. Virtually the entire interior is plastic, including plastic seats, wall panels, ceiling and baggage racks.

Fuel Source in Pond Algae

Converting energy from the sun into methane gas has been achieved on a small scale by University of California scientists. The gas, a basic component of motor fuels, is formed when bacteria attack dead pond algae in the absence of oxygen. The plants store energy from the sun while growing.

Reel-and-Rotary Power Lawn Mower Introduced

Features of rotary and reel-type lawn mowers are now in one unit. Powered by a 2¾-horsepower gasoline engine, the mower cuts down rough growth in a 20-inch rotary swath, after which the 18-inch reel smooths and shapes the lawn. Cutting-height controls are on the mower wheels to vary the degree of cutting. Clutching is automatic through throttle control on the handle. The rotary attachment is removed by pulling out two pins and slipping off the V-belt blade drive.
Homemade Automatic Sprinkler Stops When Rain Falls

When there's insufficient rainfall for Bert Scriver's lawn in Ft. Lauderdale, Fla., his homemade automatic sprinkling system takes over. He made a rainfall gauge out of a tin can. If rainfall is more than one quarter inch, the weight of the water in the tin tilts a control arm to disconnect the system. Otherwise, a time clock activates a solenoid valve inside a \( \frac{3}{8} \)-inch water line, and triggers a hydraulic valve in the main water line from which the sprinkler system operates. Normal evaporation of water from the tin-can gauge resets the system.

Telephone Receiver Amplifier Can Be Carried in Pocket

Voice volume received by telephone can be amplified for the hard of hearing, for persons working in a noisy location and for those making rural or long-distance calls. A new portable amplifier clips over the receiver. With a plastic housing that has much the same contour as the telephone receiver it covers, this amplifier weighs only three ounces and can be carried in the pocket. This apparatus has been designed with printed circuits, transistor amplifier and tiny batteries which may be conserved by turning off a volume-control switch when the amplifier is not in use. Volume can be adjusted by finger-tip control. The amplifier also cuts out room noise.

British 1000-Mile-Per-Hour Jet Fighter Has Two Powerful Engines

Britain's Electric P1A prototype fighter plane has flown 1000 miles per hour in level flight and can fly 1500 miles per hour. Razor-thin, sweptback wings and tail have ailerons on trailing edges. The production model will stack two Rolls-Royce Avon jet engines vertically in the fuselage with an air intake in the nose. They will replace the Hunter and Javelin as all-weather fighters for squadron duty with the RAF.
Like to try your hand at voodoo, jazz or chamber music on an assortment of antique instruments?
Drop in on this

Musical Museum

By John Franchey
Photos by George W. Walter

Arthur Sanders, son of museum's founder, inspects an orchestration which duplicates a 12-piece band

Visitor tries out a tune on a dulcimer, built in 1860. Instrument is an ancestor of the present-day piano

EVER VISIT a museum and wish you could touch or get a better look at the rare objects on display?
There's one in New York State where visitors can do just that and more. They not only can see over 500 antique musical instruments and player devices of every description, all in working order, but they can play them as well.
The museum is a hobby turned full-time activity for a retired automobile mechanic, Hardie Sanders of Deansboro, N. Y., which is about 14 miles south of Utica. In a building near his home where he formerly operated his own business, Sanders has collected a fabulous assortment of priceless old instruments, from harmoniums to melodeons to all types of mechanical marvels.

Visitor Has Wide Choice

Depending on his whim of the moment, the visitor can try a tune on a 17th Century virginal, which is a small spinet, have a go with mallets at an 1860 dulcimer, an ancestor of the piano, or tap out a roundelay on a harpsichord built in 1547.
If he's percussion-minded, he can do a solo stint on such diverse instruments as African voodoo drums, Chinese gongs,
Javanese bells, Malayan cymbals or American tambourines dating back to the California gold-rush days of 1849.

Or if his tastes are on the loud and rugged side, the visitor can blast out a chorus on a pre-World War I pipe organ once used at spiritualist meetings, or make the neighborhood dogs howl by a brief turn on a calliope that can be heard two miles away.

**Automatic Musicians**

There are scores of other manual instruments in Sanders' museum. And while they are popular, the center of interest is an array of automatic musicians that were ingenious in their day—and still are.

Typical of these is a 1915 Seeburg nickelodeon, the grandfather of today's jukebox. It plays tunes using bass and snare drums, cymbals and castanets, to name a few.

Another is the Mills Violano Virtuoso, probably the first mechanical musician to be powered by electricity and once called "The Eighth Wonder of the World." Originally costing $6000 around 1912, it plays piano and violin duets with steel fingers plucking out the melody on the violin. The museum has five of these rare collector's items, including two with a pair of violins.

Among the dozens of other mechanical marvels is a Deegan Una-Pon which is powered by a storage battery and plays tunes on 32 bells, and a Wurlitzer military-band organ complete with rows of cornets and drums. The museum also features several foreign street pianos from such countries as Italy, France and Turkey.

A pair of youthful instrumentalists try a duet with an old-fashioned slide trumpet, shown at left, and an unusual Italian serpentine horn.

This is a DuKleist military-band organ used on a merry-go-round about 1898. It has to be hand-cranked. Note array of horns in the front opening.
Sanders’ curious hobby started 20 years ago when he bought a music box that wouldn’t work. Being a master mechanic, he tinkered with it in his spare time until he fixed it. This interested him so much that, for a man who worked all day tuning motors, he turned to collecting and tuning old musical instruments and player devices as a relaxing hobby.

Since then Sanders has gradually added to his collection, all requiring repairs and some, particularly the self-playing type, needing extensive work.

**Couldn’t Get Parts**

The manufacturers of these marvels of music automation have either gone out of business or changed to other lines of products, making it impossible to obtain vitally needed parts. So Sanders has to make his own parts and often special tools as well. Some of this work turned out better than the originals, Sanders claims with a true craftsman’s pride.

At first Sanders kept his collection in his home. But then his son, Arthur, joined him in his hobby and it wasn’t long before they had music boxes and melodeons under all the beds, harps and pipe organs stacked in the hallways, and assorted pianos, melo-harps and nickelodeons strewn all over the living room.

By 1951 the restored musical antiques were so numerous that they were crowding the family out of house and home. So, Mrs. Sanders made a suggestion.

**Museum in Garage**

Since the doctor had ordered Sanders to retire anyway, why not convert the automobile-repair garage into a musical museum and open it to the public? This was done and it has been a tremendous success ever since.

Sanders travels throughout the country seeking additions to his collection, which has increased from its original 150 instruments to more than 500 today. And he has obtained them in the most unusual places and often in terrible condition.

For example, his orchestrion, an extremely versatile and complicated automatic that duplicates a 12-piece band, was located in a small Pennsylvania coal-mining town. The cabinet had been chopped up for firewood and the innards were a maze and filled with dust. Three months of intensive work were required to restore it.

And what are Sanders’ plans for the future of his museum? Nothing more, he says than to keep it the kind of a place where both children and grandparents can have fun exploring musical instruments of a bygone era that are a part of our cultural heritage.
Seats for 150,000—None Behind a Post

FOUR FOOTBALL GAMES could be played at the same time in the arena of Olympic City, $57,000,000 aluminum-canopied sports and convention palace planned for the New York City area.

Dubbed the "world's largest room," its 250-foot-high ceiling will span 34.7 acres without a single supporting post to block a spectator's view. The building will contain an estimated 228,312,000 cubic feet of space. Seating capacity will be 150,000.

Architects designed the roof as a "series of hyperbolic paraboloids," using plates of aluminum welded together and stiffened at the connecting ridges with extrusions. This design is expected to give the strength needed to span a width of 1080 feet and to withstand the usual snow and wind loads.

Roof of structure will reach height of a 25-story building. Weight load will be directed to foundation via walls at edge

At uppermost level of Olympic City clubhouse will be a promenade-restaurant with accommodations for 1000

JUNE 1957
New Tools for Grooming Your Lawn

ROTARY POWER MOWER with a 32-inch cut and a motor of only 2½ horsepower is made possible by using three individual overlapping blades (see bottom-view diagram). The two smaller blades are belt-driven by the direct-drive center blade.

Goodall Mfg. Corp., Warrensburg, Mo.

SPRINKLER CADDY attaches to a garden hose and provides mobility, controlled watering and may be changed without getting shoes or clothing wet. It can also be used as a sprinkler for children. The entire unit folds flat for storage.

Clark Metals Co., Denver 2, Colo.
RIDING POWER MOWER will grade and seed a lawn, cut the grass, pull loads up to 1000 pounds and do a variety of other chores. Pneumatic rear tires provide maximum traction, while an automotive-type differential reduces lawn gouging.

Porter-Cable Machine Co., Syracuse 8, N. Y.

CUTTING HEIGHT is changed on this power mower by a simple lever that adjusts all four wheels simultaneously. Squeezing the lever releases it for a new setting in a matter of seconds, and when released it locks into place again.

Huffman Mfg. Co., Dayton 1, Ohio

DISPOSABLE ROTO-FERTILIZER is an easy way to feed the lawn. Slip the outer cover off, attach the metal handle and roll the perforated cylinder which releases the right amount of fertilizer evenly over the grass. And, the fertilizer is mint scented.

Forward House Div., Ohio Malathion Chemical Corp., 745 Fifth Ave., New York City 22

LIQUID SPRAYER assures an even distribution of lawn chemicals. The hose pump operates on a one-wheel drive. As the wheel turns, rollers move along the hose and forces the solution out in a fine constant spray through a clogproof nozzle.

O. E. Pinck Co., Clifton, N. J.

JUNE 1957
Experimental Missile Fired "Backward"

Rearward-launched guided missiles can be fired by high-speed U. S. bombers at attacking interceptor aircraft. This missile system, first developed for the U. S. Air Force by Cornell Aeronautical Laboratory, Buffalo, N. Y., has been tested successfully on rocket-propelled sleds at the Holloman Air Force Base, N. Mex.

Hercules Transport "Flies" Underwater

Skin divers are helping aeronautical engineers, equipped with TV cameras, fatigue-test an aircraft submerged in a 270,000-gallon tank of water at Marietta, Ga. The 62-ton C-130 military propjet plane will make 20,000 pressurized underwater "flights."
Flight Suit With Built-in Gear Developed for Skyhawk Pilots

Pilots for the Navy's A4D Skyhawk midget attack bomber wear a new lightweight flight suit. In one garment are: A life jacket, parachute harness, seat belt, shoulder strap and oxygen gear. On ejection, a timing device opens the chute.

Ten-Story Mobile Tower Aids Missile Maintenance

Servicing of guided missiles prior to firing at Patrick Air Force Base, Orlando, Fla., is to be made easier by a 120-foot tower that moves under its own power along railroad tracks. The tower weighs 340,000 pounds, has a base span of 24 feet and can be lowered on a giant hinge in order to escape hurricane winds.

Basis of Life Created in Test Tube

Scientists have taken an important step toward the creation of life in a test tube. An international group of scientists has synthesized ribonucleic acid, the energypacked cell material that manufactures protein. The laboratory-created molecules appear to be identical to natural ones, or at least very similar, and to behave in much the same way in laboratory tests.

F-51 Becomes Museum Piece

Retirement recently of the last North American F-51 Mustang to the Air Force Central Museum at Wright-Patterson Air Force Base, Ohio, marked the end of propeller-driven fighter aircraft in the U.S. Air Force.

JUNE 1957 117
Ross McKenney, center, shows students split sapling which he bent over knee and will form into snowshoe

Graduate of the Maine woods, Ross McKenney learned enough from the Indians and from his battles with Nature to become Dartmouth’s

Professor of the

By William Gilman

Photos by Eleanor Gilman

Rabbit snare is wire loop on the end of a heavy pole balanced over forked stick and under peg in tree
TO THE ORDINARY PERSON lost and hungry in the woods, perhaps facing starvation, a rabbit bounding safely away among the trees can be sadly frustrating. That's where Ross McKenney, expert in getting out of trouble in the forest, is different. He'd get that rabbit for his supper.

Where fancier sports gear fails, the do-it-yourself survival technique of this master woodsman takes over. He'd have the rabbit come back. And he'd snare it with whatever he had handy—shoelace or threads unravelled from his sweater or a piece of tree bark.

Such are the tricks which McKenney teaches at Dartmouth, where he is America's only college coach in bait and bullet, cabin and trail. One of our few remaining woodsmen of the genuine old school, his university was the deep Maine woods.

Tenderfeet Get into Trouble

Forests have much to teach in these outdoor-living days of camping and hunting, when the tenderfoot can stray into serious trouble. But where the tenderfoot feels only lonely wilderness around him, McKenney's alert eyes see a supply house filled with the simplest materials imaginable for easing an ordeal or saving a life.

For example, tree bark can meet an emergency after another. It will kindle a warming fire and tie poles for a night's shelter. Lapped sheets will give a "shingled" roof against rain. Bark will wrap leaves or moss around a wound, bind sapling splints about a broken leg, tie improvised snowshoes or make an emergency stretcher for transporting an injured companion. Bark binds sticks into a cagelike fish trap or can be made into a cup for heating water.

This kind of education may seem remote from Latin, literature and logarithms, but along with being in the Ivy League, Dartmouth has a strong North Country flavor. That is why 18 years ago it created a new job called "outdoor technician" and asked McKenney to take it.

His main duty is coaching woods-and-stream activities of the famed Dartmouth Outing Club at this New Hampshire school whose students attend our only college with an arctic research center. Dartmouth owns summits such as Mount Washington and a 26,000-acre wilderness for use as a proving ground by budding geologists and explorers. DOC rescue teams, frequently called on to hunt crashed airplanes and lost persons, are made up of two first-aid men, two rock-climbers and two woodsmen.

"Workshop" Is the Outdoors

On campus McKenney has a basement workshop, where the only power tool is a motorized grindstone for sharpening such favorite instruments as his trail ax or his unusual "whittling tool" made from an old hayrake tooth. In this basement,
he builds skis, snowshoes, canoe paddles and the like. His main workshop is the outdoors where he teaches the "little things" that make a crafty woodsman. His young trailmates look on him as somewhat of a cross between Deerslayer and Hiawatha.

Incidentally, it was from serious Johnny Neptune, a Penobscot Indian chieftain, that McKenney learned many of his stock of survival tricks like getting that rabbit if you've missed him with your gun, or if you don't have a gun. In a few minutes you can rig up a snare. It's easiest if you have in your pocket a coil of copper wire. With wire a slip-knot loop can be made quickly. Otherwise, a bootlace or strand of tree bark or sweater threads will do the trick just as effectively.

**Keep off the Rabbit's Tracks**

Choose a tree alongside the route which the rabbit took, but keep off the hare's tracks. A heavy pole is poised across a forked stick. The lightweight end of the pole is held down by a peg driven in several feet up the tree trunk. The snare's loop dangles from the pole tip. When the rabbit runs into the loop, dislodging the pole tip from the peg, the heavyweight pole end drops and the snared animal is raised.

**McKenney "Outfoxes" Rabbit**

Without bait the snare might stay empty a long time, but McKenney knows a rabbit habit. In flight, it halts at the nearest thicket. By circling around, then hollering, you can start the rabbit running again. But this time it bolts straight down its previous tracks and runs its head into the loop suspended there, even if someone stands only several feet off to one side of the rabbit trail.

Besides this tip-up snare, there are various deadfall traps using bait. Here, a pole's heavy end or a rock drops on the animal after it has dislodged a trigger pin whittled out of wood. This trap can be set up in a tree to catch climbers or in water to get animals such as the muskrat.

Drinking water also can be an emergency...
item, especially if it happens to be tantalizingly out of reach in a stream or pool; or perhaps you're too exhausted or have had an accident and can't get down to the water.

Bark on the common white birch tree peels easily. Cut a round sheet of it six inches in diameter. Fold this in half; then fold the bark again. Open the bark like a chemist's filter paper and you have a conical drinking cup. Split the tip of a stick and insert the cup's folded side in the slit, and you have a handy dipper the handle of which can be several feet long. Additional layers of bark make the cup sturdier. Two handles prevent its getting limp; when warmed carefully over a fire, you can boil water in this container. Yet, McKenney will show you there's no better emergency kindling for a fire; a match flame applied strongly to "green" birch bark causes a quick flare-up.

Shelter and Warmth

A big survival item is providing yourself with night shelter and warmth to restore your energy and avoid dangerous wandering in the dark. "A nice overhanging ledge is fine," says McKenney, "but they don't often come when you want one. I've seen too many victims of walking too late. When a fellow knows he's lost, an hour before sundown is none too soon to start putting up that shelter and dragging in windfall stuff for an all-night fire."

McKenney's experienced eyes can spot a suitable shelter site almost anywhere. The lean-to structure can be a pair of forked uprights with crossbar over the forks to support the leaning roof poles which are then covered with tree boughs or birch bark to keep out rain.

You can pull down the top of a young tree, lash it to a ground post and have a fine arch against which to set poles. A lodged tree fallen against another is also ideal "backbone" for a lean-to. A log lying on the ground or an ordinary standing tree will do when poles are poised at an angle on them. For the tree you whittle wooden pegs which you pound into its trunk; driven slightly downward with the grain, the pegs penetrate. Poles leaned against these pegs form a wigwam-shaped shelter.

Heating Tips

Heatingwise, if your fire is built at the base of a tree, a natural draft will pull smoke up. If there are several persons, rather than making a wide sleeping shelter, erect two narrower ones face to face; fire between them makes for easier heating. In winter dig down to ground level for your fire and shelter; walls of the snow trench will make you more snug.

One must item is waterproof matches, either the purchased kind or the type made by wrapping ordinary matches in paper and dipping the package in melted paraffin. The other must is your cutting tool—a belt ax preferably, but at least a jackknife.
Fish trap made of sticks and tree bark is placed in stream below pool. Dammed stream steers fish to trap

Survival also means finding your way back to civilization. In case of a deep snowstorm McKenney builds his own snowshoes to carry him lightly over icy surfaces. For material his first choice is the ash tree—a lightweight wood, easy to work. He cuts a four-inch sapling and splits it lengthways into four quarters. To prevent warping he removes most of the heartwood. He now has lumber for the snowshoe frame.

Remaining work consists of slowly bending such a strip over your knee to give it snowshoe shape; if soaked in water first, the wood will bend more readily. It is slotted toward front and back; in the slots a wooden toe and heel bar are inserted; then the tail end is tied together permanently. Netting is now strung across with a basket weave, as in darning. For this filling, thongs would be fine, but tree bark will do. Use tough, inner bark that has been cut into strips and braided for extra strength.

Trees such as elm, basswood and ash are best for bark removal. In spring's sap-run time the bark peels off easily in big sheets. Later, when the bark is tighter, you peel more carefully, as you pry with your knife. When bark is very tight in winter, first pound the tree with a club or simply whistle strips of bark from the trunk.

**Thongs From Animal Skin**

An expert woodsman isn't limited to tree bark, when he needs material for rope. From the skin of an animal, McKenney easily makes rawhide thongs. After scraping the hide, he slices it into thong strips. Drawing them through a ⅛-inch hole shapes them nicely.

McKenney's neatest trick for making emergency thong involves his leather boot. First, he cuts off a circular strip. Then, he whittles a notch at the end of a small piece of wood. The notch is as deep as the leather's
Above, chopped sapling serves as splint with padding of birch-bark sheets for "injured" Dartmouth student.

Thickness and as long as the thong is to be wide. The leather is laid on a flat piece of wood with the notch held firmly over its edge and the point of a jackknife jabbed into the wood at a slight slant. Simply by pulling on the leather's end—as in ripping a ribbon of cloth—the leather unwinds into a long thong.

With such a selection of emergency binding materials, McKenney points out that it's easy to create equipment in the woods in case your companion is injured.

"Of course, if he's big and you're a little (Continued to page 216)

Rock deadfall trap, above, and tree deadfall, below, both operate on principle of animal dislodging trigger.
FOR THE
HOBBYIST...

BUILD A CITY in your spare time. Prefabricated parts of skyscrapers and bridges interlock to form strong, realistic models. The set consists of plastic sections of various shapes which can be combined to form models of real buildings such as New York's Empire State Building and Chicago's Tribune Tower.

Elsom Products Co., 3610 Touhy Ave., Chicago 45

TILE KIT duplicates appearance of ceramic tile but actually consists of small squares of vinyl tile. Odd-shaped tiles are easily made by trimming with scissors. Tile cement is spread over object such as a wooden bowl, and tiles pressed into place. Tile mortar then is used to fill and seal cracks.

MODEL ENGINE for a new plane kit has several innovations. Instead of twirling the propeller, you pull a cord to start the engine, like pulling the rope of an outboard motor. The plane has two sets of controls (above). One set makes model climb or dive, the other is connected to a new control on engine which enables the young aviator to slow it down or speed it up. Previously, such model planes flew at constant speed.

FURRY SQUIRREL, approximately full size, comes to life in another kit. The kit has 12 preshaped plastic parts which are cemented together to form the animal. Flocking then is applied to give the squirrel a furry appearance. Whiskers and green-tinted eyes complete the project.

PORTABLE RADIO complete with six transistors can be built from another kit. Small battery no larger than a flashlight battery powers the transistorized circuit. Instructions include easily understood diagrams so even a novice can assemble the radio. Kits are also available for building smaller transistorized radios. Hearing-aid plug takes place of speaker.
Seagoing Trucks for Alaska

By Edward A. Herron

Conveying supplies to Alaska quickly and safely has been a problem since gold-rush days almost 60 years ago. Seagoing "truck convoys" may be the answer. These consist of a fleet of ocean-going tugs that move in a perpetual circle between Seattle and Anchorage; behind each tug is a 204-foot barge crowded with refrigerated trailer units. At Alaska Freight Lines' pier in Seattle, cranes lift loaded vans aboard barges for the 10.7-miles-per-hour, 5-day voyage. Self-contained generator units on each barge continuously refrigerate perishables. Arriving at Anchorage or Seward, vans are hauled by diesel trucks to destinations.

Bargeload of trailer units is towed through Puget Sound toward Port of Anchorage 2000 miles away.
Most of the tugs and barges are able to make the trip between Seattle and Anchorage (at 10.7 m.p.h.) in less than a week.

Below, dock facilities are maintained at Anchorage in the summer and at Seward to the south for wintertime barge deliveries.

Right, 60 heavy-duty, diesel-powered trucks haul cargo up to docks at Seattle and from docks at Seward and Anchorage.
Globemaster Hauls Two 36-Foot Trailer Homes to Greenland

Two special 36-foot-long cold-weather trailers are loaded into a C-124 Globemaster for delivery in Greenland. The trailers will be office and home for the men who operate one of the Air Force’s distant early-warning line of radar sites which stretch across the frozen regions of North America. They are specially insulated against cold weather and equipped with vaporproof lights.

Push-Button Control Operates Distant Factory

Industrial processes can be measured and monitored by remote-control apparatus hundreds of miles from the actual production site. When requested by a supervisor at the control point, the temperatures, pressures or other data necessary in storage tanks and manufacturing techniques are adjusted and reported. A receiver indicator, remotely operated by a supervisor, “calls” the tank or work site with signals over ordinary telegraph circuits, telephone lines, VHF and microwave radio bands. Apparatus at the production area converts data requested into a return signal for the receiver indicator.

Left, supervisor operates remote-control receiver indicator in “calling” for position of tank float. Device by tank’s side converts data into return signal.
Slotted Surfboard
Gives “Feel” of Water Skis
There’s a new thrill in water sports—a board that combines the features of a surfboard and water skis. The board, shaped much like a surfboard, has a U-shaped slot in the rear, leaving two sections about the width of water skis. The flexibility of these sections gives the “feel” of water skis, yet the board is easier for a beginner to master than a pair of skis.

Tailor-Made Antibiotics
Can microorganisms be crossbred? That is the hope of scientists at Rutgers Institute of Microbiology. They are studying microorganisms’ reproduction methods in the hope that tailor-made antibiotics can be developed.

Weight “Heard”
On Scales for Blind
Electronic scales enable blind workers to “hear” the weight of small-lot items to be packaged. Wired to a three-tone speaker, a two-arm scale produces one sound for underweight, another tone for overweight, and a third sound for correct weight. A blind worker places a container with the exact number of items to be packaged on one scale arm; into an empty container on the other scale arm, he drops items until the scale tone tells him the arms are balanced and the container has enough units.

Russian Jet Race Car
Hits 185 Miles Per Hour
Strictly experimental, a jet racing car built by the Gorky Motor Works in Russia has been successfully tested, according to press stories. The jet car is driven by jet thrust alone, there being no linkage between the wheels and the kerosene-burning jet engine. Thus no gearbox is needed.
SUBMARINE LUMBERMAN

By Ken Metzler

DEE McVAY, ex-Navy diver, heard that Oregon's State Game Commission was seeking an economical way to clear the mountainous stacks of logs and stumps that cluttered the shores of a tiny lake on the coast.

If so much wood clogged the shores, McVay reasoned, there must be wood on the bottom, too.

As a result of this curiosity, today he's in business diving for logs to help fill the high demand for lumber.

Back in 1954 McVay slipped beneath the waves of Eel Lake in the first of a series of underwater explorations. There, in jumbled abandon, he found hundreds of logs representing 10 million board feet of lumber.

This began one of the most unusual logging operations in the annals of American forestry. So far, McVay and his five-man crew have raised a million board feet of submerged logs from the depths of the lake.

The logs are an accumulation of timber cast off from reckless logging operations of 20 to 45 years ago. These loggers literally stripped the coastal foothills of old-growth timber. The logs were shoved into the lake, where they eventually sank to the bottom.

Storms Also Contributed

To a lesser extent, gales whipping landward from the Pacific contributed to this massive collection. Through many centuries, giant Douglas firs, cedars and spruces succumbed to the ravages of coastal weather and toppled into the lake.

From the murky, muddy lake bottom, McVay brings up logs he estimates blew into the water about the time the Mayflower was being rigged to sail westward with the Pilgrims. The water has preserved them remarkably well, according to McVay, and the lumber is as sound as if the trees had been chopped down only yesterday. He said the lumber goes to market with that of recent vintage, and no one can tell any difference between the two.

The techniques used by these deep-water lumberjacks would probably astound some of their traditional ax-and-power-saw contemporaries. Working from a raft, McVay or one of his divers descends into the inky blackness of water 40 to 50 feet deep. He "fells" a log by attaching a large deflated canvas bag or buoy at each end.

Air is then pumped into the bags and, as the diver cries "Timber!" over the two-way telephone, the log begins rising to the surface. Inflated, these canvas bags can bring up logs weighing as much as two tons.

Logs thus "harvested" are towed to shore, sawed into convenient lengths for handling and fed into an adjacent sawmill. The rough-cut lumber from this mill is trucked to another mill for finishing.

In this highly specialized type of logging, no one worries about falling trees or forest fires. Logs rising out of control, however, are a serious threat to both the diver and the men on the raft above. And there are probably no other woodsmen who have to worry about getting their air lines fouled.

Project Aids Conservation

Despite these differences, both accomplish the same basic purpose of providing lumber for a construction-hungry nation. But equally important in McVay's project are the conservation aspects.

Eel Lake rests placidly beneath the foothills of the Western coastal mountains in
a setting of young trees. Oregon's Game Commission, anxious to revive it as a fishing and recreation lake, gave McVay underwater-salvage rights in return for clearing the shores.

Not Getting Rich

McVay admits he isn't exactly getting rich from his underwater logging operation, but he finds the work very interesting and he is familiar with the work since he's been diving for years.

His previous salvage-diving work sent him to the bottoms of sawmill storage ponds to recover sunken logs. He also has helped remove automobiles from torrential streams.

Once he spent many nerve-racking hours beneath the surface of a raging flood in Iowa, patching up dikes that threatened to wash out at a moment's notice.

Spider Shares Helmet

But his most hectic time in a diving suit occurred the day a spider somehow got inside his helmet.

"The darned thing started building his web," McVay recalled, "from my nose to my eyebrows and there wasn't a thing I could do about it. He was still at it when I came up two hours later. It was the worst time I've ever had."
Russian Volga Is Clutchless

Ruggedly built for the rough roads of Russia, the new Volga has that country's first automatic transmission. It is a conventional torque converter with a three-speed gearbox. The 150-cubic-inch engine is a four-cylinder model of 70 horsepower. Top speed of the Volga is said to be about 80 miles per hour.

Pocket Calculator Easy to Operate

You can write with one hand, while the other is operating an automatic calculating device. Made of aluminum, this instrument is three inches in diameter and weighs one ounce with case. The circular calculator does multiplication, division, exchange rates, currency calculations, percentages, squares, cubes and other problems. The device is said to have the performance of a 10-inch slide rule. Instructions accompanying the device furnish all knowledge necessary to operate the unit.

Streamlined Cycle Looks Like Scooter

It looks like a motor scooter, but it's really a streamlined body shell that can be clipped to any motorcycle. Made of plastic, the shell was designed as a prototype by staff members of the British magazine The Motor Cycle. Tests show that a motorcycle equipped with the body gets up to 35 percent more mileage per gallon and 10 percent more speed. The 45-pound body shell, including 20 pounds of accessories, is attached by thumbscrews at only three points on the motorcycle frame.
By Thomas E. Stimson, Jr.

**TURNS OUT 10,000 LOAVES PER HOUR**

Anyone who has watched a housewife struggle through the chore of baking half a dozen loaves of bread will marvel at a mammoth bakery near Los Angeles. It has a capacity of 10,000 loaves per hour. The new Langendorf bread plant, costing $2,500,000, turns out loaves of bread in much the same manner that Detroit manufactures automobiles.

Automatic equipment sifts flour, meters ingredients and mixes dough. Other machinery cuts dough to size, shapes loaves and places them in pans that travel on conveyor lines through a giant baking oven and finally to slicing and wrapping machines.

Not only does the robot bakery perform all the work that once was done by hand, its machines have been taught to think for themselves. The molder-panner refuses to drop a lump of dough onto its conveyor line until an empty pan arrives and then...
drops the dough in the center of the pan. Again, when pans from several machines are arriving simultaneously at the main conveyor line, pans from one machine are held up until other pans have moved along and the way is clear. Otherwise, there would be a traffic jam. There are still white-shirted bakers present, but they are there only to oversee the machines. The entire process operates on an electronically controlled timetable.

In this bakery, quantities are measured by the ton instead of in ounces or pounds. There is enough flour in four big tanks for 136,000 large loaves; even more flour remains in an adjacent seasoning room. Blended and sifted, flour in the tanks is blown by air pressure through stainless-steel tubes to the mixing department when needed.

