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"My retiring came out of a business trip to Tampa in 1942. I was dining at a restaurant and happened to notice Don Nelson, a friend of mine from New York. I went over to wish him a wonderful vacation.

"'Vacation? Why, didn't you know we moved down here when I retired?'

"I was amazed. 'But you're too young to be retired!'

"'Nonsense!' he smiled. 'It's what I'd been planning for fifteen years.'

"Don invited me out to his home the next day. 'I sure envy you, I said. 'I know I never could save enough money.' Then Don explained that he never could have retired on what investments or savings he had. But he had a good salary and he had found a way to make part of his salary buy a retirement income. It was called the Phoenix Mutual Retirement Income Plan.

"Flying home, I noticed a Phoenix Mutual ad in a magazine. Sure enough, I could get a retirement income guaranteed for life if I started young enough. When I got home, I cut out the coupon and sent for the booklet telling all about Phoenix Mutual Plans. In a few days it came by mail. And there was exactly the plan for me. If I started right then—at

40—I'd be able to retire in only fifteen years with \$300 a month.

"I felt more and more pleased and secure as those fifteen years went by. I decided on the West Coast of Florida because I had old friends in that area. And as soon as my first check for \$300 arrived, I was off. Now that I'm settled, the real fun's just beginning."

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AROUSÉ by reports that U. S. youths are physically inferior to Europeans, the University of Oregon's top-notch physical-education laboratory is testing muscles with ingenious machines. Don't miss "How to Measure Physical Fitness," first of a two-part article.



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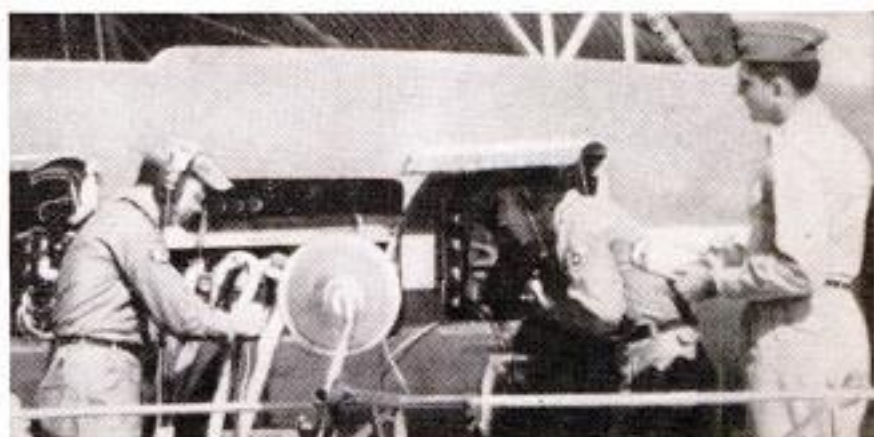
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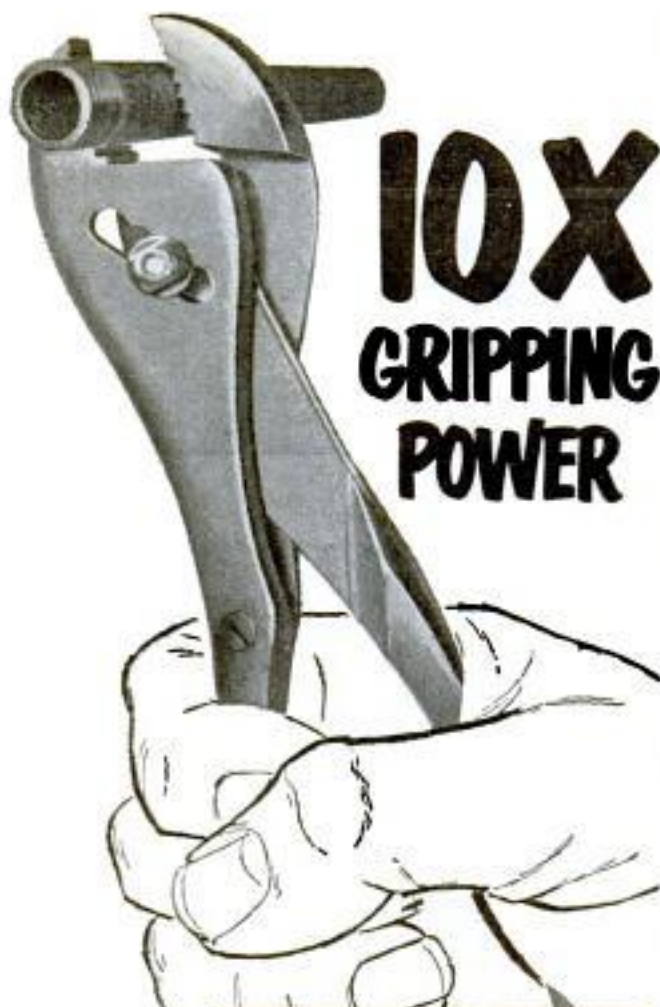
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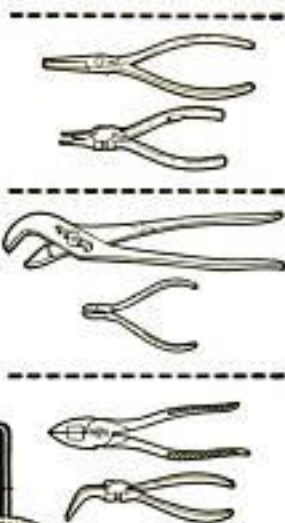
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## ACROSS THE DESK



### He Built His Own Wheel Chair

Handicapped by arthritis in the legs, back and both hands, and unable to open his right hand for the last five years, Joe Weston of Windsor, Ont., Can., built this powered wheel chair for himself—while sitting in a wheel chair. He bought a couple of wrecked motorcycles and used whatever parts he could adapt to his purpose. The rear wheel, by which the chair is



steered, was a trailer wheel; the frame is of angle iron. The sides came from an old "furnacette," the bottom from the hood of a Dodge, the armrests and rear deck are  $\frac{3}{4}$ -inch plywood. A two-horsepower, 24-volt electric motor drives the vehicle and Mr. Weston says with four six-volt car batteries he can travel five or six hours at up to 15 miles per hour. One double-pole, double-throw switch controls forward and reverse, another is hooked in series-parallel for slower speeds.

### To the Editor:

I would be obliged if you could help me obtain some information relating to ambulance vehicles and equipment in use in the United States of America. I would like, if possible, to make contact with an employee of an ambulance service in America, so that an interchange of ideas and information may be effected. I am particularly interested in the types and designs of American ambulances, and also the equipment carried in these vehicles. Of special interest to me would be the design and

(Continued to page 10)



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3 IN THE HOSPITAL, I HAD PLENTY OF TIME TO THINK

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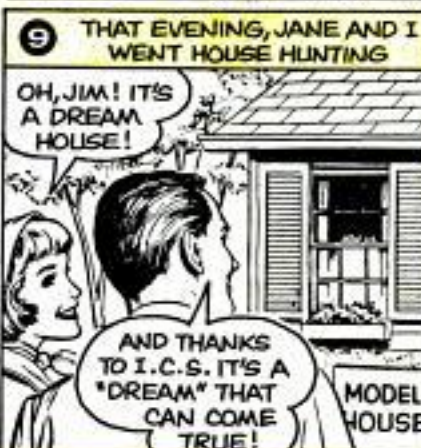
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(Continued from page 6)

construction of the ambulance stretcher, which appears, from the photographs I have seen of it, to have a retractable undercarriage to permit the handling and loading of the stretcher by one man.

In Australia, the states are divided into ambulance districts: The Latrobe Valley District being one of 16 districts in this state. This district has its headquarters at Morwell, Gippsland, the center of one of the richest deposits of brown coal in the world. We serve a population of approximately 50,000 people, and to provide an efficient service we have eight ambulances, all equipped with two-way radio. Our vehicles travel approximately 12,000 miles per month attending to some 450 calls, many of which involve traveling 200 to 500 miles. We have our own buildings and workshops, and a Committee of Management is responsible for the conduct of the service.

D. B. Matthews,  
Superintendent-Secretary,  
Latrobe Valley District Ambulance  
Service,  
McDonald and Spry Streets,  
Morwell, Victoria, Australia.

### To the Editor:

For many years I have keenly awaited each new issue of PM and I was especially interested in John Ott's observations as regards the tests in application of the shorter wavelengths of light, June 1957 issue. If I may, per medium of your splendid magazine, establish contacts with others who are making a study of ultraviolet light and its effect on plant and animal, I would be pleased to hear from them. All letters will be answered.

H. W. W. Taylor,  
R.D. 3 Papapara Road,  
Wanganui, New Zealand.

### To the Editor:

A pat on the back, please, for the editor who decided to publish the two letters on pages 6 and 8 of the August issue. They are right up my street and voice what I have been thinking and saying for many years. I used to deal with a garage in British Columbia in the 1920s which carried a notice "The man who lends the tools is out—permanently out."

Mr. Carleton Esty, who writes about Fords, may possibly remember the days when we roped the rear wheels of our Model-Ts and had to climb the mountains

(Continued to page 14)



**J. E. SMITH, Founder**  
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to show you how easy, practical it is to  
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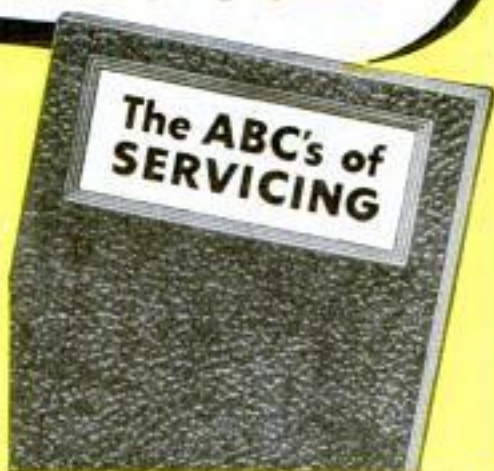
Right now, a solid, proven field of opportunity for good pay is servicing the millions of Television and Radio sets now in use. Hundreds of TV and Radio stations on the air offer interesting jobs for Operators and Technicians.

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**You Learn by Practicing with Equipment NRI Sends**

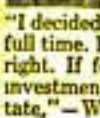
Clearly written, well-illustrated NRI lessons teach TV-Radio-Electronics principles. Also, without extra charge, you get NRI kits developed especially to give you actual practice with TV-Radio equipment. You build, test, experiment with actual Television-Radio receiver or broadcasting circuits, build, use testing equipment. All equipment is yours to keep. In your own home you gain knowledge, develop skills needed for jobs in this vast industry.



**NRI Trained These Men**



"I have my own Radio-TV business and my income has provided me with financial security. Business is great. I can't keep up with the work."—EDWARD M. DUDEK, Chicago, Ill.



"I decided to quit my job and do TV work full time. I love my work and am doing all right. If fellows knew what a wonderful investment NRI is, they would not hesitate."—W. F. KLINE, Cincinnati, Ohio.



"Thanks to NRI, I operated a successful Radio repair shop. Then I got a job with WPAQ, later WBOB and now am an engineer for WHPE."—VAN W. WORKMAN, High Point, N. Carolina.



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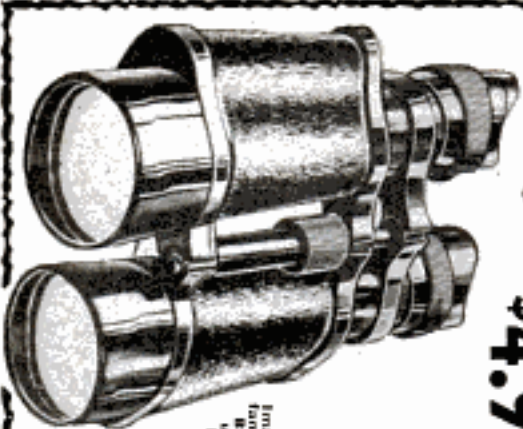
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A patent gives the inventor the exclusive right to prevent others from making, using, or selling the invention claimed in the patent for a period of seventeen years.

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.

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HOW IT WORKS  
HOW TO CLEAN  
HOW TO ADJUST

(Continued from page 10)

in reverse to get gravity feed to the carburetor. Happy days, we didn't bother much then about squashy seats.

George Hornsey,  
Stoneleigh, Surrey, England.

**To the Editor:**

The enclosed photo shows my cat looking out the front window of a house I built for him. Since there are very few cat houses, I thought this photo might be of



interest to your readers. My cat is a large one; the house is built of wood, including the imitation bricks at the front end. The cat is resting on what I call the snoozing platform, which extends the full length and half the width. The lower or main floor is the chow department or dining room. The roof is shingled and the walls have three windows on the sides.

Charles Homewood,  
Los Angeles, Calif.

**To the Editor:**

Recently I was looking at one of my old issues of *PM* (May 1905) and noticed a subscription ad which stated that you could send *Popular Mechanics* to your friend for \$1 a year or at \$3 for five years. What really amazed me was that a life subscription could be obtained for only \$10. Oh, for the good old days. Nevertheless, at 10 cents or 35 cents an issue, such a fine magazine as *Popular Mechanics* will always be worth its price.

Stephen Dudley,  
Long Beach, Calif.

☐ Deep-sea telephone cable being laid 2400 miles from Point Arena, Calif., to the island of Oahu will furnish 36 circuits to supplement the 14 radio circuits now used between the mainland and Hawaii.



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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.*

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600x16	\$3.48	670x16	\$3.95
650x16	3.85	670x16	4.05
650x16	4.25	700x16	3.95
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600x16	\$3.48	670x16	\$3.95
650x16	3.85	670x16	4.05
650x16	4.25	700x16	3.95
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600x16(6)	6.75	640x16	4.95
650x16	5.75	670x16	5.35
650x16(6)	7.25	710x16	9.45
700x16	6.35	700x16	5.95
750x16(6)	8.45	800x16	6.35
550x18	4.95	820x16	6.35
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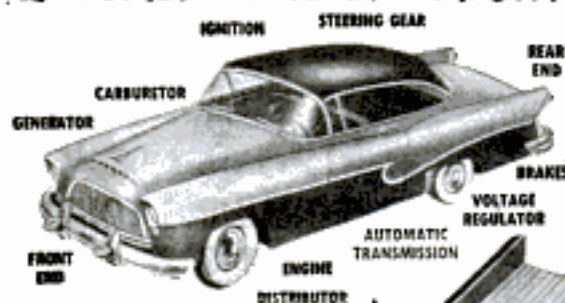
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I was young once, as you may be—today I am older. Not too old to enjoy the fruits of my work, but older in the sense of being wiser. And once I was poor, desperately poor. Today almost any man can stretch his income to make ends meet. Today, there are few who hunger for bread and shelter. But in my youth I knew the pinch of poverty; the emptiness of hunger; the cold stare of the creditor who would not take excuses for money. Today, all that is past. And behind my city house, my

summer home, my Cadillacs, my Winter-long vacations and my sense of independence—behind all the wealth of cash and deep inner satisfaction that I enjoy—there is one simple secret. It is this secret that I would like to impart to you. If you are satisfied with a humdrum life of service to another master, turn this page now—read no more. If you are interested in a fuller life, free from bosses, free from worries, free from fears, read further. This message may be meant for you.

By Victor B. Mason

I am printing my message in a magazine. It may come to the attention of thousands of eyes. But of all those thousands, only a few will have the vision to understand. Many may read; but of a thousand only you may have the intuition, the sensitivity, to understand that what I am writing may be intended for you—may be the tide that shapes your destiny, which, taken at the crest, carries you to levels of independence beyond the dreams of avarice.

Don't misunderstand me. There is no mysticism in this. I am not speaking of occult things; of innumerable laws of nature that will sweep you to success without effort on your part. That sort of talk is rubbish! And anyone who tries to tell you that you can think your way to riches without effort is a false friend. I am too much of a realist for that. And I hope you are.

I hope you are the kind of man—if you have read this far—who knows that anything worthwhile has to be earned! I hope you have learned that there is no reward without effort. If you have learned this, then you may be ready to take the next step in the development of your karma—you may be ready to learn and use the secret I have to impart.

## I Have All The Money I Need

In my own life I have gone beyond the need of money. I have it. I have gone beyond the need of gain. I have two businesses that pay me an income well above any amount I have need for. And, in addition, I have the satisfaction—the deep satisfaction—of knowing that I have put more than three hundred other men in businesses of their own. Since I have no need for money, the greatest satisfaction I get from life, is sharing my secret of personal independence with others—seeing them achieve the same heights of happiness that have come into my own life.

Please don't misunderstand this statement. I am not a philanthropist. I believe that charity is something that no proud man will accept. I have never seen a man who was worth his salt who would accept

something for nothing. I have never met a highly successful man whom the world respected who did not sacrifice something to gain his position. And, unless you are willing to make at least half the effort, I'm not interested in giving you a "log up" to the achievement of your goal. Frankly, I'm going to charge you something for the secret I give you. Not a lot—but enough to make me believe that you are a little above the fellows who merely "wish" for success and are not willing to sacrifice something to get it.

## A Fascinating and Peculiar Business

I have a business that is peculiar—one of my businesses. The unusual thing about it is that it is needed in every little community throughout this country. But it is a business that will never be invaded by the "big fellows". It has to be handled on a local basis. No giant octopus can ever gobble up the whole thing. No big combine is ever going to destroy it. It is essentially a "one man" business that can be operated without outside help. It is a business that is good summer and winter. It is a business that is growing each year. And, it is a business that can be started on an investment so small that it is within the reach of anyone who has a television set. But it has nothing to do with television.

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## Are You Mechanically Inclined?

While the operation of this business is partly automatic, it won't run itself. If you are to use it as a stepping stone to independence, you must be able to work with your hands, use such tools as hammer and screw driver, and enjoy getting into a pair of blue jeans and rolling up your sleeves. But two hours a day of manual work will keep your "factory" running 24 hours turn-

ing out a product that has a steady and ready sale in every community. A half dollar spent for raw materials can bring you six dollars in cash—six times a day.

In this message I'm not going to try to tell you the entire story. There is not enough space on this page. And, I am not going to ask you to spend a penny now to learn the secret. I'll send you all the information, free. If you are interested in becoming independent, in becoming your own boss, in knowing the sweet fruits of success as I know them, send me your name. That's all. Just your name. I won't ask you for a penny. I'll send you all the information about one of the most fascinating businesses you can imagine. With these facts, you will make your own investigation. You will check up on conditions in your neighborhood. You will weigh and analyze the whole proposition. Then, and then only, if you decide to take the next step, I'll allow you to invest \$15.00. And even then, if you decide that your fifteen dollars has been badly invested I'll return it to you. Don't hesitate to send your name. I have no salesmen. I will merely write you a long letter and send you complete facts about the business I have found to be so successful. After that, you make the decisions.

## Does Happiness Hang on Your Decision?

Don't put this off. It may be a coincidence that you are reading these words right now. Or, it may be a matter that is more deeply connected with your destiny than either of us can say. There is only one thing certain: If you have read this far you are interested in the kind of independence I enjoy. And if that is true, then you must take the next step. No coupon on this advertisement. If you don't think enough of your future happiness and prosperity to write your name on a postcard and mail it to me, forget the whole thing. But if you think there is a destiny that shapes men's lives, send your name now. What I send you may convince you of the truth of this proverb. And what I send you will not cost a penny, now or at any other time.

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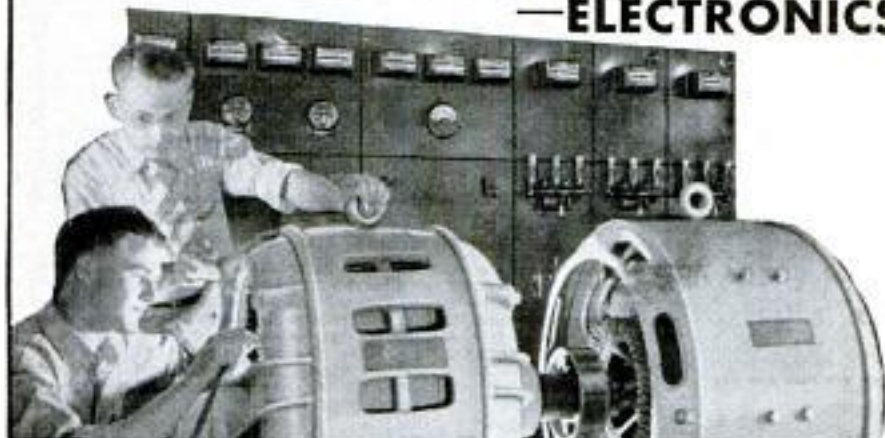
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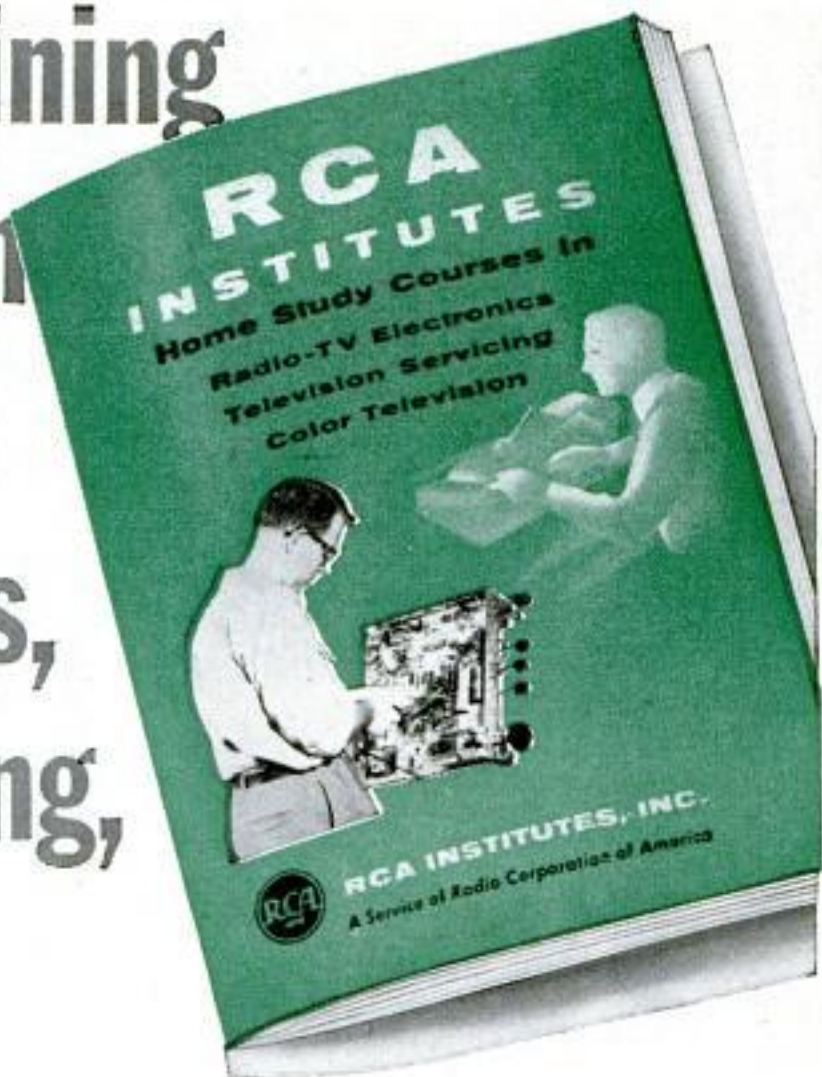


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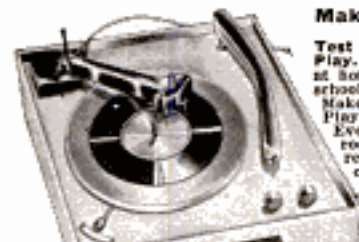
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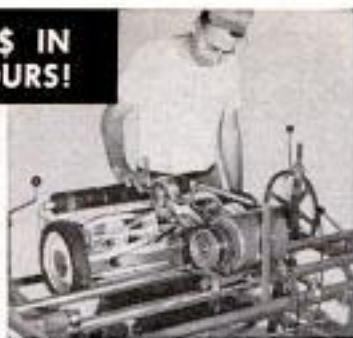
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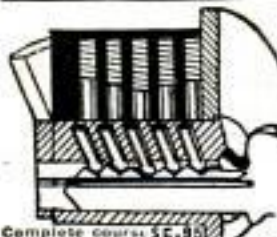
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Instead of just being told about science, the youngsters themselves participated. Furthermore, they journeyed all over

In a visit to a chemical laboratory, students discover the unique characteristics of new plastics



Delaware and parts of Pennsylvania to shake hands with some of the basic sciences. To discover the field of biology, they made overnight trips to a wildlife refuge and a marine-biology laboratory. To survey chemistry and physics they visited university and industrial laboratories.

Their introduction to astronomy included a demonstration of a planetarium and telescopes, along with a night session in which they did their own stargazing.

In other special sessions the students learned something about blood typing, genetics, anthropology, atomic energy, the use of the slide rule, stereophonic sound, science and safety, crime prevention and crime detection.

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Blueprints</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Drafting Machine Design</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Sheet Metal Drafting</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Elec. Engr. Technician</li> <li><input type="checkbox"/> Elec. Light and Power</li> <li><input type="checkbox"/> Practical Electrician</li> <li><input type="checkbox"/> Practical Lineman</li> <li><input type="checkbox"/> Professional Engineer (Elec)</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> High School Diploma</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Mathematics</li> <li><input type="checkbox"/> Short Story Writing</li> </ul> <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> <li><input type="checkbox"/> Supervision</li> </ul> <p><b>MECHANICAL and SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Diesel Engines</li> <li><input type="checkbox"/> Gas-Elec. Welding</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Metallurgy</li> <li><input type="checkbox"/> Industrial Safety</li> <li><input type="checkbox"/> Machine Design</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Professional Engineer (Mech)</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration and Air Conditioning</li> <li><input type="checkbox"/> Tool Design</li> <li><input type="checkbox"/> Tool Making</li> </ul> <p><b>RADIO TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> General Electronics Tech.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Industrial Electronics</li> <li><input type="checkbox"/> Practical Radio-TV Eng'g</li> <li><input type="checkbox"/> Practical Telephony</li> <li><input type="checkbox"/> Radio-TV Servicing</li> </ul> <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Car Inspector and Air Brake</li> <li><input type="checkbox"/> Diesel Electrician</li> <li><input type="checkbox"/> Diesel Engr. and Fireman</li> <li><input type="checkbox"/> Diesel Locomotive</li> </ul> <p><b>STEAM and DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Power Plant Engineer</li> <li><input type="checkbox"/> Stationary Diesel Engr.</li> <li><input type="checkbox"/> Stationary Fireman</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton Manufacture</li> <li><input type="checkbox"/> Cotton Winding and Weaving</li> <li><input type="checkbox"/> Loom Fixing Technician</li> <li><input type="checkbox"/> Textile Designing</li> <li><input type="checkbox"/> Textile Finishing &amp; Dyeing</li> <li><input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Winding and Weaving</li> <li><input type="checkbox"/> Worsted Manufacturing</li> </ul> |
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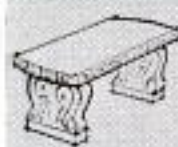
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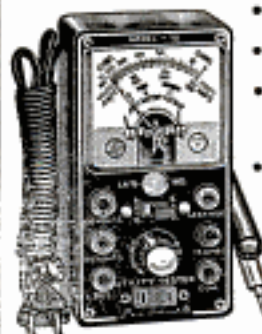
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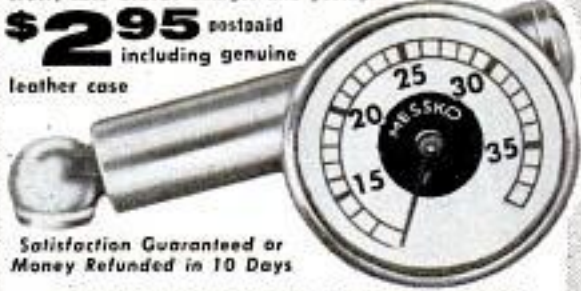
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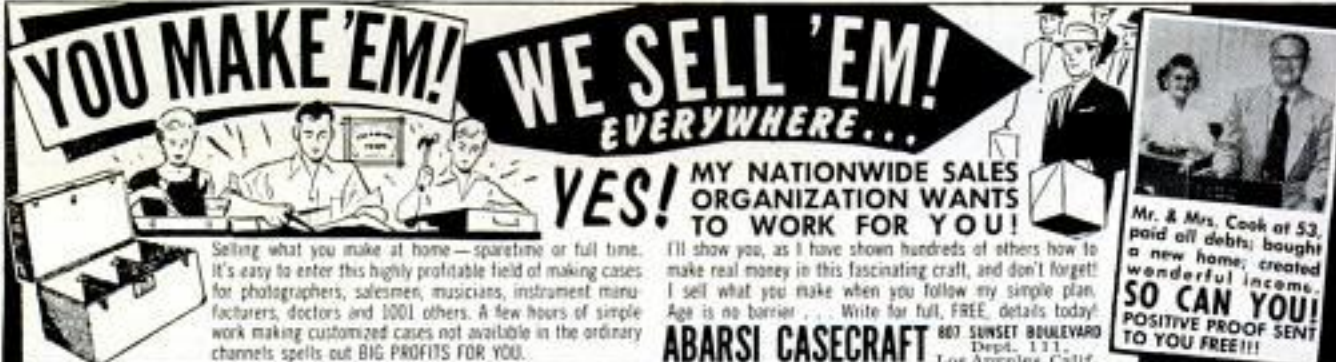
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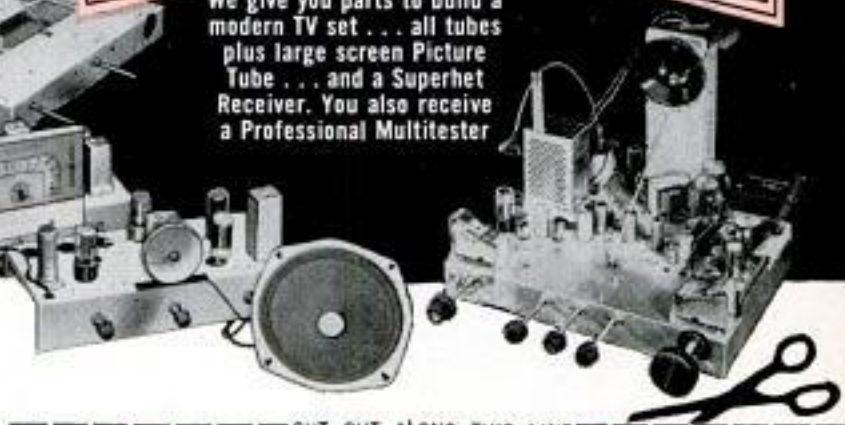
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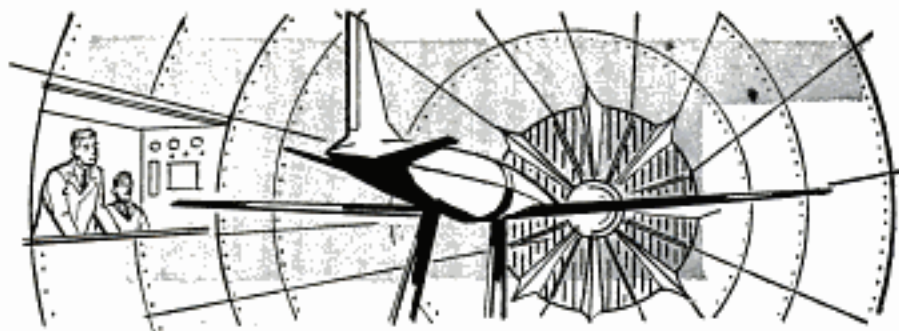
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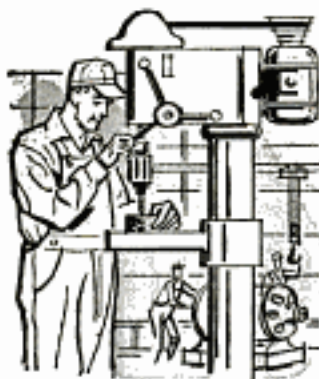
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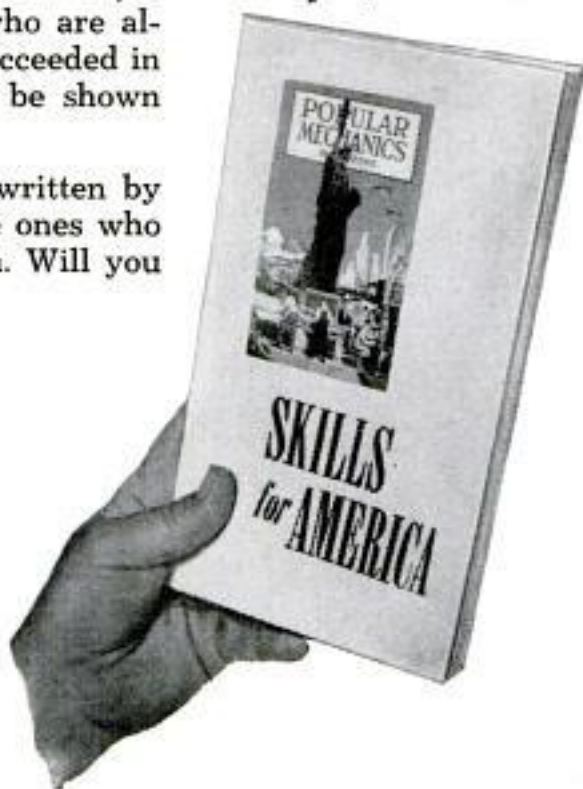
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**EXCLUSIVE!** 10,000 1957 Gift buyers' names on gummed labels, \$15 per 1000. First time offered. Sara-Kay Imports, Tallahassee, Florida.

**BUY** Wholesale! Thousands nationally advertised products at big discounts. Free wholesale plan. United Wholesalers, 1265-P Broadway, New York City.

**FREE** Lesson. Repair your TV set, or friends. Amazing new Isotronic system trains you to handle any TV service job in one short week! Start your own business. Save up to \$300 on schooling. Write: Electronic Engineering, Dept. AC-17B, 1038 S. LaBrea, Los Angeles 19, Calif.

**LEARN** Flower arrangement and floristry. Start your own business, part or full time. Many good paying positions open. Earn while learning. Send for free book. National Landscape Institute, Studio M-117-C, 11826 San Vicente Blvd., Los Angeles 49, Calif.

**BUY** Direct from factories—Appliances, cameras, watches! Free details! Cam Company, 6810PM-20th Ave., Brooklyn 4, N.Y.

**MIMEOGRAPHING** Services pay sensational local profits. Exciting secret plans exposed! Write: Mabelle Mimeo Shop, Bonham 7, Texas.

**TAKE-OUT** foods. Your own business using successful proven methods. Complete details \$1. Alamo Take-Out Foods, Inc., 1832 Tyler, Hollywood, Florida.

**SELL** Books by mail. Details free. Berryman, 153 Victoria, Northlake, Ill.

**PROFITABLE** Mail order business. Operated from home. Earn extra money pleasantly. Free exciting literature. Write Harvey Sales, 5713A Euclid, Cleveland 3, Ohio.

**SELL** Books by mail. 400% profit. Royal, Box 368-X, Cleveland 27, Ohio.

**REBUILD** Batteries; repair dolls; make rubber stamps. "75 Ideas" free. Universal, Box 1076-A, Peoria, Ill.

**STATUARY** Molds! Super quality liquid rubber. Ajax Products, 734 East 236th Street, Cleveland 23, Ohio.

**LEARN** Real estate thoroughly and enjoyably in your easy chair by listening to records. Excellent profitable profession, full or part-time. Many successful graduates. Lee Institute, Brookline 46, Mass.

**MANUFACTURE** Perfumes, cosmetics, cleaners, polishes. Work home. Catalogue free. International, 6347 Parnell, PM107, Chicago 21, Illinois.

**UNIQUELY** Different postcard projects bring avalanche of mail order cash. Powerful advertising copy furnished. Revealing information free. Craft-Horizon, 2694 So. 10th, Fresno 25, Calif.



**SELL** By mail. Tested methods. Alfano, 19 Pine Street, Closter, New Jersey.

**\$34.70 TWO Hours.** Manufacturing. No selling. Carlayne Castings, 1803 Fremont, Rapid City, South Dakota.

**IMPORT-Export!** Mailorder opportunities. Details, Warner, Box 6, Fort Scott, Kansas.

**FOUR** Color mail order catalogs—Fifty fast-selling items. Orders filled for you. Big profits. Sample, details free. Associated, Box 53-A, Boston 22, Massachusetts.

**"EVERYBODY** Likes candy"—Make professionally home. (Our 47th Year.) Ragsdale Candies, B107, East Orange, New Jersey.

**BRUSH** Plating outfits for plating articles in the home and shop. No tanks necessary, silvering mirrors, spare or full time. Free particulars. Gunmetal Co., Ave. H, Decatur, Illinois.

**BUY Wholesale!** Over 10,000 nationally advertised products. Appliances, cameras, sporting goods, housewares, watches, typewriters, tools, clothing, etc. Send postcard today. Buy-Rite, Box 258, Hawthorne 1, New Jersey.

**MAILORDER.** Learn to sell by mail. Complete course. Low cost. Ransie, Box 1719-A, Richmond 14, Virginia.

**OPERATE** Easy-to-start, profitable home mailorder business! B. Mann, Woodcliff Lake, N. J.

**EARN** To \$100.00 per hour snow-flocking Xmas trees, centerpieces, etc. Flocking, 7061 Belmont Avenue, Chicago 34, Illinois.

**\$60.00 WEEKLY** Sparetime. Start home Venetian blind laundry. Protected territory. Interesting information free. Burt, 2434EP, Wichita 13, Kansas.

**WANT** To make big money at home? \$10.00 profit in an hour possible with invisible mending. Make tears, holes, disappear from clothing, fabrics. Steady year-round demand from cleaners, laundries, homes. Details free. Fabricon, 6234 Broadway, Chicago 40, Illinois.

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**OPERATE** Mailorder folio business! Free details. Ballard's, 425 East Catherine, Louisville 3, Ky.

**MAKE** Flexible molds. Cast plaques, figurines. Free sample. Tooker, 1045-R Fairview, Hamilton, Ohio.

**NATURAL** Molding rubber, extra thick. Free sample. W. Wooley, 1016-A Donald, Peoria, Illinois.

**BIG** Money raising fishworms and crickets. Free literature. Carter Farms, Plains, Georgia.

**START** Home business making statuary, plaques, novelties, garden furniture, artificial marble flooring, liquid marble. Make your own flexible molds. Amazing profits. Only \$1.98. Free literature. Popular Mechanics Press, 631 No. St. Clair St., Chicago 11.

**WANT** More business? Here's an amazing opportunity to increase your sales. Talk to thousands of interested readers of "Mechanica Popular." Our Spanish Edition covers the Latin American countries like a blanket. They're real mailorder buyers. Classified rate 75¢ per word. Try an ad in our next issue. Classified Advertising Department, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

**VENDING** Machines—No selling. Operate a route of coin machines and earn amazing profits. 32-page catalog free. Parkway Machine Corporation, Dept. 26, 715 Ensor Street, Baltimore 2, Maryland.

**MONEY** In saw and lawnmower sharpening sparetime at home. Free book. Virgil Foley Company, Columbia Heights, Minnesota.

**\$70 WEEKLY**—Home, spare time. Simplified mail bookkeeping. Immediate income—easy! Auditax, 34757A, Los Angeles 34.

**TO \$100.00 Weekly.** Sparetime, home operated mailorder business. Successful beginner's plan. Everything supplied. Lynn, 10420-M National, Los Angeles 34.

**BREED** Rare tropical fish at home. Earn big money! Learn secrets! Help fill huge demand. Amazing opportunity! Free plan. Tropical Fish Breeders, Los Angeles 61, Calif.

**MINK** Raising information free. Complete. Lake Superior Mink Farm, Superior, Eel, Wisconsin.

**BE** Appointed state notary public now. Write, Stationers, Boerne, Texas.

**I** Want to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. Include literature if possible. F. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.

**COPUBLISH** Mail Sale Advertiser, leading mail order paper. Details, latest copy, dime. Vanroy Shirk, Lebanon, Penna.

**LEARN** Photo-negative portrait retouching. Men, women. \$3 hour possible spare or full time at home. Easy, glamorous. Work for photographers by mail order. Full details 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, housewares, silverware, radios, vacuum cleaners, lamps, tools, clocks, watches, jewelry, etc., etc., over 1000 items. Join thousands of successful independent dealers. Send for free catalog and dealer price list. H. B. Davis Corp., Dept. 11, 145 W. 15 St., New York City.

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

**WE** Love our mailman—He leaves over \$1000.00 monthly in our rural mailbox. My college professor husband drafted a scientific home mailorder method. We bought a Texas ranch, live as we always wanted. Now we sell the Ranch Mailorder Method. Operates anywhere. Inquire: Eveningshade Ranch, Boerne, Texas.

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**FIX** Typewriters. Inexpensive home course teaches factory secrets. Free booklet. Athey, Tarentum, Penna.

**MONEY** For you! Big profits! Cast plaster figurines, bookends, plaques at home with XL rubber molds. No experience needed! Write for illustrated, 40-page catalog, only 25¢! Plastic Arts Studios, 3403 So. Madison Street, Department 5, Muncie, Indiana.

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**LIQUID** Rubber. Make flexible molds. Free sample. Chaney, 1907-A East Road, Jacksonville 11, Florida.

**START** Home mimeographing business. Pays amazing profits. Literature free. Housel, Lanoka Harbor, N. J.

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**WE** Pay \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have 25,000 customers. Free book. Washington Mushroom Ind., Dept. 172, 2954 Admiral Way, Seattle, Wash.

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**ADVERTISING** Executive now reveals tested, authentic mail order instructions offering amazing profit opportunities at home. Write Holiday Publications, 2301 Greyson Road, Duluth, Minnesota.