8000-Gallon Sugar Tank

A housewife keeps a few pounds of sugar in a bin; at the Langendorf plant as much as 8000 gallons of liquid sugar are stored in a huge plastic-lined tank, kept sterile by ultraviolet lamps. A pair of 4000-gallon tanks contain shortening that is heated to 115 degrees F. so it can be pumped as a liquid through insulated pipes to the mixing department. Milk, salt and other ingredients are kept in stainless-steel receptacles.

It isn't even necessary here for the master baker to look at the ingredients he is mixing. Almost everything he does is by remote control. His recipe for a certain kind of bread might read like this: "Set the flour dial and press the discharge button. Next, press the shortening and sugar buttons. Set the water meter to deliver the desired number of pounds and press that button..." Each substance is electronically...
measured to the correct amount when its button is pushed, then is automatically delivered through pipes or tubes to the proper mixing machine.

Step-by-step, the process of baking bread scientifically follows this pattern: Metered amounts of flour, yeast, yeast foods and water are stirred together in a giant mixer, then poured into a trough which is wheeled into a fermentation room for a 4½-hour period. During this time, under controlled heat and humidity, the yeast converts the basic ingredients into a "sponge." From the fermentation room the sponge goes to another mixer where the final ingredients are added. These consist of more water and flour, milk, malt, sugar, shortening, salt and enrichment substances (such as minerals and vitamins).

**Dough Goes to Loaf Divider**

Next the thoroughly mixed batch of dough, now weighing 1,600 pounds, is delivered to the loaf divider, a machine that automatically weighs and cuts the dough into the pieces that eventually will become loaves of bread. Each piece of dough falls onto an endless belt that carries it to the next machine, a loaf rounder, that kneads and rolls the lump of dough into a ball. A belt carries the loaves slowly through a "proof room" where fermentation continues.

Gases produced by the yeast must now be removed, so the loaves are squeezed flat like pancakes in a series of rollers, then carried by endless belts to the molder-panner where the flat pieces of dough are rerolled into shape and are dropped one at a time into the baking pans traveling on a conveyor line below the machine.

The conveyor line transports the pans to the final proofer room where the dough rises and assumes its final loaflike shape. The slowly moving pans spend 65 minutes here in a temperature of 110 degrees F., then are switched to a conveyor that carries them into one end of the 120-foot-long baking oven. This oven is a continuous traveling hearth, with its heat automatically controlled so that loaves enter one end as dough,
emerge from the other end at the precise moment when they have been beautifully baked.

Air Jets Loosen Loaves

Now each loaf must be loosened from its pan; this is done by a jet of air directed down one side of the loaf. Next, loaves must be removed from their pans. This was a hot chore that no one wanted in the days of baking by hand. In the new bakery, it's done via machine by a depanner that clamps onto 20 pans at a time and tips them over, dropping the loaves onto a traveling belt. On this the loaves move to a cooler where they are transferred to slowly moving trays for an hour of cooling off.

By the time their temperature has dropped to 95 degrees F. they leave the cooler and ride one after another along a belt to the slicing machine, where a row of bandsaws slices an entire loaf at once.

The final operation is the wrapping of each loaf, a task that a machine can do more quickly and neatly than human hands. In the wrapping machine a length of plastic is cut from a thick roll, wrapped and folded around the loaf, then sealed with heat. There are several slicing and wrapping machines side by side; each handles 60 loaves per minute.

Process Takes 10 Hours

There's only one thing that mechanization cannot do without lowering the quality of the product, and that is the speeding up of the fermentation, rising and cooling processes. Each of these steps takes time. The only thing science can do about it is to provide the temperatures and humidities at each step that produce the best results. It still takes 10 hours from the time the first ingredients are mixed together until the freshly baked loaf is sliced and wrapped.

On merits of home-baked bread as compared to bread made in a commercial bakery, master bakers flatly say that from the standpoint of quality control, the bread made by machines wins hands down. The reason: Each loaf contains precisely the same amounts of the same scientifically selected ingredients, baked exactly the correct length of time at exactly the same temperature.
UNESCO Headquarters in Paris to Have Two Acres of Glass

Ideas of some of the world’s greatest architects went into the planning of the massive, Y-shaped UNESCO headquarters building in Paris. The seven-story concrete-and-glass structure was designed by Pier Nervi of Italy, Bernhard Zehrfuss of France and Marcel Breuer of the United States. They were assisted by Lucio Costa, Walter Gropius, Charles Le Corbusier, Ernesto Rogers, Sven Markelius and Eero Saarinen, whose buildings dominate the capitals of the world.

As indicated by the models above, the Secretariat will be faced with nearly 100,000 square feet of glass. The futuristic structure in the foreground will be used for conferences and committee meetings. Approximately 1000 scientists, educators and technical experts will have offices in the Secretariat Building. The basement will have facilities for five radio and television studios, a theater, printing plants for UNESCO publications and an emergency electric plant.

Dome Design for Oklahoma City’s “Church of Tomorrow”

Wide sweeping curves are emphasized in the design of the First Christian Church of Oklahoma City, Okla. The steep hemispherical roof of the modern sanctuary rises to a height of four stories and has a glistening cover of white-chip marble. The front of the egg-shaped structure features a towering arch of glass.
QUESTION: How do you photograph the interior of a vast underground tank made “hot” by the storage of millions of gallons of radioactive waste?

ANSWER: By rigging a camera on a “fish pole.” That, in effect, is what General Electric photographers did at the Hanford plant. The tank had to be checked by photograph after the wastes were removed. An additional problem was that the tank’s top entrance was only nine inches in diameter.

The photographers rigged an old copy camera on one end of a 12-foot metal pole. A flash unit was fitted in place with a spring hinge so it would fold back behind the camera as it entered the tank. Once inside, it flopped into firing position.

The fish pole was a success and engineers now have a composite picture of the inside of the entire tank.

RESEMBLING a guided missile, a gleaming new electrostatic generator (lower right) has been put into operation at Aldermaston, England. Capable of building up to six million volts of electricity, the instrument hurls atomic “bullets” at various materials in a target area. The instrument will serve as a tool for basic nuclear research.

TOMORROW’S leading nuclear scientists may be trained in a new nuclear-engineering center under construction at the Massachusetts Institute of Technology.

Physics students of a few years ago would be amazed at some of the facilities that will be available at the new center: A $2,225,000 research reactor, a nuclear instrumentation laboratory, a subcritical reactor and a graphite-moderated pile.

THE ATOM powers a new airport-marker lamp that has no bulbs, batteries or electric supply and will operate for as long as 10 years without maintenance.

The lamp operates by exposing phosphorus to a radioactive gas. It is available in a variety of shapes and sizes.

URANIUM mining in the United States now has moved east of the Colorado plateau for the first time.

Just 50 miles northwest of New York City, at Warwick, N. Y., a uranium mine now is producing ore and high-grade uranium concentrates.
Templates 30 Feet Long From Giant Printer

A contact printer which reproduces templates 30 feet long has been developed for the aircraft industry.

The first machine, installed at the Columbus, Ohio, plant of North American Aviation, Inc., is actually two units mounted end to end. They can be operated separately or simultaneously from either of two control panels.

A unique feature is the raising and lowering of the lid with a powered ball-bearing unit. This replaces the "clam shell" or "removable blanket" type of lid found on the usual contact printer.

Average cycling time of the machine is three minutes.

Getting Cold Feet?

No more cold sheets! A new bed warmer, developed in Germany, takes the chill off the bed quickly. The warmer is plugged into an electrical outlet and slipped between the sheets. A wire frame around the heating element holds up the top sheet and permits the warm air to spread throughout the bed.

"Pony Express" By Motor Scooter

Mailmen in residential areas are sitting down in comfortable, weatherproof motor scooters as they deliver mail. A large cargo space behind the cab enables the mailman to carry his entire day's mail instead of having to be supplied from storage boxes. The Post Office Department has ordered 1500 of the "Mailsters" from the Cushman Motor Works, makers of the well-known motor scooter.

(A British firm has developed a glass-fiber diesel-powered lifeboat that holds 144 persons.)
NEW HORIZONS IN ELECTRONICS

By Lothar Stern

The Year 1957 is likely to go down in history as another milestone in the field of electronics. Some developments already announced promise to open entire new vistas for experimentation and may provide the solutions to some very vexing problems.

Sound Waves Unlimited
One of the most startling achievements is the development of the Ionovac, a loudspeaker capable of changing high-frequency audio waves into equivalent sound waves with amazing fidelity. The operating principle of this unit, though not new, differs radically from that of any speaker in common use. Rather than employing a moving voice coil and diaphragm, it utilizes the motion of ionized air to change electrical energy into sound. The complete

(Continued to page 212)
Fig. 1, above. Initial assembly consists of numbered parts shown at right. Tip of V-shaped cutout in board No. 3 is located midway between outer edges and 1½ in. from back edge.

Fig. 2, lower right. Cabinet details. Cutout in front of bottom plate permits entry of leads.

Fig. 3, below. Install glass-fiber insulation, and mount and phases speakers before fastening speaker-plate assembly to cabinet cleats.
A Four-Speaker Bass-Reflex Enclosure

By Dr. Richard C. Hitchcock

HERE'S A LOUDSPEAKER system that's fun to build and a pleasure to listen to. It is specially designed for improving the sound quality of console radios and television receivers, but will also do full justice to low-cost hi-fi systems.

The system consists of four identical 5-in. speakers mounted in a bass-reflex cabinet of unusual design. Each speaker is mounted at an angle so that the high-frequency sound beams cover an angle of 120 deg. as compared to the 30-deg. dispersion angle of single speakers. Vertical spacing between the four units prevents interference between individual beams.

At low frequencies, the four small cones, acting in unison, can push around plenty of air, and the bass-reflex cabinet design provides efficient speaker-to-air coupling which makes even a low-power amplifier sound mighty impressive. Rigid construction provides a vibrationless enclosure with a remarkably smooth response. Don't use cheap surplus speakers and expect to get a wide frequency range. But good extended-range units, such as the Jensen P5TX models used in the original enclosure, will give you an upper limit in excess of 15,000 c.p.s. and good efficiency down to about 80 c.p.s. (measurable response down to 60 c.p.s.).

Cut out the required pieces in accordance with the dimensions given in Figs. 1 and 2. If you don't have a power saw, better hunt up someone who has, because the dimensions are rather critical if a tight-fitting final assembly is to be obtained.

Inexpensive 3/8-in. fir or white-pine plywood can be used for the speaker-plate assembly and for the back and bottom of the cabinet. Birch plywood, 3/8 in. thick, is recommended for the top and sides, since this will take a good finish. The cleats fastened to the inside of the cabinet pieces should be 3/4 in. square and can be made from scrap lumber (not plywood).

Begin the construction with the speaker-plate assembly shown in Fig. 1. If all dimensions and angles have been cut correctly, the outside edges of the speaker plates should line up evenly with those of the top and bottom plates and of the center spacer. This is important because these surfaces will be fastened to the cleats in the cabinet during the final assembly. The cutout in the bottom piece is for the terminal strip to which the speaker and amplifier leads will be connected.

All panels must be securely joined with glue and nails. Any good wood glue and 3/4-in. brads are satisfactory.

Assembly of the cabinet is illustrated in Fig. 2. The cleats are so placed that all nailing can be done from the inside of the cabinet. If the cleats are 3/8 in. square, 3/4-in. brads will get a firm grip without emerging from the 3/8-in. facing plywood used for the top and sides.
Fig. 4. Proper connections between speakers and terminal strip for matching 4-ohm or 16-ohm amplifier output

All panels are glued and nailed except the bottom which is screwed on with No. 4 flatheaded screws, ¾ in. long.

The inside of the cabinet must be thoroughly padded with glass-fiber or similar acoustical insulating material. Use a double thickness (1 in.) and cut it as shown in Fig. 5. Cover the back and both sides, and use several thicknesses for the top. The bottom remains uninsulated. Use large-headed tacks to hold insulation in place.

Install the speakers by front-mounting them to the panels with wood screws. It is essential that the speakers be properly phased so that their respective cones move in and out in unison. To do this, solder a wire lead to each pole of a 1.5-volt battery and momentarily touch the voice-coil lugs of a speaker with the opposite ends of these wires (one wire to each lug). As contact is made, the speaker cone will move either out or in. If it moves out, label the lug going to the positive side of the battery with a + sign. If the cone moves backward, label the lug connected to the negative side of the battery with a + sign. Repeat this with all speakers and then interconnect the speakers and terminal strip as shown in Fig. 4.

Now glue and nail the speaker-plate assembly to the diagonally mounted cleats on the cabinet sides. (See Fig. 3.)

Some front angle trim, cut and assembled to fit the front of the cabinet and backed up with grille cloth, completes the enclosure.

Operation

Fig. 4 shows two methods of connecting the speaker system to the output of an amplifier. Television sets, radios, tape recorders and the like usually have 4-ohm output impedances, and the corresponding 4-ohm connection should be used. For hi-fi amplifiers having only an 8-ohm and a 16-ohm output, use the 16-ohm connection.

Caution: Do not play this speaker system at full volume (preferably not at all) until the glued joints have had a chance to dry completely.

POPULAR MECHANICS
“FIELD KITCHEN” FOR WEEK-END CAMPERS

By Clinton R. Hull

ON YOUR NEXT family picnic you can “take along the kitchen sink.” All you have to do is build these two plywood cabinets, which have storage space for all the necessary pots and pans, dishes, cutlery, packaged foods, a two-burner stove, and even a self-draining sink built into the top unit.

A removable end table and a second table attached to the back of the upper unit provide seating space for four adults. Additional tables can be attached to the front and opposite end if desired, doubling the seating capacity. The tables are joined to the upper unit by hooks and screw eyes, and can be supported at the outer end by a brace or by a leg inserted in a floor flange screwed to the underside. The end table shown in the illustration above is supported by a wooden bar hidden from view, similar to the type used on a drop-leaf table.

The sides, ends, bottom and tops of both units are cut from 1/4-in. exterior-grade fir plywood and glued and nailed to a frame of 1 x 1-in.-pine stock as shown in the drawing. Runners cut from 1 x 1 1/2-in. stock and nailed to the bottom of the lower unit permit easy moving of the stacked units at a camp site. Rope handles at both
Right, hooks made from flat steel and screwed to underside of end table, engage screw eyes on cabinet.
Marine-type seam compound, applied between sink lip and underside of cabinet top, assures watertight seal around sink. Garden hose is clamped over sink outlet to carry waste water to trench near camp site.

ends of each unit provide a comfortable and safe grip when carrying them.

The top on the lower unit should be flush with the sides and ends with the edges sanded round, so that the corner brackets on the upper unit slide over the top without splintering the edges when stacking the units for use. A thick coating of marine-type seam compound applied between the rim of the sink and the underside of the cabinet top before mounting the sink, assures a watertight seal. The completed cabinets can be painted or varnished and plain or fancy hardware installed on the doors and tables as desired. A plastic-laminate top installed on the top of the upper unit provides a good work surface and improves the appearance.

A length of plastic garden hose attached to the sink outlet and passed through a hole drilled in the end of the cabinet provides for convenient disposal of dishwater and other liquids. Liquid refuse should be allowed to empty directly into a shallow trench and covered with fresh earth daily for sanitary purposes.

Leg on table attached to cabinet is inserted in floor flange screwed to underside of table top.
DECOR BOARDS IN FREE FORM

In addition to being conversation pieces in themselves, decor boards are the answer to the problem of displaying small pictures, curios and other knickknacks in a room of modern furnishings. Besides adding a sharp contrasting background, these "bulletin boards" save the wall from numerous nail holes as they hang like pictures. Insulation board tacked to a plywood base provides a soft, thumbtack surface which is covered with a fabric of your choice. The decor board in the photo was covered with black burlap to contrast against a salmon-pink wall.

Jeanne and Emil Frey, Trumbull, Conn.

Bug Catcher on Car Radiator Gathers Fish Bait En Route

Using your car to trap fish bait may sound a bit ridiculous but it proved a worthwhile stunt to one fisherman in traveling from one lake to another on a vacation trip. Like every motorist, he was plagued with bugs clogging the radiator of his car. The thought occurred to him that the bugs would make excellent bait if there were some way of collecting them as he drove along. This was accomplished by attaching a piece of screen wire to the radiator and curling up the lower edge to form a trough to catch the bugs that fell to the bottom. Each day a handful of bugs was collected in this manner which made it particularly convenient when bait was not always readily available.

Lyle Sovay, Toledo, Ohio.

When preparing vegetables for cooking, peel and cut the onions before you peel and cut the potatoes. Handling the potatoes after the onions will kill the onion odor on your hands.

POPULAR MECHANICS
**Light-Radiating Ceiling Illuminates Bathroom**

Soft, shadowless illumination that approaches the effect of daylight is produced in this bathroom by fluorescent lamps mounted above a false ceiling of corrugated glass fiber as shown in the illustration. Line-type fluorescent lamps are installed 12 in. apart and wired to a wall switch that is located out of reach from the tub as a safety precaution. A single strip of plywood 8 in. wide, nailed to a cleat fastened to the ceiling, forms one side of the light enclosure. Three pieces of stainless-steel molding bent at the ends and provided with T-slots so they can be hung between opposite sides of the enclosure, support a panel of corrugated glass fiber as shown. The latter is mounted 8 in. below the fluorescent lamps.

**Subduing Appearance of Screws On Cabinet Hardware**

Often the appearance of a cabinet may be improved by making the screws or bolts that attach the hardware as inconspicuous as possible. This can be done by filling the screwhead slots with crack filler, sanding them smooth and painting them to match the hardware. In the case of a bolt head, just paint the exposed part or replace the bolt with a screw, if it is possible.

Walter E. Burton, Akron, Ohio.

**Plane Itself Is Fixture For Honing Blade**

When the plane iron of your block plane needs honing you can put a perfect edge on it without removing it from the plane. First extend the length of the oilstone with a piece of wood of the same thickness as the stone to serve as a rest for the rear end of the plane. Then advance the plane iron through the adjustable throat a distance sufficient to hone a 25 to 30-deg. bevel and simply move it back and forth over the stone, keeping the end of the plane on the wooden block. If the plane iron cannot be clamped in the plane, hold it in place with the fingers, using a slight pressure on each forward stroke over the oilstone.

Ken Murray, Colon, Mich.

*JUNE 1957*
Boat Equipment Locker

There's room for shipshape stowage of all your valuable boat gear in this locker. The structure, which can be built in single or multiple units, is framed in 2 x 4-in. stock and sheathed and roofed with exterior-type plywood bonded with a waterproof adhesive. Doors and storage shelves also are of plywood. Details on the opposite page suggest shelf arrangements, but of course both the arrangement and number of shelves are optional with the builder. There will be material left over from cutting the plywood panels to make shelves of average size for each unit. In this way waste is reduced to the minimum.

A single unit of the locker measures 7 ft. from the bottom of the sole plate to the top plate. It is 6 ft., 1½ in. wide and 3 ft., 7 in. long. The multiple unit as pictured on the opposite page provides four lockers and is approximately 13 ft., 4 in. long. The multiple unit also can consist of only two single units, making the structure very nearly square. This can be an advantage in some locations.

As originally planned, the structure can be placed on the dock or along the water front as pictured above. Note that the plan view on the opposite page provides for framing the structure on the dock, the sole plates, which in this case are 2 x 4s, being nailed directly to the dock boards. In this construction the dock forms the floor. When the structure is located elsewhere, as along the water front, a foundation and floor must be built. The upper right-hand details on the opposite page suggest two methods. If you decide to build a single-unit locker it may be advantageous to frame the floor on skids so that the locker can be moved.
In this case, 2 x 4-in. joists are nailed to two 4 x 6-in. skids. Then a plywood floor goes down over the joists and the studs are toenailed to sole plates nailed in turn to the floor. Use nails of sufficient length to reach through the plywood floor into the joists. Where a multiple-unit structure is to be located permanently on the beach, the floor can be framed as in the upper right-hand detail below, the framing bearing on concrete blocks as suggested in the illustration. Flat stones also can be used as a foundation. When blocks or stones are used in this manner they should be bedded level on reasonably stable soil. Stones or blocks should be placed at the corners and also at a minimum of three points along the length in order to support a four-unit structure adequately. As a foundation for a two-unit structure, stones or blocks should be placed at the corners and at the mid-point. In any case, the structure must be above grade level a sufficient distance to assure ample air circulation under the floor.

Note from the details that the roof is supported on two 2 x 4-in. beams running lengthwise. Note also the construction at section D-D and in details A, B and C. Materials required for construction of one unit only are given in the material list. **

[Bill of Materials for Single Unit]

**PLYWOOD**
- 1-1/2" ext. for plywood (roof)
- 1-1/2" ext. for plywood (doors)
- 1-1/2" ext. for plywood (shelves)

**LUMBER**
- 2-1/4" x 2-1/4" No. 2 and better, S4S (studs)
- 2-1/4" x 2-1/4" No. 2 and better, S4S (beams, beams and headers)
- 1-1/2" x 1-1/2" white pine, S4S (door frame)
- 1-1/2" x 1-1/2" white pine, S4S (door trim)

**HARDWARE**
- 4-1/4" x 4" lightweight T-hinges (doors)
- 3-1/8" safety hinge (doors)
- 8d galv. casing nails (door stiffeners)
- 8d galv. box nails (plywood to frame)
- 8d and 10d common nails (framing)

**MISCELLANEOUS**
- Roll roofing and finishing materials (Follow recommendations of manufacturers)

---

**Construction details courtesy Douglas Fir Plywood Association and Socony Mobil Oil Co., Inc.**
Hinged Tool Tightens Flooring Before Nailing in Place

To avoid damaging the tongue of a flooring board while tightening it for nailing, one carpenter uses the tool shown. It is made of two wooden blocks hinged together, one end being grooved to fit over the flooring tongue, the other having three or four large screws driven at an angle to project about $\frac{1}{2}$ in. Placing the notched end over the tongue of the flooring and pressing the tool down with the foot drives the projecting screw points into the subfloor and forces the finish floor into place.

Cool Grip for Hot Cup

Slipped over a paper or aluminum cup, a sleeve of corrugated cardboard will provide a cool grip when serving hot coffee. Several sleeves can be made in a few minutes by cutting the sleeves from single-faced corrugated cardboard. Be sure to make the sleeves small enough that they will not slip over the tops of the cups.

Truck-Size Insecticide Sprayer Utilizes Exhaust Manifold

Eliminating insects from an outdoor picnic grounds is done by one grounds keeper with a minimum of time and labor by using the exhaust system of a pickup truck as a portable sprayer. A pump-equipped gallon tank from a kerosene heater is clamped under the instrument panel of the truck and connected to the exhaust manifold by a length of tubing. After the tank is filled with insecticide it is pumped to 10-lb. pressure, which assures that the insecticide will be forced into the manifold against exhaust pressure. A valve on the tubing line controls flow of the insecticide into the manifold where the heat and pressure cause an insect-killing fog to be discharged from the exhaust pipe.

Wax Paper Keeps Tile From Sticking to Mastic

Fitting floor tile individually around pipes, door casings and other obstructions can be a messy job when the floor has been coated with mastic. A stunt worth remembering is to first lay a piece of wax paper over the sticky mastic. This will permit you to cut and try the tile for fit without getting it smeared with cement. Since the mastic will not cling to the wax paper, it can be removed easily.

John Krill, N. Lima, Ohio.
HOW TO INSTALL A
THROUGH-THE-WALL
AIR CONDITIONER

IF YOU DISLIKE the idea of having to mount a room air conditioner in a window, you’ll be interested to know that through-the-wall models now permit the do-it-yourselfer to mount them right in the wall where they won’t rob the room of daylight or hinder the cleaning of the window.

Being thinner in cross section than the conventional window types, they take up less room both inside and out. As an example, General Electric’s Thinline model, which was used in this installation, projects into the room less than 3 in. and permits a novel camouflage treatment when the unit is not

Through-the-wall opening is located on inner side of wall first. Here cutting line is drawn on masking tape

Sawing through tape helps prevent chipping of plaster. Note starting hole at corner for keyhole saw
After marking through-the-wall opening on outside, plus the cutting line for the surround casing, a portable saw makes quick work of cutting the opening.

When siding and sheathing have been ripped off rough-cut opening, a handsaw is used to saw off the studs flush. Notice how siding has been cut back.

Above, this part you make yourself. It is called a surround and is nailed securely in the opening.

Above, metal sleeve assembly is installed next and is screwed solidly to the surround at top and sides.

Below, with mounting flanges in place, unit is set in opening and bolted securely to the metal sleeve.

Below, unit installed. Preassembled "picture frame" fits snugly around case to cover rough plaster.
being used. A large wall picture can be hung over the grille in cases where it presents a decorator problem appearancewise.

The unit pictured comes as a kit and all you need do to install it is to cut a rough opening in an exterior wall and make a wooden surround and casing to fit the opening. The air conditioner can be installed in both brick-veneer and frame construction. The manner in which it is supported in each case is shown in Figs. 10 and 11. In frame construction it can be easily installed by any handy homeowner.

**Roughing-in the Opening**

It is best to make the surround and casing beforehand so as to have it ready to slip in place when the rough opening is cut. This is made similar to a regular window frame, using 3/4-in. material for the surround part and 1 1/8-in. stock for the casing. Fig. 9 shows how it is nailed together. The important thing is to see that the inside opening measures 23\(\frac{1}{4}\) x 27\(\frac{1}{2}\) in. You should give it a priming coat of paint at this time.

Actual location of the air conditioner is governed by individual requirements and preferences. You may wish to mount it low, such as under a picture window, or up higher on the wall. From the standpoint of maximum efficiency and the fact that cool air falls, a head-high installation is perhaps best. The design of the room itself will
Calking space between the metal sleeve and surround is filled all around to make it water and air-tight dictate where it will work out the best.

Make the opening in the inside wall first, marking it as in Fig. 1, and sawing through the plaster and lath with a keyhole saw as in Fig. 2. The rough opening must measure 25 x 29 1/4 in. to allow for the thickness of the wooden surround that lines the opening. Your next step is to align the position of the opening in the outside surface with the one just cut. Perhaps the best way to do this is to spot the four corners of the opening by marks on the sheathing, doing this as accurately as you can, and then drawing lines diagonally from these points.

A small hole is drilled through to the outside at the point where the lines intersect and this hole is used as a central point in marking the outline of the siding. You have a little leeway here if you do not get this just perfect. With a level and square you’ll be able to come close.

**Electric Saw Speeds Job**

A portable electric saw makes quick work of cutting through both the siding and sheathing as shown in Fig. 3. It is particularly useful in cutting back the siding all around to let in the casing of the surround. From here on it is a case of sawing off with a handsaw studs that fall in the opening, as in Fig. 4, and then inserting the surround as in Fig. 5. You’ll notice in Fig. 10 that the surround, when in place, must not protrude beyond the plaster. A width of 5 1/4 in. for the surround only is about right for all typical frame-wall construction. The surround is nailed securely in the opening.

The hardest part of the job is done and from here it is a case of inserting a metal sleeve assembly in the surround as in Fig. 6. This comes preassembled with a sponge-rubber seal around the rear face. The sleeve is fastened to the surround with two screws on each side, inserting them in holes that you must drill yourself. Additional screws may be used in the top to anchor the sleeve, but do not use any in the bottom. Water could leak through if you did.

**Placing the Air Conditioner**

Mounting angles must be screwed to the case of the air conditioner before it is shoved in the opening. You have a choice of two mounting positions which depend upon the thickness of the wall. In frame construction, the No. 2 mounting position is generally used. Complete instructions show just how these angles are attached.

The air conditioner is placed in the opening from the inside and is anchored securely to tapped holes in the sleeve with six hexhead bolts that permit you to draw the case tightly against the sponge-rubber gasket provided. Where it is mounted high on the wall, you’ll need help as it is fairly heavy. After this, the opening remaining around the case on the inside is covered by a preassembled picture-frame trim piece held with four screws. The final step before plugging it in is calking all around the metal sleeve on the outside, as in Fig. 12, to make it weathertight. A calking gun does the job in a jiffy.

**Cork Strips Prevent Buckling of Hardwood Block Floor**

To prevent a hardwood block-type floor from buckling at doorways and other places where a small gap for expansion is not practical, one homeowner cemented a cork strip in a gap provided between the outer edge of the flooring and adjoining construction. At interior doorways, a cork strip the width of the threshold is used, and next to the threshold piece of exterior doors and other places where an expansion gap is needed, a strip 1/2 in. wide is sufficient. The strips can be cut from 3/16-in.-thick squares of cork tile, or from a sheet of cork gasket material obtainable in most auto-supply stores.
Removable “Rumble Seat” Makes Two-Passenger Tricycle

Just a few scraps of lumber and a couple of toggle or J-bolts are all the materials required to build this tricycle “rumble seat,” which is bolted to the step plate. Dimensions are determined by the size of the tricycle, but the seat should not extend too far or the rider’s weight may raise the front wheel off the ground. Mounting a heavy-duty caster on the lower end of the handle-bar support of the rumble seat may be necessary, if the step plate at the rear of the tricycle is too narrow to provide sufficient support for the seat.

John D’Avella, Lindenhurst, N. Y.

Index Card in Negative File Identifies Cut-Film Type

A method employed by one photographer enables him to quickly identify cut-film type by referring to an index card filed with the specific negatives. Printed notching codes cut from the film boxes are pasted on the cards, as shown, identifying the film type used, so that the same type can be used in making a similar shot.

Rowlock Horns Tied to Gunwale Can’t Be Dropped Overboard

Rowlock horns can be prevented from being accidentally dropped overboard from a rowboat if a short length of fishing line, tied to the shaft of each, is secured to a screw eye fastened to the underside of the gunwale as shown. As a safety precaution, the horns should be removed from their sockets when passengers are boarding.

“...To prevent marring freshly painted drawer pulls, leave the screws in the pulls and “hang” them from a magnet. Screws must be steel to be attracted by a magnet.

“...It is easier to finish: wood paneling before installing it. Be careful when nailing or gluing so that no marks will be left on the finished panels.”

JUNE 1957
SOLVING Home Problems

YOUR PAINT-ROLLER TRAY provides an ideal container for storing brushes overnight. Lying flat in the tray, there is no chance of the bristles losing their shape.

PAPER DRINKING CUPS serve as perfect molds for making frozen fruit-juice suckers. Punched paper strip placed across cup will hold stick upright in cup while the liquid freezes.

MASKING TAPE applied to the reverse side of book jackets at the top and bottom edges prevents wear and tear.

PLANTS ARE REMOVED from their pots without disturbing the roots with a slotted paddle. Slip slot around plant stem, turn over and dislodge by tapping paddle on table edge.

THREAD ON YOUR BOBBINS won't come unwound and tangled in your sewing box if held with bit of sticky tape.

WHEN THE LIFTING TAB on a milk-bottle cap tears off, a handle can be formed by wrapping the cap in plastic wrap and then twisting the ends as shown. Cap will still fit the bottle.

POPULAR MECHANICS
FOLDED TURKISH TOWEL makes a good padded surface for ironing any material that has snap fasteners. Fold the towel in several layers and place fasteners face down on it. Then press from backside.

TO AVOID THE SHINE on ribbon after washing, don't iron it. Instead, wind it tightly around a clean bottle and let dry. A couple of rubber bands may be used to hold the ribbon in place on the bottle.

COAT HOOKS are less of an eyesore when mounted over plastic coasters. Here you can see what eye appeal a leaf-design coaster adds to a plain hook on a hall door. Holes are punched in coaster for screws.

BOWL WON'T ROCK AND ROLL when chopping vegetables for salads if you rest it on the open end of a pan. This will cradle the bowl so it won't rock. Any kitchen pan that is smaller than the bowl will do.

WHEN A JOINT OPENS between the crossrail and the stile of a paneled door, two long screws driven in counterbored holes as shown below will draw it up tight again. Hold it first with a clamp if you can.

RECIPE HOLDER becomes a new use for a spring-type paper clamp when attached to the file box. Use a small clamp for this and attach it to the front of the lid with a tiny bolt placed in hole provided.

5" No. 24 F.H. WOOD SCREWS

21/4" BODY HOLES

31/8"-DIA. HOLES, COUNTERBORED

SPACE BETWEEN STILE AND CROSSRAIL

JUNE 1957
T-Base Fitted With Clips Holds Hand Grinder in Vise

Next time you want to hold your hand grinder horizontally in a stationary position so both hands are free, don’t risk damaging the tool by squeezing it between the jaws of a bench vise. Instead, take a few moments’ time to make this simple holder which is nothing more than two blocks nailed together T-fashion and fitted with two spring-type tool clips. Adjust the clips so they grip the grinder firmly yet allow it to be removed easily.

Shelving Conceals Chimney For Attic Conversion

In attic conversions, where chimneys cannot be included in corners or concealed between walls, they can be made less conspicuous behind removable shelving. When installing the shelving, allow a 2-in. clearance between the chimney and combustible material such as wall framing. Four sections of shelving, extending from floor to ceiling, can be arranged around a chimney, forming a rigid assembly when bolted or screwed together as indicated.

Two Light-Tight Ventilators For Cooling Photo Enlargers

One of these two light-tight ventilators can be used to prevent a homemade photo enlarger from overheating. The vertical ventilator consists of a 1-gal. metal can in which disk baffles are fastened. Trimming one edge of each disk provides a zigzag path for the escaping air. The horizontal ventilator is made of wood and contains a spiral passage from inlet to outlet for the heated air.

Screen Door Held at Any Angle By Rubber-Tipped Prop

Holding open a screen door at any angle is no problem when this door prop is used. It consists of a 2½-ft. length of ½-in. dowel that is attached to the doorframe by means of a screw eye in both dowel and frame. A rubber crutch tip on the lower end of the dowel prevents it from slipping. When not in use, the prop is swung out of the way and fitted into a screw hook driven into the lower part of the door.
Smoke Roasting, now so popular, can be done by anyone without expensive oven equipment. All that is needed to make this close cousin to a Chinese oven is a 35 or 55-gal. oil drum, some small wheels or large casters to provide mobility, and an asbestos-lined box of heavy sheet metal to serve as a firebox. Necessary adjuncts are a thermometer and a heavy-gauge wire grill.

If making the firebox is beyond your tools and skill, have your local sheet-metal man do it. Have him provide a hinged lid and a draft door as indicated. Then, while the box is being made, remove one end of the drum, which will be hinged in place later to serve as a lid, and clean the barrel thoroughly inside and out.

Now, rivet the firebox over an opening cut in the side of the drum near the bottom and line the box with asbestos. The lining may be held in place with sheet-metal screws, driving them through the asbestos and into the metal. The projecting ends of
the screws should be cut off almost flush with the sides of the firebox.

Mounting the wheels or casters is next. This may be done in any way desired. The method shown is only a suggestion. Next comes the wire grill. Mount it inside the barrel in the position shown. Three small angle brackets, spaced equally and riveted or bolted to the side of the barrel, will support it.

You are now ready for the lid. Cut a damper opening in the lid, hinge a cover over it and provide some means of supporting the cover at different heights. Some kind of a cool lifting handle will be required for the lid. This may be an old cooking-utensil handle, stove-lid handle or something similar. The handle should be installed before hinging the lid to the barrel.

Installing the thermometer is next. This should be the type that can be inserted in the barrel with the dial on the outside and have a reading up to at least 350 deg. F. If this type is not available, an oven thermometer may be installed inside the barrel, but will be difficult to read.

The work shelf is a handy accessory, but not absolutely necessary if you prefer to get along without it. It is made of heavy sheet metal flanged along both sides and one end to provide rigidity. The other end is hinged to another piece of sheet metal, which also is flanged at the sides, and has one end cut to the contour of the drum. This piece is attached to the drum with small metal brackets. A folding bracket supports the shelf in the raised position.

Painting is a matter of choice, but be sure to use a heat-resistant paint. Before cooking in the oven, preheat it to a high temperature to burn off any residue that might cause an unsavory odor in the food. In use, charcoal is burned in the firebox, the draft door and damper being adjusted to maintain the desired temperature inside the oven.

Since every outdoor chef considers accessories as necessary to his hobby as an oven or grill, every neophyte chef should have a supply. Basic are a chef's hat, cotton gloves to handle charcoal, a pair of tongs to handle meat without puncturing it and a folding wire grill to handle crumbly hamburgers. There are others not necessary, but convenient if you wish them. But more important is a knowledge of fuels. In most stores you will find two types of charcoal, lump and briquettes. Which one to buy is mostly a matter of choice. There is a third type of briquette that contains partially burned hickory that imparts a hickory flavor to the foods. And, of course, small pieces of hardwood can be applied to the fire to produce smoke and impart their flavor to the foods. Hickory and cherry are the woods most used.

POPULAR MECHANICS
Larry Argiro, Associate Professor of Art, State Teachers College, New Paltz, N. Y., saw his first mosaics as a boy in southern Italy while playing in the ruins of Pythagoras' temple. Struck by the intricate designs on ancient floors and walls, he decided then to revive the nearly forgotten art. Although Professor Argiro worked in many art forms in this country, it wasn't until five years ago that he discovered a successful way to inlay mosaics on metal, wood and other substances used in modern buildings and furnishings. Now, mosaic can be applied to almost any surface in or on your house.

**DECORATE WITH MOSAICS**

By Larry Argiro

The ancient art of mosaicking (inlaying surfaces with ceramic or glass-like tiles now available in many colors) is well within the ability of almost anyone. Applied with special adhesives, mosaic tiles may be used to modernize and beautify old surfaces, or to inlay new pieces, such as free-form tables designed and built to your liking. Lamps, book ends, jewelry and cigarette boxes, glittering bowls and ash trays can be made with base materials that depend entirely on your own ingenuity. Or, you can tile counter tops, walls around sinks, lavatories and bathtubs and, if desired, even work out beautiful designs on other walls.

Most mosaic tiles are approximately 3/4 in. square and are available in a rainbow of colors. There are three basic types, the cost of the tile depending on the type. The tiles may be "cut" to various sizes and shapes with carpenter's pincers. In doing
The beginning of an attractive, easy-to-clean splashboard above the work counter in a kitchen this, there will be some waste as a tile does not always break as desired. But in most cases, the waste material can be used in working out other designs.

To apply mosaics, first work out the design full size on paper, Fig. 1, coloring it to match the tiles being used. Then transfer the design to the base or object to be covered, Fig. 2, first thoroughly cleaning the surface. Next, apply adhesive to the surface and place the tiles, following the design and color previously worked out. It is best to coat only a few square inches of surface at a time as the adhesive may set before the tiles can be placed.

It is easier to work out any central designs or themes first, Fig. 4, and fill in the background afterward. Leave spaces of \( \frac{1}{8} \) in. or more between the tiles for grouting.

After all tiles have been applied, mix a grout as in Fig. 3. It consists of white tile cement and water, mixed to a consistency slightly thinner than patching plaster. This is spread over the mosaic by hand to fill in the joints between the tiles. While the grout is still wet, wipe the face of the mosaic with a damp sponge to remove excess grout.

In case of a table or other flat surface, metal or wood edging may be used to cover the edges and produce a finished appearance. The basic forms on which you can cement the tile to make different objects are endless. For example, a section of cardboard carpet roll provides an excellent cylindrical lamp base. Each end is plugged with a wooden disk, glued in place. Rec-
First step in mosaic work is to lay out the design on paper full size and color it to suit your desire

tangular lamps can be produced by assembling suitable forms from plywood. A hole bored in the top before the tiles are applied will accommodate the lamp fittings, which are available in any hardware store.

Blocks of wood provide excellent bases for mosaic book ends. They may be used in rectangular shapes, or sawed diagonally to make interesting pyramidal forms.

Old cigar boxes provide good foundations for jewelry and cigarette boxes. Interesting effects can be achieved by setting the tiles close together with no grouting. Almost any battered old tray or bowl can be made to look like a collector's item with simple application of mosaic. Steel mixing dishes used by chefs in restaurant kitchens are good, as are wooden salad bowls. Cheap metal or paper trays and bowls from the dime store do equally well. Much depends on the mosaic design.

A mosaic-surfaced table is a piece you will be proud of forever. If you make your own in free form or in rectangular shape, nothing lighter than ¾-in. plywood should be used. Shellac both sides to prevent warping. Sets of flange-base, screw-on legs in walnut, mahogany, birch or metal may be purchased inexpensively. These legs come with mounting plates for setting them either vertically or at an angle, depending on the period design of the table.

Mosaic may be applied directly to walls to make interesting splashboards above sinks, bathtubs and lavatories, much in the same manner as applying plastic tile. To assure neat, straight rows of tile, draw pencil lines on the wall for each row, leaving joint spaces for grouting. Apply the grout as for other types of work and wipe off the surplus. Here, as for other jobs, work out the design on paper first and then transfer it to the wall. Be sure to use appropriate designs for kitchen and bathroom. **

After tile has been placed and adhesive set, grout is mixed in bowl and applied to the tile joints

Remember, it's easier to work in central design first and then fill in the various backgrounds afterward

JUNE 1957
HAVING REACHED THE POINT described in Part I, you are ready to plank the hull. The importance of careful fairing cannot be stressed too much and you should double check with a straightedge to make sure that the planking will lie flat against all contacting members. This not only includes the sheer and chine log and the edges of the frames but the keel and bottom battens as well. You'll notice in Fig. 21 that the keel is faired from a centerline. As there is a slight arc to the bottom members of the frames, you may find it necessary to fair the outer edges of the bottom battens a little. A strip of plywood placed across the members as in Fig. 22 will determine the amount that must be removed.

Side planking: Sectional views in Figs. 24, 25, 26, 31, 34 and 35 detail the planking. It is preferred that the hull be side-planked with single panels of ¾-in. marine-grade (AA) plywood. However, if you cannot obtain plywood long enough, two panels can be joined in the manner shown in Fig. 27.

If working alone, perhaps the best way to determine the shape of the plywood planking is to make a template by stretching wrapping or building paper around one side of the hull and marking it accordingly. This is then cut out and traced on the plywood as in Fig. 32. If extra help is available, you can forget the paper pattern and mark the shape directly on the plywood by holding it against the hull and running a pencil along the sheer and chine log. After the plywood is cut slightly oversize, it is clamped and temporarily screwed in place at several points for the final fitting, Fig. 23. The fitting at the transition joint, Fig. 28, from frame 5 forward, must be made at the very edge of the chine log and is the most important joint in the planking. The planking at the sheer, transom, stem and chine aft of frame 5, may be left ¾ in. or so long for final fitting after the planking is permanently fastened in place. When the

To Save Both Time and Work
If you wish, you can buy the patterns for the stem, frames, transom, breasthook and chine blocking already drawn full size. And, to further simplify construction, you can buy these parts in kit form accurately cut in mahogany from Glen-L Marine Designs, P.O. Box 588, Compton, Calif.
trial fitting meets your satisfaction, the planking is removed and used as a master pattern to mark the plywood planking for the opposite side. If the hull is to be coated with glass fiber, you can use a hard-setting glue in applying the planking. Where it is not to be treated with glass fiber, a soft-setting or mastic-type glue should be used.

All contacting surfaces are coated with glue and the plywood planking is relocated by the trial screw holes and fastened permanently. Screw the planking to the sheer clamp with 1-in. No. 8 screws spaced 4 in. apart. Space them 3 in. apart at the chine and stagger them as much as possible. Space 1 1/4-in. screws 2 in. apart at the stem and transom. It is not necessary to screw the plywood to the frames unless you wish. The plywood planking is applied to the opposite side of the hull in the same manner. You will notice in Fig. 30 that it is first necessary to fair off the planking at the stem to allow the planking to lap at this point. The planking on both sides is now trimmed even with the chine-log member. Go about this carefully and check as you proceed with a straightedge as you did in fairing. Here, the fairing is done only aft of a point at frame 5. Fig. 28 shows that from this point forward, the bottom planking and the side planking butt together.

**Bottom planking:** The bottom planking is 3/8-in. marine plywood also and, like the side planking, it is preferred that it be full-length panels. It is applied in two sections with the joint falling on the centerline of the keel. Fitting the butt joint with the side planking from frame 5 forward will require a little doing. Your best bet is to rough-mark, cut and keep trimming until you get a good fit. The rough scribing along the stem is, of course, a simple matter. In springing-in the bottom planking up forward, you will find the panel fairly stiff. To help make it conform, cover the area with a few burlap bags and saturate them with boiling water. This is necessary also when actually fastening the panel in place. After one panel of the bottom is fitted, it may be used to mark the other half. Coat all contacting surfaces with glue as before.

*Fig. 22* Fairing of keel, battens and chines is checked for unevenness with plywood strip placed across members
Left, plywood side planking is temporarily clamped in position and then roughly marked for overall size and begin driving the screws, working forward from the transom. Use 1-in. No. 8 screws 3 in. apart along the chine and keel and 4 in. apart at the battens and stagger them as much as possible. After the first half is trimmed at the stem, the other half is applied. After both halves are in place, final trimming is done.

Skeg: The skeg covers the joint in the bottom planking at the keel, Fig. 38. It is cut from 1\(\frac{1}{4}\)-in. oak or fir, following Fig. 38 and is set in a bed of mastic before being fastened to the keel with 2-in. No. 10 screws spaced about 6 in. apart. If the hull is to be glass-fibered, the skeg, of course, is added afterward.

If the hull is not to be covered with glass fiber, a stem band is used to cap the exposed edges of the plywood planking. This oak strip, which measures \(\frac{3}{8}\) x 1 in., extends from the deck line to the end of the skeg. Screw this to the stem and keel with 1\(\frac{1}{2}\)-in. No. 8 screws spaced 12 in. apart. In addition to the stem band, a spray rail should be added to cover the joint of the side and bottom planking at the chine, Fig. 33. A single piece of oak or mahogany is used for this and is ripped to measure 1 x 1\(\frac{1}{4}\) in. in section. It too is embedded in mastic before being attached with 2-in. No. 10 screws, 12 in. apart.

Blueprints Available
Those who prefer to build Sea Knight from plans larger than the ones presented in the magazine may purchase a set of blueprints, 17 x 34 in., by writing Blueprint Department, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11.
Glass fiber: Covering the hull with glass fiber is a sure way of preventing checking of fir plywood, a common fault. There is nothing particularly difficult about applying glass fiber but it is important that the manufacturer’s instructions be followed carefully. Proper proportions in mixing the resin catalyst are most important as is the correct temperature for applying. Essentially, it is a case of applying the bonding agent to the wood with a roller as in Fig. 36 and then laying glass-fiber cloth in it while wet, Fig. 37, and finally applying a second application of the resin-catalyst mixture. Before actual painting, the hull should be sanded lightly and any screw holes or imperfections filled with wood putty.

Painting: While the hull is upside down, the primer may be applied to the bottom. If the hull has been covered with glass fiber, be sure that the primer is recommended for use on glass fiber. If the hull is fir, use a resin-type plywood primer as a base. Flat primer should be applied, sanded when dry and then given a second application and so on until the surface is smooth. Follow the primer with two coats of marine enamel applied to the bottom only. If the hull is to remain in water, the bottom should be painted with an antifouling paint applied according to manufacturer’s instructions. This is generally applied to an unprimed surface shortly before the hull is launched.

(To be continued)
Magnet Serves as Cutoff Stop

When using the saw fence as a cutoff stop for repetitive work, a strong horseshoe magnet stuck to the fence provides a "self clamping" clearance "block." A block like this, or one of wood, is always required in cutoff work and never should the work be butted directly against the fence. If done, the work will catch between the blade and fence and be thrown with force.

Wood Jig Starts Tap Square in Plastic

The difficulty of starting a tap square in plastic, without damaging the surface of the material, is avoided when a block of wood is drilled and tapped and then held in position over the work. In addition to eliminating damage to the plastic, this jig will enable you to make the holes tap true and with greater precision.

Rubber-Stamp Impressions Tinted With Metal Powder

Metallic powders are easily applied to fresh rubber-stamp impressions, giving them the appearance of having been imprinted with metal. Regular stamp ink can be used in any color on absorbent materials. After covering the impression with the powder, allow it to dry a minute or two. Then gently shake off the excess.

New Fence-Post-Treating Method Stops Decay and Termite Damage

A simple soaking process, developed by the Forest Service of the U. S. Department of Agriculture, has been devised whereby homeowners and farmers can treat their own fence posts against decay and termite damage. It entails soaking the ends of the posts in two successive solutions, the first being copper sulphate, available in crystal form, which is diluted at a ratio of 18 lb. to 24 gal. of water. Allow a day for the crystals to dissolve, otherwise extensive stirring will be necessary. The large ends of the posts, preferably freshly cut, are immersed in the liquid which should be of a sufficient depth to cover the entire section of the post that is later to be buried in the ground. After two days the posts are transferred to a second solution of sodium chromate, purchased in powdered form, which is dissolved in water at a ratio of 18 lb. to 26 gal. Posts are soaked with the wide end down for one day and are then inverted to permit saturation of the narrow end for another day. Upon removal, they should be piled and allowed to dry for several weeks to allow the chemicals to become more evenly distributed. If necessity demands that they be used immediately, rinse the posts in clear water to remove surface deposits. Rubber gloves are required for handling the solutions and care must be taken as these chemicals cause irritation if brought in contact with the skin and are harmful if taken internally. Residue should be disposed of in a hole dug in the ground at a sufficient distance from wells and livestock ponds to prevent contamination. The liquids should be allowed to seep away before refilling the hole. If retained, the solutions must be fortified before reusing.
Above, patio roof of corrugated glass fiber nailed on framework of 2 x 4s attached to house and supported by posts as outlined in Fig. 2, affords protection from rain and direct rays of the sun. A second post, not shown in the outline, supports the other end of the roof.

**KEEP YOUR PATIO COOL WITH A GLASS-FIBER ROOF**

*By Raymond Schuessler*

**HERE IS A COLORFUL** glass-fiber patio roof that you can start building in the morning and have completed before sundown. After measuring the area to be covered, the members for the framework are cut from 2 x 4s and the supporting posts positioned as indicated in the red outline in Fig. 2. Each post is anchored to the floor by a ½-in. steel rod, which is inserted in the bottom of the post and in a ½-in. hole drilled in the concrete floor. Then the framework is nailed to the house and to a 4 x 6-in. beam nailed on top of the posts, Figs. 3 and 4, after which the glass-fiber panels, Fig. 1, are cut and fastened to the 2 x 4s with aluminum nails. The panels should overlap one corrugation for sealing with clear mastic. Predrilling of nail holes is recommended prior to fastening the panels to the rafters.

**POPULAR MECHANICS**
Above, cross pieces are staggered to break dominant lines of corrugated roof. Fig. 4, pre-painted 2 x 4 nailed directly to house supports upper end of roof. Fig. 5, glass fiber is easy to cut with fine-tooth saw.

Leather Punch Improvised by Grinding Nail End Flat

When it is necessary to provide an extra hole in a leather belt and no punch is available, try grinding the end of a nail flat as shown. Then, hold the nail in position on the belt, using a wooden block as backing, and strike it a sharp blow with a hammer. A neat, clean-cut hole will result.

When you reupholster or slipcover furniture, pin some of the fabric scraps to the underside of the chair or sofa. There they will be handy in case you need them for small patches. They will have faded about the same degree and be just about as soiled, making a better match than a piece of fabric stored where it kept perfectly clean.
Protect Yourself Against

Simple, practical suggestions that any homeowner can take to family as well as reduce possible damage by wind to his home

YOUR CHANCES of becoming part of the statistics compiled each year on the loss of life by windstorm can be reduced greatly by taking precautions to safeguard yourself and family. This is especially important if you live in a region where severe windstorms may be expected.

Although it is not practical at present to build houses that will withstand the full impact of tornadoes, they can be reinforced to resist the strong winds along the fringe of tornadoes, or most winds of hurricane force. Personal safety in such storms is best assured by substantial shelters below grade level. Much property damage can be prevented by taking some simple precautions before a storm strikes.

Effects of Severe Winds

A wind blowing from one prevailing direction exerts a positive pressure on the windward side of a building, and a negative pressure or suction on its leeward side. The amount of pressure on the windward side of a roof depends mostly upon its angle. There is practically no pressure from a horizontal wind if the roof slope is less than 30 deg., but the roof covering still may be susceptible to damage. Fig. 1 shows the distribution of pressure and suction on
Windstorm Damage

help assure safety to himself and and other personal property

various parts of two types of buildings, one having a gable roof and the other a flat or shed-type roof. While a 50-m.p.h. wind produces a pressure of about 61⁄2 lb. per sq. ft., a 70-m.p.h. wind almost doubles, a 100-m.p.h. wind quadruples this pressure as shown in Fig. 2. Sometimes the suction force exceeds the pressure force. Openings like broken windows on the windward side of a building permit pressure to be built up inside of it.

Fig. 3 shows how buildings are affected by strong winds. Pressure against the windward side tends to lift and overturn a building not firmly anchored to a foundation or one not having a substantial foundation. As the suction force increases, a building tends to shear and slide off a foundation. Suction on the roof, aided by pressure under it, tends to raise it unless firmly anchored to the walls. A building tends to collapse under wind pressure if it does not have properly braced walls and roof, or if the structural members are weakened by decay or deterioration. Momentary gusts of wind from varying directions, generally of greater force than that of the prevailing wind, weaken a building.

Windstorm-Resistant Construction

New buildings erected in a region where severe windstorms can be expected should have windstorm-resistant construction. Details of such construction are contained in
the National Building Code. Information on how to build wind-resistant farm buildings is also contained in Bulletin No. 144 of the U.S. Dept. of Agriculture. Fig. 4 shows a number of important features. Sills are fastened to a poured-concrete foundation wall with \( \frac{1}{2} \times 16 \)-in. anchor bolts of which the ends to be embedded are bent at right angles. For concrete-block foundations, the anchor bolts extend through the blocks and are embedded in the footing. In both cases, the spacing of anchor bolts should not exceed 5 ft. Studs are each toenailed to sills with five 10d nails. Wooden posts on piers are fastened to them with U-shaped straps of \( \frac{3}{16} \times 2 \)-in. steel. These are embedded in both the pier and the footing, and fastened to the post with \( \frac{3}{8} \times 3 \frac{1}{2} \)-in. lag screws. Diagonal bracing let into the frame members of walls at corners will add considerable rigidity. Girders resting on posts are bolted or strapped together with \( \frac{3}{16} \times 2 \frac{1}{2} \)-in. steel straps. Rafters and joists resting on top plates of wall framing are attached to them and to the studs with 24-ga. steel straps about 1 in. wide, as in the lower three details of Fig. 4.

As roof damage is the most frequent result of windstorms, particular attention should be given to strong roof construction and wind-resistant covering. Roof coverings should be applied strictly in accordance with manufacturers' instructions. Inadequate nailing is usually the cause of failure of some composition shingles in breaking off when subjected to strong wind. Fastening each tab with a spot of quick-setting asphalt cement, not less than 1 in. in diameter, Fig. 5, will hold the tabs down securely.

**Protective Measures**

Existing buildings are less susceptible to windstorm damage if kept in good repair. Any loosened projections of portions of a house, such as trim, cornices, shutters, gutters and downspouts, should be kept properly secured, in good sound condition, or replaced as necessary. Tabs of composition shingles should be cemented down as already noted. Trees should be kept pruned to eliminate dead branches and minimize breakage.
of live ones. Loose objects like trash cans, lawn furniture, lumber and children's play equipment, should be located in spots sheltered from prevailing winds, or gathered and put in the basement before a severe storm strikes. This will prevent them from being blown about and causing damage. Some of the loose objects may have to be anchored securely.

Window Protection

In areas subject to hurricanes, strong panels of 1-in. wood or 5/8-in. exterior-type plywood should be kept at hand to board up windows as in Fig. 6. Provisions for securely fastening such panels should be made in advance, instead of nailing them down at the time of an emergency. In some cases the panels may be held in place like storm sash or screens, using hangers at the top and hooks or turn buttons at the bottom. The inset in Fig. 6 shows the use of hanger bolts, which are left in place permanently. The panels should not touch the glass of a window, especially when under wind pressure. For windows that are larger than a single panel, you can join several panels together, reinforcing the abutting edges with lengths of 3/16-in. T-iron as shown in Fig. 7.

Picture windows in houses, and display windows in stores can withstand considerable wind pressure if braced as shown in Fig. 8. A straight piece of 2 x 10-in. stock is set vertically against the center of the windowpane by means of adjustable holders at the top and bottom. A slight cushioning effect is provided between the glass and the brace by applying a length of self-adhering sponge-rubber weather stripping to the edge of the brace as indicated. Large garage doors also should be braced.

If, during a severe windstorm, the wind blows into the house through broken windows, doors or other openings, dangerous pressure may be built-up inside. This can be relieved by providing openings of equivalent size on the leeward side. This precaution may be enough to save a building.

Warnings are radioed in areas that are likely to be subjected to severe storms like tornadoes and hurricanes. As tornadoes form suddenly, and therefore cannot be forecast, tornado alerts are issued in areas where weather conditions are likely to cause them. After one has been observed, its general direction and progress can be broadcast. The general path of a hurricane can be predicted with reasonable accuracy and warnings issued many hours in advance. Knowing what kind of a windstorm to expect enables a person to take
specific precautions besides the general measures that apply to all windstorms.

**Recognizing a Tornado**

Persons who are frequently in open country and may be out of touch with communications temporarily, should be able to recognize the funnel-shaped cloud formation that is characteristic of a tornado. Extending downward from storm clouds, this columnar cloud may look like a thick rope that is only a dozen or so feet in diameter. Or, it may be a V or U-shaped cloud of much greater diameter, occasionally as much as a mile or two, although the average diameter is about ¼ mile. This cloud whirls around in counterclockwise direction at speeds estimated as high as 500 m.p.h., accompanied by a deafening roar. When the lower end of the cloud touches the earth, which it may do intermittently, continuously or not at all, structures in its path usually are instantly demolished.

In central U. S., tornadoes generally move toward the northeast and tend to swing northward at the end of their path. The forward speed is generally 25 to 40 m.p.h., although over 65 m.p.h. has been recorded. A tornado may remain stationary at one spot for several minutes, or it may follow erratic U-shaped or circular paths occasionally. While the average path is only 15 miles long in midwestern U. S., some have traveled over 200 miles. They may occur in any month of the year, but their greatest frequency is during the early months in the southern states, and during May and June in locations farther north. The center of a tornado is an area of greatly diminished pressure. When this passes over buildings that are not vented to equalize air pressure inside and out, the structures practically "explode." The difference in pressure may be equal to several hundred tons.

**Surviving a Tornado**

Quick decision and action are essential to survive an approaching tornado. Often people in autos can get out of the way. If such escape is impossible, the best place outdoors is a ditch or depression in which a person should lie flat. The greatest protection is afforded by a reinforced-concrete shelter built below grade level, Fig. 9. It should be about 5 x 8 ft. in size, preferably about 7 ft. deep. It should have a tent and a strong door that can be fastened securely.

A reinforced-concrete shelter located in one corner of a basement, as in Fig. 10, will be accessible quickly to persons in the house. This shelter should have a window opening, provided with a solid panel of plywood instead of glass, as an emergency exit should the doorway become blocked with debris. The door should swing inward so it cannot be held shut by debris.
A lean-to type of basement shelter that will accommodate two or three persons, and has an exit at either end, can be built of wood as shown in Figs. 11 to 13 inclusive. This shelter was especially designed by the U. S. Civil Defense Administration to provide protection against bomb blast. Being highly resistant to falling debris, largely because of its strongly reinforced roof that slopes at a 45-deg. angle, this shelter offers considerable safety in a tornado. The roof of 1-in. yellow pine or 5/8-in. exterior-type plywood is nailed to a framework of 2 x 6-in. “rafters” spaced about 6 in. on centers. These are nailed to top and bottom plates or cross pieces which in turn are securely bolted to the wall and floor of a basement.

In a frame house, the part of a basement that is closest to an approaching tornado is the safest spot to be if a separate storm shelter is not available. Very little rubble tends to fall into the basement of a frame house at this point. However, just the opposite is true in case of a brick, stone or concrete-block house. Such a house tends to disintegrate quickly when struck by a tornado, and debris may bury persons in a basement. Such a house should have a separate storm shelter. Reinforced-concrete buildings or those that have a steel-frame construction offer a high degree of safety when occupants keep away from windows and doorways.

**Hurricanes**

A hurricane is a rotating windstorm that may be several hundred miles in diameter. The center or “eye” is a calm area of low atmospheric pressure averaging about 14 miles in diameter. Around this center the wind travels in counterclockwise direction, at speeds of 75 to 150 m.p.h. The greatest force is just outside the eye. The storm center advances at a relatively slow speed. A spot that lies in the path of the eye is first subjected to winds from one direction, after which there is a period of absolute calm, and then the wind blows with equal fury from the opposite direction.

Many hurricanes lose most of their violence after traveling inland, but cause torrential rainfall, often resulting in severe floods. In the U. S., hurricanes are seasonal from June to November, reaching a peak of frequency at the beginning of September but they can occur at other times also.

In view of the changing wind direction that may be experienced in a hurricane, the vent openings on the leeward side of buildings during the early part of the storm may have to be closed, and other vents provided on the opposite side. Occupants of waterfront homes should evacuate them and move to higher and safer locations farther inland before the storm strikes.
Water-Ski Jump

SKI-JUMPING THRILLS are not restricted to winter snow when you have this floating ski-jump ramp to lift you into the air on water skis. The 20-ft. ramp lifts the skier 5 ft. into the air, and only speed and natural caution determine how high and how long will be the jump.