**FREE** Book "505 Odd, Successful Businesses." Work home. Pacific, Oceanside, Calif.

**INTERNATIONAL** Mailorder business. Complete setup service—Not just instructions. Hermes, 152 West 42, New York City 38.

**PLASTERCRAFT** Molds, liquid rubber, plasters, flocks, candle supplies. Catalog and manual free. Blue Rapids Supply, Blue Rapids, Kansas.

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**MARY-Mac** agency—motorized vibrator. Cushions, chairs, tables, belts. Mary-Mac Factory, 1012 Powhattan, Dallas, Texas.

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**CASH** Paid for boxtops! Some, 25¢! Inquire: Boxtops-AK, Cedar Hill, Texas.

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**WEAVERS.** Write for low prices carpet warp, rug filler, looms, parts, inexpensive beam counter. If you have loom, give make, weaving width please. Or. Rug Company, Dept. N715, Lima, Ohio.

**EARN** Sparetime money by mail. Details free. Elvet Bloomfield, Box 24, Station A, St. Joseph, Mo.

**SELL** Perfumes. Easy profits. Free details. Cloche Perfumes, Arden, N. C.

**MAILORDER!** Succeed with profitable, proven methods. B. Mann, Woodcliff Lake, New Jersey.

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**HOME** Business Digest guarantees results. Sample, rates 25¢. Harold Hamm, Route 5, Fenwick, Ontario, Canada.

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**TYPISTS!** Make money at home! Mailers, 2 Madison, Greencastle, Indiana.

**HOTTEST** Mail order plan ever! Sell photos, films, art novelties. Huge proven profits! Free details! A.M.P.R.O., Dept. 1C, 429 South Western, Los Angeles 5, California.

"HOME Business Digest" has money-making opportunities galore. Sample 25c. Donovan, 79-PM Greenbelt, Levittown, New York.

ATTENTION Typewriter owners. Make handsome profits. Write today. Groves Company, 482, Hastings 8, Nebraska.

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BIG Money raising, fishworms and crickets. Free literature. Carter Hatchery, Plains, Georgia.

EARN Money evenings copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1, Wisconsin.

SELL Titania gems. Far more brilliant than diamonds. Catalog 10¢. Diamondite, 2420-M 77th, Oakland 5, California.

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FREE Book "505 Odd, Successful Businesses." Work home. Pacific, Oceanside, Calif.

DOLLARS Every day! It's magical—You keep all the dollars. Setup free. Otto Miller, Box 588-W, Oshkosh, Wis.

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\$60.00 WEEKLY Sparetime. Start home Venetian blind laundry. Protected territory. Interesting information free. Burt, 2434ER, Wichita 13, Kansas.

WE Pay \$3.50 lb. dried. Grow mushrooms. Cellar, shed and outdoors. Spare, full time, year round. We have 25,000 customers. Free book. Washington Mushroom Ind., Dept. 173, 2954 Admiral Way, Seattle, Wash.

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IN 1952 I had no job and little money. Today I am retired, own a home, car, and bank account. Anyone can do this regardless of age or education. Free information write Norris Cole, 217 49th Street West, Bradenton, Florida.

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MEN And women wanted to start home business in spare time with little table-top rubber stamp machine. Easy to earn up to \$9.80 an hour without previous experience. Full particulars free by mail. Send postcard to Roberts, 1512 Jarvis, Room CR-2-L, Chicago 26, Ill.

MUSHROOMS Quicker, easier, cheaper. Newest facts free. Luxur, 641 South 19th, Newark 3, N. J.

AGED Homemaker nets \$100 weekly! Free packet Secret Journal. 919 secretspans! Work home. Publicas, Oceanside, Calif.

EARN \$50.00 Daily making mats, shoes and mud guards from old tires. S and S Patents Inc., 1307 North Clark St., Chicago 10, Ill.

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SELL Books by mail. Directory tells wholesale sources. Send \$1.00. Clemons, Box 187-B, Sunnyvale, California.

EARN Sparetime dollars. Work home. Industries, 526M S. Western, Chicago 12.

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FREE Catalog, money making opportunities. Thomas, Box 909-P, Providence 1, R. I.

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CASH In on contests now! Get facts that help. Write Sanders & Co., 1762 Euclid, Lincoln, Nebr.

BIG Offer and opportunity mail 10¢. Palm, Box 1221, Baton Rouge, La.

TEN Proven ways to make money in your spare time. Send \$1 to: Homework, 4505 Harriet Ave. So., Minneapolis 9, Minn.

PREPARE Income tax returns at home spare time. \$5.00-\$10.00 per hour. Simplified instructions. It's a honey. Particulars free. Reynard, Box 1265-E, Peoria, Ill.

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EXTRA Income opportunity, mail 10¢. Dahle, Box 7-PM2, Omaha 10, Nebraska.

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PRACTICAL Formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

LATE, Modern manufacturing formulas. List free. Moon Chemical, Martville, New York.

COSMETICS. Perfumes, latest manufacturing formulas. Folder free. Fiedler, Box 21, Jamaica Plain 30, Mass.

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LEARN Plastics fabrication for spare time income. Low cost home training now available. Write for free booklet. Interstate Training Service, Dept. D-3, Portland 13, Ore.

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PLEXIGLAS. Acetate, vinylite, polyester, fiberglass, epoxy, styrofoam, mold materials. 23 page instructive, informative wholesale-retail catalog. 25¢. Gem-O-Lite, 5527 Cahuenga Blvd., North Hollywood, California.

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SPECTROSCOPE For quick analysis \$3.00. Kutting, 26278 Arastradero, Los Altos, Calif.

CHEMISTRY-Science magazines. Literature free. Lankton, Box 5126-C5, Lansing 6, Michigan.

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**SMALL Southwest college with excellent research facilities is seeking the services of experienced instruments makers.** Beginning salary range \$5000 to \$6000 per annum depending upon qualifications. Excellent climate for health seekers, outdoor recreation, including hunting, fishing, swimming, and golf. Direct letter of application to Arthur P. Stanton, Personnel Manager, Campus Station, Socorro, New Mexico, describing qualifications and salary requirements. Include recent photograph.

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**JUST Show our beautiful chenille bedspreads, they sell themselves.** Walker, Flat Lick, Ky.

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**BIG Profits selling baby book promotion to drug stores.** Tremendous repeat business. Stutson Enterprises, 14 Patterson Rd., Dayton 9, Ohio.

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**CHRISTMAS Music cards.** Dorby Music Cards, Box 354, Morristown, New Jersey.

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**EASY Handwork makes fast-selling useful articles.** Sample free. Sunmade Company, Brockton 64, Massachusetts.

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**BIG Multicolor wholesale catalog!** Housewares, appliances, clothing, silverware, cookware, luggage, binoculars, radios, phonographs, cameras, recorders, projectors, typewriters, shavers, sporting goods, toys, tools, sewing machines, watches, jewelry. Name brands. Huge discounts. Postcard: Selbyco, Decatur 162, Illinois.

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**USED And new watches \$2 up.** Free list. Southern Watches, 5-PM So. Wabash, Chicago 3.

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**TRUE Wholesale! No service charge.** No minimum. Name brands! Big stock. Catalog \$1, refundable. House of Better Buys, Mail Dept., 722 East Silver Spring, Milwaukee 17, Wisconsin.

**WHOLESALE! Clothing, appliances, jewelry, furniture, etc.** Free wholesale plan. United Wholesalers, 1265-M Broadway, New York City.

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**BUSINESS** Cards. 1,000, one color, \$4.85. 1,000, two color, \$5.85. Send check with order. Alt Specialties, Dept. A, 5511 Lewis Ave., Toledo 12, Ohio.

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**PRESSES,** Type cabinets, supplies. List for stamp. Lincoln Press Company, 220-J Hartwell, Fall River, Mass.

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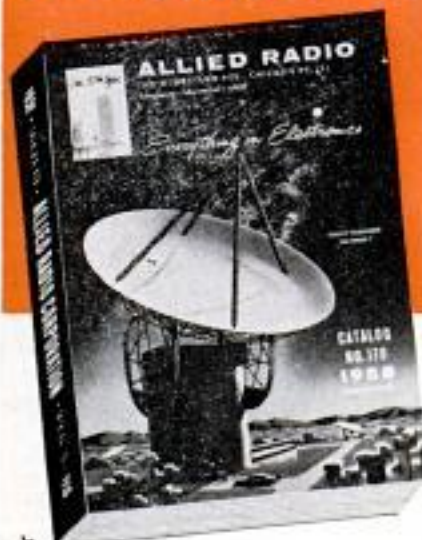
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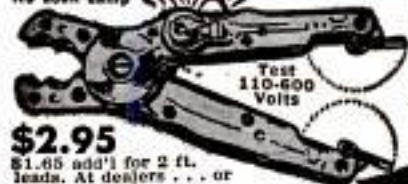
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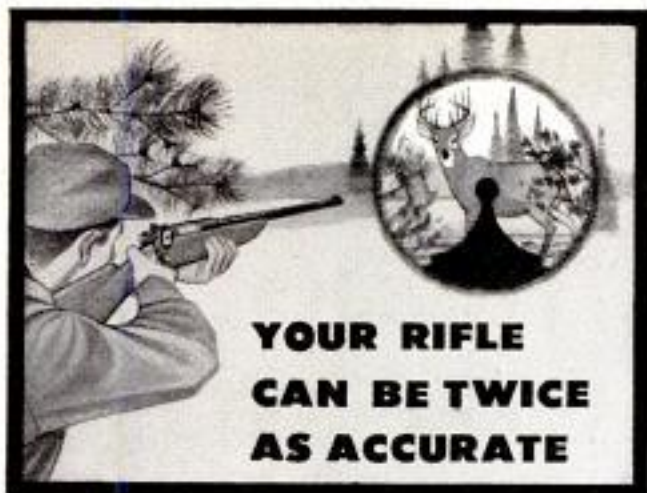
Technicians at Wallops Island, Va., recently lobbed a freakish-looking rocket into the sky. The rocket was a Nike with an Honest John first-stage booster and a pair of spear-tipped noses. The National Advisory Committee for Aeronautics explained that using up a high-altitude rocket for every new nose idea gets expensive, so technicians worked out a plan to test two different nose-cone configurations at once. The lift of one balanced the drag of the other during the flight, while delicate instruments measured the heat effects produced in the noses by their different angles of attack. Results of the test will help scientists develop new alloys and nose designs for future missiles.

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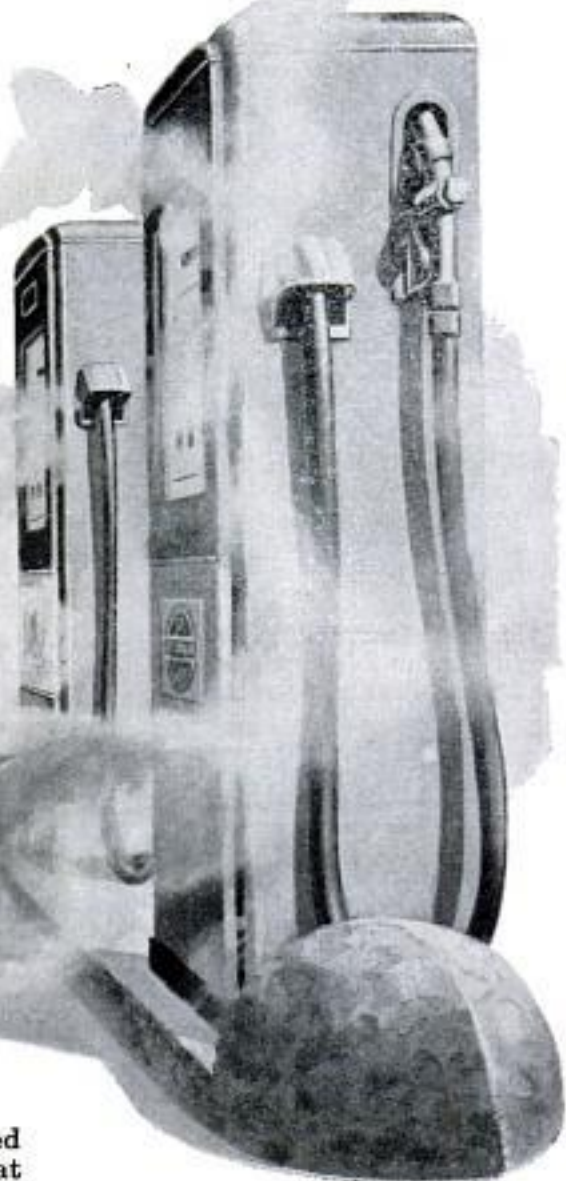
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79

# Is your car "smoking behind your back"?



Then see your

## DOCTOR OF MOTORS

Blue smoke usually means trouble—engine wear that's taking its toll in lost power, performance—wasted oil, fuel and money! What to do? See your Doctor of Motors—your skilled mechanic—the man who knows how to restore engine efficiency and that "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 piston rings! Perfect Circle Corporation, Hagerstown, Indiana; The Perfect Circle Co., Ltd., 888 Don Mills Road, Don Mills, Ont.

## PERFECT CIRCLE

**2-IN-1 CHROME PISTON RINGS**

*restore that New Car Feel*



You'll be surprised how quickly and economically your dependable Doctor of Motors can bring back a "New Car Feel" to your car. See him now!





Since the war this teak tree fell across the jungle path, leaving just enough room for Landrover to pass

Monsoon and jungle have swallowed up the wartime *Reprinted* trail made famous by General Stilwell. This is the *"PM Highlights"* story of six English youths who, years after, found a new

## Adventure on the Stilwell Road

By Adrian Cowells

WE LEFT "Hellgate," the last Indian post, climbed the 4000 muddy feet of gloomy mountainside and there, poised in Pangsung Pass, we and our escort halted in the rain and made a last brew of coffee.

We were six graduates from Oxford and Cambridge, though with our beards, rainproof jackets and jungle boots there was little to connect us with an English university except the signs on our car doors. They read: "The Oxford and Cambridge Far Eastern Expedition." We had left England five months before and motored across Europe, the Middle East and India to our base camp at Assam. Singapore was our goal. We were trying to find an overland route across the span of Eurasia from London to Singapore.

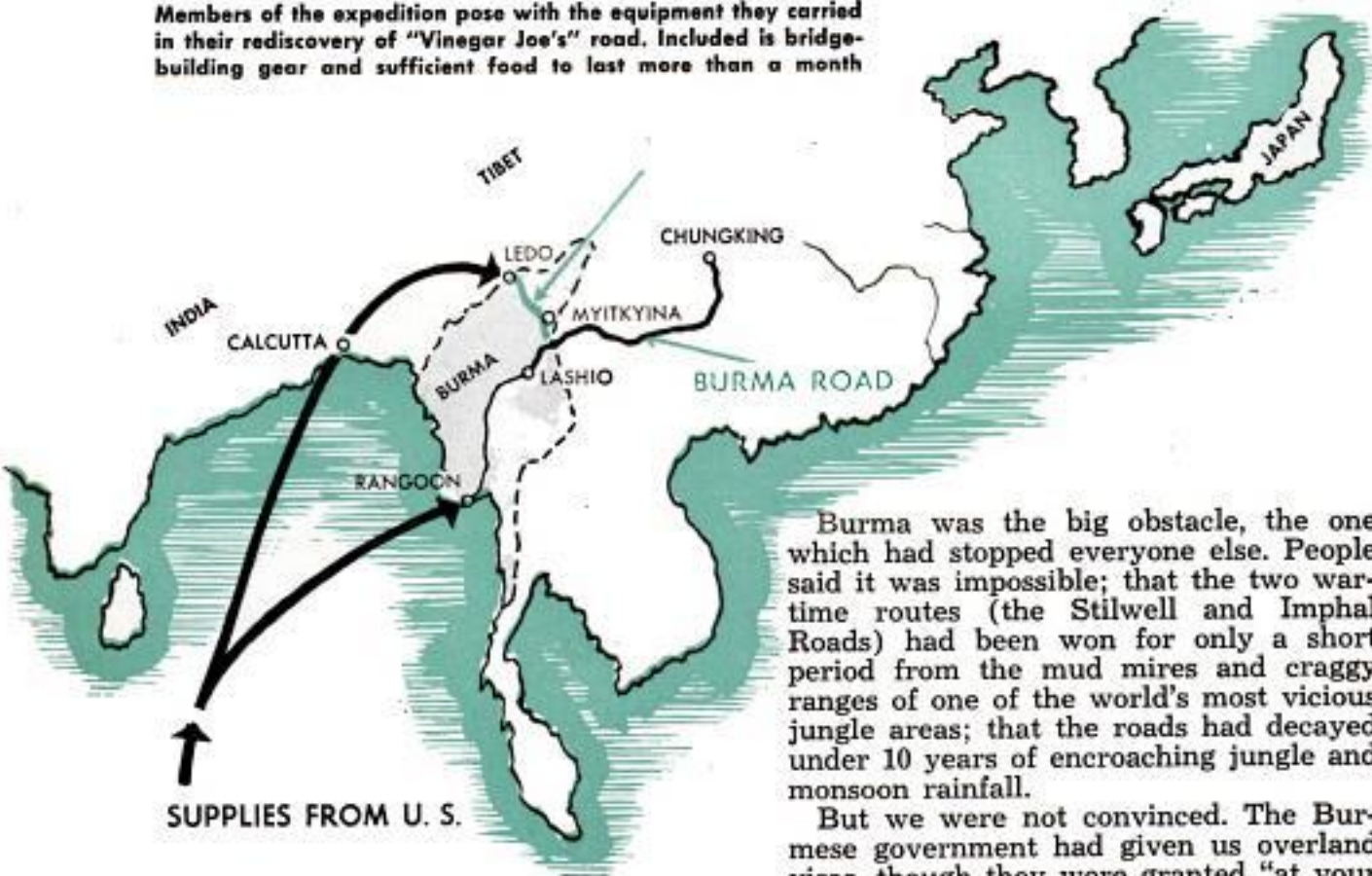
NOVEMBER 1957

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Members of the expedition pose with the equipment they carried in their rediscovery of "Vinegar Joe's" road. Included is bridge-building gear and sufficient food to last more than a month



Map shows how the Stilwell Road was driven through to a junction with the older Burma Road. Supplies from the United States came across two oceans to Burma, then up the two roads to the fighting front

Burma was the big obstacle, the one which had stopped everyone else. People said it was impossible; that the two wartime routes (the Stilwell and Imphal Roads) had been won for only a short period from the mud mires and craggy ranges of one of the world's most vicious jungle areas; that the roads had decayed under 10 years of encroaching jungle and monsoon rainfall.

But we were not convinced. The Burmese government had given us overland visas, though they were granted "at your own risk." We had managed to get information on bandit positions. It might be true that no one knew anything about the routes into Burma, but we felt there was



As far as Ledo, the road is part of Indian network and maintained. From this signboard on, it passes into ruin

no harm in finding out for ourselves.

We had tents, camping gear and food to last more than a month; petrol tanks which would take us 1000 miles; power winches to pull the cars up a cliff or out of a river; equipment to build bridges; and two of the toughest four-wheel-drive, 10-gear vehicles in the world, our Landrovers.

And so, as we drank our coffee at the top of the pass, our escort told us what little was known of the road, and we told them what we had learned from conversations with former soldiers and engineers who, years before, had helped build it.

#### Japanese Invade Burma

A week after Pearl Harbor the Japanese had invaded Burma and in a lightning campaign seized the Burma Road, drove a wedge between India and China and cut off Chiang Kai-shek from his supply line to America.

Some of the defeated British, Chinese and American forces in the north jettisoned their vehicles and retreated through the tangled morass of march and jungle which stretched between Myitkyina and India, staggered over the Patkai Hills into Hellgate. They had established the trail which was to become the Stilwell Road, but at that time men called it the "Road of Death."

One of the survivors was Lt. Gen. Joseph Stilwell. "I claim we got a hell of a beating," he said. "We got run out of Burma. I think we ought to go back and retake it." An army of millions of men under his charge was helpless until the supply line was established again.

#### Fantastic Engineering Project

To open the route he planned to blast a highway and oil pipeline from Assam to the old Burma Road. As an engineering project, to be carried out in the face of two Japanese divisions, it seemed fantastic. And because one man forced it into

Washouts have swept away many sections. Expedition built bridges or forded streams up to floor level





India-Burma frontier is marked only by a signboard. This was the first expedition given permission to make the trip in years



On some of the rivers, Army pontoon ferries were still operating, but they frequently went aground some distance from shore. Below, torrential rains had swept away stretches of the road. Such sections had to be rebuilt with branches



creation it was named in his honor—the Stilwell Road.

The road was built by 10 engineer battalions behind a screen of jungle fighters. In that evil land, 200 inches of rain poured down each year, rivers rose 30 feet in a day. When Lord Louis Mountbatten flew over the route, he asked someone the name of the river below. "That's no river," said an American looking down at the sheet of water. "That's Stilwell's road." "Vinegar Joe" himself described it as "Rain, rain, rain, mud, mud, mud, typhus, malaria, dysentery, exhaustion, rotting feet, body sores."

In the mountains, landslides washed bulldozers into 1000-foot jungle chasms. A mule once sank right out of sight in the mud.