Designed for simplicity of construction and quick disassembly for winter storage, the ramp has a 2 x 4 frame that is assembled with galvanized bolts, nuts and washers. For the surface of the floating ramp, a new, high-density-resin overlaid fir plywood is recommended. The surface of this type of plywood is glass-smooth and flint-hard, ideal for water skiing, as it requires no waxing or finishing and withstands the abuse of water skis sliding over it. However, regular exterior-grade plywood can be used for the ramp surface. Its upper surface should be prepared by flowing on two coats of heated carnauba wax. The underside of the plywood, as well as all framing of the ramp, should be given a heavy prime coat, then finished with a good grade of exterior or marine-grade paint. As indicated in the details, the framework under the plywood ramp consists of cross members between the outer frame members, and staggered shorter members between the cross members. This construction assures a rigid surface for the skier. The lower frame, in which oil-barrel floats are strapped, also is made as one unit.

When the ramp is to be assembled, float the lower frame with all diagonal braces loosely connected to it. Then, float the plywood ramp over it and slip bolts through the upper ends of the diagonals while lifting the ramp into position. Next, install the two side gussets and tighten all bolts. Now, strap the oil drums in place, with the bungs facing upward, and fill them with water, as required, to balance the ramp and adjust its height. Heavy screw eyes on the four corners of the lower frame of the ramp are used to attach anchor cables that lead to anchors made by filling pails with concrete and inserting large screw eyes in the wet mix. These anchors are necessary to keep the ramp from shifting with the wind and from the wake of a passing boat.

As indicated on the detail, the forward member of the ramp frame is a length of 2 x 6 to provide added strength at this point. To finish the edge of the plywood ramp, 3/8-in. half round is glued and nailed to it as indicated in the detail.

Douglas Fir Plywood Association

POPULAR MECHANICS
Add a new dimension of thrills to the sport of water skiing by taking to the air via this floating ramp. Details below show that upper frame, to which plywood ramp is screwed, consists of staggered short members fitted between cross pieces of outside frame. Lower frame supports four standard 55-gal. oil drums that act as floats. All openings in the drums should be sealed except those on the sides of the drums.
How to make
Fishing Jigs

By Vlad Evanoff

ONE OF THE MOST effective lures used in salt-water fishing, and which now is finding increasing favor with fresh-water anglers, is the "jig." This lure consists of a metal "head" in which a single hook is embedded, and a "body" of bucktail hair, feathers or nylon. The most attractive feature of jigs is that any fishing enthusiast who ties his own flies or makes his own lures can cast the jigs with a minimum of tools and equipment.

Making the Molds

First step in making jigs is to have a model, or pattern. The pattern can be a jig on hand from which the feathers have been stripped and the hook and eyelet removed, or it can be carved from softwood, Fig. 1. Next, a mold is made by pouring plaster of paris or water putty into a cardboard box. As indicated in Fig. 2, the box should be a size that permits a space of 3/8 in. between the body end of the jig and the box side, and 1 1/2 in. from the opposite end of the jig and the box side. First, pour the box half full of plaster, coat the jig pattern with petroleum jelly and press it halfway into the wet plaster. Two nails then are sunk into the plaster near diagonally opposite corners and allowed to project about 1/4 in., Fig. 3. They will act as locating pins when reassembling jig halves for casting.

After the first half of the mold has hardened, brush its entire surface with heavy oil, then fill the box with plaster. When the plaster sets, which usually requires about 1/2 hr., break the box away from the mold. Use a knife blade to separate the mold halves, Figs. 5 and 6. Pry out the pattern, which will remain in one of the mold halves, and set the mold aside to season at room temperature for about two weeks.
When the plaster mold has thoroughly seasoned, use the point of a knife to cut eyelet grooves and hook slots, Fig. 8, which are determined by placing hooks and eyelets on the mold and tracing around them with a pencil. Eyelets, Fig. 7, are formed from brass or copper wire. Also carve a funnel-shaped pouring hole in each mold half.

**Casting the Jigs**

Metal for casting the jigs should be lead or tin, which often can be purchased as scrap metal. A combination of the two metals, such as bar solder, also is good. The greater the proportion of tin, the lighter the jig will be. Melt the metal in a ladle and pour some into each half of the mold, both to warm it and to remove any moisture. Next, place the hook and eyelet in position, Fig. 9, hold the mold halves together and quickly pour the mold full of metal, Fig. 10. When the surface of the metal indicates that it is hardening, lay the mold on its side until the metal has cooled completely. Wear heavy gloves for this operation, as the mold quickly becomes too hot to hold, and there is the risk of splashing molten metal on the hands.

In a minute or two the mold halves can be separated and the jig removed. Cut off the excess metal, Fig. 11, and drop it back into the ladle. A mold made as described will permit casting up to two dozen jigs. Chips or holes in the mold can be patched, but when the mold gets rough it should be remade. For a permanent mold, take a freshly cast plaster mold to a foundry and have it cast in bronze or aluminum. The cost should not be more than a few dollars, and the mold can be used for a lifetime.

**Finishing the Jigs**

After a number of jigs have been cast, file them smooth, then polish with sandpaper or emery cloth. Feathers or hair now are applied in several steps. First, wrap a few turns of heavy thread around the jig where the feathers will be attached, and cover this wrapping with quick-drying cement. Place a pinch of feathers against the cement, then wrap a few more turns of thread over them. Again apply the cement and a few more feathers. Repeat this operation until the hook is well concealed. Finally, wrap a few extra turns of thread around the assembly and coat them with cement. If the metal used for casting the jig had a high tin content, it probably will stay shiny. Metal containing more lead will quickly oxidize and turn dark, so it should be painted in colors that are compatible with the colors of the feathers used. Eyes may be painted on the jig to give it a more professional look.

**JUNE 1957**
Warm Water for Washing Car
Warm running water was made available outdoors for car washing by this homeowner who installed a hot-water tap next to the cold-water outlet on the side of his house and then connected both to a garden hose with a laundry-tub mixer, which is available at most hardware stores. Temperature of the water is controlled by adjusting the tap faucets.

Rubber Band Cut From Inner Tube Chipproofs Sharpening Stone
The edges of your sharpening stones will not become chipped when stored in a tool drawer if a wide band cut from an inner tube is stretched around each of them as shown. Also, dirt is prevented from working into the surface of the stones in contact with the bottom of the drawer.

Lavatory “Step” for Small Children
This plywood step or platform built into a lavatory cabinet permits a small child to reach the lavatory. Made of 3/4-in. plywood, the step is fitted in a slot cut in the front of the cabinet as shown, and slides between cleats nailed to the inside of the cabinet. A wooden strip nailed to the front and extending slightly from the sides of the platform prevents it from being pushed in too far.
Robert Taylor, Cuyahoga Falls, Ohio.

Solder Gun and Stick Shellac Speed Furniture Refinishing
One fast and efficient way to fill deep scratches when refinishing furniture is to use a soldering gun and stick shellac. Use just enough heat to melt the shellac and flow it into the cracks. Overheating will char the wood. Smooth the shellac as well as possible with the heated gun, then sand when cool.—H. Y. Moon, Orient, N. Y.
IF YOU USE A BOAT to reach your favorite hunting or fishing grounds, and would like to spend more time at these spots, boat camping may be the answer to your problem. When fishing a lake or stream, instead of heading back to a lodge or seeking a camp site in late afternoon to avoid traveling in strange waters after dark, just drop anchor and stay aboard.

Boat camping does not require a large craft outfitted with bunks and deluxe equipment. Ordinary outboard-powered runabouts from 12 to 16 ft., if fairly broad-beamed and seaworthy, can be fitted for boat camping. Two persons can sleep aboard most 12 to 14-ft. boats, and there will be room for food, fuel and equipment for a two or three-day trip. If the boat is 15 or 16 ft. long, three adults can be accommodated under the same circumstances.

Fuel and oil consumption will limit the distance that it is possible to run a boat, if there are no fuel or supply stations along the route you plan to take. For an ordinary runabout the maximum round-trip distance usually is from 150 to 200 miles. After a test run of a fully loaded boat to determine fuel consumption, the practical range of operations can be estimated fairly closely. Keep in mind that some extra fuel should be carried to permit operating the boat while on the hunting or fishing grounds. Because 20 gal. of gasoline and 4 qt. of oil equal the weight of an average adult, and require as much or more space, rate of fuel consumption may dictate that one less person can be carried in a boat when longer trips are made.

Boat camping permits you to drop the fishing pole and pick up the mess kit without walking a step

JUNE 1957

185
Each boat will have to be considered a separate problem, but fundamentally, boat camping requires that a boat have weather protection and sleeping space. In some instances, removable hinged plywood seat backs can be lowered to a horizontal position so the backs and seats form a sleeping platform. Where this is not possible, two or more pieces of plywood placed lengthwise of the boat across the seats will provide a sleeping platform. When the platform is not in use, the plywood pieces are placed in the bottom of the boat for floorboards. For maximum sleeping comfort, sleeping bags are recommended over a blanket-mattress combination. Sleeping bags are weatherproof, and can be rolled up and stowed away in a small space.

For protection against the weather, a folding canvas cover can be either purchased or made. For the do-it-yourself top, \(\frac{1}{2}\)-in. thin-wall conduit is bent to form the ribs and the cover itself is cut and sewn from 8-oz. canvas. As shown in the photographs, the lower portion of the cover is designed to stay in place when the upper portion is removed, forming a windscreen.

Cooking can be done aboard on a small camp stove. Because gasoline and oil for the engine, as well as fuel for the stove, are carried aboard, a dependable portable fire extinguisher should be considered standard equipment when a stove is used. In addition, keep the stove as far as possible from engine and fuel supplies. Flashlights or battery-powered electric lanterns should be used rather than lamps requiring fuel.

Because you must be self-sufficient when boat camping, a spare propeller and nut should be clamped under one of the seats.
or under the foredeck out of the way. A lightweight folding anchor and about 100 ft. of anchor line also are necessary. A small kit of tools, spare ignition points and spark plugs should be included in the equipment. If your boat is subject to puncture or snag damage, buy a repair kit, available at most boat dealers, which consists of glass-fiber cloth patches and resin. Materials in these kits can be used on either wood or metal hulls. Shear pins for the propeller are another necessity, as is a pair of lightweight oars, just in case a pin is sheared in midstream and the boat must be rowed to shore.

Foodstuffs carried aboard should be as light as practicable, and can include pancake flour, dried fruits and the like. Carry a minimum of canned goods, since their weight may be considerable. A first-aid kit is an indispensable piece of equipment for boat camping or any outdoor trips. If you anchor your boat in a stream where there is a possibility of flash floods, put out plenty of anchor line and face the bow upstream. In country where there are snakes anchor at least several feet off shore, with the bow toward open water so the boat will ride well in case of a sudden storm. Where the banks are rocky, wedge several smooth dead branches vertically against the bank to keep the boat off the rocks. Tie bow and stern lines well above water, in case the stream should rise while you are sleeping.

When you have had enough of hunting or fishing, no time need be spent in breaking camp. Just take in the anchor, start the motor and head for home.
Razor Blade Used for Cutting Stored Safely in Clip

A single-edge razor blade is a useful cutting tool for many odd jobs around the home, but when not in use it is a real hazard unless the sharp edge is covered. After slipping the blade in the clip, hang it in a convenient place out of reach of children, or keep it in a drawer.

Adapter for Cut-Film Holder Handles Off-Size Film

Sheet film that is smaller than the holder at hand can be used in an emergency by making a simple adapter to hold it. Select a discarded negative that will fit the holder and cut four tabs in it under which the edges of the unexposed film can be inserted as shown in the photo. Then load the adapter and insert it in the holder in the regular manner. A fifth tab cut at the upper end of the adapter will allow you to center the film when loading in the dark.

Richard Hanscom, Elmhurst, Ill.

Protect Art-Brush Bristles With Drinking Straw

The bristles on a small art brush can be protected from damage when not in use if a short length of drinking straw is slipped over the ferrule as shown. For a long period of storage, the bristles can be completely sealed in the straw by closing the open end with cellulose tape.

Year-Round Uses for Shellac in the Home

From garden markers to winter bouquets is the range of uses for shellac around the home. For the garden, shellac empty seed packets to row markers and then shellac the outside surfaces of the packets. The packets will stay in place and be legible all summer. In your home, holes worn in linoleum can be repaired by filling them with a paste made of shellac and finely ground cork. When the mixture has dried, sand smooth and paint to match the linoleum pattern. Repair cracked wooden salad bowls by cleaning the cracks as well as possible and then filling them with shellac. Use only enough to come flush with the surface and wipe off any excess. You can restore the appearance of a mirror when breaks appear in the silver backing by applying smooth aluminum foil and shellacking it in place. Polished-brass fixtures and utensils will not darken if two thin coats of shellac are applied. Denatured alcohol will remove shellac should that become necessary. Old lamp shades can be given new life by stripping off the covering and replacing it with a colored map or decorative paper. For durability, apply two thin coats of shellac to the paper. Shellac can be used to preserve the beauty of autumn foliage for winter bouquets. Lay the leaves as flat as possible on a newspaper and apply shellac to one side, covering stems as well as leaves. When the shellac is dry, turn the leaves over and repeat.
Hand Grinder Fitted to Lathe

By Walter E. Burton

SMALL SHOPS will find practical use for this simple adaptation of a hand grinder of the type that clamps to a workbench. Common light grinding jobs ordinarily done on the lathe with a motor-driven tool-post grinder can be carried out with an accuracy very nearly equalling that of standard tool-post-grinder setups. The hand grinder used must be in good condition with tight bearings and without excessive backlash in the gear.

As pictured above and below, the grinder is clamped to a bracket bolted to the tool-post mounting pad. On some small lathes, the axis of grinding wheel must be in same horizontal plane as lathe centers. Note position of bracket.

Here the hand grinder is set up with wheel guard and crank extension for refinishing lathe center.
a standard 1/2-in. machine bolt will serve to hold the bracket. On other lathes you may find it necessary to make a special clamping plate and alter a capscrew to suit as in the lower-right-hand detail above. The pin detailed is usually necessary to prevent the screw from turning in the T-slot when tightening or loosening. In some cases the standard tool-post clamping plate will serve as a clamp for the grinder bracket. If this assembly can be utilized, then all that will be needed is a capscrew altered to suit. The bracket must be bent at the correct angle to bring the axis of the grinding wheel in the same horizontal plane as that of the lathe centers when the grinder is clamped in place.

In addition to the bracket and clamping-plate assembly, the parts shown above in color were added to the original grinder. These are the crank extension which is necessary when the grinder is aligned with the compound, the deflector and wheel guard which are optional, the special clamping screw and pad, and the adapter. The adapter is needed only when wheels having center holes larger than the grinder spindle are used. Ready-made adapters also are available. If the original clamp screw and pad are long enough to clamp tightly onto the bracket, then the special clamp screw and pad pictured will not be required. None of the parts shown is fully dimensioned as each must be made to fit the grinder and lathe used.

Before grinding work mounted in a chuck or between centers, dress the grinding-wheel face square-across. When grinding work mounted between centers, set the compound at an angle of 1 to 2 deg. so that only the corner of the wheel contacts the work. Set the lathe carriage for a slow longitudinal advance and turn the grinder crank uniformly at a moderate speed. If you do not wear eyeglasses regularly, protect the eyes either with goggles or a suitable eyeshield.

** Damper Quiets Circular Saw **

To reduce the “sing” of a circular-saw blade one craftsman improvised a damper. The damper consists of a piece of sole leather positioned to contact the blade below the arbor. It is supported by a length of spring wire bolted to the dust chute.
Hold-Down for Running Mouldings

To run uniform mouldings on a saw, one craftsman uses this adjustable hold-down, which clamps to the rip fence. A piece of thin spring steel bent as shown and mounted in a recess in the lower edge exerts a downward pressure on the stock. Elongated screw holes at one end permit limited flexing. Additional tension is applied by a compression spring inserted in a hole drilled edgewise through the hold-down at the center of the recess. The screws in the plate which retains the spring are adjusted in or out for the desired tension.

Sanding-Block Lock

Cloth or paper abrasives may be locked to a flat, curved or round sanding block by means of a bar which snaps into a slot cut lengthwise in the block. The bar is hinged at one end and equipped with a spring clip on the opposite end. When depressed in the slot the bar does not interfere with the sanding operation. Another means of fastening strips of abrasive to a flat holder is with a flexible piece of wood wedged against undercut shoulders at each end to clamp the ends of the abrasive.

Post Shelves Add Shop Space

A metal support column located in your basement workshop can be used to good advantage when equipped with shelves as shown. Each shelf is made from two pieces of 2 x 8 clamped together edgewise around the post, the hole for the post being cut half in each piece. Long bolts running through both pieces clamp them to the post. Thin wood strips nailed to the shelf edges, to project above them slightly, keep small parts and tools from rolling off and being damaged on a concrete floor.

Mrs. Doris F. Wiley, Maywood, Ill.
MACHINING METAL TUBING

MACHINING METAL TUBING in the lathe often poses a problem in mounting between centers and also in chucking. Some operations may require that internal cuts be made to precise dimensions, or that both ends of the tube be faced-off true. When chucking tubing having a wall thickness of ½ in. or under, special care must be taken to prevent crushing the tubing out of round or, if chucked internally, of distorting it and affecting the accuracy of the machining cuts. Although it requires more time and care to center the work accurately in the 4-jaw chuck, some operators prefer the latter rather than the 3-jaw scroll, or self-centering, chuck. Each individual jaw of the 4-jaw chuck will require less pressure to hold the work securely, whether it is gripping the tubing internally or externally. The four jaws also more nearly equalize distribution of the pressure.

As a rule, when machining externally or internally, it is advisable to remove stock from tubing in a series of light cuts rather than attempt to bring the work to dimension in one heavy cut. Aluminum, brass and plastic tubing are easiest to work, as the average cuts can be made without a

Many lathe operators prefer expansion center for supporting tubing. Center does not score outside surface
lubricant. Smooth work on steel tubing will require a lubricant.

Turning: Perhaps the easiest of all methods of chucking a large tube for turning is to grip it internally with a 4-jaw chuck and then support the tailstock end with a pipe center, as shown in Fig. 1. The pipe center can be purchased ready-made or can be turned in the lathe. Pipe centers with plain bearings are suitable for average work. The center detailed has a plain bearing with oil grooves. It has a capacity of up to 3½-in. inside diameter of tubing. Another method of handling tubes over 3 in. in diameter is by means of an expansion center, Fig. 2, which works on the same shank as the pipe center. The expansion center is fitted over the shank, which is placed in the tailstock, and is then adjusted to the inside diameter of the work by turning the four bolts or screws in or out as needed. Either carriage bolts or machine screws can be used.

The one disadvantage in using a pipe center is that the end of the work must be faced-off square to assure accurate centering. However, if the work is mounted on a cone center having a slow taper, reasonably accurate centering will be more or less automatic. A metal pipe center is sometimes made up with a slow taper to accommodate a limited range of work diameters. Often the required slow taper is worked on a length of hardwood to the requirements of the job at hand. For making wooden-plug chucks, or centers, B in Fig. 3, use maple or birch, either one of which will hold its shape and turn well at slow speed. Instead of cutting the plug chuck to a slow taper, it can be step cut, A in Fig. 3, to the exact work size on one step. By turning
three steps on each piece the center can be used for three work diameters. After turning the chuck and before removing it from the 4-jaw chuck, it is sawed apart, Fig. 3, to provide a mounting for both ends of the tube. Fig. 4 shows a tube mounted on plug chucks made in this manner.

A standard piece of equipment for supporting the outboard end of a chucked piece of tubing is the lathe steady rest. On small lathes this will have a capacity of about 3 in. Both the steady-rest jaws and the work at the point of contact should be coated with lubricant to minimize scoring. If it is desired to completely eliminate scoring on a piece of smooth tubing, the simple trick of wrapping the work with gummed paper tape will give the needed protection. The tape should wrap around and slightly overlap, with the lap so made that the edge of the paper will not catch and tear as it passes under the steady-rest jaws. Coat the paper with polishing wax or paraffin and then apply light grease.

When centering work with the lathe steady rest, run the work at slow speed with the jaws set to clear. Then, with the work rotating, advance any one jaw of the rest until the tube appears to run true. Center with a stop, or a dial indicator if a high degree of accuracy is specified. Note in Fig. 5 that work longer than the lathe can be handled by using the steady rest. Fig. 5 shows the headstock end being threaded, the mounting being a plug chuck on a screw center, B in Fig. 3. This type of chuck is often used for tubes under 2 in. in diameter. For very large work, two disks of wood, C in Fig. 3, are most practical. One disk is first turned to the required diameter and flanged slightly as detailed. The second disk is then placed against the first and supported by the cup center. This setup will give enough friction to hold the second disk in place and permit turning it to duplicate form.

A large steady rest is often useful. A simple improvised type is shown in Fig. 6. It is suitable for work up to 4½ in. in diameter. Jaws for this rest are made up as required for each job. An example is pictured in the photo, Fig. 6, the special jaws being held in place with C-clamps.

**Drilling:** When holes are to be drilled into tubing it must be mounted in a vise or held securely by other means. A milling vise of the type pictured in Fig. 7 is useful as it allows the work to be moved directly under the drill bit. Holes should be accurately located and the locations center-punched before drilling. A simple method of locating a straight line around a tube is to use a single wrapping of paper, Figs. 8 and 9. The paper can be taped in place or used as a straightedge for pencil marking, Fig. 8. The paper may also be used to determine hole spacing. Do this by first marking the circumference of the work. Then, for example, if the work is to have three holes, set off three equal spaces on any line drawn on the paper, Fig. 9. Connect point A with the circumference mark and then draw lines from B and C parallel with the line from A. This will divide the circumference into three equal spaces, and the marks can be transferred by wrapping the paper around the work.

In most cases it is not worthwhile to fit a backing behind a drilled hole to prevent burring. On most jobs, slight burring on the inside of the tube is not objectionable. Burring can be minimized by using a drill...
with a point angle of about 135 deg. instead of the usual 118 deg.

Sawing: Aluminum is easily cut on the bandsaw, using an ordinary woodcutting blade running at the speed normally used for wood. Of course, tubing also can be cut with a hacksaw if a bandsaw is not available. The tubing is very likely to slip and turn if you try to cut it freehand by either method. It is always best to use some kind of clamping device in order to get an accurate cut. One simple mounting is the drill-press vise, Fig. 11. A shop-made V-block, Figs. 10 and 12, will take tubing up to 2 in. in diameter. The use of a drill vise in an inverted position, Fig. 15, is often useful. Two other practical methods of holding tubing for bandsawing are pictured in Figs. 13 and 14, the hand screw providing both clamp and handle for moving the work to the blade. Note that the clamp detailed in Fig. 10 and shown in use in Fig. 12 has a guide bar which slides in the groove in the machine table. This device gives a very accurate cut. Brass and steel tubing also can be bandsawed, but the machine must be fitted with a reduction drive and special metal-cutting blades. Some small bandsaws are available with a built-in reduction gear which reduces the speed of the band wheels for metal cutting. Machines without this special drive can be driven at reduced speeds through an improvised countershaft. Always use a blade with the correct number of teeth. ★ ★ ★

Drill-press vise holds tubing securely for cutting with bandsaw. Setup produces accurate, smooth cut.

Above, work up to 2 in. in dia. can be held in this V-block with improvised clamp and a guide bar which rides in table groove. Below, three views picturing use of hand screw and drill-press vise as holders for tubing of large and small diameters. Fig. 13 shows hand screw used as clamp with sliding guide. Figs. 14 and 15 show hand screw and drill vise used freehand.
Simple Rack for C-Clamps

If you are tired of dragging several C-clamps hooked together out of a drawer, or unscrewing them from the edge of the bench top each time one is needed, try the simple rack shown. It consists of a length of 2 x 4, beveled on one edge so it tilts up slightly when screwed to a wall. The clamps are hooked over the 2 x 4 with the clamp screws down.

M. C. Anderson, San Lorenzo, Calif.

Altered Boxes Save Work, Time

Many of the stacked paper boxes on store shelves need not be lifted off to get at items in the lower ones if the box fronts are altered as shown. This applies particularly to boxes containing such items as envelopes and other thin, flat stock in boxes that have slipover covers of equal length. First, the end of the box is removed, then the lower half of the end of the cover is "hinged" with transparent tape to provide easy access.

Simple Ball-Turning Tool Bit

The tool bit shown in the detail permits fast, accurate turning of small metal balls on a lathe without a special ball-turning attachment. To make the bit, use a blank turning bit or a piece of tool steel. Anneal it and at a slight angle drill a hole of the same diameter as the desired diameter of the ball through the bit near one end. Mark a diagonal line around the tool, bisecting the center of the hole at the top and bottom. Then grind away the end to this mark. The bit is then hardened and the ends honed to provide keen cutting edges.

C. W. Woodson, Chicago.

Wire Solder on Tape Spool Protected Against Dirt

Wire solder will stay dirt-free and grease-free whether carried in a toolbox or stored on a shelf in the workshop when it is rolled onto an empty adhesive-tape spool. Snapping the cover onto the spool as indicated will effectively seal the solder against dirt. The tape spool also is ideal for carrying small amounts of solder in a toolbox when the solder is removed from a large roll.
Torch Carrier for Flame Cutting

This torch carrier, or burning machine, was developed to handle a special flame-cutting job, the specifications of which called for cutting heavy steel plate to a tolerance of plus $\frac{3}{16}$ in. The unit consists of a carriage sliding on 1 1/16-in. rods in a manner similar to that of a lathe carriage. The carriage is advanced at a uniform speed by means of a lead screw, which is power-driven through a double-reduction, V-belt drive as detailed below. A vacuum-cleaner motor controlled by a rheostat supplies power. On the original machine a three-step sliding pulley was used on the lead screw. Matching four-step pulleys also can be used. Only a few general dimensions are given as the drive unit must be built to suit the job. Ordinarily, the machine is mounted on a large welding table so that the torch can be positioned for straight cuts. For cutting off heavy tubing as pictured at the right, the torch is held stationary and the work rotated.—Phillipo Vallini, Kenosha, Wis.
HOW WOULD

Q—When cutting long stock, what should be done to minimize blade breakage and assure accurate cutting on a bandsaw?

A—Provide an extra support for extremely long work. The support can be an extension of the saw table, a special, separate supporting table, a stand or sawhorse of the correct height. On some combination tools, such as shown, the saw table and rip fence can be combined to provide a low-friction supporting surface in a matter of moments.

Q—What is “pad sawing” and how can it be a big timesaver when many duplicate pieces of stock are cut on a bandsaw?

A—"Pad sawing" simply means that a number of pieces of stock are made into a "pad" or stock that is held together by driving nails through the waste portions of the work. The pattern to be cut out on the saw is drawn on the top piece of stock and the cut is made as though the stack of wood were a single piece of material.

Q—Cutting a small number of pieces of the same width in which there are reverse curves will require what bandsaw setup?

A—A pointed guide block is clamped to the table as shown in the photograph. After drawing the curve on the stock and making the first cut freehand, the guide block is clamped to the table directly opposite the center of saw blade so the space between the blade and the end of block is equal to the width of the workpiece to be cut.

Q—Stock to be bent in a curve must be reduced in thickness on the area of the curve. How is this done on a bandsaw?

A—On one edge of the stock, mark section to be reduced in thickness, making its length about 1 in. more than the required length of the curve. Make one end cut first, then saw into the line and to the end cut. Reverse the workpiece and saw along the line to the opposite end of the scribed line as shown in the photo.
Q—You need a number of thin pieces of wood cut in a curved pattern for trim. How can they be cut from thicker stock?

A—Lay out the pattern on a piece of fairly thick stock and cut it out on the bandsaw. Next, turn the shaped stock on edge and rip it into thin sections as shown in the photograph, to produce pieces of trim of the desired thickness. Stock to be cut in this manner must be clear, straight-grained and free of large knots.

Q—What two rules should be followed when ripping thick stock on a bandsaw to produce accurately dimensioned thinner stock?

A—Because even the widest bandsaw blade is comparatively narrow, it is important that the work be held rigidly and at right angles to the saw table. Even if your saw has a rip fence, attach a wide auxiliary fence to it as shown in the photo. This will assure that the stock being ripped has support its full height and length.

Q—In compound cutting, as when making a shaped part, why should the waste pieces be kept until bandsawing is completed?

A—Because the waste pieces can be replaced temporarily on the workpiece to permit easier handling while other cuts are made. To make pieces like the ones shown in the photo, make cuts on opposite sides first. Then tack or tape the waste pieces back onto the surfaces from which they have just been bandsawed.

Q—When cutting pieces of stock to a simple curve and uniform width, what setup can be used on a bandsaw?

A—Place the rip fence on the table so the distance between it and the blade is the width of the stock to be cut. Then, cut the curve on one edge of the stock freehand. Place this edge against the rip fence and make the opposite cut by keeping the curve at a constant tangent to the rip fence to make a parallel cut.
1. **Builder's Level** works on the principle that water always seeks its own level. Consists of two transparent tubes with valves and clamps. One of the gauges is screwed to each end of a garden hose filled with water. Gauges are clamped to that part of structure to be level-checked as pictured. Lengths of hose can be coupled to give accurate level checks of 100 ft. or more.

Level-Rite, Granby, Conn.

2. **Setting Tool** is made especially for expanding masonry anchors in bottomless holes, and also in walls where hammer blows may break or shatter masonry such as tile and cinder-block construction. In use, the anchor is attached to expandable holder and pressed into hole in masonry. Turning the handle sets the anchor tightly in the hole. Comes in a wide range of sizes.

Arco Expansion Bolt Co., Marion, Ohio

3. **Bandsaw and Belt Sander** mounted on a single stand provide the small shop with an efficient combination tool that conserves space. Comes complete ready to set up and operate. Includes 10-in. bandsaw, 6-in. belt sander, 1/2-hp. motor, motor mount and floor stand. Tools located to permit full-capacity use without interference. Mount designed for easy belt change.

Power Tools, Inc., Beloit, Wis.

4. **Builder's Square** has body 48 in. long and tongue 16 in. in length. Made especially for work on wallboards of all kinds, also plywood panels 48 in. in width. Tongue is graduated through 8 in. of its length and outer end is provided with a lip which prevents the tongue from dropping below the edge of stock when laying off dimensions across width or along length.