#### Mile-a-Day Progress

But the macadam moved inevitably forward. Men of all races, speaking 200 different dialects, struggled ahead thigh-deep in the mud. At a mile a day the road advanced. To build it, the Allies created the longest line of communication of the war—12,000 miles across two oceans, by pipe, rail or river steamer to Assam—and—when the highway was finally finished—by 1079 miles of jungle and mountain to Kunming.

To operate that thin macadam strip, 360,000 square miles had to be conquered at a great loss of human life.

On January 27, 1945, the east-bound armies met those from China and the road was through. Seven months later, atomic smoke mushroomed upward above Hiroshima, heralding the end of the war. From that day the Stilwell Road has been forgotten, decaying into the jungle.

This was the ghost we had come to find.

We set out in silence as our escort bade farewell. The road was gone. What was left was a thinning undergrowth and stone foundations under the mud, mud which lined the track like grease on a garage floor. Our cars slithered between the narrow jungle walls. The track twisted and turned, clinging to the impossible contours of the mountainside, never straight for more than 30 yards. Occasionally we could see,



Explorers pose in a derelict Japanese tank, one of thousands of rusty items of war equipment along road

1000 feet below, the surly green of the jungle in a valley.

### Bridges Down

Soon we realized that our main problem was the streams of that mountainside. Some of the bridges were down, wood yellow with rot, decaying into the water. Sometimes a Landrover stuck in the river bed, and water dashed in one door and out the other as we waded with winch and cable. Sometimes we came to an old Bailey bridge and laid logs across it to provide a surface. On occasion a whole span would sag under us.

But despite it all we descended by the second day into the bowl of the Upper Chindwin. That was our tribute to a great engineering feat: A road so well built that after years of neglect in that impossible environment it still survived. Naturally the macadam was gone, scrub encroaching, bridges swept away. But there was nothing which six men and Landrovers with power winches couldn't overcome.

As we came down into the valley we left the land of the Nagas (their last head-hunting war had been in 1952). We had been warned about them, but the few we saw were timid, small, cheerful and carried nothing but knives. Most of the other forest men had homemade muzzle-loading muskets or wartime rifles loaded with ammunition dated 1942. But none

of them could have been more friendly.

All the way down the road we had been passing the ruins of war. We picked up a torn helmet from the upturned cab of a lorry. We poked inside a tank for snakes, and tried to identify the remains of enormous construction machines. There were stacks of oil drums, mounds of corrugated iron, skeletons of Jeeps and bulldozers. "Did you find any human skeletons?" is a question we are frequently asked. No, not a sign.

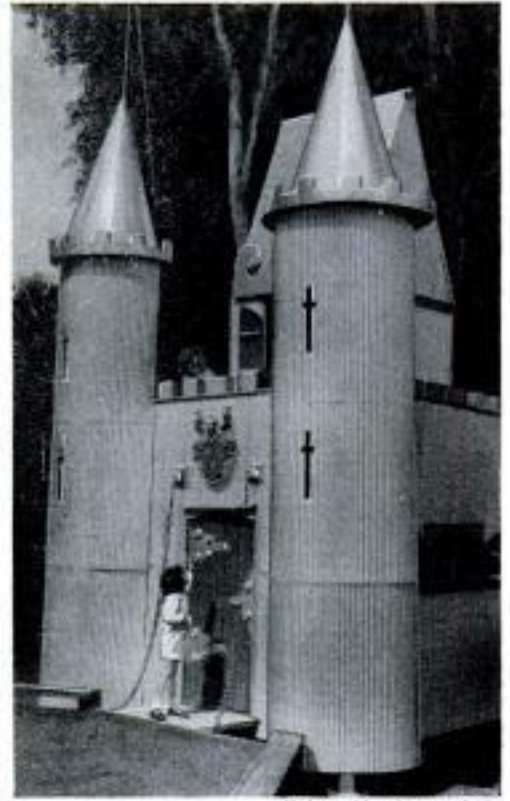
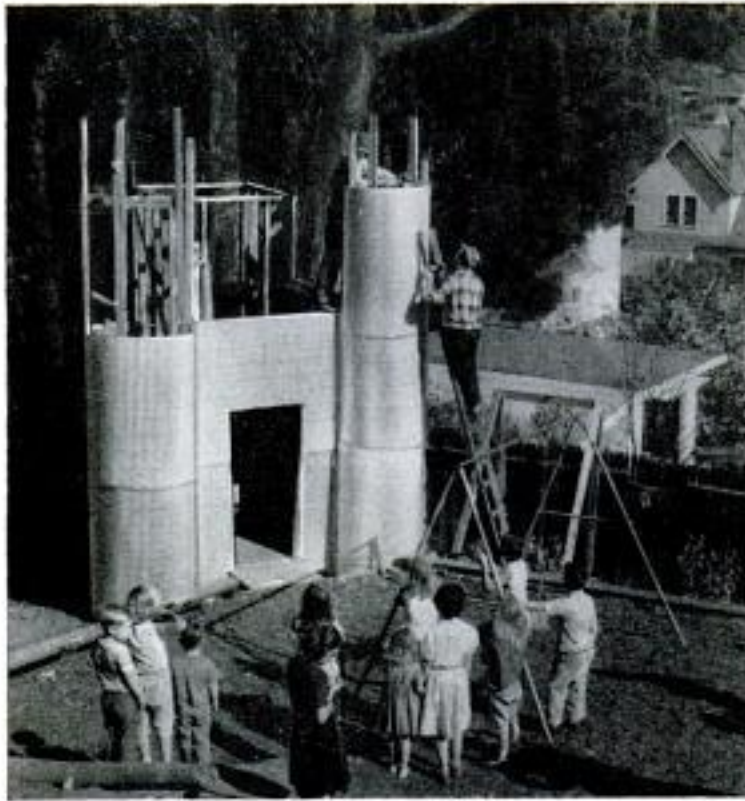
### "Anyone for Badminton?"

We traveled down the red dirt until we

(Continued to page 274)

Typical of the effects of 10 years of rainfall is this wreckage of a Bailey bridge, completely covered with vegetation





Kaiser Aluminum photo

## Corrugated-Metal Roofing Makes Back-Yard Castle

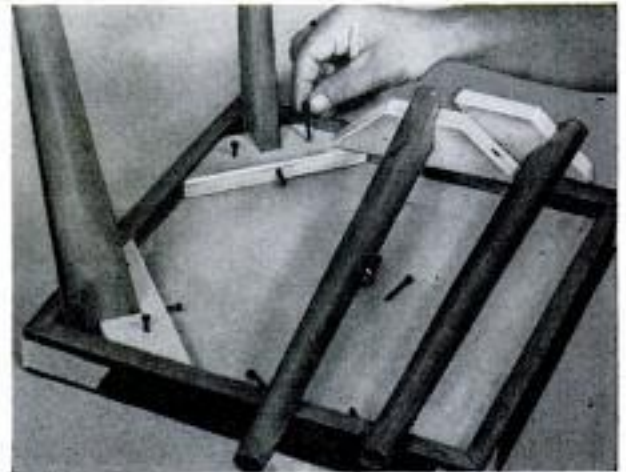
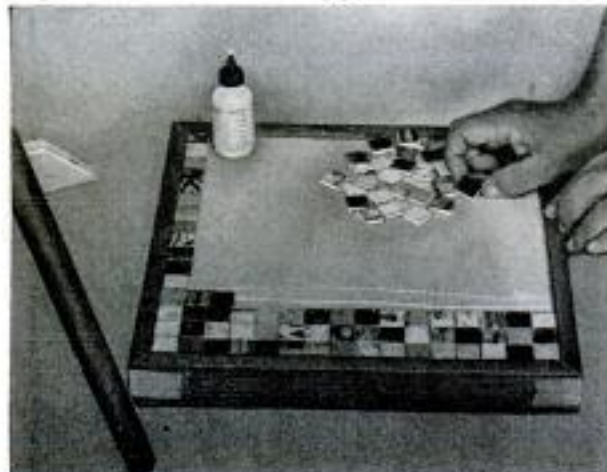
Aluminum roofing wrapped around a framework of two-by-fours produced a "fairy castle" for the children of Frank

Kane, of San Francisco, Calif. The castle is eight by eight feet in area. The second deck is reached from inside one tower.



## Mosaic-Tile Table Assembled From Kit

All the parts to make a mosaic-tile table are included in a new do-it-yourself kit. The table measures 14 by 14 inches and stands 16 inches high. The legs fit into slotted corner pieces which are glued and screwed to the table top. The tiles are  $\frac{3}{4}$ -inch squares of Italian ceramic in a variety of colors and patterns. Glue from a squeeze bottle is applied in a ribbon to the table top, and a row of tiles is laid along it. Pressure spreads the glue evenly. After all the tiles are laid and the glue is dry, the joints between the tiles are filled with a special grout. The wood parts of the kit are natural walnut and can be given any suitable finish. Two models of the table are available.





# 1958

## AN APPRAISAL OF THE NEW MODELS

By Arthur R. Railton

**T**OP STORY for 1958? It's tough to pick just one. There's an abundance of mechanical innovations—some of real significance, some of passing interest only.

This year there are more mechanical changes than usual as the companies, in most cases, move into the second year with the same body styling.

Probably the top candidate for honors is the widespread availability of air suspension. Except for Studebaker-Packard and Chrysler Corporation (and don't be surprised if Chrysler has an air-steel option in midseason), the entire industry will be floating around on optional air bags by midseason.

Looming big, too, is the adoption of the unitized body by Lincoln and Ford Thunderbird (yet to be introduced).

A whisker behind, if behind it is at all, comes the all-new Chevrolet chassis, body and engine—a major achievement for any manufacturer, even one in the family of mammoth General Motors.

Less important, perhaps, but of interest are such items as fuel injection, electronic and otherwise, a big crop of lighter but bigger engines, the rise of the acoustical engineer, the completely variable-pitch transmission stator, aluminum brake drums and other accomplishments.

Let's look at some of these developments in greater detail.

### Air Suspension

If you need evidence of how fast the industry can solve a problem when it wants to, look at air suspension. A few years ago, air suspension was a faraway look in Detroit's eyes. It was, engineers said, suitable for trucks and buses, but still a long, long way from the passenger car. It was too complicated, too expensive, too apt to give trouble and, anyway, unnecessary.

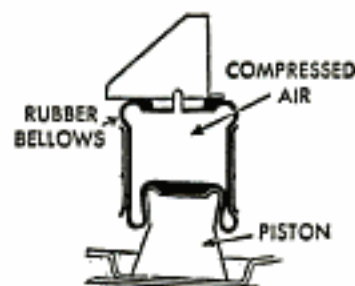
What happened? Like a horde of ants pouring in on a picnic sandwich, engineers in various companies went to work. Within two years, three companies have licked the problem and are boasting about the system's simplicity, its long life and its trouble-free nature.

Air suspension does have advantages. Nobody denies that. But it isn't the difference between night and day. It is more the difference between a good day and a perfect, it's-great-to-be-alive day.

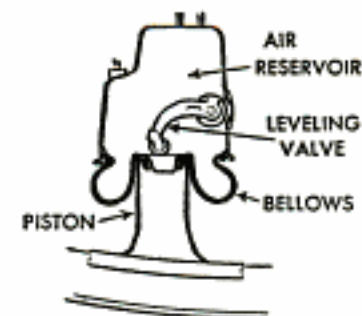
Unlike steel suspension, air has almost a zero rebound. It acts, as one engineer describes it, like a dropped ball of putty. It just flattens out, without fuss or bother, smoothing out the wildest rebound.



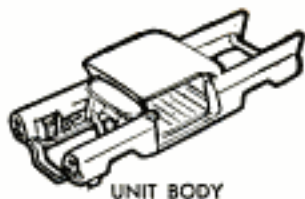
You can demonstrate the principle of the air bag simply by pushing your fist into a balloon restricted in a cup



Here's how it works in a car. The body and frame rest atop the bellows, the wheels and axles ride beneath the piston



Chevrolet's leveling valves are inside the bags. Other designs mount them separately between frame and axles



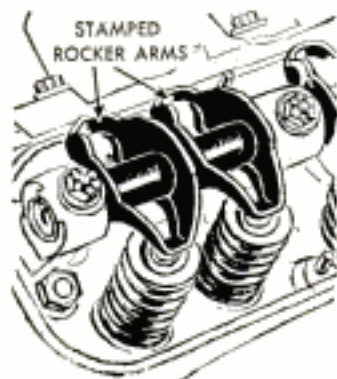
UNIT BODY

Big news indeed is the use of the unit body by Lincoln. It makes the bigger-than-ever car as tight as a bank vault, provides more headroom too



X-FRAME

Chevrolet's X-frame makes it 30 percent more rigid. It also makes possible a smaller turn circle even though it's longer



Close-up of rocker arms on '58 Dodge engine, which is one of year's new designs. It is bigger in displacement, yet takes up less underhood space

Such a characteristic is fine on sharp dips or frost heaves, but on a table-smooth boulevard it offers little advantage. The ride is good, of course, but so is it on a well-sprung steel job for less money at the moment.

Air suspension does provide constant height. The car rides the same and maintains the same height whether partially or fully loaded. It makes it unnecessary to compromise for a soft ride and a heavy load. You can have a system that will handle both equally well.

Air solves the trailer-drag problem for the week-ending boater. It will also, in Buick at least (which has an override button to boost the body five inches above its normal height when desired), provide a means of raising the body to move easily through deep snow or rutted back roads.

Most air suspensions are the same. Squeeze an inflated balloon into a large measuring cup and push your fist against it. You are demonstrating how air suspension works. The car has a compressor that provides additional air and a leveling device that meters air into the "balloon" when needed, but the principle is the same. The automobile axles have "fists" on them which push into balloons restricted inside steel grilles. The trapped air is compressed and you ride in comfort—like riding on air, which in fact you are.

Air suspension is simple. Its major complication is the leveling valves. Chevrolet simplifies that by mounting the valves inside the air bags where they are protected. Some systems have fast and slow-leveling devices, others rely on a slow system only. Fast-leveling adherents say when the passengers climb into the car it should level at once. Slow-leveling exponents say the car will level in a few seconds anyway, why complicate the system unnecessarily with additional valving?

Not publicized yet, but certain to be along in the future are all sorts of accessories to use with the air systems: Paint sprayers, tire inflaters, air horns, air brakes and undoubtedly many more.

### Unit Body

Lincoln, in its new plant at Novi, Mich., has invested its future in the unit body. To build unit bodies requires a different assembly operation, different machinery. This is one reason why Ford or Chevrolet with their numerous assembly plants will never be able to make a complete change-over to unit bodies in one model-year. It will have to be an evolutionary change with them, if the change is ever made.

As you know from reading American Motors advertisements, the unit body has no separate frame. In conventional frame-body construction, the frame, a carry-over from the wagon days, holds together all the running gear. Wheels, engine, transmission, axles, all are attached to the frame. The body is built separately, often in another plant. At the right moment in the assembly timetable, the body, all painted, chromed and upholstered, is lowered and bolted to the frame, which is equipped with the running gear. Thus there are two major assembly operations: Chassis assembly and body assembly.

In unit construction, there is no such separation. The rigid floor or underbody is the starting point and the side pieces, fenders and roof are welded to it. Thus the car becomes more and more rigid as it is assembled. Incidentally, American Motors bolts its front fenders on—the rest of the body is welded.

Evidence of this inherent rigidity can be obtained by operating the rear door on a 1958 Lincoln four-door hardtop. Despite the stub pillar to which the short hardtop door is

hinged, the door shuts solidly with no shake or drag. Normally, as hardtop owners know, rear doors on four-door models are mighty limber.

The unit method gives more interior room also, especially headroom. Most important, though, is the tight structure that doesn't creak or groan over rough terrain.

Both American Motors and Lincoln use the unit body and both dip the bodies in paint to assure absolute coverage of all metal, both exposed and unexposed. Lincoln dips its bodies to the tops of the fenders in a plastic-type paint to prevent rusting of lower body panels. American Motors submerges the entire body in the paint to assure body durability. These first coats are followed, of course, by finish coats with the usual spray application.

### Chevy's New Car

Borrowing from the Cadillac book, Chevrolet offers an X-frame devoid of side rails. No unitized design, the X-frame-body combination, nevertheless, is extremely shake-free. A torsion-absorbing tubular center section where the arms of the X cross makes it so. Chevrolet claims it is 30 percent more rigid than the previous frame.

Because of the X-shape, which allows greater lock-to-lock wheel turn, and because Chevrolet now mounts its steering linkage ahead of the front suspension, the turn-circle diameter is smaller despite the added wheelbase (117.5 inches compared with 115.0 last year). The bigger 1958 Chevrolet turns in 37.5 feet, four feet less than the shorter 1957 model.

Coil springs are used on all four wheels by Chevrolet. To prevent rear-axle windup during acceleration there is a U-shaped upper control arm running from atop the differential to the frame members. By designing the chassis for coil springs all around, Chevrolet makes installation of air bags relatively simple, at extra cost of course.

### Other New Features

Every one of the Big Three (GM, Ford and Chrysler) offers a new, bigger engine this year. GM's new engine is in the Chevrolet. Ford's (known as the FET engine for Ford, Edsel and truck) is in the Edsel and will be in the Ford. Chrysler's is shared in varying displacements by Plymouth, Dodge and De Soto. All have big bores, short strokes, high compression ratios.

All three of the new engines have a simplicity that reduces manufacturing complications. All are light in weight, often lighter in fact than the smaller engines they replace. Among the simplifications are stamped rocker arms, in-the-block combustion chambers, fewer water passages, low-silhouette intake manifolds, cleaner exterior lines. All are designed for easier access, especially to spark plugs and tappets. Maintenance-needing parts, such as distributor and fuel pump, are moved to the extreme front of the block in some cases.

Another area of added emphasis this year is acoustics. The acoustics engineer sat way, way back among the drawing boards in the bull pen a few years ago, but now he's up front at all the planning sessions. Cars have become so refined that noise suppression is a critical problem. Pounds and pounds of soundproofing are added to bodies. If you can't keep the noise down, you must muffle or absorb it. Outside the car, the engine may be real noisy, but inside it whispers.

Lincoln's new unit body created a sound problem as unit bodies do. Acoustics engineers solved it by making perforations in the underbody to kill the sounding-board effect.

Fuel injection is offered on some lines at Chrysler. The

(Continued to page 270)

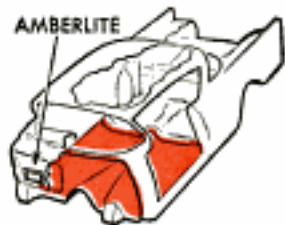
QUIET, PLEASE



FELT DEADENER

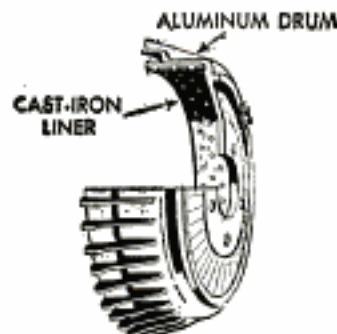


SPRAY-ON DEADENER



AMBERLITE  
JUTE, PLASTIC FOAM  
AND CARPET

Cars don't get much quieter, it's just that the noise they make is better absorbed. The drawings show how Buick uses various materials to provide you with quiet. Acoustics is an essential part of design



Bigger, faster cars need more brakes. Buick carries finned aluminum drums on its front wheels to minimize brake fade

# HERE'S A QUICK SUMMARY

## STYLING



AMBASSADOR

Ambassador



BUICK

Buick



CHRYSLER

Chevrolet

Chrysler



CONTINENTAL

Corvette

De Soto



IMPERIAL

Dodge

Imperial



PLYMOUTH

Lincoln

Oldsmobile



STUDEBAKER

Packard Hawk

Plymouth



PACKARD

Rambler

Studebaker



CORVETTE



DE SOTO

Hudson and Nash are gone. The Ambassador which replaces them uses the Rambler shell stretched nine inches. Grille is anodized aluminum. Four headlights standard. Rear fins flare outward. Station wagons available in this longer body

Completely new sheet metal, but 1957 shell retained. Port-holes and full wheel cutouts gone. Grille is waffle-ironish. Three-piece rear glass, ribbed roof discontinued. Hood raised to make car "feel" longer from the driver's seat

Looks big and is, being 9 inches longer, 4 inches wider, 2½ inches lower. Front is Chevy-ish, rear is fresh and flashy. Fins are tucked in with strong diagonal lines. Flattened rear fenders. Impala hardtop and convertible tops in luxury

Chrysler little changed. Dual headlights standard. Taillights restyled. Compound windshield on all hardtops, convertible. Mirror mount new. Grille restyled, Windsor's especially

Longer by nine inches, mostly ahead of front wheels to give a 300SL look. Fake louvers in hood. All-new dash has useful passenger grab-bar. All dials now right in front of driver

Double-wrap windshield on all hardtops and convertibles. Four headlights standard. Other exterior changes are in brightwork

Front-end styling, side trim new. Dual headlights standard. One-piece front seat has nonremovable lower cushion

After 1957's success, changes are face-lift variety: New grille-bumper, side trim. Electric door locks optional

Clean, straight lines with look of luxury feature the Lincoln. Distinctive front and rear, it has unique diagonal headlights plus fanciest rear end in the business. Continental has reverse-slant rear glass that goes down, distinctive tail treatment

Usually chrome-free, this year's car is bedecked. Chrome on sides make car seem lower, longer although shell is unchanged. Roof is thinner. Rear window higher. Gone are the '57 struts

First to eliminate all grillwork (others may follow). Packard Hawk has only a narrow slot above plain front bumper. Hood has aircoop. Rear deck has wheel imprint

Four headlights standard. Grille all new. Taillight is round and mounted low on rear fender. New mount for mirror on dash eliminates blind spot caused by third person in front seat

Styling is more conventional: Headlights are back in the fenders; controversial bulge on roof rear ironed flat; front fenders are flattened; rear fenders are finned

Dual headlights standard, except optional on Champions. Roof line lowered. High, canted taillfins are also new

# OF WHAT'S NEW AND WHAT ISN'T

## CHASSIS

## ENGINE—TRANSMISSION

Nine-inch extension to Rambler unit body is just ahead of cowl. Added braces stiffen already rigid package. Steering geometry improved, recirculating balls used. 14-inch wheels

V8 engine develops 270 horsepower with 327 cubic inches. Four-barrel carburetor, dual exhausts standard. Push-button automatic transmission controlled by engine vacuum

Optional air suspension has a high-lift knob so you can raise body 5 inches above normal if desired, as in snow or ruts. Aluminum front brake drums on all but the Special series

New Flight Pitch Dynaflo has three turbines and infinitely variable-pitch stator. Downhill braking feature controls car speed descending steep grades. Fan clutch cuts engine noise

All-new chassis has two-piece prop shaft, coil springs all around. X-frame plus forward-mounted steering gear permits shorter turn circle despite added length. Air suspension available

New engine (348 inches) has combustion chamber in block, a machined extension of cylinder. Piston is peaked for turbulence. Wide-open manifolds. Smaller V8 and Six still available

Windsor on shorter 122-inch wheelbase, sharing Dodge-De Soto shell. New Yorker unchanged. New power steering. Nonslip rear end optional

Compression ratio up (10 to 1); displacement unchanged at 354 inches. 300D series has fuel injection optional. Transmission unchanged

Despite added over-all length, wheelbase still 102 inches. With four-speed gearbox, locking differential, it's a bargain-price race car

Space limits make use of Chevy's big new V8 impossible; 1957 engine retained. Injectors are optional as is four-speed transmission

Like other Chrysler Corporation cars, De Soto offers new power steering, locking differential

All models have new V8 engines with 350 or 361 cubic inches. Electronic fuel injection optional

New power steering requires only 3½ turns from lock-to-lock. Torsion-bar front end retained

All-new V8 added to previous V8 and Six designs. Lighter but more rigid, it comes in two sizes

Longer outboard-mounted rear leaf springs reduce rear-end roll. Torsion bars in front

392-cubic-inch V8 retained. Compression upped to 10 to 1. Transmission unchanged

Unit body welded into a tight package only 56.5 inches high. Dipped in plastic paint to prevent rusting. Trailing arms in rear. Coil springs all around. Air suspension available

New 430-inch V8 is lighter, lower. Horsepower is 375. Water-jacketed intake manifold. Combustion chambers machined in block. No Siamese ports. Transmission has dual-range feature

Air suspension available at extra cost. The 88 series has economy rear axle and economy carburetor, giving 3 more miles per gallon

Compression: 10 to 1. Horsepower down on 88s for economy, up on other cars. Transmission thermostats end upshift delay in cold weather

Uses same chassis as Studebaker Hawk. One-piece driveshaft. Lowered floor pan. Roof line down slightly. New spring rates. 14-inch wheels

Supercharged V8 engine of 275 horsepower. Automatic or handshift transmission. Same power package as in Studebaker Golden Hawk

Basically unchanged from 1957. Available at extra cost is locking differential. All-new power steering has smaller and quieter pump

Optional new V8 has 350 cubic inches, 10 to 1 compression. Lightweight, it also has less over-all height. Fuel-injection is optional

V8 models have 14-inch wheels. Sixes retain 15-inch size. New steering gear, full wheel cutouts reduce turn-circle diameter

V8 develops 215 horsepower, has 8.7 to 1 compression, four-barrel carburetor. Borg-Warner transmission has push-button panel

One-piece driveshaft, 14-inch wheels (optional on Champion), lengthened rear springs

The 185-inch Six and the two V8s (259 and 289 inches) unchanged. Transmissions are also same



DODGE



CHEVROLET

RAMBLER



## Ambassador



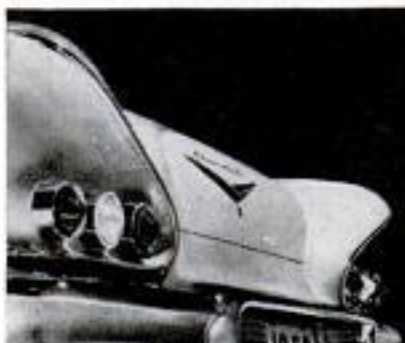
American Motors makes its big car, the Ambassador, more competitive in price by designing it on the Rambler shell. Previously, its Hudson and Nash had a separate shell from the Rambler. Nine inches are added to the hood to distinguish it from the smaller car. Its optional automatic transmission is push-button controlled.

## Buick



Many Buick traditions are gone: Portholes, grille and full rear-fender cutouts. Air suspension has high-lift feature that raises body five inches above normal to clear ruts or abrupt ramps. Photo, left, shows air-ride piston with body in extra-high-lift position.

## Chevrolet



One of the two most changed cars for 1958, it may appear like the 1957 model at first glance. But a view of its flat-fendered rear end corrects that in a hurry. It is big and powerful with a variety of engine sizes and transmissions. It has coil springs all around or, if you can afford it, air suspension for extreme luxury.



## *Chrysler*

Chrysler expects its second year with the dart-shaped styling to be even more successful. Sheet metal is unchanged. Mechanical and production improvements will be emphasized. Windsor models have a new look, using as they do the corporation's smaller body shell for the first time. Power steering has more "feel of the road." Bendix fuel injection available on 300D only.



## *Corvette*

Slightly longer due to extended front overhang, the new Corvette looks more European. It remains the only American production car that is taken seriously by the sports-car set. It offers lots of options, including four-speed gearbox, locking differential, fuel injection.



## *De Soto*

De Soto's most apparent exterior change is the grille and even there the same character remains. All have a new V8 engine, available in 350-inch and 361-inch sizes. Compact, simple and designed for rigidity without bulk, the engine takes up less underhood space than its less powerful predecessor. It is easier to service, lighter in weight. Fuel injection optional only on Adventurers.





## Dodge



Styling changes are minor as Dodge, like all Chrysler divisions, continues the big-fin styling. Grille, taillights and other details are reworked slightly. Four headlights are standard. Dodge offers the corporation's new V8 in 350 and 361-inch displacements. Its wedge-shaped combustion chamber means Chrysler is moving away from the hemispherical design. Retained are the smaller V8 and Six.

## Imperial



With 1957 sales more than triple 1956 figures, Imperial continues its successful styling, making only minor changes. An electric locking system lets you lock all doors by pressing one button. One-piece front seat provides more legroom for rear-seat passengers, more headroom in front. Last year's unhandy turn-signal switch is redesigned. All models are two inches longer than in 1957.

## Lincoln



Without doubt, the year's most interesting design, Lincoln is all new—even its factory. On rough roads or boulevards, its unit body handles like a sports car, rides like a limousine. The huge new engine (430 inches) weighs less than last year's. Fast steering, trailing-arm rear suspension (with air optional), extreme lowness, all make this car a pleasure to drive or ride in.





## **Oldsmobile**

There's a lot new here as Olds aims to recover from a mediocre sales year. Many horizontal trim lines make it look longer, lower. Four headlights, a new grille, the nondivided back window, all emphasize a new look. Radio pulls from dash for use as separate portable, right.



## **Packard**

There's a Hawk in the Packard line for the first time. And it's definitely European, with a shark-mouthed front end—the least cluttered design in the industry. An imprint of a spare tire decorates the rear deck. More Packards will be out later, including a new hardtop.



## **Plymouth**

Considered by many to be the best looker in the 1957 Chrysler family, Plymouth continues its styling another year. It now has four headlights, a new grille (although similar to last year's). The taillight is a single round lens at the base of the soaring tailfin. Extending upward from it is a shiny aluminum bar. Fuel injection is available for top performance. The new V8 engine has 350 cubic inches. Also available are the 318-inch V8 (last year's Fury engine) and the 230-inch L-head Six.



## Rambler



No more going it alone, the Rambler looks more like the other cars with its headlights in fenders and flaring tailfins. Gone, too, is the bulge at the rear of the roof. Seats are redesigned and make the interior appear much larger because of the lower backs. Economy is increased. Turn circles are even smaller.

## Studebaker



Studebaker has adopted 14-inch wheels. Big news is that it will soon be selling the German Goggomobil coupe also, a two-cylinder air-cooled two-seater (not shown here). For pictures and details see *PM*, May 1957, page 48.

## Mercury



Out for big-car business, Mercury has a new line, the Park Lane, 220 inches long on 125-inch wheelbase. Other Mercurys are 213 inches long, have 122-inch wheelbase. All-new engines range from 312 to 400 horsepower. There's a new automatic transmission, too. Air suspension (see cutaways left) optional. Front-end styling new, as are rear fenders. Many new features such as automatic brake adjuster, powered heater controls and lubricated-for-life bearings on front end.

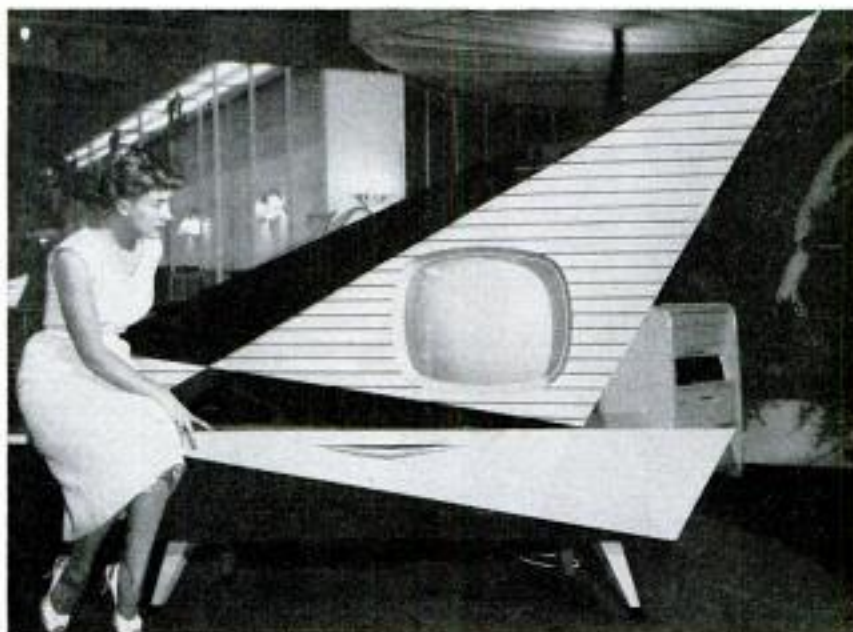
## Bail-out Slide Prevents Injury

No child's plaything is a slick slide used by the Navy to prevent injury to airmen during bail-out drills. It was devised by Lt. Gordon L. Backer, a flight surgeon at Sanford Naval Air Station, Fla. The slide fits up and under the escape chute of the Navy's A-3D bombers. Previously, when the airmen landed on the ground, they tore their parachutes and suffered lacerations, dislocated backs and on one occasion, a broken leg.



## German TV Set Resembles Sailboat

Startling in design, a combination television, radio and phonograph set is the latest innovation in Germany. Called the Comet and resembling a sailboat, the TV section can be rotated in any direction by remote control, swiveling on the base. The base contains the radio-phonograph. This set was on display at the International Radio, Television and Phonograph Exhibition in Frankfurt, and is designed to sell for about \$750 in Germany.



## Skiers Somersault For Winter Fun

Flying through the air with the greatest of ease, daring Norwegians on skis perform tricks. Some skiers do somersaults across the Stryn-Geiranger Highway in the mountains of western Norway as a training exercise.

Pratt and Whitney Aircraft's J-57 and J-75 engines are the first American-built jet engines to be certified by the Civil Aeronautics Board for commercial airliner use.





# Christmas



**PORTABLE PHONOGRAPH-RADIO** needs only four flashlight batteries for power. Transistor set is designed to play 6000 records or 750 hours of radio without battery change. Electric governor keeps turntable speed constant if power wanes  
 Hockland Precision Mfg. Co., Orangeburg, N. Y.

**NONSKID BALL-POINT PEN** that won't skip when writing on slick surfaces has a tip like a round metal sponge. The new porous tip, if greatly magnified, would appear something like the ball through which man is blowing smoke. The thousands of microscopic pits and channels in the pen's ball point permit the ink to flow smoothly to the paper while thousands of grippers on the outside of the ball provide traction to prevent skidding over greasy or glossy writing surfaces  
 The Parker Pen Company, Janesville, Wis.

**GAS-RANGE ROASTER** also can be used for grilling, barbecuing, baking, steaming or deep-frying. It fits into the top of one of the new model ranges, and has its own automatic gas-burner control. Roaster is stored in the range compartment  
 Geo. D. Roper Corp., Rockford, Ill.





# Shopping Center

**ELECTRIC COFFEEMAKER** produces two demitasse cups of the beverage in 60 seconds. Water goes in the reservoir under the ball. A strainer bowl on the double-spout arm holds two teaspoons of ground coffee. It works on a.c. or d.c.

*Leslie Creations, Lafayette Hill, Pa.*

**ELECTRIC CAN OPENER** has a specially designed cutter blade to open any shape of can—round, square or oval. A magnet lifts the lid while the can is automatically held in position. The opener even smooths the edges of cut metal

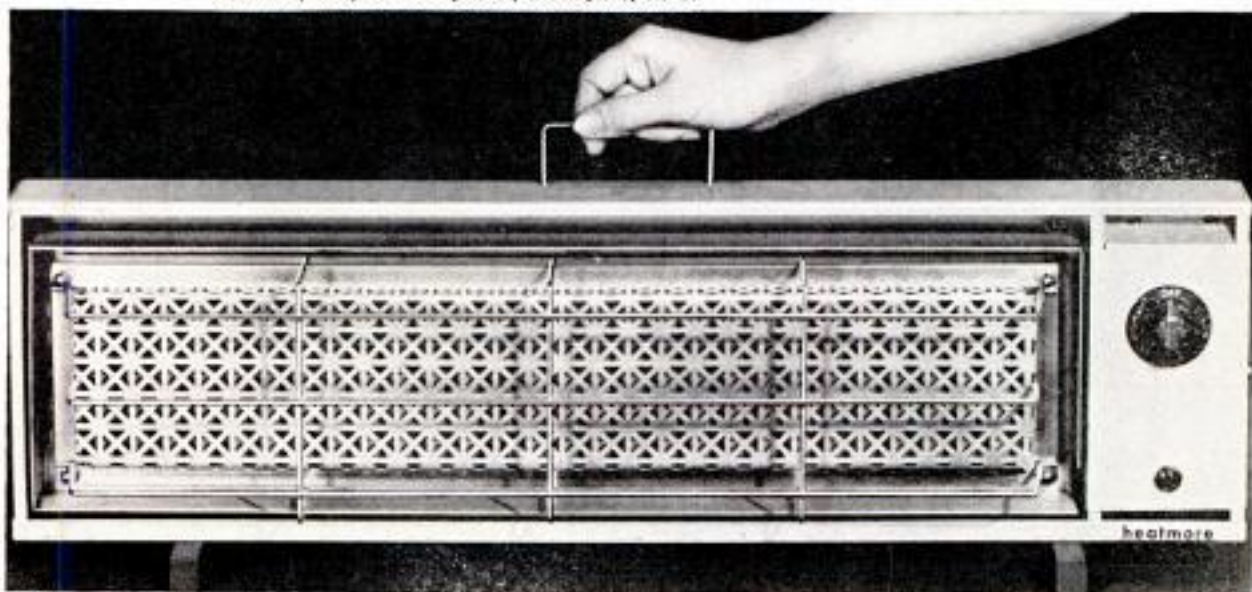
*Burgess Vibrocrafters, Inc., Graystone, Ill.*

**ADJUSTABLE NIGHT LIGHT** can be set at the brightness level desired by a twist of the regulator knob at the top. The knob turns a small shutter between a seven-watt bulb and a translucent lens. It plugs into standard electric outlets

*General Electric Co., 95 Hathaway St., Providence, R. I.*

**PORTABLE ELECTRIC HEATER** is available in decorator colors. A safety feature is a mercury switch that automatically cuts off electric current to the heater if it is tipped over. A thermostat keeps the heat at the level you select

*Heatmore, Inc., 59 Throop Ave., Brooklyn 6, N. Y.*





**FORKED-STICK SET** for campfire cooking is made of aluminum. Weighs 17 ounces, is assembled in seconds  
The Porta Company, Inc., 32 Neponset St., Canton, Mass.

**SUITCASE COOLER** holds picnic food for eight people. Each side takes two cans of reusable dry refrigerant  
National Steel Cabinet Co., 2415 N. Pulaski Rd., Chicago 39



# Christmas

**OIL HONE** for sharpening knives and cleavers slowly revolves through a trough of honing oil as the blade is drawn across the abrasive surface. The honing surface is a replaceable 15-inch-long tube that slips over a steel core

Wulff Mfg. Co., Ontarioville, Ill.



**HOME MILK DISPENSER** permits the family to save money by purchasing milk in bulk or in large containers. The refrigerated unit holds 24 quarts in two tanks. There's a separate storage space for butter, eggs and cheese

Norris Dispensers, Inc., 2720 Lyndale Ave., South, Minneapolis 8, Minn.



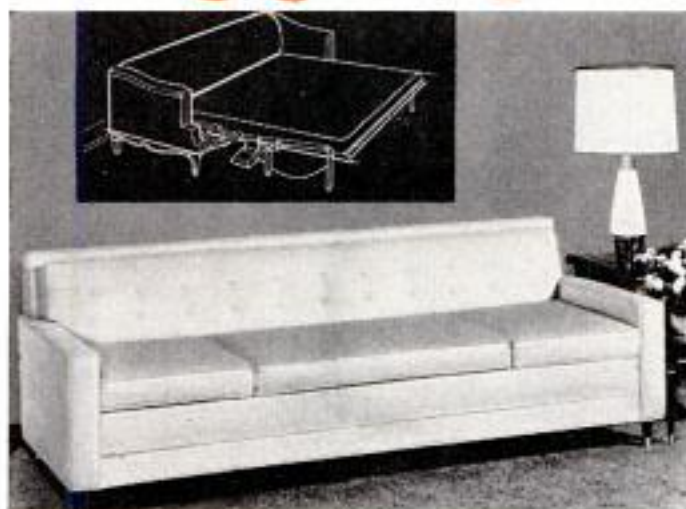


**D.C. ELECTRIC OUTLET** can be installed in your bathroom to supply direct current for a.c.-d.c. electric shavers, which reportedly operate better on d.c.  
Wellson Electronic Products Co., 15236 Erwin St., Van Nuys, Calif.

**PLASTIC BEACH BAG** can be used to carry your swim suits and picnic lunch. Inflated, it becomes a 30 by 30-inch table, or it can be used as a pillow.  
Plastic Products, Inc., 62 18th St., Brooklyn 32, N. Y.



# Shopping Center



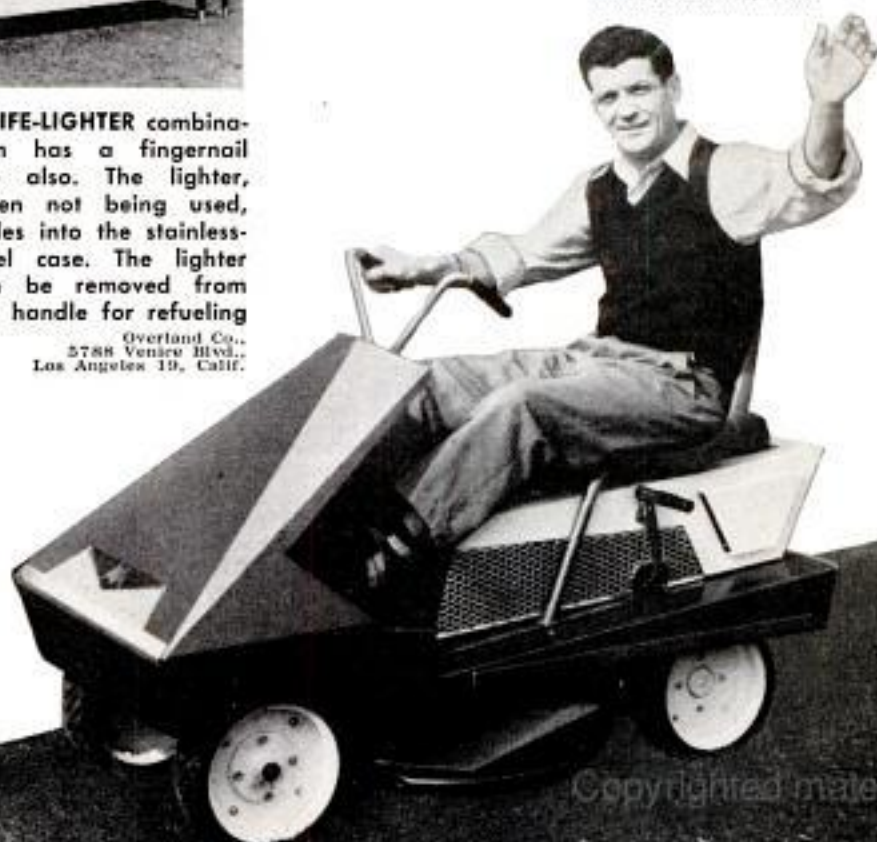
**KING-SIZE SOFA BED** has long, slim, modern lines but it conceals a 54 by 75-inch mattress. Closed, sofa is 32 by 80 inches. Has a special lightweight sofa-to-bed converting mechanism.  
Converta-Sofa, Grand Rapids, Mich.