Fairgate Rule Co., Cold Spring, N. Y.
5. SERVICE KIT is a 16-piece screwdriver and socket set packed in a metal tote tray which also serves as a wall rack. Set contains seven screwdrivers in assorted sizes, seven sockets, one socket-drive handle and metal tray. Drivers have plastic handles.


6. MASONRY DRILL is power-driven, cores a hole through reinforced concrete at an average rate of 1 in. per min. Can be positioned for vertical operation as pictured, or for operation on floors. Maintains a constant cutting speed in either position.

General Electric Co., Schenectady 5, N. Y.

7. SPECIAL CHUCK holds drills and reamers with broken shanks. Chuck features a driving plate designed to fit over the flutes of the drill and hold it in correct axial alignment when chuck is tightened. Three-jaw collet grips the drill body uniformly.

Paul H. Morinahan & Co., 4206 N. Wilson Dr., Milwaukee 11, Wis.

8. SCREWDRIVER has wire stripper in plastic handle. Strips insulation from solid or stranded wires, 14 to 20 ga. inclusive, without tearing insulation at point of cut or scoring the wire. Driver blade is nickel-plated. Comes in 4, 5 and 6-in. lengths.

Wire Stripper Tools, Inc., Glen Head, N. Y.

9. LAWN-MOWER SHARPENER handles both reel and rotary-type mowers. Fast, accurate adjustments for positioning mower, hollow or flat grinding of bed knife and for horizontal and vertical feed of grinding carriage. For hand and power mowers.

The Fate-Root-Heath Co., Plymouth, Ohio
1. **ALUMINUM SLIDES** modernize and beautify old windows. To install, remove the wooden stops, cords and weights. When removing the stops, care must be taken not to splinter the sides of the grooves in which they are installed. Then insert metal strips according to instructions furnished with the kit. Due to tension which holds strips in place, they also act as weather stripping. 


2. **TWO-COLOR DRAWER PULLS** combine velvety black and colors with polished brass, bronze or copper. Come in choice of two sizes of conical knobs and two sizes of rectangular pulls as pictured. The parts are interchangeable, making a range of color combinations possible. Round pulls can be used either as doorknobs or drawer pulls in colors to match counter surfaces. 


3. **LOCK GUARD** attached to the strike plate of a door lock prevents forcing of the striker with a strip of metal or a hack-saw blade. Is installed simply by loosening the striker plate with a screwdriver and then sliding the guard into place. Requires no alteration of the lock or striker plate. Will not cause the door to bind. Available in 3/32, 1/8 and 5/32-in. sizes.

Cellulock Corp., 299 Madison Ave., New York City 17
4. ALUMINUM INSULATION is said to reflect up to 95 percent of radiant heat that reaches its surface. Keeps homes warmer in winter and cooler in summer. Comes in easily handled rolls 36 in. wide, each roll covering an area of 250 sq. ft. Installed with a staple gun or with a hammer and ordinary tacks or screen staples. Foil is bonded to two sides of heavy paper. Reynolds Metals Co., 300 R. Thames St., Louisville, Ky.

5. SPECIAL PAINT-CAN LID is fitted with a tubular holder designed to support the brush upright in the can when the lid is pressed down into the closed position. Eliminates the time and bother of cleaning the brush at the end of the day, a feature that will be fully appreciated by do-it-yourself painters and decorators. Also prevents film forming over paint in can. R. S. Hensbury, 306 Marshall Ave., Collingdale, Pa.

6. WEATHERPROOF COATING can be used inside or out for added protection for exposed surfaces such as window sills, porch columns and exterior doors. Applied over a glass fabric it seals cracks in plaster, woodwork and masonry, gutters and flashings. Can be colored and used as a primer for paint or as a finish coat on walls. Can be applied with gun or applicator. Tuff-Kote Co., Woodstock, Ill.

7. FOLDING UTILITY TABLE also can serve as a sturdy workbench. Top is 1 1/2 in. thick, 24 in. wide and 60 in. long. It is supported on folding brackets of steel finished in baked enamel. Brackets lock automatically when table is raised to horizontal position. Folding feature aids in solving space problems in laundry and utility rooms, kitchens and garage workshops. Stuht-Bilt Steel Products, Inc., 2501 N. Peterson, Chicago 45.

JUNE 1957
Hot-Water Tank Converted To Stock-Watering Trough

A discarded hot-water-heater tank with four holes cut on one side and three staggered on the opposite side allows hogs or sheep to drink without crowding or getting into the water. A cutting and welding torch is the only tool required to cut the holes and weld the tank to its base.

Egg-Eating Hens Discouraged By Linoleum Swinging Doors

When the problem of hens eating their eggs must be eliminated by attaching swinging doors to darken the nests, linoleum doors hinged with friction tape will do the job. Cut the doors to the shape shown and fold the tape so it adheres to both sides. Tack the free ends of the tape hinges to the upper edge of the nest opening. Leather or canvas also could be used as hinges. The latter materials would require riveting to the linoleum doors.

Grain Hopper Set on Legs Dispenses Ground Feeds

The grain hopper from an old combine was salvaged by a feed dealer and mounted on legs with casters for use in dispensing ground feeds in small quantities. The legs, made from 4 x 4-in. stock, are fastened to the hopper with angle iron at the corners and steadied with diagonal braces of 2 x 4-in. lumber. Bed rails for the casters are also made from lengths of 2 x 4s. A vertical sliding door on the side of the hopper, operated by a lever, controls the flow of feed.

C. F. Marley, Nokomis, Ill.

Old Iron Wagon-Wheel Rims Support Farmyard Feed Rack

Iron-wheel rims from old wagons and farm implements were used by one farmer to support feed troughs at the proper height. Two wheels cut in half with the spokes removed furnish the four supports necessary for one trough. Flat-steel cleats are welded to the cut ends of each rim and drilled to accommodate bolts which fasten them to the bottom of the trough. Serving as runners, the rims permit skidding the trough to a new location when necessary.

When selecting a paint color remember that the sample should be a little lighter than the finish desired since paint dries darker, and the larger the wall surface to be covered, the darker it will appear.
Some spark plugs are designed for high speeds, some spark plugs are designed for low speeds, but . . .

AUTO-LITE POWER TIP "fires up"
Ford Motor Company cars at all speeds!

The first spark plug ignition-engineered for today's engines* and today's driving

Today's higher-horsepower, higher-compression engines and today's driving demand more from spark plugs, and Power Tip gives more! Performance tests prove Power Tip "fires up" engines of Ford Motor Company cars for top performance and economy at all speeds! Here's why...

At low speeds, the projecting Power Tip gets hot fast, operates hotter to burn away fouling deposits which impair engine performance in city driving. At high speeds, the Power Tip is actually cooled by the richer air-fuel mixture to check dangerous pre-ignition caused by overheated spark plugs.

Ask your dealer to install a set of Auto-Lite Resistor Spark Plugs with Power Tip in your car today!

*Power Tip is ignition-engineered for overhead-valve V-8's and for most overhead-valve 6's in all these cars: Buick, Cadillac, Chevrolet, Chrysler, De Soto, Dodge, Ford, Hudson, Imperial, Lincoln, Mercury, Nash, Oldsmobile, Packard, Plymouth, Pontiac, Rambler, Studebaker.

AUTO-LITE® RESISTOR SPARK PLUG WITH POWER TIP
Auto-Lite makes a complete line of spark plugs, including Standard, Resistor, Small-Engine, Transport, Aircraft, and Diesel-Starting.
New! Kodak

Actual size
Available in two types to fit most flash-synchronized cameras
$9.95-$11.95 (as little as $1 down)

FAST magazine loading with carrier discs that hold 6 flashbulbs each
Rotary Flashholder

permits 6 flash shots without reloading!

Ever miss a prize flash shot because you were changing bulbs when the action took place? Not much chance of that happening when you own a new Kodak Rotary Flashholder! It holds six M2 bulbs per loading, changes bulbs instantly by revolving the magazine turret, ejects all spent bulbs simultaneously...and can be completely reloaded in split seconds!

Ask your photo dealer to demonstrate the Kodak Rotary Flashholder. You'll like the simplified exposure calculator which tells at a glance which lens opening to use. And with its B-C (battery condenser) power, you'll get top flash dependability. Available in two models to fit most synchronized-shutter cameras. Complete with a Midget B-C Flashpack, flashbulb carrier discs. (Batteries extra.) List prices only $9.95 and $11.95...or as little as $1 down.

HERE'S HOW THE KODAK ROTARY FLASHHOLDER WORKS...

FAST, EASY LOADING. Six M2 flashbulbs are slipped into each of the two carrier discs that come with the Kodak Rotary Flashholder.

LOADED DISC OF BULBS is placed in magazine on the back of the flashholder. Bulbs are changed by simply rotating the magazine turret.

DIAL WINDOW on flash exposure calculator frames name of film in use—provides direct reading of correct exposures to be used.

BATTERY COMPARTMENT easily accessible. Rotary Flashholder operates on either B-C or penlight battery power. Midget B-C Flashpack provided.

TYPE I KODAK ROTARY FLASHHOLDERS attach directly to the bodies of cameras provided with the Kodalite-type of built-in contacts. Type II Kodak Rotary Flashholders fit cameras with an accessory shoe, or those that require a bracket mount. Bracket, cord, and connectors supplied.

(Prices are list and are subject to change without notice)

EASTMAN KODAK COMPANY, Rochester 4, N.Y.

JUNE 1957
Snappy Performance!

Sealed Power

KromeX Piston Ring Sets

Snappy! This describes your engine's performance when you re-ring with Sealed Power KromeX Piston Ring Sets. New car zip has been built back in.

Designed for your car

Sealed Power manufactures piston rings specifically designed for every American make of car.

Save Oil

A KromeX ring job saves you oil money immediately, also pays off in longer piston and cylinder life. Install a Sealed Power KromeX Ring Set and you will prove to yourself that no finer piston rings can be had.

From us to you. An illustrated manual on engine care—free, yours for the asking. "Care and Feeding of Engines" is highly informative, could save you a lot of maintenance expense. For your free copy, write Sealed Power, Dept. G-6, Muskegon, Mich.

Water in Basement

Q—During exceptionally heavy rains water comes into my basement through the floor drains. Several times it has reached a depth of 2 in., or more, even at the highest points of the floor. My neighbor says he thinks this water comes from the downspouts which empty into tiles at the corners of the house. Is this possible? If so, how do I correct it?

R. A., Mo.

A—It's possible your neighbor is right. We're guessing, of course, without knowing the layout and direction of the drain, or drains, from the downspouts. Assuming that these lead to a common drain, which in turn leads to the storm sewer, it is possible that the common drain has become partially clogged, either with debris or by tree roots. If this assumption is correct, the common drain is clogged to the point where it will not take the full flow from the gutters, then the excess water will back into the basement through the floor drains. Assuming that this deduction is correct, then the thing to do is have the drain rodded to clear the obstruction. However, another and more common cause of basement flooding should not be overlooked. That is the possibility that water may be backing from an overloaded or partially clogged storm sewer directly into the basement through the floor drains. In this case it may be necessary to install a sump pump or "standpipe" of the type which screw into special threaded fittings installed in the floor drains. Also it's a good idea to notify your street department. Cleaning the sewer may remedy the trouble.

Buckling Roof Shingles

Q—My home is less than a year old and already the roof shingles are buckled in places on both sides of the ridge. What has caused this and what should I do to correct it?—B. S., Chicago.

A—Usually, shrinkage of the roof boards is the reason shingles buckle as you describe. Either the roof boards were wet by rain before the shingles were applied, or the lumber already contained too much moisture. In either case, as the boards dry they shrink in sectional size and any course of shingles nailed to one board will buckle as shrinkage of the board lessens the distance between the nails. It also should be noted that buckling can (Continued to page 210)
"Delta "900" radial saw"

The Delta "900" is the most powerful 9" home workshop radial saw ever built. And it's the most useful all-purpose radial saw ever made for use outside of industry. Here's why:

TRUE 3/4 H.P. MOTOR—Actually exceeds NEMA power specifications. Guaranteed for one full year! You make heavy cuts faster, easier—and the motor runs cooler.

EXCLUSIVE "TURRET ARM" ACTION—Swing, spin and tilt the head with Delta's double overarm construction. You get full blade travel and full table capacity at any angle, including left hand miters.

EXTREME VERSATILITY—It does almost every workshop job you want to do—rip, drill, rout, sand, grind, shape, cut mouldings and many others. Saves you the cost of extra, specialized tools in your workshop.

SELECT EDGE GRAIN FIR TABLE—Only the finest grade prime wood is used to guarantee freedom from warpage and distortion.

TAKE UP TO 24 MONTHS TO PAY on terms to suit you! The Delta Budget Plan offers easy terms—as little as 10% down—and you can start enjoying Delta tools right away.

GET ALL THE FACTS ABOUT THE DELTA "900" RADIAL SAW—Compare—then make up your own mind. Your Delta Dealer is listed under "TOOLS" in the Yellow Pages of your phone book.

Send Coupon for all the facts

another product by

ROCKWELL

Delta Power Tool Division
Rockwell Manufacturing Co.
502F N. Lexington Ave., Pittsburgh 8, Pa.

☐ Please send me complete information on the Delta "900" Radial Saw.

☐ Please send me names of Delta Dealers near me.

Name ______________________________________

Address ___________________________________

City __________ County ______ State ________

June 1957
be caused by the swelling of the roof boards due to absorption of excess moisture in the attic. If this is the case, buckling will occur where the shingle course happens to be nailed to adjacent boards, one of which may be of high resin content and, therefore, less absorptive than the other. One board swells (expands) and this has the effect of shortening the distance between the nails. Usually buckling caused by shrinkage of roof boards will correct itself if excessive moisture is eliminated from the attic by adequate ventilation. However, when buckling is caused by shrinkage of the roof boards, it can be corrected only by carefully removing the nails holding the buckled shingles, flattening the shingles and then nailing. After nailing in this manner, the old nail holes in the shingles should be filled with asphalt roofing cement to prevent leakage.

Aluminum Living
is maintenance-FREE

with nichols
NEVER-STAIN

ALUMINUM trellis
to accent the Beauty of your Flowers

- RUSTPROOF — lasts indefinitely
- Never requires painting — maintenance-free
- Attractive "LUSTRE-BRITE" silvery-like finish accents beauty of flowers and vines
- Reflects sun's heat and provides numerous surfaces for vines to grip
- Easy to put up — complete instructions in each package
- Ideal for interior treatments such as room dividers, etc.
- Available in 10 ft. and 25 ft. packages complete with hardware. Look for the red-white-blue displays at your favorite store.

ALUMINUM grass stop
for the neatest lawn in your neighborhood

- RUSTPROOF — lasts for years and years
- NEW "safety edge" makes installation easy — no sharp edges. No joints or clips.
- Ideal for use around trees, shrubs, sidewalks and driveways
- Substantially reduces tedious lawn work
- Won't interfere with mowing
- Available in 40 ft. coils in 4" and 8" girth

ALUMINUM clothesline

- RUSTPROOF — lasts indefinitely
- Once up — always up, summer and winter
- Will not rot, rust, chip or crack
- Solid or stranded in 50 ft. and 100 ft. coils

(Continued from page 208)

A—Perhaps you have thought of removing the old plaster. We hesitate to recommend this procedure as a first step. It's a tedious, disagreeable task, but in some cases it may be advisable to assure a permanent job. Removing the plaster saves a lot of extra work in relocating the wiring, outlets and the trim. If you decide not to remove the plaster you have two or three choices of procedure. You can remove the trim and nail 1/4-in. filler strips to the door and window casings. These strips should be about three fourths the width of the trim piece so that when the latter is reinstalled it will cover the edge of the plasterboard. Another method is to remove the trim entirely and install a metal molding, or edging, especially made to finish off edges of the plasterboard at openings. In some cases old types of trim have square edges and the pieces are thick enough to permit rabbing the edges to take the plasterboard. Of course, this job requires power equipment.

Relocating Trim

Q—The walls in my home are in bad condition, the plaster hazards are considerable. I am wondering what to do about it, that is, how does one relocate if it is necessary to cover walls and ceilings with plasterboard. The trim is old style and I'm wondering what to do about it, that is, how does one relocate it to compensate for the added thickness of the plasterboard?—O. B., Nebr.

A—Perhaps you have thought of removing the old plaster. We hesitate to recommend this procedure as a first step. It's a tedious, disagreeable task, but in some cases it may be advisable to assure a permanent job. Removing the plaster saves a lot of extra work in relocating the wiring, outlets and the trim. If you decide not to remove the plaster you have two or three choices of procedure. You can remove the trim and nail 1/4-in. filler strips to the door and window casings. These strips should be about three fourths the width of the trim piece so that when the latter is reinstalled it will cover the edge of the plasterboard. Another method is to remove the trim entirely and install a metal molding, or edging, especially made to finish off edges of the plasterboard at openings. In some cases old types of trim have square edges and the pieces are thick enough to permit rabbing the edges to take the plasterboard. Of course, this job requires power equipment.

Restyling Exterior

Q—I have a postwar brick home, square, two-story with hip roof. I suppose it's called a "Modified Georgian." I suppose it's called. The door opens onto a concrete stoop and there's a picture window. It's livable but unattractive. Can you suggest improvements?—E. B. N. Y.

A—If, as you say, the house affords a livable interior plan, then we would not make any major changes in the structure. Your local architect or builder is in a much better position to advise than are we at such long range. All that we can do are suggestions for your consideration. We would think about adding a porch, extending perhaps across the front but lacking a foot or so of being the full width of the structure. This could be built with concrete floor over a suitable fill, the roof being supported on corbeled brick. We would also consider adding a screened porch at the back, or an open porch if desired, with access from the service door or the kitchen.

POPULAR MECHANICS
GUIDE goes one step further to give you the big difference in headlamps

In this Guide-developed machine each Guide T-3 Headlamp completes its assembly as follows. The light is turned on and when the exact beam center is automatically located, the machine electronically compares, memorizes and performs the necessary degree of "Guide Point" grinding to establish a perfect plane for Safety-Aiming.

Here, with only an ordinary screwdriver, Guide T-3 Headlamps are being accurately aimed with T-3 Safety-Aimers that fit over the accurately placed and ground "Guide Points". This can be done in a few minutes in broad daylight—ensures your really getting all the benefits built into these new Guide T-3 Headlamps.

Exclusive electronically controlled process is secret of Guide's extra aiming accuracy!

Now, your car can have 20/20 vision for nighttime driving. With new Guide T-3 Safety-Aim Headlamps you get more light aimed right...on the right side of the highway, where you need it most!

A Guide-developed process permits Guide to gem-grind three precisely located aiming points on the lens of every headlamp. These "Guide Points" are accurate within one ten-thousandth of an inch—providing the most accurate aiming plane in the industry.

You get safer, more relaxed, pleasanter motoring every night you drive with Guide! It's a proven fact that nighttime driving is the most tiring and dangerous. So, give yourself and fellow motorists all the benefits of more light aimed right from a new pair of Guide T-3 Safety-Aim Headlamps. Your nearby AC dealers can install and aim them in a matter of minutes, day or night.

Relax...go Guide...tonight!

AC SPARK PLUG — THE ELECTRONICS DIVISION OF GENERAL MOTORS

JUNE 1957
Don't call a doctor...

This rule has loose joints... they're weak and worn. It's ready to fold up forever. Don't call a doctor. Get a new one. This time, be precise... say Stanley, it's a good rule.

Take this new Stanley "100 PLUS" No. X226 6 ft. Extension Rule for example. No comparable rule lasts longer. It never gets "rule arthritis." Its joints have been permanently lubricated. They're young and springy. They can take it. The black, deep-cut markings with their protective plastic finish wear four times longer than those on thin-skinned rules that may suffer from "tired ink." Buy No. X226, and make a note of how long it measures up for you. You'll agree that Stanley Rules are your best buy.

Have you seen the new Stanley Glide-O-Matic? This smooth acting tape rule locks blade in place, marks work with metal scribers and retracts automatically. The best in tape rules. 8, 10 and 12 ft. lengths. Try one yourself and see.

For free booklet "Measuring Tools and How To Use Them" write Stanley Tools, Division of The Stanley Works, 626 Elm Street, New Britain, Conn.

New Horizons in Electronics

(Continued from page 141)

absence of any moving mass other than air contributes to its phenomenal high-frequency response, said to be well over 50,000 c.p.s.

The heart of the Ionovac is a small quartz cell, Fig. A, which is divided in two sections by a narrow aperture. Air cupped within this aperture is ionized by the application of a high r.f. voltage which literally tears billions of electrons out of their atomic orbit and forms an electron cloud. Under the influence of an audio signal, this cloud expands and contracts, thus creating sound waves which faithfully follow any modulating electrical signal.

As a hi-fi "tweeter" the Ionovac is mounted in a horn, Fig. B, which also houses a transformer required for coupling the signal from the modulator-oscillator chassis, Fig. C, to the quartz cell.

Although the Ionovac's first application is in the field of high fidelity, its more significant potential lies in its ability to create supersonic (silent sound) waves of almost any power and frequency. These frequencies above the range of human hearing are already being used for numerous industrial and medical purposes, but research is still in its infancy. It is here that the Ionovac's unique characteristics may prove to be of vital importance.

Introducing the Cryotron

Three years of research have resulted in the development of the Cryotron, Fig. D, a tiny electronic switch destined to trim giant computers down to size. The Cryotron represents the first practical application of superconductivity, a phenomenon discovered nearly 50 years ago.

(All materials, even the best conductors, have some electrical resistance at normal temperatures. At extremely low temperatures, however, below —240 deg. F., the resistance of certain metals is reduced almost to zero and such metals become superconductive.)

The Cryotron, in its simplest form, consists of a straight piece of wire with another wire, fine as a human hair, wound around it as a control winding. Below the critical temperature, the resistance of the straight wire drops almost to zero, permitting the flow of a large amount of current through this wire. Any current flow through the control winding sets up a magnetic field which destroys superconductivity in the straight wire, causing its resistance to return. Thus current in the control winding can cut off the current in the straight wire.

(Continued to page 214)
TURBOGLIDE: forecast of the future

You don’t have to look on the drawing boards—the answer is plain in any Turbo- glide-equipped 1957 Chevrolet. Here is tomorrow’s drive, with an absolutely shift-free sweep of power, smooth as a plume of steam. Here is a quadrant that doesn’t say “LO”—because there is no auxiliary planetary gear system needed. Here are three turbines for full-torque take-off, brilliant passing power and ultra-thrifty cruising. Here is the finger- flick Hill Retarder for safer slowing on grades . . . all this in a transmission that weighs 30 percent less than any other automatic drive (thanks to the largest production aluminum die casting in the world), with fewer parts, far fewer external openings and absolutely no delicate automatic shift valves. It’s an engineering triumph—because it moves without a hint of mechanism. Try it and see! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.
Switches such as these form the basis of electronic computers, and many thousands of them are used in a single instrument. To date, fragile vacuum tubes and expensive transistors have been used, but the Cryotron's basic simplicity which permits rapid, low-cost manufacture, coupled with its small size, may bring about a revolution in computers.

**New Batteries Show Promise**

With the invention of transistors less than 10 years ago came the demand for smaller, lighter batteries with longer life. Two recently announced units give promise of some real progress. The small battery in Fig. E packs a potential of 95 volts into a cylinder only about 3/8 inch in diameter and less than 1 inch long. But its real asset is its phenomenal shelf-life expectancy—predicted to be more than 20 years. Though currently produced only for special applications requiring high voltage at little or no current, such as monitoring instruments, one-shot triggering devices and the like, continued research may soon produce a similar unit for more popular and universal applications.

Departing from the conventional method of generating electricity by chemical action, the button-sized battery in Fig. F actually converts atomic energy into electric power. Operation of the battery depends on a two-step conversion of energy: from atomic action to light and from light to electricity. The light source consists of a mixture of phosphorus and an oxide of promethium-147, once considered a waste product of nuclear fission. Beta particles emitted by the promethium are absorbed by the phosphorus and converted into red and infrared light. This light is picked up by two or more photocells and converted to electric current.

The atomic battery has a nominal power output of 20 microwatts and will provide usable current for about five years. It is the first such device to be completely safe for personal use and requires no special precautions.

Although not yet commercially available, the battery will eventually be used for hearing aids and radios, and even an atomic-powered wrist watch is currently under consideration.

The principles involved in these new products represent drastic departures from accepted procedures. While designated, at present, for specific and special applications, engineers are already engaged in research and experiments intended to broaden their scope. Results of those experiments may have a far-reaching influence on electronic developments. *****

---

**WHAT A DREAMBOAT!**
**MY IDEAL HERO!**

**WHAT A DATE!**
**I'M BATTLING ZERO!**

**SMELLS GRAND!**
**PACKS RIGHT!**
**SMOKES SWEET!**
**CAN'T BITE!**

**WHY YOU SMOKE A PIPE Too! MM-MMM! YOU'RE FOR ME!**

**IT'S SIR WALTER RALEIGH—NATURALLY!**

**SIR WALTER RALEIGH'S BLEND OF CHOICE KENTUCKY BURLEYS IS EXTRA-AGED TO GUARD AGAINST TONGUE BITE.**

**FREE!**

20-PAGE BOOKLET ON PIPE CARE. JUST WRITE TO: SIR WALTER RALEIGH DEPT. 126-F LOUISVILLE, KY.
A great heritage

A great future

50
YEARS OF
AIR POWER

GO

U.S. AIR FORCE

For complete information on your opportunities as an Airman in the U.S. Air Force, write, giving your age, to: Airman Information, A-103, P.O. Box 7608, Washington 4, D.C.
guy, it might be best to leave him comfortable in a shelter with fire and fuel, and hike out for help," says McKenney. "But even so, if he's badly hurt, you can carry him out on a travois."

First, if the injury is a fracture like a broken leg, saplings bound with thong or bark will keep the leg straight. "Don't try to set the bone. The main thing is to keep it straight so the tendons won't contract," McKenney says. Then, assemble a travois, which is a pair of poles for dragging your burden. Upper ends of the poles are tied around your chest. Below, the poles are cross-framed with notched saplings tied to the poles. Bark is woven across this frame to support the victim and is used to lash him to the travois for the journey. If there are two or more persons available for the carrying job, an ordinary stretcher can be put together in similar fashion.

Campus Workshop

Back in his campus workshop with a choice of drawknives, clamps and other gear, this woodsman turns out homemade products. In five minutes he blocks out an ax handle from a flat plank or tree limb; in 15 minutes more he has it whittled to exactly what he wants.

His favorite carving tool—his "crooked knife"—is a hayrake tooth of quality steel. This, McKenney heated and pounded to shape to give it an upturned and slight backward curve. The resulting tool doesn't tear wood but slices in a quartering motion; swiveling the wrists adjusts the depth of cut.

Of his profession McKenney concludes: "I wouldn't sell my forest knowledge for all the paper money in Wall Street, but I'm happiest when I'm giving it away to real sportsmen who are able to laugh when the going gets rough."

Insects Due for Fatal Surprise

New contender for the championship among insect repellents is diethyltoluamide for use on skin or clothing against mosquitoes, chiggers, ticks, fleas and biting flies. Resisting rubbing and wearing, this substance is a pleasant lotion that reportedly is superior to other repellents against the yellow fever, salt marsh, irrigation water, snow water, subarctic and malaria mosquitoes, in addition to the stable, deer and sand flies. Diethyltoluamide is said to be the best available repellent against ticks and chigger mites.
If your headlamps look like these—
YOU NEED A PAIR OF NEW G-E All-Weather HEADLAMPS
YOU’LL GET LOTS MORE LIGHT!

WATER DROPLETS inside the lens not only scatter the light, but they also help discolor metal reflectors. This can’t happen with G-E All-Weather Headlamps—moisture can’t possibly get inside.

DISCOLORED REFLECTORS absorb light rather than reflect it, causing a loss of up to 50% of the original light output. Dirt and moisture can never enter G-E All-Weather Headlamps so the reflectors always stay shiny.

BLACKENED BULBS in old-style headlamps block out the light from the filament and cause a dangerous drop in light output. This can’t happen with G-E All-Weather Headlamps because there are no inner bulbs!

G-E All-Weather HEADLAMPS NOT ONLY GIVE YOU LOTS MORE LIGHT... BUT YOU ALSO GET:

Better seeing in fog, rain, snow—The lower beam filament has a special shield that cuts down reflected glare and lets you see better in any weather.

Lower beam puts twice the light 300 feet ahead at the curb—You can see much better against the glare of oncoming traffic.

Upper beam that reaches far and wide—For open road driving, the upper beam filament is left unshielded to let you see curves, dips—even side roads.

So, for safer night driving, get a pair of new G-E All-Weather Headlamps today — and have your dealer aim them when he puts them in. You’ll see the difference tonight.

General Electric Co.,
Miniature Lamp Dept.,
Nela Park, Cleveland
12, Ohio.

GENERAL ELECTRIC
Soft water can save every home owner $100 a year

Reduces water heating costs, saves plumbing, adds 33% longer wear to clothes

Clear, filtered soft water is more efficient, more economical for every using need: photo developing, car washing, bathing, laundry, dishes. Saves up to 60% on soaps and detergents, keeps drains open and trouble-free. No hard water scale in plumbing, appliances, utensils.

New Culligan

AUTOMATIC WATER SOFTENER—provides an unlimited supply of hot and cold soft water regardless of family size or water usage.

Completely automatic! Electronic Regen-a-rator quickly, quietly, automatically regenerates at night, while you sleep. Compact! Softener is 57 in. high x 10½ in. square. Low operating cost; salt supply lasts 6 to 12 months. 10-year Warranty.

About $330 plus installation
Slightly higher west of Rockies and in Canada

FREE!

3,000 page, 12-volume $20 Popular Mechanics DO-IT-YOURSELF ENCYCLOPEDIA SET. Send coupon for certificate which your Culligan dealer will redeem for $20 Popular Mechanics Encyclopedia Set with your purchase of Culligan Automatic.

CULLIGAN, INC., NORTHBROOK, ILLINOIS
Gentlemen: Please send free Popular Mechanics Do-it-yourself Encyclopedia Certificate.

Name.__________________________________________
Address________________________________________
City________ State______________________________

(Continued from page 100)

Most-Frequent Complaints

While 22.9 percent of the Buick owners make no complaints at all, others have some unkind things to say.

First on the complaint list is the excessive use of gasoline. Second is poor assembly and third, body noises and rattles.

"The car is fine, but it takes a banker to drive it at the mileage it gets. My two-ton truck gets better gas mileage."—Texas lumberman.

"Very poor gas mileage: 7.5 miles per gallon in city and 10 on highway."—Missouri telephone worker.

"I must use the very best premium gas. It won't run properly on some brands that are advertised as premium grade."—Ohio telephone assigner.