**RIDING ROTARY MOWER** has foot-pedal control of cutting height and a geared transmission with forward, neutral and reverse. Dump cart, lawn roller, snow-blade attachments available.

The Midland Co., 1200 Rawson Ave., South Milwaukee, Wis.

**KNIFE-LIGHTER** combination has a fingernail file also. The lighter, when not being used, slides into the stainless-steel case. The lighter can be removed from the handle for refueling.

Overland Co.,  
5788 Ventura Blvd.,  
Los Angeles 19, Calif.





**TOBOGGAN SLED** of aluminum has a ball-joint coupling between fore and aft sections which makes sliding toy steerable. Seat is made of varnished plywood

Mirro, Manitowoc, Wis.

**ELECTRIC BRAIN** for the young scientist can be assembled from a kit without soldering. Flashlight batteries provide power to operate 33 different circuits

Oliver Garfield, 120 Lexington Ave., New York 10.



**SCOOP BALL** is a junior version of jai alai. The hollow plastic ball is thrown and caught in the 14-inch scoop. The game can also be played indoors

Cosom Industries, Inc., 6012 Wayzata Blvd., Minneapolis 16, Minn.



**MINIATURE TRAMPOLIN** is designed to satisfy the jumping urge of small children. It's built of aluminum furniture tubing with a canvas bed

Tekay Products Co., 9140 Meadowlark, Milwaukee 17, Wis.



**TRAIN STOPPER** is a realistic cow for model railroad. Electric train halts as cow crosses track. Train proceeds when cow moves back

A. C. Gilbert Co., 5th Ave. & 25th St., New York City



**PANEL PLAY** lets children use their imagination in designing tents, tanks, trains, forts or houses from set of eight squares of hardboard. No tools are needed to assemble the play panels

Design Industries, 207 Penn Ave., Pittsburgh 21, Pa.



Copyrighted material





**JUNIOR SLEEPING BAG** designed for children between three and six years of age can be used for travel, back-yard camping or as a beach pad. Bag is lined with moisture-repellent acetate

*Julee Comforter Mfg. Co., Holyoke, Mass.*

**TRAVELING CRANE**, one of the newest accessories for toy electric-train sets, lowers a magnetic device and transports culvert sections from the car to the culvert-unloading station

*Lionel Corp., 15 E. 20th St., New York City*



## Center for Youngsters



**SALVAGE BOAT** for the bathtub admiral in your family is equipped with a four-inch, hollow, plastic diver who receives air through a lifeline connected to a pump on the deck. Other equipment includes a cable hoist to lower the diver, ladders and compass

*Ideal Toy Co., 200 5th Ave., New York City*



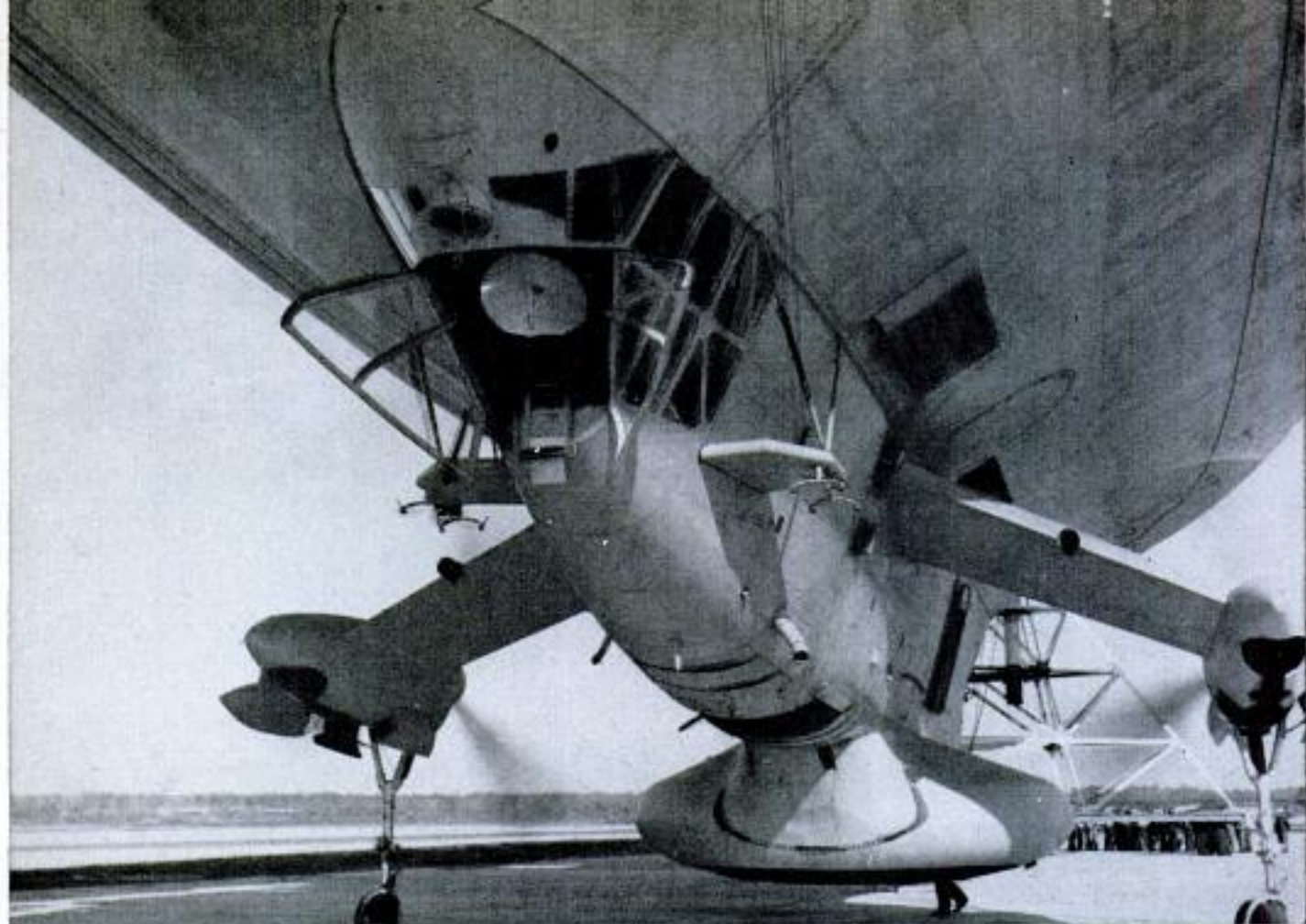
**RAILROAD HANDCAR** for kiddies operates on 10-inch gauge steel track welded to steel ties. The car has a freewheeling gear system so the pump bar will not accidentally "kick" the children if they let go of it. Pump bar remains stationary when car coasts

*Ottaway Amusement Co., 3045 N. Saint Francis, Wichita, Kans.*

**SAND-BOX SUNSHADE** also is a lid to cover sand box when it is not being used. The canopy is held in place by a pin mechanism and slides up and down the aluminum post. The box, 36 inches in diameter, and 5½ inches deep, also can be used as a wading pool

*Chippewa Plastic Mfg. Co., Inc., 5205 Eastman Rd., Midland, Mich.*





## 'Passive Radar' Makes Microwave Maps

RECENT TESTS with microwave detectors like the dish-shaped antenna inside the blimp cabin, above, may change aerial-reconnaissance methods. The new technique, called "passive radar," locates an enemy by detecting the energy waves radiated by his weapons and factories. Similar experiments are being conducted with infrared detectors. An example of infrared reconnaissance is shown in the aerial photographs at the left. One shows an aircraft factory in New York as it appears in daylight. The other shows the factory as it would appear on infrared film during a blackout. The bright spots are caused by infrared waves generated by aircraft on runways, cars on highways, boilers and machine tools. Passive equipment doesn't generate a signal the enemy can intercept.

104 POPULAR MECHANICS

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## **MECHANICAL "WOODPECKER" DRILLS DYNAMITE HOLES**

AT THE EAGLE MOUNTAIN iron mine of Kaiser Steel Corporation in California a miner "flies" a unique rig for drilling blasting holes in huge boulders. The big boulders are chunks of ore that were not broken down to manageable size by the large blasts that crumble the ore in the open-pit operation. The drilling rig is known as a travel drill and consists of a 10-foot-long drill and an operator's cage on the end of a 40-foot-long boom. The operator can move the boom to either side and up or down, and can travel along the boom, by means of controls in his cage. He also operates the compressed-air drill, or jackhammer, with which the dynamite holes are cut. The machine can also drill holes in the side wall of the mine as high as 28 feet above the pit floor. The entire travel drill is self-propelled.





Kiekhoefer photo

### Boat Aids Plane Take-off

Heavily loaded seaplanes take off on calm days with an assist from an outboard motor at Flin Flon, Man., Can. Gordon Mitchell uses the method to give his planes additional lift on a smooth lake when the pontoons "stick" to the water's surface.



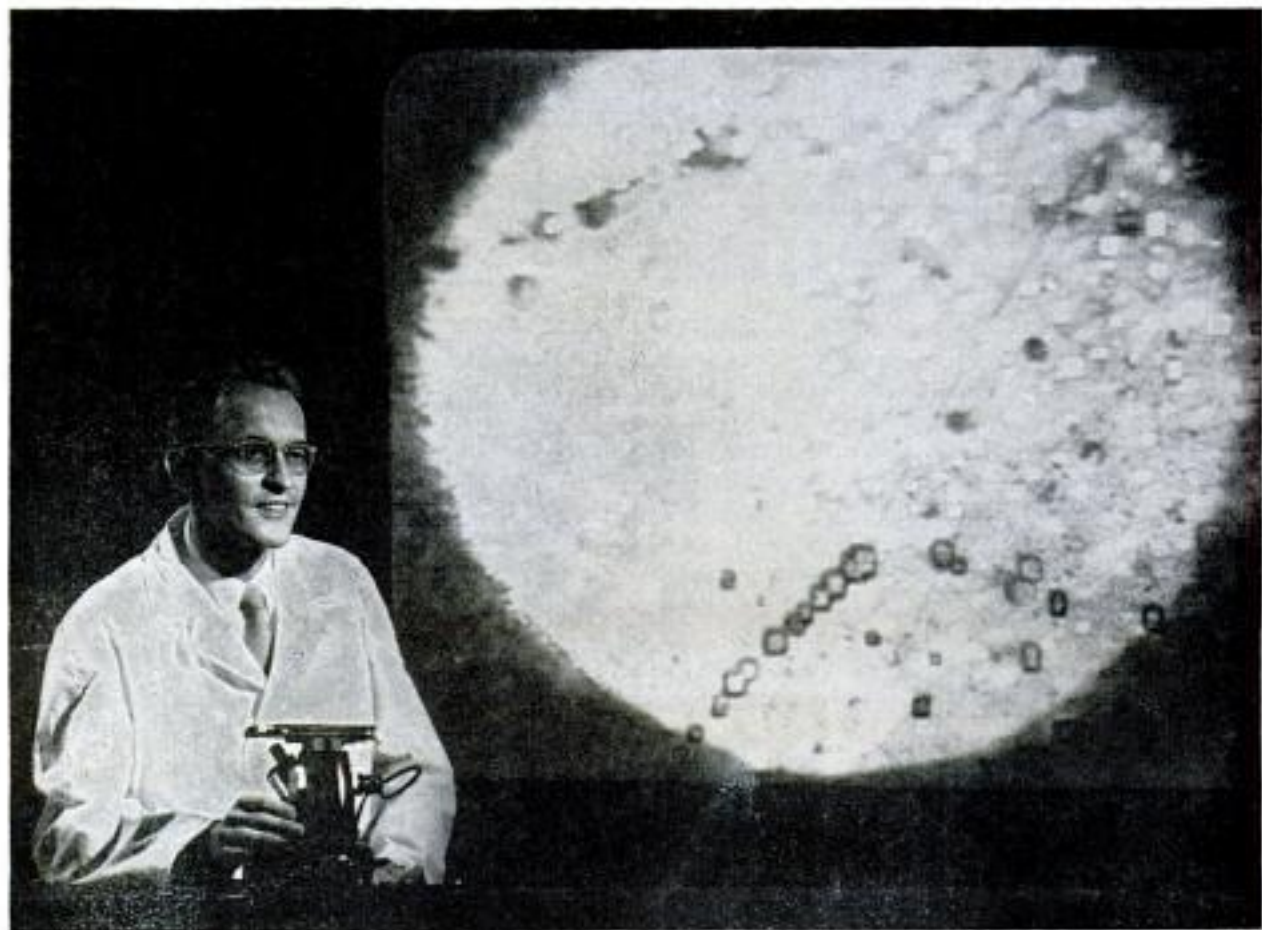
### Push-Pull Terminal Truck

Built for truck-terminal and piggyback operations, a trailer spotter has two sets of floor pedals and separate or simultaneous power steering for front and rear wheels. Driver can push or pull trailers while facing direction of movement.

### Square Bubbles Surprise Atomic-Energy Scientist

Latest thing in science is the square bubble. They are  $\frac{3}{100,000}$  inch thick and appear when lithium fluoride, irradiated with neutrons, is heated above 1112 degrees F. Lithium fluoride is a glasslike material used to study the effects of neutron

bombardment. The bubbles were a surprise discovery by Dr. Peter Senio in experiments for the Atomic Energy Commission. He is not sure how the bubbles are formed, but believes they will lead to findings in the structure of matter.



**WHAT DO YOU** think of them? The 1958 cars, that is. Last year we asked the same question and you let us (and the industry) have it. What do you say now?

This secrecy business is a strained one. Two days before the Edsel was first shown to the public, this reporter visited a major competitor's proving ground. There, as natural as you please, sat a 1958 Edsel in the garage. It had thousands of test miles on it. How come? we asked.

Engineers explained it was a mutual-exchange deal. "We give them our new models in advance and they do the same for us. We probably know as much about the Edsel as Ford does by now."

**Of course, the secrecy about new models, as everybody in the industry knows, is to protect retail sales. It is not to hide secrets from competitors. After all, there are thousands of as-yet-unsold current models in showrooms and nothing must make them less attractive to the buyer. The big wheels in automobiles apparently think the public does not expect a new model to come out each year. And they don't want to destroy this illusion.**

Some insiders say a similar fear explains why there won't be a domestic version of a small car to compete with the foreign imports for a long while. You can't suddenly destroy the market for two and three-year-old used cars. It could ruin your dealers.

So instead you bring in Opels, British Fords, Metropolitans and Vauxhalls from overseas to compete with the foreigners. But volume is self-limiting. There are only a limited number of ship bottoms. Thus, there is no chance of enough coming in to hurt domestic sales very much.

#### **Black Marketeering**

On the same subject is the story of the black market in Volkswagens. It's a big business in the United States. It is said that one airline pilot made \$10,000 in the first six months of 1957 buying VWs on the East Coast and selling them in the Midwest. He orders a VW from each dealer in each city he flies into. As the cars are delivered he ships them to a Midwest city and sells them at \$100 profit per car. He sells more VWs than some dealers!

Another racket is that of giving American soldiers due to return to the States from Germany the money to buy a VW at the factory from an employee or direct. The Army ships the soldier's goods home for him free and the guy who advanced the dough for the car waits at the dock to take over in the States. He hands the GI \$100 or so for his trouble and sells the car at a nice profit.

The catch is that many of these cars were built for use in Germany and have illegal

# **Detroit Listening Post**



**By Art Railton**

safety glass, lights and other items. The unsuspecting buyer has to pay to have these changed before registering it.

If you like the big wagon-wheel Ford taillights better than the new oblong variety on the 1958 models, wait for the new Thunderbird. It has four of the big round lights on the back end. It also has some side-panel sculpturing that looks a lot like the 1958 Lincoln.

#### **Look Backward, Please**

Engineers are still trying to solve the rear-view mirror problem. One company is experimenting with a mirror mounted on a short pedestal on the roof above the driver's head. How does he see into it? There's a plastic-windowed hole in the roof through which he looks. The view rearward is unexcelled. The next question is will the public go for a mirror that sticks up from the roof like a mushroom?

**Over three years ago when this column mentioned the problem of rear vision, an Indiana inventor showed us a periscope he had built into the roof of his car (see PM, Sept. 1954, page 154). This may still be the best answer.**

The new, smaller American Motors Rambler, called the American, is to be a thing apart. It will have no annual styling changes. It's got to last 10 years at least. That will keep costs down and, AM hopes, resale values up.

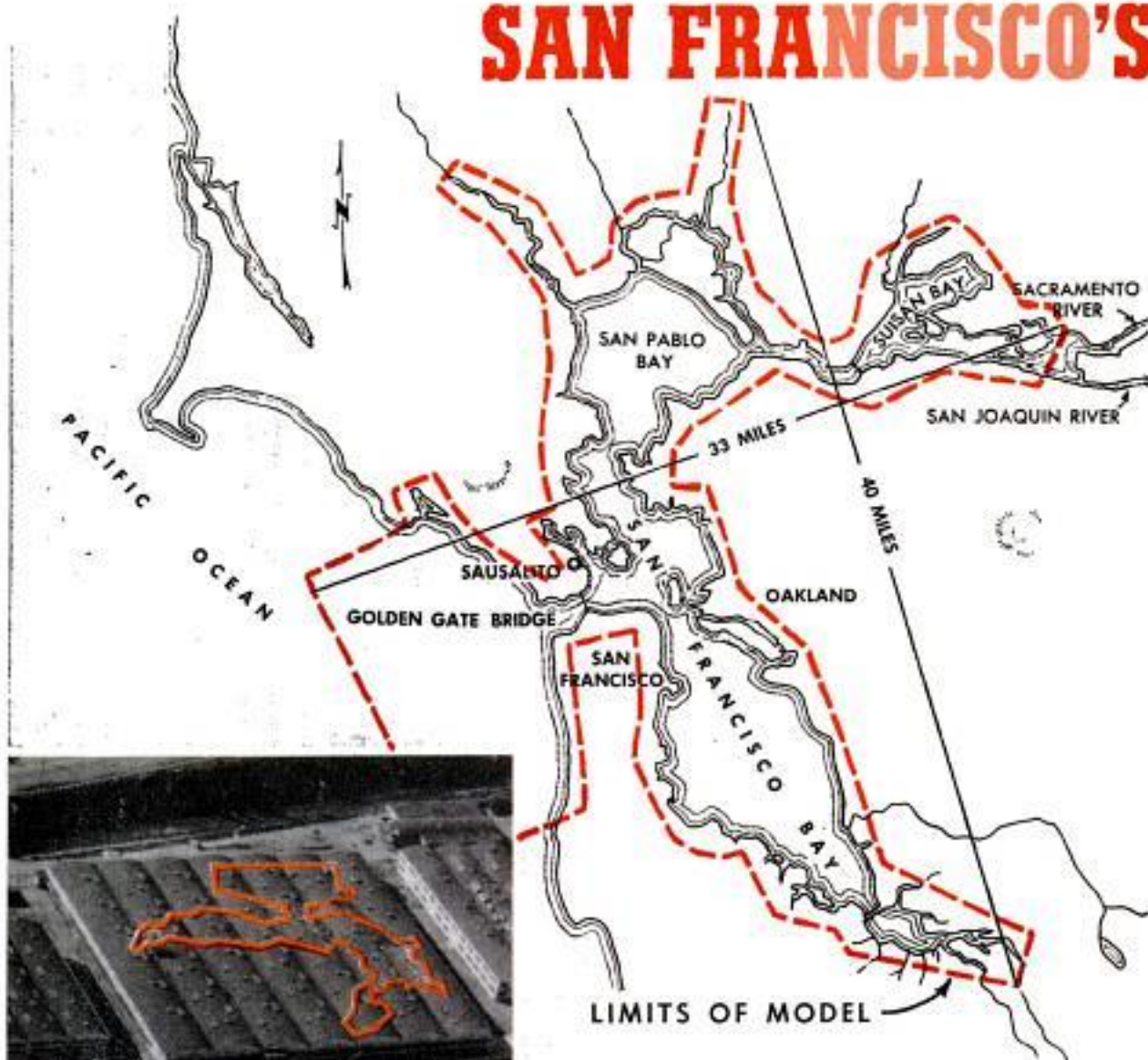
**One report states that the British Motor Corporation (Austin, MG, Morris, Riley and Wolseley) is not going to bring out any new models until sales fall off. This, the company says, will stop the annual slump in sales that comes when the public holds back awaiting a forthcoming new model. American manufacturers claim the opposite. Their theory is that the new styling boosts sales by making current cars appear obsolete.**

As you will notice elsewhere in this issue, displacements are up again—and sharply. And no end is in sight. It looks as though they will continue up to 500 inches.

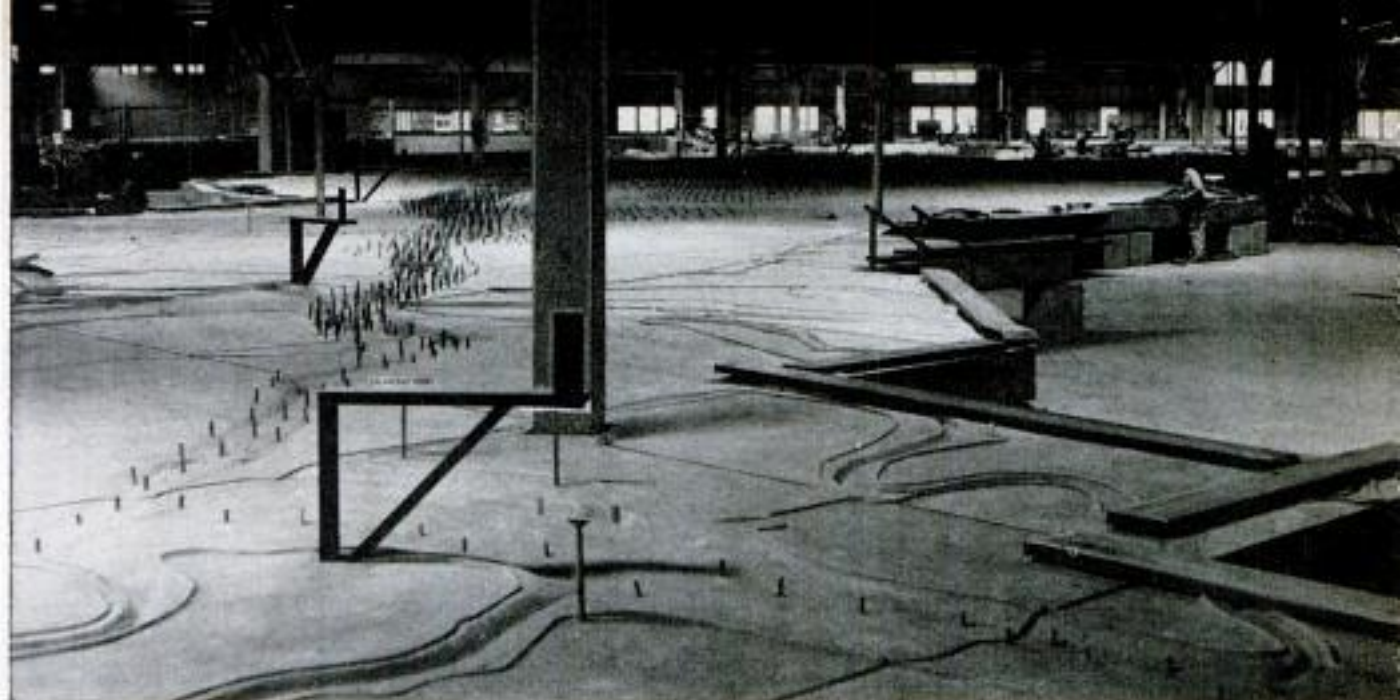


Golden Gate Bridge section of model shows care taken to reproduce San Francisco Bay exactly in miniature

## SAN FRANCISCO'S



Model is 340 feet long and wide, and its 29,000 square feet represent 550 square miles of bay area. Its tremendous size is outlined at left on warehouse which houses it



Elevations and contours were carefully scaled one foot to every 1000 horizontal feet and 100 vertical feet

## ACRE OF CONCRETE

by Lee Elam and  
Leo Rosenhouse

IT IS ALMOST impossible for man to duplicate the actions of nature. This is being done in a big way, however, with a remarkable working model of the San Francisco Bay area. The model is an entire acre of concrete and reproduces all the complex inner-workings of the bay area, from the ebb and flow of tides to the movements of silt and water velocities.

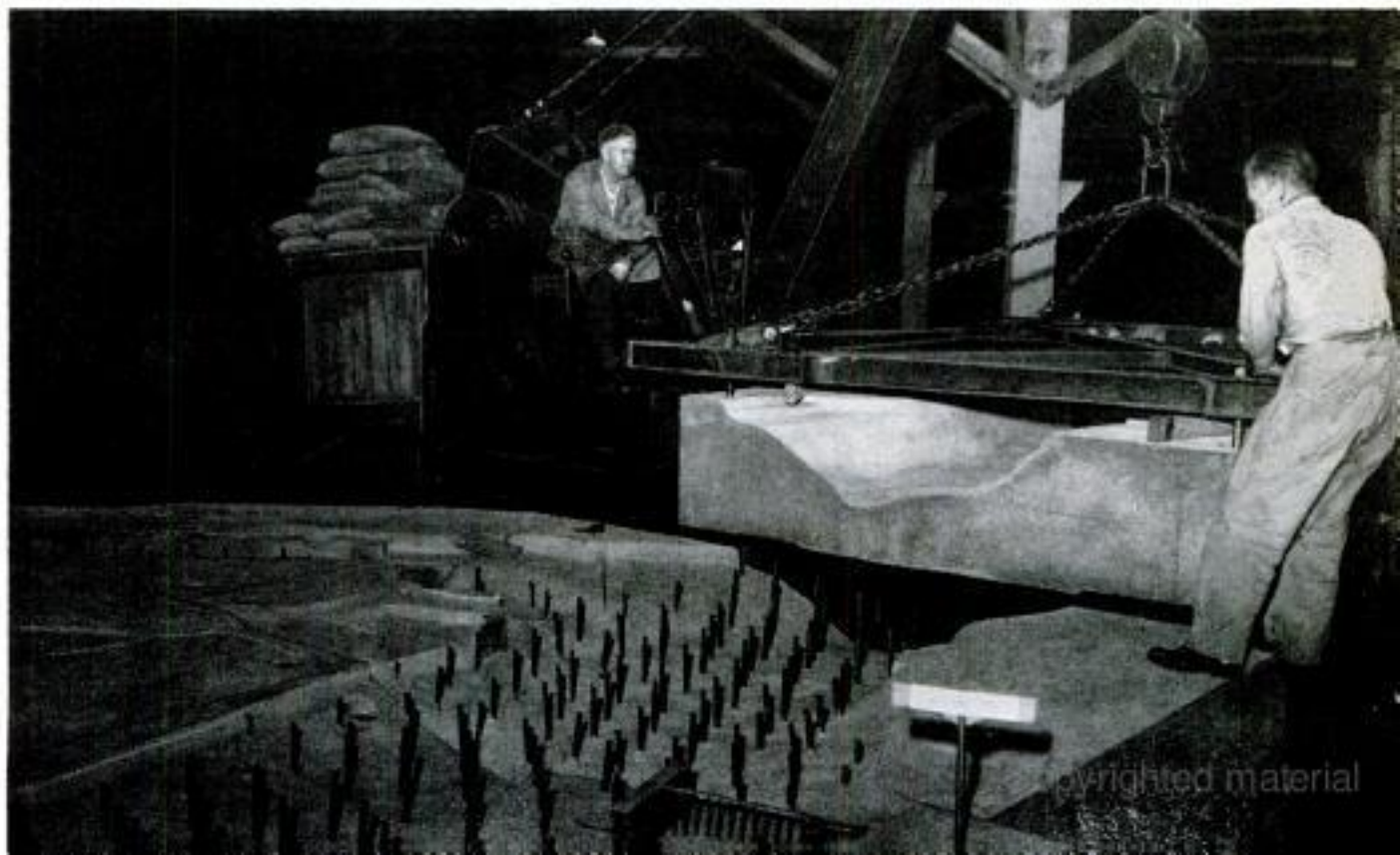
The model was built by the U. S. Corps of Engineers. There are a lot of answers the engineers need, and they expect to have most of them by 1960. They will find

out why the generally placid waters sometimes turn into a witch's cauldron, dangerous to even sizable ships.

Just as important to industry and shipping, and the future development of the bay's potential, is the knowledge they will gain on which of the currents build shoals, where the silt comes from and what happens when structures such as bridges and wharves are built in the bay.

Information gained will be important to the vast farming interests along the islands of the Sacramento River that flows into

Model was put together like a giant jigsaw puzzle, involving 158 slabs of concrete weighing five tons each



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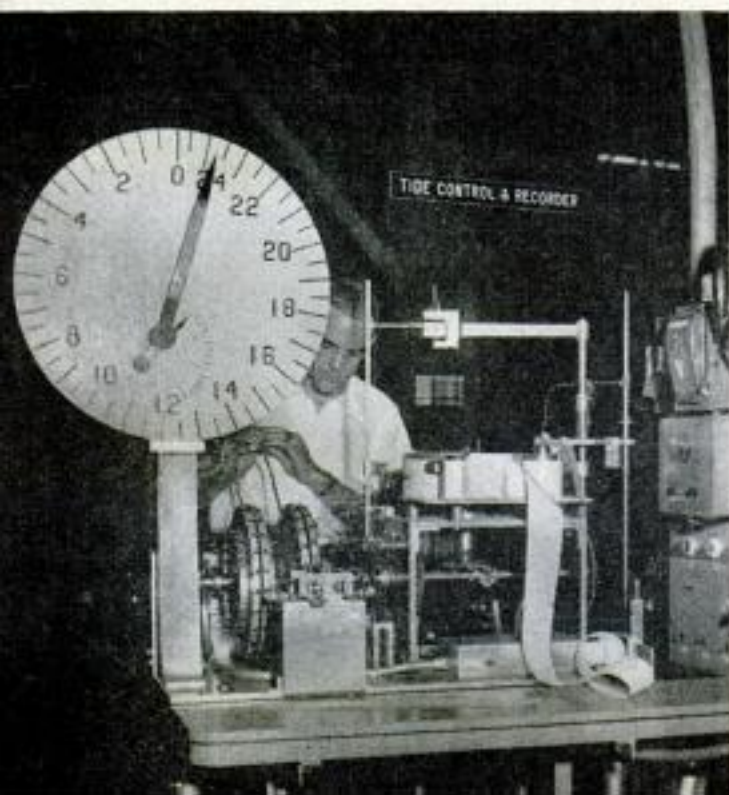


Engineer measures tidal movements. Copper strips in the water control the duplicated ebb and flow of tides

San Pablo Bay, and the San Joaquin River that empties into the Sacramento at the bay. For years there has been a gradual increase in the distance the bay's salt water backs up into the rivers and sloughs around the islands and damages farm lands. The cause must be found and methods devised to stop it, or the economy of the area will crumble.

Located in a huge Corps of Engineers' warehouse in Sausalito, a suburb of San Francisco, the huge \$300,000 model has

**This instrument automatically regulates tides in the model. A cycle is completed in 14.9 minutes**



an over-all length and width of 340 by 340 feet. The paved area is 29,000 square feet. It took nature countless centuries to build San Francisco Bay, but man duplicated it in almost perfect miniature in two years.

The model was built under rigidly controlled specifications made possible by examining hundreds of charts of the bay. Thousands of aerial photographs were taken. Boats probed the water with elaborate instruments to gather data on currents, sedimentation and salinity. And hundreds of blueprints were drawn to set down each detail that could be scientifically accumulated. The model was constructed to scale one foot for each 1000 horizontal feet, and one foot for each 100 vertical feet of the area it represents.

The model is made of 158 precast, reinforced 12 by 12-foot concrete blocks weighing five tons each. They are supported at the corners by leveling bolts mounted in rings welded to steel plates embedded in concrete pieces to permit proper adjustment of the model floor to correspond with the elevations of the natural bay.

Each block was poured on a sand foundation. Properly contoured welded wires were fitted to conform to the topography. Top concrete was added to mold these contours. The delicate shaping of the surface was done by expert topographers who relied on engineer's draftings. The blocks were set in place with a crane, like a giant jigsaw puzzle. After all blocks were placed, the openings between them were sealed



with a bituminous jointing material.

The 550 square miles the model represents include a segment of the Pacific Ocean, an area 17 miles beyond and 14 miles north and south of the Golden Gate.

At one side of this ocean area is a sump in which 17 tons of salt are mixed with 118,000 gallons of water to the exact salinity of the ocean and bay waters. The mixing pump has a 4500-gallon-per-minute capacity.

The rise and fall of the tide and accompanying tidal currents in the model bay are created by generating the tide in the model ocean. Salt water is pumped from the storage sump into the ocean head-bay by a pump that discharges 9000 gallons per minute. Ebb and flow are regulated by an automatic tide-control operating a motor-driven valve in a separate outflow pipe connecting the head-bay and sump.

Flow created by the pump is regulated on a time schedule that represents the time of tides, and a complete 24-hour tidal cycle is performed every 14.9 minutes. The tides function the same as they do in the actual bay where their cycle is dictated by the moon and turning of the earth. Four tidal cycles are created every hour, 48 every 8-hour day, 12,240 during 225 annual working days. This explains why a massive amount of needed data can be obtained in a short period of time.

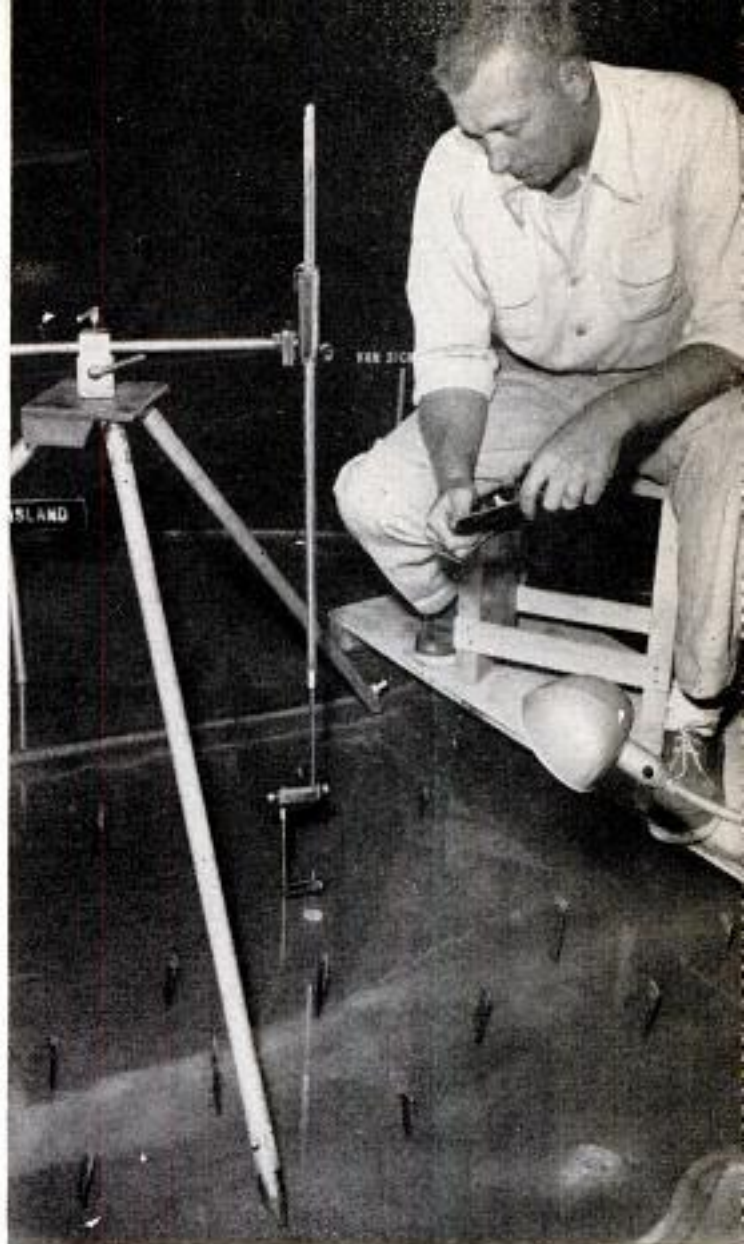
When the investigations are finished around 1960, the Bay will be one of the world's most thoroughly studied harbor areas, shedding new light on the whole science of hydraulics.

At the Sacramento River end of the model, there is a pump that sends fresh water into the river channel coordinated exactly with the salt-water tides. This duplicates nature's clash between these two waters and will reveal how far the tides will force their way up river and leave adjacent farm land damaged by salinity, and what can be done to correct the problem.

To simulate the action of silt, which in nature builds up shoals and sand bars, a light bituminous material called gilsonite has been introduced into the waters. The tides that come through the 3½-foot-deep Golden Gate channel cause it to deposit in the same places that nature does in the bay.

When it is known just what happens to the silt during tides, engineers will be able to reduce by almost half the annual \$2,000,000 it costs to remove an average of eight million cubic yards of material to keep open shipping channels. They will know where to dredge and when.

(Continued to page 266)



Velocity meters measure flow of tides. Engineers want to know how far tides take salt water up rivers

Slough in \$300,000 model fills with water at high tide and otherwise performs exactly like the bay



# HAY PELLETTIZER



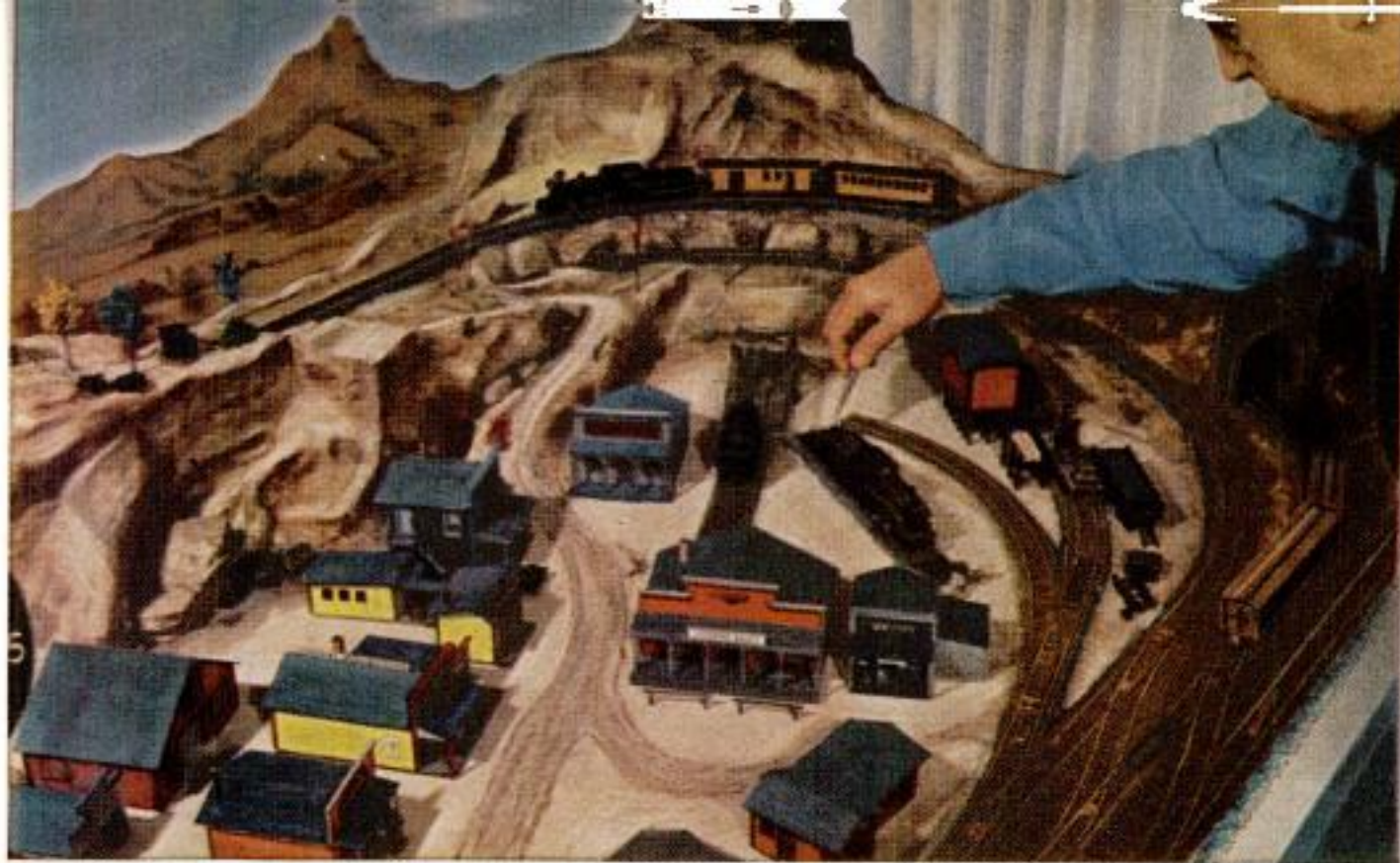
Two-section, 10-ton self-propelled hay pelletizer eats through windrow of alfalfa on a California farm



Elevator at front of rig picks up alfalfa hay from windrow, above, and feeds it into hammer mill. Pellets in truck bed, below, are inspected after they leave hopper at end of rig



**HARVESTING HAY** in pellet form has several advantages for a farmer. The succulent and coarse portions of alfalfa are combined so that livestock get a more balanced diet. A five-ton load of pellets takes the space of about 232 bushels, eliminating the need for massive storage area. The half-inch pellets are easier to handle. Also, pelleting can be accomplished on almost any summer day; the farmer doesn't have to wait for ideal hay weather. The photographs on this page illustrate a hay-pelleting operation on a Rio Vista, Calif., farm. The hay is picked up and dropped into a hammer mill where it is pounded to a fineness that is correct for pelleting. The mill blows it back from this unit to the pellet shaper where steam is introduced to become a binder for the finely ground hay. Pellets drop from this machine into a cooling box where a fan removes enough heat to allow them to be moved out on a lift conveyor to a 1½-ton storage hopper. When the hopper is filled a truck moves up and an auger unloads the pellets into the truck. The finished pellets have a moisture content of about six percent. The power units of the rig burn diesel fuel and the wagon carries a steam generator.