"My complaints are in the assembly. I think there is good material used in Buick, but it is put together poorly. Doors don't fit, windows don't roll all the way up, bulbs are missing or don't light."—Iowa inspector.

"Most of my trouble has been minor, but annoying: Faulty ignition switch, oil pumps, speedometers, leak in power steering, window alignment, door locks, horn ring not operating, and others. When we get all the parts working properly, it will most likely turn out to be a good car."—California accountant.

"I have had it at the dealer's for service approximately 40 times in five months."—California surgeon.

"Dealer unable to stop rattles and squeaks in body."—Texas branch manager.

"Rattles like a cheap car, not like a $4000 automobile."—Tennessee advertising man.

What About Interior?

Buick owners place the neat instrument panel high on their list of interior likes. Other interior features they commend include the large glove compartment and the upholstery.

"I like the arrangement and workmanship of the instrument panel."—Maryland attorney.

"Large glove-compartment door with places for coffee cups."—Indiana telephone operator.

"New fabrics."—Oklahoma railroad worker.

But they don't like some other interior features. And, as seems to be common in the industry, the chief complaint is the location and design of the ash trays. Other complaints involve floor mats, location of (Continued on page 220)
BIG VALUES in TINY MOTORS and POWER APPLICATION KITS

Order your choice of four miniature battery-operated motors—one for every taste—from 11 g to 18 colts—and build BIGGEST VALUES IN THE HOBBY FIELD. These motors, with the accessories in kits listed below, provide all types of drives for hobby items, tiny research and industrial devices. Make beautiful gifts.

No. 8-100 Hi-Drive Motor, 5-4V $2.50
No. 9-100 Same, for 12V $3.00
No. 3-100 Tiny Atom Motor, 11g-3V $2.00

For higher voltage: $2.50

#1113N Tiny Atom motor assembly kit with many acc. $3.50
No. 1300N Small accessories kit $1.00
No. 3700 Large accessories kit $3.00
No. 4000 Deluxe accessories kit $5.00
No. 3900 Super-Power-Kits with motors, speed reducers, all accessories $10.00
No. 38 Kit of 8 magnets—10 lbs. $2.00
No. 3600 Vari-speed gear unit $4.00
No. 1049 Gear train unit $3.00
Hi-Drive motor No. 8-100.... $5.95

Same with No. 9-100 Motor $6.45

* Kits illustrated. Ask for FREE Cat.

All Wilson's motors have Permanent Alnico Magnets.

Make and order and we pay postage in U.S.A. No C.O.D. on Alnico. Tax for delivery in Ohio. Write Dept. PM.

WILSON'S OF CLEVELAND
425 Lakeside Ave., N.W. • Cleveland 13, Ohio

Genuine Alnico Magnets

Amazing, Permanent, Non-Electric, Highly Practical. Conduct interesting experiments. Learn the facts about magnets. Makes a wonderful gift. Choose from fresh or salt water, rods, rings, etc. GUARANTEED. Try any magnet one week. Money back if not as promised.

No. 5100: 10 lbs. on steel block $18.50
No. 6205: 7 lbs. on steel block $9.50
No. 7305: 7 lbs. on steel block $9.25
No. 8305: 7 lbs. on steel block $8.95
No. 9405: 5 lbs. on steel block $8.50
No. 10405: 5 lbs. on steel block $8.00
No. 11405: 2 lbs. on steel block $7.50
No. 12405: 1 lb. on steel block $7.00

Miami Magnet Company, 3240 N.W. 27th Ave., Miami 42, Fla.

Money for Men, All Data Free

THE PLASTEX Industry needs manufacturers on small scale and for the production of Lamp and Clock Shades, Art Goods and Novelties in Plastics and Martile finishes. Everyman is Advisory. The material makes regular 10c store sellers. Rubber molds furnished for short production. Small investment brings good returns. machinery. PLASTEX INDUSTRIES, Dept. A

3400 Third Ave.
New York 16, N. Y.

Automatic Saw Set...

MAKE EXTRA PROFITS!

Set 400 teeth per minute on hand or band saws, 4 to 15 points, with the BeMaCo Automatic Saw Set. Fast, accurate, true hammer-annvil action sets teeth uniformly, eliminates tooth breakage. Used profitably by saw shops and manufacturers everywhere. Every machine positively guaranteed!

Write for details—today!

Beaver Mfg. Co.
800 Isis Avenue • Inglewood, Calif.

MAKE MINE KLEINS

Your skill—the quality of work you do—is controlled in no small measure by the quality of the tools you use.

That's why electricians and good workmen everywhere insist on Klein Pliers—standard of quality by which others are judged "since 1857."

In the complete Klein line you will find pliers exactly suited for every job you do. See your hardware store or Klein distributor for the Klein Pliers you need.

Your hardware store has Kleins in stock or can get them for you quickly. Look for this new display board. It shows the most popular items in the Klein line.

Mathias KLEIN & Sons
Established 1857
7200 McCormick Road • Chicago 45, Illinois
the window cranks and the floor humps.
"Must close ash trays to get out of the car. I have two skinned knees to prove it. The trays are too low and too small."—Anonymous owner.

"Ash tray is too small and dangerous. Have to look every time it's used. That takes my eyes off the road too much."—Kansas salesman.

"Don't like long-nap floor mat."—New York retired Army officer.

"Carpeting shows all footprints."—Ohio housewife.

"Front-window crank not in right place. Too hard to work."—Mississippi farmer.

"Don't like hump in front where transmission is located."—Maryland dentist.

More Best-Liked Features

The following quotations from owners describe additional best-liked features. For a listing of the features and the percentage of owners mentioning them, turn to the percentage table on page 101.

"When you tromp down on the accelerator, the variable pitch comes in and you are gone."—Texas lineman.

"Performance is superb. It has speed if I need it and very often I need it."—Ohio salesman.

"I like Dynaflow, especially in the mountains in snow and ice. You keep moving. We have passed dozens of stalled cars, but the Buick just keeps on going."—Ohio businessman.

"Dynaflow is smooth. You feel no change in going from stop to high speeds."—Kansas secretary.

"Holds the road good at top speed."—California serviceman.

"Has the weight to keep it from whipping every time the winds are strong."—Oklahoma retired policeman.

"Holds the road. You feel solid and secure."—Nebraska cattle feeder.

"This four-door hardtop has legroom, front and rear."—Virginia salesman.

"Visibility good. Lower hood means all four fenders are visible."—California scrap dealer.

"Interior trim is in good condition. Nothing is misfit. No rough edges."—Michigan carpenter.

"Low without sacrifice of seat height and headroom in my Super."—Nebraska retired farmer.

"Like the windshield washer and find the new location of the control button an excellent safety feature."—California owner.

"I find the Safety Minder buzzer useful. It would have saved me $10 if I had used it all the time."—California aircraft worker.

"I like the elimination of portholes on

(Continued to page 222)
New Pine Plywood helps you add storage space to your home

Weldwood Old Craftsman makes the job easy because it's the easiest working, easiest painting plywood ever!

Crammed for storage space? Here are four ways you can get it—easily. And although these projects are really “pro”-looking, they're not hard to build. The reason: they're made with Weldwood Old Craftsman Pine Plywood according to easy plans (see coupon). Old Craftsman Pine combines all the advantages of top grade pine lumber with all the advantages of rugged plywood construction.

Old Craftsman Pine Plywood paints better, saws cleaner, machines more quickly and sands smoother. Comes already factory-sanded! Available in panel sizes from 3' x 6' to 4' x 10'. Thicknesses from 1/4" to 1-13/16". See Old Craftsman at your lumber dealer’s soon.

**STORAGE CABINET** only 29” high—but with over 5 cubic feet of storage space! Has an adjustable shelf. Ideal for records, linens or as a base for desk or dressing table. See coupon for easy-to-follow plans.

**SLIDING-DOOR CABINET** is 4’ long, 2’ deep, has adjustable shelves. Ideal for linen, china, clothing, etc. Complete plans and step-by-step photos in new booklet. See coupon for your copy.

**EARLY AMERICAN HUTCH** gives you plentiful storage space in a handsome, conversation-provoking cabinet. Has drawer, handsome planter box, over 6 cubic feet of storage space. See coupon.

**BUILT-IN CLOSET** converts the wall at one end of your room into two 6’ x 30” closets plus four open shelves and two swinging-door cabinets. See coupon for plans.

---

**PINE PROJECT BOOK**

**UNITED STATES PLYWOOD CORPORATION**

Box 61, New York 46, N.Y.

Please send me your book “Projects You Can Build With Weldwood Old Craftsman Pine Plywood.” I understand it contains the 4 projects shown on this page plus 14 others.

PM6-57

NAME: ........................................

ADDRESS: ..................................

CITY: .............................................. STATE: .

JUNE 1957
the front fenders." — Massachusetts field representative.

"Have had very good service from my dealer." — Texas medical doctor.

**And Other Complaints**

Here, in order of frequency of mention, are quotations that describe the other complaints of Buick owners:

"Not enough entrance headroom. I don't like hitting my head every time I get in." — Iowa assistant manager.

"Difficult to enter and leave from curb side, although plenty roomy when inside." — Illinois businessman.

"Brakes wear out too fast." — California physician.

"I have had five sets of brake linings put on this Roadmaster in 5000 miles." — North Carolina radio serviceman.

"Brakes always grabbing on windy days due, so experts say, to sand blowing into the brake drums." — Wisconsin owner.

"Bad carburetion, but a special carburetor kit is coming in to correct it." — Kansas engineer.

"Am having trouble with stalling. Dealer blames it on carburetor. GM is sending a kit to correct it." — New York pharmacist.

"Windows are hard to move up or down." — New Jersey merchant.

"Glass in windows does not fit properly." — Kentucky salesman.

"Windshield wipers are jerky if windshield isn't real wet." — Indiana farmer.

"Wipers do not give enough coverage in heavy rain and snow at high speed." — Iowa salesman.

"Car is only two months old and chrome is pitted and rusted." — Michigan plumber.

"Paint poor. It's flaking." — Georgia Army officer.

"Dealer service particularly poor." — California secretary.

"Does not have good rear springs. They bottom easily when loaded." — Ohio railroad engineer.

"With any grade of gasoline there is a sufficiently vicious engine knock on fast acceleration to cause one to let up." — Illinois electrical engineer.

"They should put better tires on the car. In 5000 miles I have had three of them replaced." — Texas welder.

"Should put some kind of a handle on trunk of Special." — New York attorney.

"When new, oil consumption was very heavy—five quarts first 1000 miles. Now it burns none. I don't like fact that I must buy premium gas for normal driving." — Connecticut park superintendent.

"Rear window fogs up. It is a definite safety hazard. Someone forgot to compute

(Continued to page 224)
SAVE MONEY THREE WAYS WITH A SILENTONE MUFFLER!

The moment you install a Silentone on your car, you start saving money in three ways. Look at this!—

1. **LONGER MUFFLER LIFE** — Silentone is a heavier muffler, with double-wrapped, up to 3/4 heavier shell, heavier outer heads and tubes; this gives you thousands of extra driving miles.

2. **BETTER MILEAGE**—Silentone's scientific design lets your car run quieter—more efficiently, too, reducing exhaust back pressure to give more pickup and smooth acceleration. And with improved performance you get real savings on gas.

3. **LOWER FIRST COST**—Despite their extra performance and longer life, Silentones actually cost you less. Many stores will install a Silentone for you at big savings. Ask about one today. They're individually engineered for your car.

SOLD ONLY BY AMERICA'S LEADING AUTOMOTIVE CHAIN STORES

**Silentone Mufflers · Dynatone · Glass-Packed**

Dept. 2F, Toledo 1, Ohio

**FOR BETTER REFINISHING JOBS USE**

**Klean-Strip Paint Remover**

- Non-inflammable
- Removes any finish
- Fast
- Needs no neutralizing

**FREE! 44 PAGE BOOKLET ON PORTABLE POWER TOOLS**

Hundreds of time and money-saving ideas for hobbiests, builders, professional wood-workers.

**FREE! 44 PAGE BOOKLET ON PORTABLE POWER TOOLS**

Peterson-Cable Machine Company

7146 N. Salina St., Syracuse 8, N.Y.

**Save your back and money! To lift a tractor or deep freeze, a propeller or side of beef, a 2-ton machine or 250 lb. tank—use a 'Budgit' Electric Hoist. It's fast—1/4 ton can be lifted 1 ft. in less than 2 seconds. It's safe—the two brakes act "quick as a wink". Each brake can hold the full load. It is easy to "inch" loads into place. All parts of the hoist are extra tough for years of work.

Garages, farmers, institutions, machine shops, big and little plants — all prefer portable 'Budgit' Electric Hoists. 1/4 to 2-ton sizes. AC and DC models. For truck service or where there is no electricity, choose a 12-volt battery-operated model. Ask your "Shaw-Box" Distributor for details or write us for Bulletins 402 and 404.

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

354 W. BROADWAY

MUSKEGON, MICHIGAN

GORDON SMITH & COMPANY, Inc.

411 College Street, Bowling Green, Ky.

JUNE 1957
At Last!
A "TOOTHLESS" PLIER
THAT GRIPS
WITHOUT GOUGING

One of the handiest tools you'll ever use... the new "toothless", smooth-jaw plier that grips without gouging. Just the ticket for gripping chrome-plated fittings, plastic, wood and other smooth surfaces. Especially handy on chrome sink-fixtures and other hard-to-handle jobs. Jaws quickly adjustable to full 2" opening. Get yourself a Channellock No. 415 Smoothjaw Plier. You'll find it's "the right tool" on scores of jobs in home and shop.

Ask Your Hardware Man For A
CHANNELLOCK Smoothjaw PLIER

Made only by
CHAMPION DEPARTMENT TOOL CO.
MEADVILLE, PENNSYLVANIA

the air circulation."—New Jersey marketing analyst.
"Don't like plastic lining in glove compartment. Everything in it rattles."—New Mexico farmer.

Other Comments

PM asked the owners for their opinions on the trends in the industry. The great majority state that they agree with the trend (83 percent). Many made interesting criticisms of the trends. Some of the most interesting are quoted below.

"I am disappointed in the trend toward lower, faster cars. The lowness makes it awkward to get in and out. You have to push harder on the seat and this ruins the seat eventually. No other durable item appears to get into the consumer's hands needing so many adjustments as a new automobile. At the price we have to pay we should receive quality merchandise."—Massachusetts comptroller.

"I would like to be able to see a little farther by having my eyes a little higher. They put prison guards up in towers so they can see farther and at the same time they drop us lower in these cars and claim better visibility. Just who are they trying to kid?"—Colorado trader.

"I wish the car builders would listen more to these PM questionnaires and build the cars the people want."—Ohio salesman.

"It is my opinion, having had eight new cars in the past 10 years, that you are now trading in a better car fundamentally than you get."—New York clergyman.

"If I had it to do over, I would have kept my 1955 Buick. It had only 12,000 miles on it. I got 18 miles per gallon, it rode better and I believe it was faster."—Indiana service attendant.

"This Buick is as low as it should ever get. Fourteen-inch wheels would be foolish as would the addition of fins."—Massachusetts product specialist.

"If I had wanted exceptional gas mileage I would have bought a smaller, lighter one."—California mechanic.

These are the opinions of a cross section of 1957 Buick owners from coast to coast. They live with the car and know it best. Turn to pages 102 and 103 for additional opinions and performance data on the Buick Special.

Closed-Circuit TV for Trains

British Railways have put into service the first train to be equipped with closed-circuit television for passenger entertainment, with a coach fitted as a studio and a receiver in each passenger coach.
Beauty... Power... Adventure!

Yours with the fabulous new Harley-Davidson Sportster

**BEAUTY...**
Magnificently sleek styling, flashing chrome and striking two-tone color combinations command immediate attention wherever you go.

**POWER...**
Get "raring to go," instantly responsive speed and acceleration with the 1957 Sportster's pace-setting new 55 cubic inch overhead valve engine.

**ADVENTURE...**
Whether you're off on a lark or off to work, each mile is an adventure on a Sportster. You're on your own, happy and carefree as the wind.

Easy Monthly Terms
Your Harley-Davidson dealer will be pleased to show you how easy it is to own a fabulous new Sportster... arrange for a convincing test ride. Call him now or write for free literature.

Harley-Davidson Motor Co.
Dept. P, Milwaukee 1, Wis.

---

Handi-calk saves on Home Repairs
SO EASY YOU CAN Do-It-Yourself

Handi-calk
Ugly cracks and gaps in your home due to settling, admix dirt, dust, soil, moisture and cold and lead to costly repairs, inside and out. Seal them the easy way with Handi-calk. Will not sag or stain. Can be painted over. So easy to do yourself with the Handi-calk gun.

Glazing? Try EASY HANDI-GLAZE!
HANDI-CALK DIVISION DEPT. HC2
3226 W. 47th St. Cleveland 4, Ohio

NEW 1957 CATALOG
200 MODELS—SAVE 2/3
EASY TO BUILD—Designed for the amateur. Over 200
Models. Prouds to Cruisers, 8 to 21 ft. Formed hulls
Seal and Custom finished, Save 50%... New NEW
Sea Ray Molded FIBERGLAS BOAT KITS. Truly professional results. NO
upkeep, SAVE 2/3 assembly time. 12 to 16 ft. Utilities and Runabouts.
SEND 35c for 64 page Boat Kit & 24 page Sea Ray Catalogs. SEND $1.00
for both plus "Boating Handbook." Dealers inquire for franchise.

BOAT PLANS & PATTERNS
Frame-Pac Kits
WRITE NOW! CUSTOM CRAFT, BUFFALO 7A, N.Y.

The finest
FLOOR POLISHERS
are
Red Devil Tools.

Protect your home against power interruptions with an...

ONAN Emergency ELECTRIC PLANT
Provides dependable standby electricity for heating system, pumps, freezer, lights, appliances. Keeps home safe, livable. Automatic standby stop. Find out how little it costs! Write for Folder!

D. W. ONAN & SONS, INC.
3249 University Ave. S.E.
Minneapolis 14, Minnesota
Buy Your Railroad Tickets by TV

(Continued from page 81)

staples it to the space coupon. The transaction is ended and you pay your money.

The original coupon listing the space sold is forwarded by pneumatic tube to the filing area where it will be quickly available until the moment the train departs. If there is a cancellation, it will be returned to its original slot in the rack.

The ticket machine not only prints the price, the tax and the total cost of the ticket, but makes a detailed record of every transaction on a four-inch-wide strip of tape. At the end of the day, this tape will show the total cash intake, eliminating many hours of tedious bookkeeping.

Telephone orders for reserved space are taken by one of the Pennsylvania Station’s 72 information clerks. Each has a television receiver, dial system and Telautograph machine. The customer’s name and the location at which he wishes to pick up the ticket are flashed to the coupon clerk via Telautograph so the ticket and reservation coupon can be forwarded instantly by facsimile to the ticket designated.

Still another innovation of the electronic ticket-selling system is the use of Intrafax machines in hotels and offices of large industrial firms. A clerk in the hotel or office merely puts an order on the Intrafax cylinder. A few minutes later, on the same machine, out comes a facsimile railroad ticket and space-reservation ticket on a single sheet of paper. This service was purchased by 25 firms before it went into operation, but facilities for 100 more firms, including banks and other railroad ticket offices, are being added. The service eliminates the need for messengers and bypasses the problem of congested city traffic. Intrafax customers are billed later by mail.

Although some availability boards list space on trains for several months in advance of their departure, most display only the available space on trains departing for a two-week period. When all the space of a certain type or for a given date is sold, the area on the availability board appears blacked out on the television screen.

Parlor-car reserved seats are handled at a different set of counters in another part of Pennsylvania Station. For parlor-car customers, the actual space coupon is sold when the ticket is purchased. Since these are sold without regard to location, and all are identical in price, they are simply handed out from a pack as they are needed. Only in the case of telephone orders are facsimile slips prepared for parlor-car seats. These are usually forwarded to a distant location.
let fast, easy Strypeeeze remove paint!

Get right down to bare wood fast with the guaranteed paint remover—Strypeeeze—the fastest selling paint remover in America.

- Stays wet—stays put
- Removes all finishes
- Harmless to hands or wood
- Cuts every layer

Available at paint and hardware stores everywhere


The Remover Corporation of America

BUY GREAT NECK HAND TOOLS

... for long-lasting performance

CHROME PLATED ADJUSTABLE TUBULAR HACK SAW

GREAT NECK SAW MFRS., Inc.
MINEOLA, N. Y. — SEE YOUR LOCAL STORE

TROPIC HEAT OR ARCTIC COLD YOU'LL START AND YOU'LL GO!

When a fuel pump has been tested under strict government supervision and found to work perfectly at 114 degrees above zero and at 76 degrees below zero, we think it has proved itself the best on the market. That's what the Bendix Electric Fuel Pump did. Positively eliminates vapor lock. No other pump even close to its price class could match it. Better get one for your car. (Send for free illustrated folderv.)

REG. U.S. PAT. OFF.

Bendix ELECTRIC FUEL PUMP
BENDIX AVIATION CORP. • (Eclipse Machine Div.), Elmira, N.Y.

Light, all-aluminum Cadillacs are care-free, give you extra hours on the water, extra speed per h.p. Extremely strong, they handle like silk, won't skid or trip on turns, can't sink. Buy Cadillac—you'll get more boat for your money! Write for free catalog—aluminum and molded plywood models for every sport.

CADILLAC MARINE & BOAT CO.
390 Seventh Avenue • Cadillac, Michigan

JUNE 1957
We Chase the Jets on Film
(Continued from page 95)
slamming him against a brick wall. Earlier methods of escape aren’t good enough.

One current idea is to power the pilot with his own personal rocket. If his aircraft gets into trouble, the rocket can shoot him up from the cockpit and ahead at the same time. He doesn’t get hit by the tail of his own plane, and deceleration is less violent. On one early test the dummy was shot out of the plane as planned, but then the rocket tore away and ran wild. On the basis of our high-speed pictures, the engineers designed a stronger bracket for the rocket.

Our photographic branch handles every kind of assignment. Seven of the staff are qualified as aerial cameramen and they have done extensive photographic work while flying supersonic. Two-place versions of such aircraft as the F-100 are used as camera ships.

There’s not much routine in their work. One man may be assigned to track a bomb after it’s been released at high altitude. His camera ship may follow the bomb drop for thousands of feet and then level off in what amounts to a 7-G pull-out. At that time the 30-pound hand-held movie camera weighs the equivalent of 200 pounds pressing down in the photographer’s lap.

Meanwhile, another cameraman may be filming spin tests of a new plane and a third
(Continued to page 230)

Photo officer adjusts the camera which shoots through a hole in the tail of the drag parachute sled
Drawer-cabinet easy to build with economical Western Pines

Just the thing to rid a room of clutter.

And it’s easy to build with clean-cutting, straight-grained Western Pine woods. Soft-textured and carefully dried, these fine woods take any paint, stain or enamel. Left natural, they can be waxed and rubbed to a smooth satiny glow.

Almost any building or remodeling project can be done more easily and economically with versatile Western Pines. See your lumber dealer for complete details.

FREE! New edition of bright ideas!
"Friendly Home Ideas"—85 photographs, many in color, feature traditional and contemporary ideas for building, decorating and remodeling using cheerful Western Pines. Write for your free copy to WESTERN PINE ASSOCIATION, Dept. 204-N, Yoon Blvd., Portland 4, Oregon.

The Western Pines
Idaho White Pine
Ponderosa Pine
Sugar Pine

and these woods from the Western Pine mills
WHITE FIR • INCENSE CEDAR
RED CEDAR • DOUGLAS FIR
ENGELMANN SPRUCE
LODGEPOLE PINE • LARCH

are manufactured to high standards of seasoning, grading, measurement

TODAY’S WESTERN PINE TREE FARMING GUARANTEE LUMBER TOMORROW

ROAD TO RICHES

You can be the next uranium millionaire! Government guarantees huge bonus! PRI instruments from $29.95. See your local dealer today! FREE CATALOG!

Write PRI, 4223 PM W. Jefferson Los Angeles 16, California

DEALERS WANTED

ELECTRIC WELDER AC or DC 110 Volts

The “Little Marvel” all-metal welder, 5-year written guarantee. Welds 5/16” metal or money back. Repairs tanks, tools, fenders, machine parts, etc. Complete with everything—rods, unit, eye shield, directions. $79.95 plus 50c postage. Flame torch accessory for soldering, cutting, brazing $3.95 complete with carbure, brass rod, Flux: $2.00 Deposit on C.O.D. 75 ampere 3/4 inch Transformer Welder $24.95 F.O.B.

ESSAY MFG. CO., Dept. 51, Quincy 69, Mass.

GRAVELY

New EASE for Country Living!

GRAVELY Gets It Done Faster! . . . Better!

New Steering Sulkly, with Rotary Mower Attachment, provides the easiest, most efficient mowing ever!

With Gravely, you fit your jobs perfectly with a choice of 30 performance-proved attachments . . . Do every lawn and garden job better, faster, easier!

All-gear drive, power reverse, optional electric starter. Nation-wide sales and service . . . Easy Payment Plan.

Write today for FREE 24-page "Power vs. Drudgery" Booklet.
GRAVELY TRACTORS, INC. BOX 663 DUNBAR, W. VA.

FIELD-TESTED SINCE 1922

MENDS MOST ANYTHING

"Holds like iron"

Used by fine furniture makers. Ideal for home and office. In 3/4 oz. or 2 1/2 oz. sizes.

JUNE 1957
Now, Crescent quality in a really heavy duty wrench. Jaws of special analysis steel, alloy handle... great strength with less weight. Also a normal duty (Stillson) pattern with forged steel handle and jaws. Both in 6" to 24" sizes.

For the craftsman or hobbyist who is proud of his skill, a handsome gold-plated clasp designed by a leading jewelry manufacturer. A $2.00 value... yours for 75c, postpaid. Use the coupon.

To Crescent Tool Co., Jamestown, N. Y.
Enclosed find 75c for Artisan's Tie Clasp.

NAME

ADDRESS

CRESCENT TOOLS
Give Wings to Work

Sign of the Artisan Symbol of Excellence

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by CRESCEINT TOOL COMPANY, JAMESTOWN, N. Y.

may be making air identification pictures of a new bomber.

Planning the camera layout for some jobs is complicated and we have a photo engineering unit for that purpose. The engineers lay out the locations of the cameras and how they will be triggered. One typical assignment was to make high-speed motion pictures of an aircraft taking off by the system known as "Zelmal" (zero launch, mat landing). For take-off, the plane is held in a launching position and becomes airborne with the help of a huge rocket booster under the fuselage.

One camera was to be focused on the launching frame, one on the rocket bottle, and others were to track the bottle to the point where it dropped from the aircraft. In addition, a number of theodolite cameras were positioned to supply the following information: Altitude versus time, downrange distance versus time, flight-path deviation versus time and pitch angle versus time. Accuracy had to be within one foot of actual position at all times. Such an assignment had to be planned with care.

Another tough problem was how to make close-up pictures of raindrops smashing against a radome at Mach 2. A radome is an exposed nonmetallic housing where the radar antenna is located. Purpose of the pictures was to learn more about rain erosion of a radome surface at high speed.

It would have been simple to mount the camera on the rocket sled carrying the radome, but this would disturb the normal flow of air around it. The camera had to be.

(Continued on page 232)

Big liquid-fueled rocket engine fires up before take-off on a high-speed test of drag parachutes
New Steering Assist
gives you more positive control over your car at all times!

When you hit the shoulder of a road... or a hole... or railroad tracks...
Your car lurches... and for a split-second is out of control! Then...

Now you can minimize this danger to yourself and family. Moog Ball-Bearing Idler Arm Kit gives you positive steering control... helps you return your car to the road smoothly. Even improves cars with power steering!

See how this new Moog Kit adjusts out steering play... makes steering easier, safer, quieter. Find out how it maintains wheel alignment... prolongs life of tires and front-end parts... saves you money. Mail coupon now!

Moog Industries, Inc., St. Louis 14, Mo.
Please send me information on the Moog Ball-Bearing Idler Arm Kit and name of my nearest dealer.

Name..............................................
Address............................................
City..............................................State

installed beside the track, together with the sprinkler heads supplying the "rain."

Here again careful planning was necessary. At 3000 frames per second, the 100 feet of film in the camera would last just 1 ¾ second. But one third of the film would be run off while the camera was accelerating up to speed, so we actually had less than one second of shooting time. And the long lens we were using had only an 18-inch field of view at the selected distance. This meant we had to catch the radome as it raced past a particular 18 inches of track at 1500 miles per hour.

All we got on the first run was a cloud of fog. The camera was late. On the third run we hit it on the nose and got sharp, clear pictures of what happens to an object when hit by raindrops at 1500 m.p.h.

We were asked recently if a camera, aimed to film bombs as they leave the bomb bay, could be attached to the wing tip of a B-47. It isn't as easy as it sounds. The flexible wing of a B-47 droops when on the ground, but straightens out in flight. You can calculate the angle at which the camera should be aimed, but there's another factor. The instant a B-47 is relieved of its bombs, the plane rises. The wings deflect momentarily and your camera misses its aim.

A problem like that is exasperating. We have others that are worse. For example: How would you mount a wing camera on a supersonic aircraft? You can't hang it outboard, as on a B-47. Turbulence would smash the camera and possibly the wing. Our solution was to have a small hole cut in the leading edge of the wing, with a mirror attached at an angle just inside the hole. The camera was placed inside the wing and aimed at the mirror.

That wing was ready for the scrap heap after its first flight. We hadn't anticipated the tremendous forces existing at Mach 1 and above. The small hole had disturbed the normal flow of air so violently that the wing was pounded out of shape in some places, ripped open in others. It looked as if it had been hit by flak. We had to try a different scheme for our pictures.

Sometime soon our rocket-sled track at Edwards will be lengthened to about four miles. Faster sled speeds will be possible, and a start will be made in full-scale studies of aerodynamic heating right on the ground. Surface temperatures may rise to 650 degrees. A whole structure won't have time to heat up, of course, but the skin will be too hot to touch. We're wondering what'll happen to our cameras mounted on these "hot" sleds.

We'll find out in time, and there'll be a whole new set of problems to solve in putting supersonic experiments on film. ***
FREEZER TIPS...

SAVE by buying day-old bread for freezer—thaws out completely fresh! Wrap in freezer paper, seal tight with “SCOTCH” Brand Freezer Tape. Moisture-resistant tape sticks tight in freezing cold to foil, film, Saran or other wraps—and you can write on it! Get “SCOTCH” Freezer Tape in cutter-edge carton, 35¢ or 98¢ rolls at stores everywhere.

© 1957, Minnesota Mining & Mfg. Co., St. Paul 6, Minn.

Fast cutting
Top quality
GENSCO

SWEDISH WOOD CHISELS

Woodworking projects have that little extra professional touch when Genso Swedish Wood Chisels are used. They’re tops: hand ground, razor sharp blades, Tenice II handles are unbreakable and fire resistant... won’t pull loose, sizes from ⅛ to 2".

Buy these accurate cutting, easier to use Genso Wood Chisels at all leading hardware stores today. Available in sets of 4, 6 or 11 chisels in vinyl coated canvas rolls.

GENSCO TOOLS
DIVISION OF
GENERAL STEEL WAREHOUSE CO., INC.
1832 N. Kostner Ave., Chicago 39, Illinois

"Molded Fiber Glass" Boat

...only boat in the world with popular lapstrake design molded right into one-piece seamless hull, with matched metal dies. Tough, fast, smooth, beautiful. Mahogany-trimmed. Three 15’7" models, priced from $495.

NEW HONEYWELL DECORATOR LIGHT SWITCH!

Change it any way, any time

THE TRANSPARENT decorator plate on the new Honeywell Tap-Lite® snaps off for easy decorating, cleans easily. Just wipe with a damp cloth.

Simple to install, Tap-Lite has screwless terminals. Easy to operate. Tap, it’s on. Tap, it’s off! Switch and plate $1.95 at hardware stores.

Honeywell

First in Controls

*Trademark
**Versatile, Powerful, easy to use...**

Black & Decker Tools!

**Powerful Black & Decker No. 44 Sander!** Does ten hours sanding in an hour. Will not track, score or burn surfaces. Even beginners get satin-smooth finishes on wood, metal or plastics. Perfect for almost any sanding job you can think of—antiques, boats, home maintenance, etc. Try it yourself, and feel the finish.

**Versatile, easy to use B&D Jig Saw!** U-10 does the work of a jig saw, sabre saw, key hole saw, plus most band saw operations. Pays for itself fast. Great for making pocket cuts without lead holes. It follows intricate pattern lines perfectly in wood, metal, plastics, leather, composition materials. Five different blades cut almost any material in your workshop.

Both of these famous tools are built to last for years. For more information see your dealer or write to: THE BLACK & DECKER MFG. Co., Dept. M067, Towson 4, Md.

Look under "Tools-Electric"

---

**His Cameras Spy on Life's Secrets**

(Continued from page 69)

of light on the sex of fish, and there is some evidence that certain wavelengths have a strong effect. Biologists are so interested they already are asking him to make similar studies on poultry and cattle. The implications are obvious.

Another time-lapse study shows cancer cells dividing. One of the principal characteristics of malignant cells is that they reproduce wildly. Ott's films, of great interest to scientists studying the cause or causes of cancer, actually show the division of cancer cells in such detail you can even see the chromosomes ("threads" which carry the hereditary genes) lining up in orderly fashion prior to the division.

**Cancer in a Glass Cage**

For Northwestern University, Ott set his cameras to spying on the life secrets of cancer cells for a full year. He imprisoned malignant-tumor cells inside a glass cage, and rigged pipes to the prison which fed nourishment in the form of plasma and saline solution to the vigorously growing cells. His cameras took one exposure every 30 seconds, day and night, for a year. In that year he obtained 1,041,200 separate pictures on 65,075 feet of film, certainly the most intensive study ever made of cancer.

Occasionally Ott is so wound up in his scientific studies that he can't sleep at night. "Then something compels me to get up and head for the laboratory to see if anything has happened," he says.

Sometimes things happen that aren't anticipated. When Ott screened a microscopic study of pollen, he saw what he hoped to catch, but something else stole the show. In one corner of the screen, a cell-like body appeared to be going crazy, trembling violently and changing shape so fast he scarcely could trace its movements. This strange "thing" which crept onto the stage is still a mystery to biologists.

Ott makes no pretense of being a specialist in this microscopic world, and makes it clear that he leaves the interpretation of his films to qualified scientists. There is a universal desire on their part to lay their hands on more of his work. In the short time he has been showing his microscopic studies, he has been besieged by universities and medical laboratories to tackle specific assignments. Right now he's at the crossroads, and can turn down any number of paths he wants to investigate.

**Chill and Warm Cycles**

He has turned up one interesting theory

(Continued to page 236)
T-BIRD
owners swear by
AJUSTOMATIC
shock absorbers

More and more owners of high-performance automobiles are demanding what only Gabriel "Ajustomatic" shocks offer:

- A choice of three positive settings—soft, normal or firm—to be made in installation.

GRAND HAVEN STAMPED PRODUCTS CO.
Grand Haven, Mich.

JUNE 1957
WONDER-PASTE
makes paint removing easy

Finish comes off, not coat by coat, but in one easy scraping
Before refinishing furniture, woodwork, etc., remove all cracked or peeling finish with Wonder-Paste. Softens up the toughest paint, varnish or enamel. Adheres to uprights. Use indoors or out.

At paint and hardware stores.

Write for free Wonder-Paste folder or send 25¢ for Illustrated Manual on Refinishing.
Wilson-Imperial Co., 119 Chestnut St., Newark 5, N. J.

New "PULL-GEAR"
SPEED-REDUCING PULLEY

Provides Correct Speed and Power to Drill Up to 1 3/4" with 1/2 H.P. Motor
Amazing new internally geared speed reducer doubles drill press capacity. Greater power, greater efficiency, greater productivity.

Provides the correct speed and power for larger drilling, reaming, tapping and boring on light presses. Easily installed in five minutes. Adaptable to all type machines. Spindle speed range approx. 45 to 3000 RPM. Made in 3 motor shaft sizes: 1/2"—5/8"—3/4". Write for literature.

THE PULL-GEAR CO.
25427 Mound Road
Center Line, Mich.

that he wants to pursue. A gardener by inclination, he has long been aware that certain plants (tulips are a common example) require a chilling period—winter—then a warming period before they will germinate. Ott suddenly observed that this phenomenon carried over to his medical studies. For some time, cancer specimens had been brought to him in heated containers from a university, and he had observed them in their heated stage. For long weeks he could see no activity. One day the lid fell off the heated container during the trip to the laboratory. Ott was tempted to throw the specimen away, but decided to put it under a microscope anyway. To his surprise, the sample showed intense activity. Subsequently, he found that many living specimens which were chilled and warmed again behaved spectacularly.

In a study of black spot on roses (caused by a microscopic spore) he couldn't force any black spot to appear, although he knew the spore was present. One day he discovered that the laboratory's night thermostat was failing to function. As a result, the heat wasn't turned down at night and the laboratory was maintained at the same temperature continually. When the thermostat was repaired, black spot immediately began to develop on the rose leaves. Subsequent experiments proved that the spore had to go through a chill-warm cycle before it would do its damage.

Similarly, he has observed insects going through the pupa stage in winter. He is convinced this is not merely a protective stage, but that the chill-warm cycle is vital to their existence. He further is convinced this chill-warm phenomenon is more important to many life processes than is generally believed. Most medical authorities agree that chilling plays an important part in the common cold, infantile paralysis and other illnesses. Ott feels that the complete cycle, chilling and warming, is essential. In one study he made of the secretions of common-cold victims, long tentaclelike growths attacked the body cells. Chilling and warming speeded up this activity.

Ott also is excited about the prospect of industrial uses of time-lapse movies taken through a microscope. In metallurgy, such films would be of great value in the study of corrosion and molecular change.

John Ott is a modest man. He speaks in soft terms of his accomplishments, but he speaks enthusiastically of the time-lapse technique that makes them possible. Scientists are even more enthusiastic about this new research tool. It's quite possible that this technique may play an important part in the solution of some of our greatest medical mysteries.
NEED A TRAILER?  GOVERNMENT SELL-THRU  YOUR COST

$49.99

ALUMINUM PRODUCTS CO.
DEPT. S
MINERAL WELLS, TEXAS

Free book on home workshops!
"What To Look For When You Buy Power Tools" gives you up-to-the-minute information on how to select and buy power tools, tells you how to set up ideal workshop at home. FREE!

Write Dept. 505-M, MAGNA POWER TOOL CORPORATION Menlo Park, California, OR Box 2808, Ft. Wayne, Indiana

DO MORE PLANING JOBS WITH LOW COST BELSAW

LIMITED MONEY-MAKING FEATURES: Full 12 1/4" x 6" capacity • Power feeds at 1/4" to 3/4" • Provides for Grinding Knives in the Cutterhead • Attachments for Involute, Hobbing, Tongue, Molding, Groove. Convert low cost rough lumber into high priced stock. Easy to make flooring and popular patterns. Send Today for FREE Literature and Prices.

Belsaw Machinery Co., 2057 Field Bldg., K.C. 11, Mo.

KADET
4-WHEEL TRACTOR
LOW IN COST-HIGH IN QUALITY

Tillers, Mowers, Tractors low as 79.50

NATIONAL FARM EQUIPMENT CO., INC.
142 GREENE STREET • NEW YORK 12, N.Y.

DO IT YOURSELF

It's Easy With . . .

KESTER
FLUX-CORE
SOLDER

Soldering's really a "clinch" . . . when you use time-tested, reliable KESTER . . . available everywhere.

FREE! "Soldering Simplified" . . . 16-page how-to-solder booklet. At your dealer or write direct.

KESTER SOLDER COMPANY
4251 Wrightwood Avenue Chicago 39, Illinois

THE REACH IS RIGHT AND TIGHT

with KRAEUTER
LONG NOSE PLIERS

You can depend on reachability and cutting power with Kraeuter's #1781 Long Chain Nose Pliers. And your reach will be tight and sure for those hard-to-get-at jobs with the extra long milled jaws of these pliers.

Buy the right line. It's the Kraeuter line. Kraeuter tools are unreservedly guaranteed.

Send for catalog #25 illustrating complete Kraeuter line.

JUNE 1957

BUY THE FINEST
BUY KRAEUTER
BUY AMERICAN

MODERN AS TOMORROW
KRAEUTER & CO., INC.
FOR 100 YEARS THE FINEST IN HAND TOOLS 1850-1950 NEWARK, N.J.
Hiller Helicopters to Develop X-18 Tilt-Wing Plane

Propeller-driven, tilt-wing transport aircraft, capable of vertical take-off and landing, are now under development. They have less hovering ability but greater forward speed than copters. Illustration shows phases of vertical to forward flight.

British Machine Is Versatile

Back-yard gardeners will find plenty of use for a small British power tool that can weed, dig, hoe, cut grass, trim hedges or, if you wish, polish your car. A universal coupler fits to the end of the drive shaft and powers a variety of tools. The air-cooled engine develops one horsepower. The entire machine weighs only 58 pounds and can cultivate between rows.

CAA Controls More Airspace

All airspace above 24,000 feet has been taken under the control of the Civil Aeronautics Administration. This more than triples the amount of airspace controlled by the CAA. Under the old system the CAA controlled traffic only when it was moving along the 90,000 miles of designated airways, or in the control zones of airports. The new system controls all airspace above 24,000 feet regardless of whether it has been designated an airway. Eventually the CAA plans to provide positive separation of all aircraft at the upper levels.
In just 10 minutes your dealer can prove...

The AMF DeWalt® Power Shop makes woodworking easy for you

See for yourself why DeWalt's original radial arm design, big capacity, and unsurpassed accuracy make it the finest, most valuable all-purpose power tool you can own.

Your dealer will quickly show you how a DeWalt saves the cost of a shop full of tools—makes all home woodworking fast, easy, safe...fun! How you can make furniture, build in cabinets, finish off the attic or basement, make home repairs...do all those things you've always wanted, even if you've never used a power tool before!

See your Franchised DeWalt Dealer for a Free, convincing demonstration today! Easi-Budget Terms—10% down, 2 years to pay!

Send the coupon for free booklet and name of nearest DeWalt dealer.

DeWalt Inc., Dept. PM-706, Lancaster, Pennsylvania Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY

☐ Send FREE colorful 20-page Booklet and name of dealer.

Name ________________________________
Address ________________________________
City __________________ Zone __ State ______

JUNE 1957 

239
Five-Stage Rocket Exceeds Mach 10

FIVE STAGES of rockets propelled this missile faster than Mach 10.4, 6864 miles per hour, which was the speed record set previously by a four-stage rocket. Since this time, another missile has reportedly exceeded the five-stage rocket's speed by flying more than 9000 miles per hour.

Final checking of the five-stage rocket was accomplished by technical personnel with the help of a giant crane at the National Advisory Committee for Aeronautics' Station, Wallops Island, Va. The first two rocket stages attained the missile's maximum altitude, while the other three were fired during its horizontal flight. Performance information was automatically transmitted to scientists on the ground.
More road horsepower—Your car will act young again when you put in 5-rib Champion spark plugs! Independent engineers proved new Champions give cars of all makes an immediate boost in the real power actually delivered at the rear wheels. Most cars gained 6% to 31%—for better hill climb and safer passing. No wonder 9 out of 10 racing drivers insist on Champion spark plugs.

If you haven't changed your plugs in about 10,000 miles—

You can make your car 4 ways newer with Champion spark plugs

Quicker starts—Your engine will start quicker, too...save time and battery wear. Tests with cars whose plugs had gone about 10,000 miles show that new Champions cut starting time as much as 71%—with an average of 39%!

Less engine wear—You'll save costly repairs! Old misfiring plugs (left) dilute oil with raw gas. New full-firing Champions (right) burn the gas...protect oil from dilution. When changing oil—be sure to check your spark plugs!

Lower cost-per-mile—You get top power and gas economy for life of the plug. Champion's great new Powerfire electrode stands up better than ordinary types—as photo above shows. Always insist on 5-rib Champion spark plugs!
DO YOU HAVE a natural aptitude for science? The following quiz will give you a clue. It's a shortened version of a 2½-hour examination given by the Science Clubs of America in a search for tomorrow's research scientists.

Don't be discouraged if the questions look tough. They are tough. The test isn't designed to test your over-all knowledge or reasoning ability, but only your aptitude toward science.

There are 17 questions with 28 different answers to be provided. Give yourself one point for each correct answer (a perfect score would be 28). Based on a random sample of high-school seniors who have taken the test, a high score is 18 or better; average, 10 to 17; and low, 9 or less. You'll find the answers on page 252.

1. One kilowatt is equivalent to 2,654,200 foot-pounds per hour. One horsepower is equivalent to 33,000 foot-pounds per minute. How many kilowatts are equal to one horsepower?

   □ 1. 33,000
   2,654,200
   □ 2. 33,000 x 60
   2,654,200
   □ 3. 33,000 x 2,654,200
   60
   □ 4. 2,654,200
   60 x 33,000

   Should be 252

2. Which one of the following terms or concepts does not apply to lichens?

   □ 1. Fungus
   □ 2. Perennial
   □ 3. Seeds
   □ 4. Symbiosis

3. Leprosy is caused by a

   □ 1. Bacillus
   □ 2. Chemical irritant
   □ 3. Protozoan
   □ 4. Virus
4. The diagram shows the relative size of the earth and another celestial body. On the basis of relative size, which of the following is the most likely identity of the larger body?
- 1. Jupiter
- 2. Mars
- 3. Polaris
- 4. Sun

5. Androgens have been made from
- 1. Ascorbic acid
- 2. Cholesterol
- 3. Insulin
- 4. Trypsin

6. Hyperon refers to
- 1. Unit of measurement
- 2. Guided missiles
- 3. Hormones
- 4. Subatomic particles

7. If a sphere of 10-inch radius represented the earth (sea level), about how far would a projection representing a mountain range with a height of 15,000 feet project from the surface of the sphere if the scale were the same?
- 1. .0025 inches
- 2. .0075 inches
- 3. .0250 inches
- 4. .1000 inches

8. The first successful separation of rare-earth elements as free ions, reported in 1955, made use of what method?
- 1. Chromatography
- 2. Ion-exchange resins
- 3. Magnetic centrifuging
- 4. Successive precipitation

9. A special type of temperature-sensing element which can transmit a strong signal from a very tiny temperature change is a
- 1. Thermion
- 2. Thermistor
- 3. Thermocouple
- 4. Thermophile

10. According to Charles Darwin, “A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase. Every being, which during its natural lifetime produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year, otherwise, on the principle of geometrical increase, its members would quickly become so inordinately great that no country could support the product. Hence, as more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical con-

(Continued to page 244)
ditions of life. It is the doctrine of Malthus applied with manifold force to the whole animal and vegetable kingdoms; for in this case there can be no artificial increase of food, and no prudential restraint from marriage. Although some species may be now increasing, more or less rapidly in numbers, all cannot do so, for the world would not hold them.”

It can best be inferred from this paragraph that:

☐ 1. The natural laws of reproduction serve to keep all organic beings in check;
☐ 2. The principle of geometric increase serves to keep all organic beings in check;
☐ 3. There is always a struggle for survival, keeping organic beings in check;
☐ 4. When environment is limited, a struggle for survival must occur.

11. In Darwin’s statement the doctrine of Malthus evidently refers to

☐ 1. Manifold force;
☐ 2. The fact that natural limits cannot be overcome, even by living organisms;
☐ 3. The fact that organic beings, if allowed, will overgrow the capacity of their surroundings;
☐ 4. The fact that the animal and vegetable kingdoms are in constant strife.

12. According to Darwin, the constant battle which each organic being wages against the other is due, first of all, to

☐ 1. Food problems
☐ 2. High reproductive rate
☐ 3. Natural enmity
☐ 4. The animal-vegetable cycle

(Graph below applies to questions 13, 14 and 15.)

13. This graph shows the relationship between melting temperature and composition of antimony-lead alloys.
The graph clearly shows that
☐ 1. Antimony decomposes lead
☐ 2. Lead and antimony are insoluble
☐ 3. Lead has a lower melting point than antimony
☐ 4. Lead is softer than antimony

14. As the percentage of antimony increases from 0 to 100, the melting temperature of the alloy
☐ 1. Decreases
☐ 2. First decreases, then increases
☐ 3. Increases
☐ 4. Remains constant

15. A mixture of lead and antimony with the lowest melting point consists of
☐ 1. 10% lead and 90% antimony
☐ 2. 50% antimony and 50% lead
☐ 3. 90% lead and 10% antimony
☐ 4. None of the mixtures listed in the other three answers

16. Underscore the correct chemical name for each of the following substances:
1. Hypo (sodium hypochlorite) (sodium thiosulfate)
2. Marsh gas (methane) (methanol) (trichloromethane)
3. Rare earths (actinide series) (lanthanide series)
4. Saltpeter (potassium nitrate) (sodium nitrate)
5. TNT (trinitrophenol) (trinitrotoluene)

17. Column I lists enzymes and hormones. Column II lists the glands that secrete them. Place the number of the gland from column II in the parentheses in front of the appropriate name in column I.

☐ 1. ACTH
☐ 2. Erepsin
☐ 3. Insulin
☐ 4. Parathormone
☐ 5. Pepsin
☐ 6. Pityalin
☐ 7. Rennin
☐ 8. Thyroxine

1. Adrenal cortex
2. Adrenal medulla
3. Gastric glands
4. Intestinal glands
5. Liver
6. Pancreas
7. Parathyroid glands
8. Pituitary gland
9. Salivary glands
10. Thyroid gland

For answers to quiz see page 252

STOP WASTING MONEY
on worn-out piston rings!

Oil-pumping is the first sign of worn-out piston rings. And worn-out piston rings mean power drop-off—costly wastage of gas and oil—expensive repairs.

The sooner you act, the less it will cost. See your motor specialist the minute oil-pumping warns you there's trouble ahead. When he recommends new piston rings, ask him for Hastings. They're engineered exclusively for replacement service . . . to provide the additional lubrication worn engines need . . . to stop oil-pumping, save gasoline and restore lost performance. Truly the best money you can spend on your car.

HASTINGS MANUFACTURING CO. • HASTINGS, MICH.

HASTINGS PISTON RINGS
TOUGH on oil-pumping • GENTLE on cylinder walls

Buy these Hastings Products with confidence:
Piston Rings, Casite, Wear Reducer,
Oil Filters, Spark Plugs
Enjoy Breezy Cool Comfort this Summer!
Window or Attic
FANS at amazingly
LOW COST!
SAVE up to 75%
WITH FAMOUS
FAN KITS
No special tools or skill
required. Absolute MIN-
IMUM GUARANTEE
Only a few pieces of
equipment needed:
& HP 1750 RPM motor
required to complete.
Thousands in use.
COMPLETE KIT includes:
Aluminum fan spider,
masonite blades, Shaft,
Oleite bronze bearings,
collars, pulleys, belt and bolts.
Step-by-step instructions
For window or attic vertical
or horizontal installation.
Also highly recommended
for poultry houses, farm
buildings, Greenhouses,
Factories, etc.
30" Fan costs average home, 6,000 CFM $14.95
36" Fan costs larger home, 8,000 CFM $17.95
44" Fan costs medium home, 1,300 CFM $13.95
20" Fan costs apt., office, etc., 2,400 CFM $12.95
Money order or check with order shipped postpaid, $3.00 de-
posit on C.O.D. orders. Circular free.
SATISFACTION GUARANTEED
FAN KIT COMPANY
154-M No. Belvedere • Memphis, Tenn.

Here is your
new garage...

Completely
MODERN

Completely
"DO-IT-YOURSELF"

Easi-Bild* Patterns—for dozens of home projects
— save you two-thirds the cost

With Easi-Bild Patterns you build valuable improvements for
your home—and the results are professional. Here is a whole
new world of fun, satisfaction, and possession. For example,
this modern garage—complete with tool house and swing-up
door—is made with Pattern #113 and Pattern #62. Or, with
Pattern #86 you can put a swing-up door on your present
garage. The lumber dealer sells you and delivers the materials
listed on each pattern. Step by step, you follow plans for
choosing a site, laying out the foundation, and building the
frame. Homasote Insulating-Building Boards form the sheathing
and interior surfaces. East-Bild Patterns thus give you the know-how to build things
for yourself for the cost of materials alone—reducing your out-
lay two-thirds. With Homasote Boards (in sizes up to 6' x 14')
and Homasote know-how, you build everything from a cabinet
to a complete house—even furniture and toys. The newly-revised
Homasote Handbook is a 68-page building manual, written for
you in practical language and
with detailed illustrations. Look
for the East-Bild emblem on your
lumber dealer's counter and use
this coupon to secure your free
copy of the Homasote Handbook.

*Y. M. Reg. East-Bild Pattern Company
HOMASOTE COMPANY, Department F-4, Trenton 3, N. J.
Send me the 68-page Homasote Handbook.

Name
Address
City. Zone...State...

Flash-bulb photography with a flat-face reflector
may be the winning combination for amateur
camera fans. These reflectors deliver a different,
distinct amount of light from each of three con-
tventional types of bulbs. "Spill-over" from this
reflector provides soft lighting. A readable,
easy-to-set lamp-exposure dial simplifies cam-
era settings. The deluxe reflector model has a
push-button handle and universal bracket

New for

Sound and picture are recorded simultaneously
on magnetically stripped film in a hand-held,
single-system magnetic-sound camera. Film pro-
cessing does not harm the sound. One third the
weight and size of existing single-system sound
cameras, the unit includes a portable power supply

Magnetic Sound Camera Corp.
1732 N. California Ave., Chicago 8

POPULAR MECHANICS
Newborn babies can be photographed by their mothers or members of the hospital’s nursery staff. A private firm installs an automatic camera in the hospital on a rental basis. The baby is placed on a tray beneath the prefocused camera.

800 Boylston St., Boston 15, Mass.

Film Fans

Ten slides of any style stereo mounting are accommodated in the magazine of a hand-held viewer. This saves handling of each slide. With matched, precision-ground lenses, the viewer has batteries capable of conversion to 110-volt a.c. rheostat control. The viewer is used without magazine.

Arrow Photographic Products, Inc.,
190-128 N. Jefferson St., Chicago

Stop Rust due to dampness

De-Moist

G. N. Coughlan Co., West Orange, N.J.

AT ALL HARDWARE AND DEPARTMENT STORES

The Secret of Scratch-free Sanding!

Ask any expert—the secret of a perfect finish is to sand with the wood grain! The old-time craftsman did it when he sanded by hand. And so do you, when you use a Dremel Straight-Line Action Sander—except that a powerful motor does all the work. With Dremel Straight-Line Action, you leave no cross-grain scratches or orbital swirl marks to mar the finish of your project. Three models to choose from.

Get a Dremel from your local power tool dealer. If he can't supply you, order direct from factory on 5-DAY TRIAL, money back guarantee. We ship postpaid.

Dremel Straight-Line Action
Power Sanders—3 popular models—$14.85 to $34.85

FREE Power Tool catalog. Write today!

DREMEL MFG. CO.
DEPT. 117F RACINE, WIS.

JUNE 1957
Outboard Boats Can Ride Faster, More Safely With Stern Fin

Stabilizing-fin units attached to the transoms of small craft permit these boats to plane smoothly within seconds after getting under way. Outboard vessels as large as 18 feet in length report speeds up to 20 percent faster and fuel savings of about 30 percent as a result of installing this device. A torsion plate on the fin assembly allows easier remote steering. An outboard motor clamps to a vertical section of the fin unit, which is secured to the craft’s transom to eliminate drag and vibration. About nine more inches of storage space are available in the stern of the boat. Safer loading and unloading of passengers are possible, and capsizing while under power is minimized.

Handy Nail Guide
HELPS YOU
SAVE TIME AND MONEY
- Tells right nail for each job
- Tells amount of nails per pound
- Tells right hammer to use

YOURS FOR JUST 10¢ Send coin direct to Estwing

Do a Real Professional-Like Job Yourself and SAVE
HOW to PAINT
With Brush and Spray
Covers All Painting Methods and Materials
You can do professional-like painting and finishing jobs yourself and save about two-thirds of the cost. Sam Brown, noted craft authority, makes it so easy for you in his book, HOW TO PAINT WITH BRUSH AND SPRAY. Order your copy now and enjoy this tremendous saving. It covers exterior painting, wall and interior decorating, furniture finishing, concrete painting — every type of painting with practical tips. Your copy will arrive in a matter of days. Tells what finish is best; what materials to use, etc. No previous experience needed. Fully illustrated. Order by mail. Only $2.50. Money back if not pleased.

MODERN
IMPROVED LAWN MOWER SHARPENER AND BED KNIFE GRINDER
Grinds any reel type mower. Hollow grinds or flat grinds bed knives. New micro feed grinding head. Sharpens hand and power mowers. No disassembly of wheels, Roller, handle or gasoline engine. No draining of gasoline or oil. Precision sharpens more mowers per hour. Costs less. Compare before you buy. If it isn’t a MODERN it can’t be MODERN.
WRITE FOR FREE BOOKLET 10A

MODERN MFG. CO., 160 N. FAIR OAKS, PASADENA, CALIFORNIA
BURBANK TEST PILOT says:
"Experimenting is my business, but when I shop I don't take risks...

I'm always satisfied most with a BRAND that's made a NAME for itself!"

MANUFACTURER  DEALER  CUSTOMER

"I MADE IT... and I know it's top quality... in materials and workmanship. It has to be to satisfy people today. And satisfied people are the only reason my business is successful."

"I SOLD IT... and I recommend it, because I know the brand has made a name for itself. Well-known brands offer the widest choice and latest improvements... and keep my customers satisfied."

"I BOUGHT IT... by brand because that's the best way of getting just what I want. I can't risk wasting time and money on hit-or-miss buying. Brand names give me the best and safest buy."

THE BRANDS YOU SEE ADVERTISED IN THIS NEWSPAPER ARE NAMES YOU CAN TRUST!
They stand firmly behind every product and claim they make.

BRAND NAMES FOUNDATION, INC • 437 FIFTH AVENUE, NEW YORK 16, N. Y.

JUNE 1957
RIPS THROUGH WEEDS 18 INCHES THICK! Nobody thought an outboard could cut a path through the matted water weeds in Florida's Lake Kissimmee. But Mark 75 made it where even air boats tried and failed! Whatever the going, Mercury can get you there. No other outboard is so reliable because no other even approaches Mercury in engineering features. Ask your dealer for a demonstration today.
MIGHTIEST OUTBOARD SHOWS ITS MUSCLES
60 WORKHORSE-POWER STRONG

New 6 cylinder Mercury Mark 75 has power for every kind of family boating fun! It's the leader of a new line of outboards with a new kind of power, stamina and handling ease.

PULLS FOURTEEN WATER SKIERS! Want big power for every purpose? Mark 75 is ideal for water skiing, cruising...fishing, too! Full Jeweled Power* protects moving parts. Aircraft-type engine mounts bush noise and vibration. Special clutch eliminates shear pins. *Anti-friction ball and roller bearings.

STANDS RUGGED SAND BAR TEST! A multi-cylinder Mercury was slammed over a sand bar time after time. No damage! Exclusive drop-forged clamp brackets, Uni-Cast 1-Piece Gear Housing and prop were intact. Mercury's are made for extra safety! (Note: Don't try this with any other outboard.)

PLANES FAMILY-SIZE CRUISERS! Mark 75 is far more powerful, far smoother than "over-sized twins." Exclusive multi-cylinder in-line design, chosen after all others were tried and rejected, gives the power flow of a fine car engine.

SINGLE LEVER CONTROL! Puts 60 hp in the palm of your hand. To start, push the lever forward and press thumb-button. To reverse (above), pull back and press button again. Crankshaft reverses direction and motor runs backward!

BALANCED TO FEATHER TOUCH! Center of gravity is so low (see photo) Mark 75 minimizes strain on the boat. See Mercury's 12 models, 6 to 60 hp. Or write for catalog to Kiekhaefer Corp., Box M-2, Fond du Lac, Wisc. ©1957.

MERCURY OUTBOARDS for 1957

introducing a new kind of performance >> power, stamina, handling ease

JUNE 1957
SAW SHARPENING IS EASY
Super Filer No. 11 Joints and sharpens bands and circular saws to 10" with all teeth correct in height, depth, pitch, bevel. When file fits steel killer, teeth are finished. Saw resharpened in one pass. Includes 8" file.

TRU-CIRCLE" saw set automatically sets teeth at 10°.

SUPER SAW FILER No. 6
Automatically holds and controls depth, bevel, and bevel. Fits all saws. Precision-machined and calibrated. Use as a guide or as a template.

WAD-A-MATIC HUMIDIFIER

BOWEL CENTERS
Centers inscribe exact location for proper hole. Pairs for 1/2", 3/4", 1" holes.

BALANCE YOUR OWN WHEELS
A precision DO-IT-YOURSELF wheel balancer designed for high-speed driving—read high balancing costs...drive safely on balanced wheels—cary in your car.

NEW HOUSEHOLD HUMIDIFIER

ONE-BAG MIXER THAT TRANSPORTS
Universal Transmix transports, mixes and dumps cement, cement, dirt, etc. P-T-O driven—no gears or chains. Can be installed or removed in 15 minutes. Fits Ford, Ferguson, AC-WD, IH Super C, H&M, Case VAC, J. D., Oliver 55, and other 2- and 3-plow tractors. Unconditionally guaranteed. See your dealer or write, giving tractor model.

CORBIN, KANSAS

MONEY BACK GUARANTEE—CATALOG FREE

Get your free copy now!
HOW TO PROTECT THE NATURAL BEAUTY OF EXTERIOR REDWOOD
An informative, factual guide to applying finishes to all redwood and other types of exterior woodwork. Written by experts at McCloskey's—one of the nation's oldest varnish manufacturers.

McCloskey VARNISH CO.
7600 State Road, Philadelphia 36, Pa.

(Store is located at this address)

--- MAIL THIS COUPON ---

ANSWERS
(Give yourself one point for each correct answer)
1—1; 2—3; 3—1; 4—1; 5—2; 6—4; 7—2; 8—1; 9—3; 10—4; 11—3; 12—2; 13—3; 14—2; 15—3; 16—1—Sodium thiosulfate; 16—2—Methane; 16—3—Lanthanide series; 16—4—Potassium nitrate; 16—5—Trinitrotoluene; 17—1(8); 17—2—(4); 17—3—(6); 17—4—(7); 17—5—(3); 17—6—(9); 17—7—(3); 17—8—(10).
Whatever the job, you'll do it better with nationally advertised products. Ask for products advertised in POPULAR MECHANICS.
Experts do it THIS WAY...

The simple steps in this easy-to-read booklet tell how to do a professional finishing job. Thirty-two pages of information on sanding and surfacing wood and metal, for only 25¢ at your paint dealer’s or sent with the coupon below. For best results, start with this booklet and finish with...

BEHR-MANNING
Sandpaper, sanding discs, and belts. Also, Behr-cat masking and electrical tapes...Norton sharpening stones.

BEHR-MANNING CO.
Troy, N.Y.

BEHR-MANNING CO., Troy, N.Y.
Enclosed is 25c. Please send “Finishing School” book.

Name: ___________________________
Address: ___________________________
City ___________________________ Zone ___________ State ___________

Attaching luggage to the top of the family car is simplified by a holding device which consists of tough cord, a metal loop and spring steel hooks. Placed on top of luggage with the steel ring at the center, double-cord strands are pulled to front, back and sides for fastening to existing framework. These ropes maintain tension while stretching 100 percent under 20 to 30 pounds’ pull or receiving shocks of 200 pounds’ pull.

Holiite Mfg. Co., 210 S. Clinton St., Chicago 6

Miscellany for

Motorists with clothes-carrying problems may find a solution in a new hook that holds four hangers. This unit springs up out of the rear seat passengers’ way when not in use. The old screw and screw hole are used in installation.

Spencer specialties, 2305 Wilshire Blvd., Los Angeles 5, Calif.
HELP, spelled in bright-yellow letters on a 12 by 12-inch red flag, now summons aid to motorists in distress. Visible day or night, this signal can be attached to the car window, while vehicle doors and windows remain securely locked.

HELP
Westing Co., 170 Highwood Ave., Kenmore, N.Y.

Motorists

Radio-controlled garage doors, contacting an obstruction, will stop and reverse without coasting. Based on limit switches and a reversing brake motor, a new apparatus is attached to a garage door driven by a sprocket engaging notches in a track. The power element is a heavy-duty, 1/4-horsepower capacitor-type electric motor, working through a sealed gear unit plugged into a 110-volt outlet.

Safe-Way Motor Door Co.,
18430 Nottingham Blvd., Cleveland, Ohio

wherever modern cars go...

they go with modern

CARTER
POWER CENTER
FUEL SYSTEMS

Look to CARTER... leading manufacturer of complete automotive fuel systems... for advanced engineering developments that make up the Power Center of America's most modern cars!

For Complete
MODERN FUEL SYSTEMS
Count on CARTER

Have your car serviced regularly wherever you see this sign... or look in the phone book yellow pages.

CARTER CARBURETOR
DIVISION OF ACF INDUSTRIES
INCORPORATED
ST. LOUIS 7, MISSOURI

JUNE 1957
You'll be proud to ride it anywhere, everywhere. Years-ahead body design, two-tone colors. Greater comfort, riding ease. Ruggedly built. Cushman Husky 4-cycle engine. Up to 50 miles per hour, 100 miles per gallon. Operating cost just 3/4 cent per mile.

- Sold and serviced nationally;
- Ask your Cushman dealer replacement parts available immediately;
- Dealer inquiries invited.

Write for new FREE booklet today.

CUSHMAN MOTOR WORKS, INC.
910 No. 21st, Lincoln, Nebraska

GIGANTIC SURPLUS SALE!

SUMMER SPECIAL

FISH & WORM SHOCKER

- Powerful hand drive at
- Generous; croaks of
- Clear, fresh tasting game fish. Very effective. Also drives fish around
- Most powerful made. New. 30 yr. cost $11.50. (42.00.)
- Pd. $3.89

MIDGET & GOLF CAR MOTOR

- Use for child's
golf cars;
- Easy start;
- Durable ball bearing 100 to 1 gear reduction motor. Runs on 6 or 12-volt storage battery. Govt. cost $5.47. (70.00.)
- SELL. $1.46 Fovi

ARMY POWER PLANTS

- Amazing bargains. Fully guaranteed
- 1000-watt, 115v. 120v. $117.50
- 2000-watt, 115v, 60-c. 189.00
- 2500-watt, 115v. 60-c. $249.95
- 5000-watt, 115v, 60-c. $499.00
- 10000-watt, 115v, 60-c. $849.75

AIR COMPRESSORS, TANKS, PUMPS

- Stainless steel tank, 12"x24". Capacity 300 cu. ft. in. 400 psi. (200.)
- Brand new, Cost Govt. over $400. Shipping wt. 19 lbs. SELL. $13.50 Fov
- Compressor, 1 cylin. 6.60 cm. $15.95
- Compressor, 1 cylin. 20 cm. 60 psi. $15.95
- Gauge 60 to 1400 psi. Special $1.99
- 20 lbs. Regulator, 500 psf. $4.95
- 2.56 Centrifugal Pump $39.95
- Also guns, hose, fittings, switches, Get catalog.

Find HIDDEN TREASURES

GOLD, SILVER, PRECIOUS METALS with the Famous Model 27 Metal Detector. Lightweight, ultra-sensitive, low cost. None finer. Also GEIGER COUNTERS for uranium and thorium for supplements. INFORMATION FREE

Eskelendorf Tractors

New 1957 Sportabout Car and Golf Carts. Write for literature.

Eskelendorf Tractors

Enjoy RUNNING WATER at LOW COST

Buy Water System Direct from Factory & SAVE

Durall Bronze System costs $1000, gives "city water" service. No more hand pumping! Only minutes to install. Pumps 275 GPH. Draws from 25' well. Fully automatic, 20 to 30,000 gal. Durall Bronze pumps, designed to last. Many valves, pressure switch, air volume control, pressure gauge, bronze seat valves, bronze relief valve. Custom in 1/2" pipe. 1.5 HP. Only $59.95 complete, or $49.95 less motor, 1 Year Guarantee. Water supply and drainage prices for over 60 years.

LABAWCO PUMPS, Belle Mead 8, New Jersey

GOLDEN PUMP COMPANY

LATE 1957 TRACTORS

LOW AS $99

New 1957 Tractor Features

15 H.P. 3 Point Linkage, Power Shift, 3 Speeds, Power Steering. Write for literature.

Enjoy RUNNING WATER at LOW COST

Buy Water System Direct from Factory & SAVE

Durall Bronze System costs $1000, gives "city water" service. No more hand pumping! Only minutes to install. Pumps 275 GPH. Draws from 25' well. Fully automatic, 20 to 30,000 gal. Durall Bronze pumps, designed to last. Many valves, pressure switch, air volume control, pressure gauge, bronze seat valves, bronze relief valve. Custom in 1/2" pipe. 1.5 HP. Only $59.95 complete, or $49.95 less motor, 1 Year Guarantee. Water supply and drainage prices for over 60 years.

LABAWCO PUMPS, Belle Mead 8, New Jersey

Find HIDDEN TREASURES

GOLD, SILVER, PRECIOUS METALS with the Famous Model 27 Metal Detector. Lightweight, ultra-sensitive, low cost. None finer. Also GEIGER COUNTERS for uranium and thorium for supplements. INFORMATION FREE

The Delectron Corp.


WELDER

4 WAY ONLY $14.75

The Welder

Complete Package: S-525 Carbon Arc. Torch and Holder handle manual and mechanical work.

FIRE-WAY WELDER CO., Dept. F2-F

1810 S. Federal St. * Chicago 16, Ill.

POPULAR MECHANICS

Copyrighted material
Antenna Tracks Moon, Missiles

“Dish” antennas, 61 feet in diameter and designed by Stanford Research Institute, are being installed near Palo Alto, Calif., and Fairbanks, Alaska. The two antennas will measure radio and radar reflections from the moon, “northern lights,” meteors, and possibly intercontinental ballistic missiles and earth satellites. Each antenna is built of aluminum tubing. The Palo Alto unit will use a 100-megacycle transmitter, while the Alaskan site is to have a 200 to 400-megacycle klystron transmitter.
This Tool Finds Out When an Oil Well Is Really an Oil Well

Fluid samples from prospective oil-bearing rock formations can be obtained for analysis with a tool that is lowered on an electric cable into position opposite the suspected formation. Discharged electically, a hollow bullet attached to an alumi-
num tube is fired into the rock. Formation fluid flows through the bullet's open nose, along the tube and into a small reservoir. A valve seals the reservoir when full and a slight pull frees the tool. Five tests can be made each time the tool is lowered.

Wiggling "Worm" of Mercury Inside Lure May Out-Fox Fish

Mercury, wobbling around like a worm in a transparent, tubular fishing lure, provides continuous wiggle, dive and dart enticing to fish. With a red head and tail, this ¼-ounce plastic lure pulls a treble hook and appears to be a real worm moving deep through the water, or just under the surface during trolling. When a retrieve is halted briefly, the lure goes into a wiggling "dive."

2 WAY PORTABLE RADIO SET SENDS—RECEIVES UP TO 10 MILES AS SHOWN
with built-in antenna or hundreds of miles with outside antennas of 50 and 40 meter amateur radio bands. Novelty also Aircraft and domestic beginners, 21 on 1 and 2.600 mc., PORTABLE SET CONTAINS POWERFUL 40-A-7 OUTPUT TUBES, 225-A-7 TUNING AMPLIFIER TUBE. TWO AA BATTERIES. NO AC PLUG-INS NEEDED! Take it with you everywhere you go—on trips, vacations, camping. Keep in contact with home, friends. Has 8 watt crystal controlled transmitter. Sensitive Regenerative Receiver. Send receive switch. Fits any 2 lbs. bag. Size: only 6"x4"x4". TESTED—PROVEN—SHIPS FROM PRACTICAL. Full information given on quick easy to get license. SEND ONLY $3.00 postpaid, ch. post and pay postage. Order now and save $11.00 COD postage. Complete equipment contains: 2 225-A-7 tubes, 2 AA batteries, antenna, easy instructions. Set of batteries (2/25c) crystal $1.50, COMPLETE PRODUCT $10.00. A regular dealer guaranteed — available — only from: WESTERN RADIO WANTED.$8.00. Send order now before price goes up.

NOW... get that wonderful inimitable, tempting, delectable flavor known as CHARCOAL FLAVOR every time you broil meat or fish. It's easy, it's foolproof with the NEW LAZY-MAN Open Fire Charcoal Type Gas Broiler

The secret is in the "Permanent Coals," which never need replacing and which enhance, even and spread heat from the fire, nothing like it, nothing anywhere near as good. Saves time, eliminates all that bother, dust and ashes. No preheating necessary. Always ready for instant use. Never disappoints. Inexpensive, too. Can be used all 12 months of the year. Thousands already in use. Highly praised. Our "Permanent Coals" are made of compounds of charcoal, the size of walnuts. You heat them with piped city gas, with charcoal gas or with any other type gas. Order NOW... by mail. Complete satisfaction guaranteed. Basic Unit for "Do-It-Yourself" installation $59.50

Broiling capacity 4 to 6 steaks or a dozen hamburgers at one time. Broiling area 14x14 square. Overall dimensions: 12" x 22" x 7½". Made of heavy gauge welded steel. Weight 45 lbs.

Order Now by mail. Complete satisfaction guaranteed. Basic Unit for "Do-It-Yourself" installation $59.50

CHICAGO COMBUSTION CO.
318 Cliff Ave., Cliffside Park, N. J.

258

FREESTHESALE CATALOG get up to 50% off
MAKE MONEY! SAVE MONEY! Buy Tools, Hardware, appliances, photo equipment, sporting goods, power tools, paints and thousands of other nationally advertised products at WHOLESALE COST TO YOU.
SEND FOR FREE 1957 WHOLESALE CATALOG TODAY!
SILVO HARDWARE COMPANY

How to Build a Boat at ½ the Cost!
— with CLEVELAND'S full size, cut-to-shape boat patterns, detailed blueprints, and specifications. All classes and styles of modern Naval Architect-designed boats from ½ to 38 feet. BIG NEW 86-PAGE ILLUSTRATED CATALOG, 50c (coin). "How to Build a Boat" booklet, $2.50. Hardware & Equipment Catalog, $1.50.

4 ft. Cabin Cruiser
CLEVELAND BOAT BLUEPRINT CO.
Dept. 8-166, Box 1651, Cleveland, Ohio

How to Build Your Own GARAGE
Save as Much as 50% of Usual Construction Costs
Get Popular Mechanics' brand new book How to Build Your Own Garage by Wayne Lecker, Assistant Shop Notes Editor, and find out how you can build your own garage at savings of 50% of usual cost. Lecker tells in famous step-by-step instructions and shows in fine, clear line drawings and diagrams how to perform every building operation from laying the concrete to installing the final trim. There are 25 designs. Brick, frame, and concrete block fully covered. Send $3.50 for your copy. 7-day money back guarantee.

POPULAR MECHANICS PRESS, 200 E. Ontario, Chicago 11, Ill.
Need A Pipe Vise?

get one that does more than just hold pipe

RIGID
Bench Vise
8 sizes, capacities
1/4” to 6”.

extra-service pipe vise

It has a handy built-in pipe bender... and pipe rest—for accurate threading. Exclusive LonGrip jaws hold pipe extra firmly, don't chew it up. Yoke and base of lifetime malleable. Most for your money—buy RIGID Vises at your Hardware Store.

Make your next pipe wrench the famous RIGID!

RIGID Work-Saver Pipe Tools

The Ridge Tool Company, Elyria, Ohio, U. S. A.
Cardboard Cathedral Model
Cardboard church models are the hobby of Franz Boehm, formerly of Prague, Czechoslovakia, and now living in Wiesbaden, Germany. Working with scissors in his home, Boehm recently built a scale model of the cathedral at Cologne. The model's towers are four feet high.

Fight
CEREBRAL PALSY

Join the
GOLDEN DEED CRUSADE
Send Your Gift to Your Local United Cerebral Palsy Affiliate
Each part of this cardboard model of the cathedral at Cologne, Germany, has been scissored out.

TWO WAYS TO BUY BETTER
Your dealer knows the right products for your needs—quality products that are nationally advertised. POPULAR MECHANICS brings you a monthly roundup of valuable "how to" information and product advertising. Read POPULAR MECHANICS every month — then talk to your dealer.

PM TAG of INTEGRITY

Arc Welding PAYS BIG!
Shop Type AC Welder
Build Your Own

Cash in on the many opportunities that exist in the ever expanding arc welding field. With a minimum investment you can start your own profitable business with the big demand for emergency repair work and construction projects. Hobart gives high efficiency at low cost, and a selection from the most complete line of welders. Phone FE 2-1223.

HOBART BROS. CO., Box M-87, Troy, Ohio
"One of the world's largest builders of arc welding equipment."

JUNE 1957

NEW!

SHAW
RM 24 MOWER WITH AMAZING MAGIC DRIVE
Three Speeds forward neutral & reverse
Wide range of speeds, complete gear selection gives you outstanding mowing control for any type terrain, any type mowing. Low cost!

3 sizes, cut 24, 32 and 36"
Riding Mowers 2½ to 8 H.P. low as..................$199.00
Riding Tractors 3 to 14 H.P. low as..................$299.00
Walking Type Tractors 2 to 5 H.P. low as............$99.00
Kit, 2½ H.P. 21" Cut Rotary Mower Shown Below $59.00
Bargains in Rotary Pulverizers also.

See your Shaw dealer or write for free literature.

Dealer inquiries invited.

SHAW Mfg. Company
4506 Front Street, Topeka, Kansas
668-66 N. 4th Street, Columbus, Ohio

BUILD YOUR OWN FANS
Motor & Fan Blade Combinations For Stand Fans, Room Coolers — Windows, Evaporative Coolers, etc. Motors all 110 V, 60/60 cy. 1400 rpm. Fan Duty.
FREE GUARD — 9 in. 900 cfm Blade & Motor $8.50; 12 in. 900 cfm Blade & Motor $9.50; 16 in. 750 cfm Blade & Motor $11.50; Guard $6.50; 20 in. 560 cfm Blade & Motor $13.50; Guard $6.50.

ALL ITEMS SHIPPED PREPAID
FREE FAN CIRCULAR listing Fan Kits, Motors, Timers, Thermostats, Shutters, etc., etc.

C. MARSHALL SALES, 3546 Fullerton Ave., Dept. P-6, CHICAGO 47

WHATEVER YOU’RE MAKING

save hours of time with

WILHOLD WHITE GLUE

Quicker to work: less clamping. Colorless, permanent. Leaves the work clean, the shop clean and your hands clean.

Paint, Hardware, Lumber, Variety Stores. Or write WILHOLD PRODUCTS, Los Angeles 31, Calif.; Chicago 44, Ill.
Adjustable Copy-Light Brackets From Curtain Rods

Extension-type curtain rods are used to support the copy lights shown. A straight section 18 in. long is centered on the column and fastened so that it can be raised or lowered. Two sections, with a right-angle bend at one end, are cut 7 in. long and fitted into opposite ends of the longer section. Ball-joint swivels are soldered to ends of the rod assembly and the lights attached to them.—H. Klien, Pittsburgh, Pa.
Every Boy Should Have
This Build-It-Yourself
Book for Boys!

It’s natural for boys to want to make things—to fuss with tools—to fashion the kind of things “kids” want. So give boys this Build-It-Yourself Book for Boys. Encourage a youngster to express himself through the sensational new Popular Mechanics book that shows how to make 56 different things every boy dreams about. It covers science, mechanics, electricity, modeling and other fields. 192 pages of easy-to-follow instruction and 469 how-to-do-it pictures.

56 Toys, Games, Gadgets, Models, Boats, Electrical Devices, Cars and Other Things Boys Can Make at Home


Boomerangs—“Ju-bee” the punt

POPULAR MECHANICS PRESS
Dept. 657, 200 E. Ontario St., Chicago 11
MAD FOR LADS
who use
AERO
SHAVE!

AERO SHAVE
push-button LATHER

Save 20¢ a Can!
So, go man! Get rich, creamy AERO SHAVE... the smoothest, slickest lather bomb of all! Three beard softeners plus gentle Lanolin! Feel—save the difference! Only 59¢.

59¢ AERO SHAVE

successor to sandpaper

STEELIE Handy Sander
with STEEL UNIBRASIVE SHEETS

Here's the secret:
Magnified Unabrasive Looks like this—every inch same depth—can't scratch—gouge—clog
Steelie: 4-2 sheets stainless steel
Lithograph: 1 coarse, 1 fine

BUCKEYE MFG. CO.
Twin Building - Saint Paul 1, Minnesota

SUPERIOR PERFORMANCE

You can rely on Gerstner Chests to provide proper care for your precision tools. Free Catalog to machinists and toolmakers.

GERSTNER TOOL CHESTS
487 Columbia St., Dayton 7, Ohio

JEFF & 4-WHEEL DRIVE
OWNERS

Front Drive with FREE-LOCK HUBS

Low Operating Costs
All Parts Stop Only Wheels Move!

In 2-Wheel Drive No Parts Moving Stops Gear Whine

Front Drive—No FREE-LOCK HUBS

High Operating Costs
All Parts Move

In 2-Wheel Drive Over 100 Parts Moving—Wearing!

Stop front drive wear Increase power Reduce engine wear Tires last longer Save gasoline Easier steering UNCONDITIONALLY GUARANTEED!

Benefit now from this money-returning investment.

©FLC Ask dealer to order yours now Write for FREE FOLDER

Free-Lock Corporation
6301 North Federal Blvd., Denver 11, Colorado

Diving Sled Permits Two-Man

TWO MEN, riding an underwater sled adapted from an Air Force mesh ambulance litter, inspect trawls, fishing nets and other marine gear for the U.S. Fish and Wildlife Service. The sled has controllable fins for steering up, down and to either side by the man in front. The rear man photographs and observes, while the sled moves up to four miles per hour at depths down to 60 feet. A Lucite “water shield” protects the team from the towing vessel’s wake. Oxygen bottles provide buoyancy for the sled. The team wears breathing gear, life preservers, knives, depth meters and shark repellent.
Team to Observe Marine Gear

3400 RPM 1/2 HP POWER SAW
RIPS - CROSSCUTS
CUTS A FINISHED 2x4 LIKE A KNIFE THROUGH BUTTER

Compare to
SAWS SELLING
UP TO $49.50

A rugged, professional type, adjustable saw. Will cut any angle from 0 to 45°. Has an adjustable 12" rip fence. Safetytrigger switch on handle. Full 1/2 HP universal motor. 20 1/2" cut. 66 cycle motor - weighs only 41 lbs.

EXTRA SAW BLADES - Available in Rip, Cross, 45° and Combination, Precision Spots.

NEW POWER SAW BENCH TABLE
This sturdy precision made bench saw table converts our famous Power Saw (above) to a handy, versatile table saw. Comes with a rip fence and other guide that keeps accurate rip cut, cross, angle or bevel cuts. Saws is easily and quickly installed. Table size 12"x12"x12"x12".

NOW ONLY 995

PHILIPPINE MAHOGANY PLYWOOD
For Framing Cams, Offices, etc. Use in Cabinet, Furniture, etc. Rotary cut, both sides sanded. Bonded with the finest resins adhesive. Face side sanded, Shrink at lower, truck rates.

SAVE 50% ON TRANSLUCENT FIBERGLAS PANELS
3MM (.08x7/9) E27 X 4.19 SF.

SPECIAL CATALOG BARGAIN!
NEW! DECORATIVE HEAVY WROUGHT IRON TRELIS
FOR PATIO ROOM SUPPRTS - DIVIDERS, etc.
Use them INDOORS or OUTDOORS! Heavy 1-1/8" black iron, supports with a beautiful wrought iron finial at each end. 12" wide. Height can be cut at 7 ft. Available either flat or curved type. Hanging flanges included.

WHEEL PLAN BOOK FREE
Wheels for portable farm, home and garden equipment built easily, economically with 6- or 12-inch Glensile ball bearing rubber tires. Rollers, carts, 1955 grade furniture, etc. Write GLANSON Corp., 340 North 13th Street • Milwaukee 2, Wisconsin.

KING MIDGET

MIDGET MOTOR CORPORATION, Athens, Ohio

235
One Person Folds and Rolls Banquet-Type Table

Two steel wheels, built into the underframe on one side of a folded, banquet-type table, enable one person to transfer the table from one place to another with little effort. Made of all-steel "girder" frame construction, this table has legs that are rigidly locked in place between toggle-action end brackets and a one-piece center-support member, when the table is in use. All bracing members are pivot-attached to the underframe. When folded, the table top and legs are locked into the underframe, leaving a profile of 1 1/4 inches in total thickness. Tread-rubber shoes lock on over legs to prevent slipping and marring of floors. Top working surface of the table is hard plastic with simulated birch grain and a perimeter edge of anodized aluminum. The two sizes made are 30 by 72 inches and 30 by 96 inches in area; both sizes are 29 inches in height. Use is suggested for schools, churches, hotels, lodges, clubs and cafeterias.

Just pull the trigger... spray paint!

The easier, better way to paint! Job's done in minutes. Finish is smooth, flawless. Speedy Sprayer is a real professional tool, favorite of craftsmen for over 35 years! At stores everywhere. 890 Oufit, including gun, hose, less motor, only $39.95

Retail Price $125.00
Factory To You $79.95

SUPERSHOP includes precision-built 8" tilting table saw, vertical and horizontal drill press, 30" lathe, sander, grinder. 100% BALL BEARING. Write for FREE catalog, full details, trial plan. Easy Pay Plan.

POWER TOOLS, INC.
106 Yale Ave. Beloit, Wis.

FREE AMAZING NEW BOOK "HOW TO ANSWER ADS"

Never before have you seen anything like this. Tells you in simple language the correct way to answer ads. Gets you quicker replies—better results, and greater satisfaction. Will save you time and money and it's ABSOLUTELY FREE. No obligation whatever. Every reader of advertising should have this booklet. Send a postcard for your copy NOW. F. W. JOHNSON, Popular Mechanics Magazine, Room 600-A, 204 East Ontario Street, Chicago 11, Ill.

W. R. BROWN CORP., 2635 N. Normandy, Chicago 35

WHEEL KIT $7.50 EXTRA

FREE! "How To Spray" booklet and literature. Write!

Model PG-12 sharpens, joints, gums, and retooths all cross cut, rip, combination, miter, and planer blades up to 12" in diameter. Two precision index plates give versatile, accurate sharpening. Guaranteed precise spacing of teeth. New safety rest prevents tilting and gouging of blade. Saves time and money. Special $3.65 grinding wheel also included for use on your own power table. Fits regular or radial swing tables.

Order today. Send check, cash, or money order. We pay postage. FREE Booklet—"How To Sharpen Saws."

QUICK-WAY SAW CO.
136 TOMPSONS ST.
CORTLAND, N. Y.

POPULAR MECHANICS
PORTABLE LIGHT PLANTS
1500 WATT PLANT 115 V. 30 A 60 C. A. Factory price...
Combined bridge & battery charging unit. Complete with portable screen, television, lights, emergency power for operating small appliances, etc. Item 22. WT. 110 lbs. Regular Factory price... $329.50...
1750 Watt Plant powered by 4.5 Briggs on generator. Model 5A. Complete with battery charger built-in Factory price...

700 WATTS PUSH BUTTON START 115 V, 60 C. A. Model 5A. Complete with battery charger built-in Factory price...

JET STEAM MASTER
Now a super efficient portable steam generator. One man can produce live steam at 8.5 Lbs. and 250 F. A. Combustion. Cold start! Produces live steam in normal pressure on 2 pounds of gas. Cleans dry geky old paint,辰, old paint, etc. lighting. Steam will also sterilize materials in a week. Fully automatic oil fired steam generator. Model 5A. (Item 10/220 for Item 21 or 23 $379.50...

GREAT GIANT METAL SHEARS
Nine inch cutting blade made of special steel. Continuous feed system. Set table height and ground. Easily cuts steel plate up to 1/2 inch thick. Item 153. WT. 43 lbs. Item 156. WT. 23 lbs. Item 156. Regular 1/8 inch. While last...

MATTER AIR COMPRESSOR
MAST"AIR" This is the master air compressor built with a NO RUST compresor. Safe up to 800 lbs. Item 299. High pressure type. CAM. Large volume of air for heavy duty service. For paint spraying, spraying, driving nails, etc. Item 299. WT. 17 lbs. Item 269. WT. 11 lbs. Item 175. Item 299. Regular 1/8 inch. While last...

WELDING KIT Two 10 ft. leads. Works with any transistor, elect...
South Bend Precision Turret Lathes keep efficient the machining of small duplicate parts. Their remarkable accuracy and positive controls simplify the holding of close tolerances with only normal machine handling care. Finishes are commonly produced that otherwise would require additional operations. Simplicity of tooling makes job changes quick and economical. Wide ranges of power feeds and thread cutting feeds assure maximum efficiency on every job. They are particularly suited for second operations. Sizes available include: 1" collet—16" swing; 1" collet—13" swing; 1" collet—10" swing. Priced from $1665.

TURRET ATTACHMENTS

South Bend Turret Attachments are available for tooling 9", 10", 13" and 16" swing South Bend Lathes for repetitive operations. Precision built for precision work, their rigidity and accuracy permit maximum feeds and speeds. Prices of hexagon bed turrets range from $284.00 to $726.00. Square Turret Tool Blocks are priced from $43.25 to $94.50. Write for Catalog giving full information on South Bend Turrets and the complete line of South Bend Attachments and Accessories.
The NEW F-57 HAMMER with IMPROVED light-weight CONSTRUCTION NON-BREAKABLE FIBER-GLASS HANDLE Stronger than Steel — with the Hickory feel

You’ll marvel at the free and easy swing of the most perfectly balanced hand tools ever made. These are two of the 28 tools with non-breakable fiber-glass handles in the new Plumb line.

BALL PEIN MACHINISTS’ HAMMER
FM24. 24 oz. head — $5.00
Advertised Consumer Price

NEOPRENE COVERED GRIP
Shock absorbent and Slip-Proof. Resists grease, oil and sweat.

New Functional head design gives added driving power.

Handle withstands overstriking without breaking. Also available in 16, 20, 32, and 40 oz. head weights.

PLUMB
Available at your local retail hardware stores.
FAYETTE R. PLUMB, INC., PHILADELPHIA 37, PA.
hitch your wagon to a holiday ... go with an Evinrude in tow!

Where to this week end...a placid pine-fringed lake? A river hidden in the hills? Down to the sparkling sea? You name it...and it's yours!

Join the thousands who go with an Evinrude in tow! One look at the new '57 Evinrudes will tell you why there's more fun ahead with an Evinrude behind.

First, they're beauties to behold...brilliantly styled to complement the smartest craft. Next, they're power-packed for great performance. Two new "18's" and three new "35's" with new, high-compression engines that deliver solid big-load driving power. New 12-volt electric starting or easy manual starting. New fuel economy that extends your cruising range. New high capacity generator (optional). Wonderfully smooth, whisper quiet power that wins you a welcome wherever you go!

Name your fun...fishing, cruising, skiing, or just plain boating...there's an Evinrude to match it with today's most advanced features.

Why let another week end slip away? See your Evinrude dealer today. Ask him for a "Revelation Ride." Catalog free. EVINRUBE MOTORS, 4467 North 27th Street, Milwaukee 16, Wisconsin.

Find Your Nearest Dealer in the "Yellow Pages"