Miniature old-time desert town of Cactus Corners is bustling terminus for this HO-gauge model railroad

**A** PARTMENT DWELLERS, faced with space problems and the ever-present possibility of moving some day, are realists about model railroading. Yet, John Moss, vice-president and design director for Marshall Field and Company, Chicago, refuses to let his apartment buffalo him into re-

stricting his HO-gauge model-train hobby.

In an eight by nine-foot alcove off a guest room in the apartment where the Mosses and their daughter Margo live, modelmaker Moss has installed an intricate train layout, workbench and a tool chest made from an old dental-instrument

# Cactus Valley Railroad-- Apartment Style

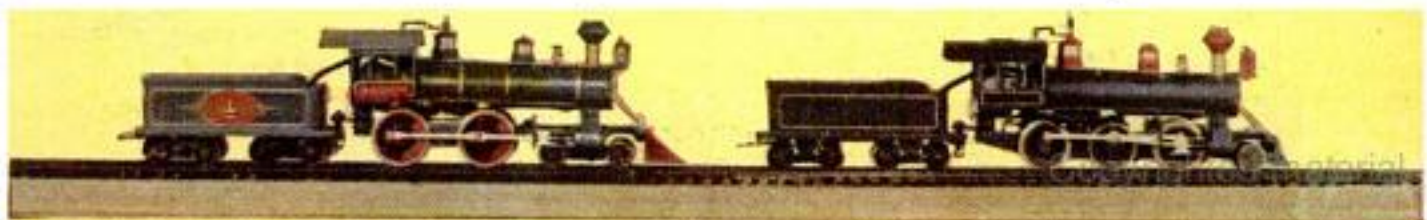


**By Robert Dorsett**

*Photos by Donald F. Honick*

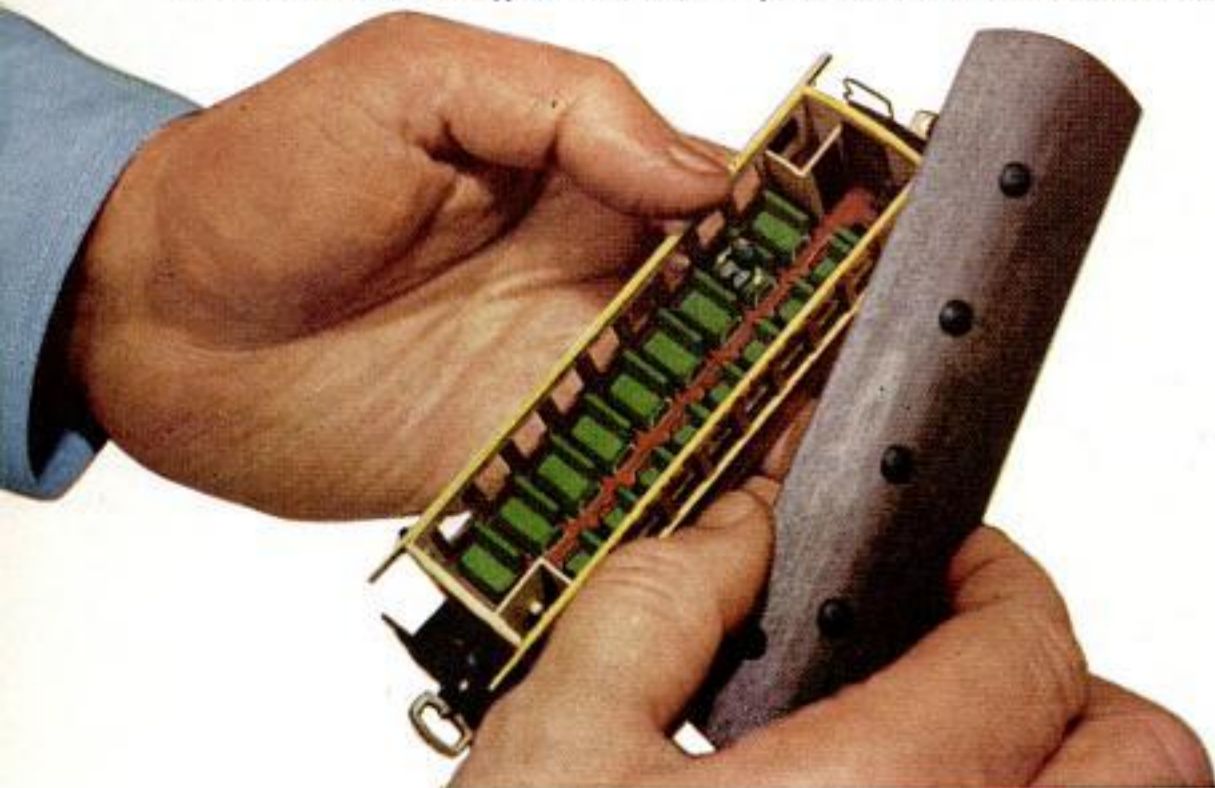
Interior of Mike's Lunch, left, shows tiny but realistic details of the models

Rolling stock, below, of early Western vintage, is built mostly from HO kits





John Moss at the controls of the Cactus Valley Railroad. The length of track totals a little less than one scale mile. Interior of a typical old-fashioned open-end coach, below, is as detailed as the exterior



lighted material



Removable tunnel conceals dead-end track. Rugged desert terrain is plaster on chicken wire and cheesecloth

cabinet. The layout can be disassembled quickly into three compact units for easy transfer to a new location. The workbench and tool chest make up an efficient, convenient "maintenance shop" adjacent to the layout.

The entire setup is named the Cactus Valley Railroad. In HO gauge ( $\frac{1}{8}$  inch between tracks) which is at a scale of approximately  $\frac{1}{8}$  inch to one foot, Moss figures he has a little less than one scale mile of track on the layout.

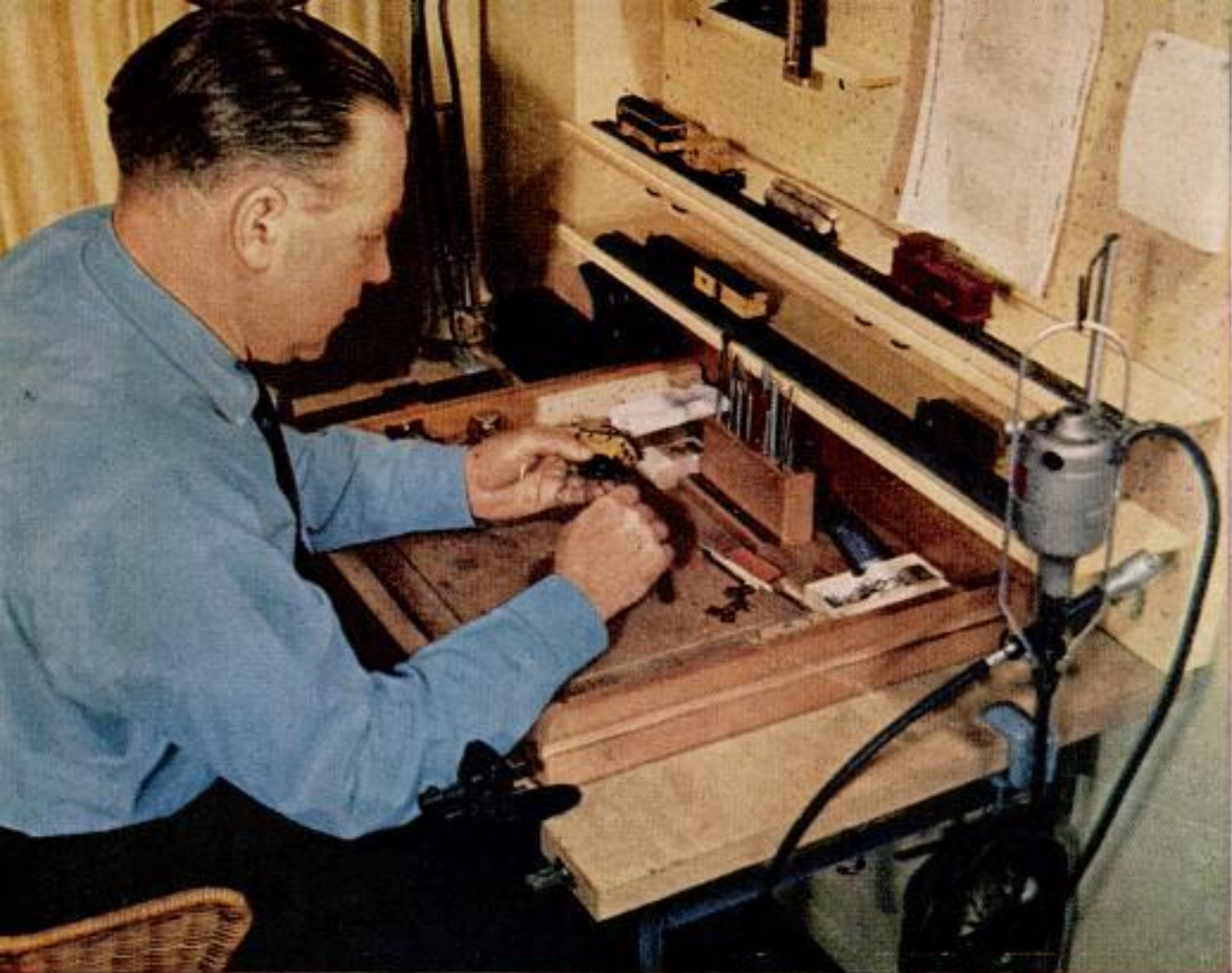
Architecturally trained, Moss slipped easily into his HO-gauge interest about 10 years ago with the assembling of a dock-side engine kit. Gaining momentum, he now has as permanent parts of his layout: A dozen or so locomotives, mostly kit-built, with various valves and pipes added; a crane work car; an assortment of freight cars and coaches; an engine turntable; a water tower; numerous switches and sidings; three tunnels and a collection of kit and "scratch made" buildings which make up the town of Cactus Corners.

This community includes Jackson's Pipe Works, the Longhorn Saloon and the Wells Fargo Co. (from kits) and Moss-created editions of the local jail, railroad stations and the general store. His Splinter Lumber Co. carries a complete stock of white-cedar lumber cut to scale.

Mike's Lunch, another Moss-manufactured item, is doing a nice business (if you'll take the building's roof off for a looksee); and between the waitress and a customer at the counter is as delicious a serving of scale coffee, ham and eggs as a gandy dancer could want before a hard day's work. From soft white-pine strips has come, at a price of three hours nightly effort for  $2\frac{1}{2}$  weeks, an old-time passenger coach with seating and rest-room features detailed to do the Cactus Valley line proud. In pursuit of accurate craftsmanship, Moss has even furnished scale pin-up pictures for the walls of the section house.

Two wood frames covered with insulation board linked by bolts and wing nuts form a foundation for the layout. Arid "cactus





Models are built in removable drawer, keeping tools and parts of project together until job is finished



Orderly storage for parts and tools is provided in the former dental-instrument cabinet, above, which is mounted on casters

country" rises on these boards from a base of wood blocks covered with chicken wire, concealed by cheesecloth and coated with plaster. Water-color and casein tinting on the plaster produces an effective Southwestern atmosphere.

The table on which the layout rests is a four by seven-foot hardboard rectangle on folding metal legs. Control switches are inset along the table edge for convenience in operating the track turnouts. Hinged, the layout can be propped up as one unit for revision and addition of wiring beneath the layout or to the control panel below.

The console consists of perforated hardboard mounted on a wood frame which serves as a boxlike base for wiring and control knobs. The control panel is atop a cut-down teacart and is



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operations. As shown, equipped with Lamp Attachment,  $\frac{1}{2}$  HP Motor, Stand, and Retractable Casters.

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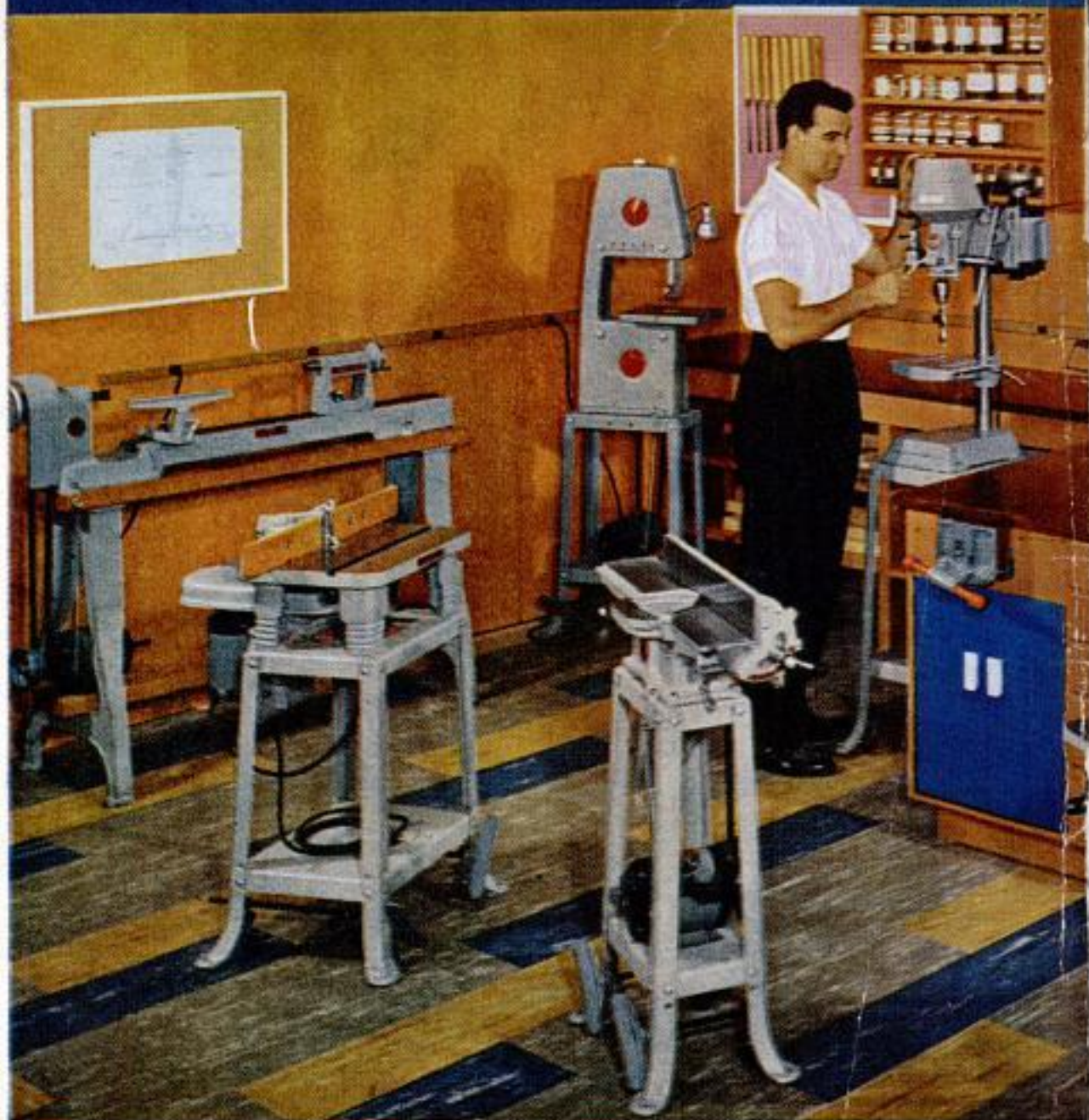
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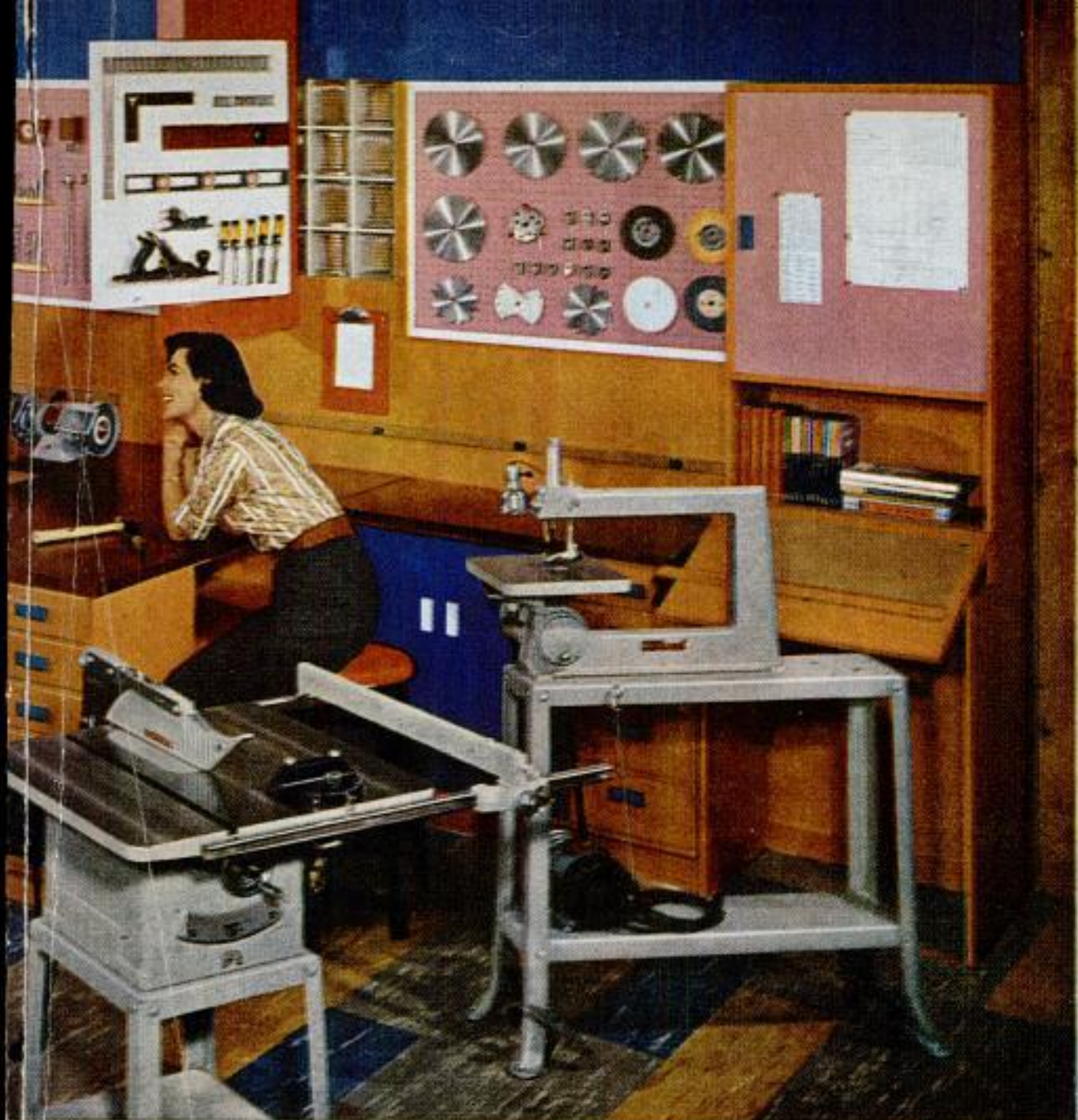
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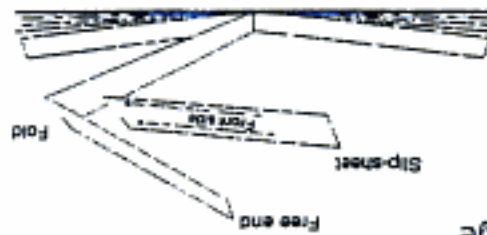


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Also shown above is the New Advanced Design Delta Dust Collector. Use it with *any* power tool to keep your shop free of sawdust, and also to clean floors, walls—even to spray paint. It's powerful enough to pick up a 1" steel ball without damaging suction mechanism!

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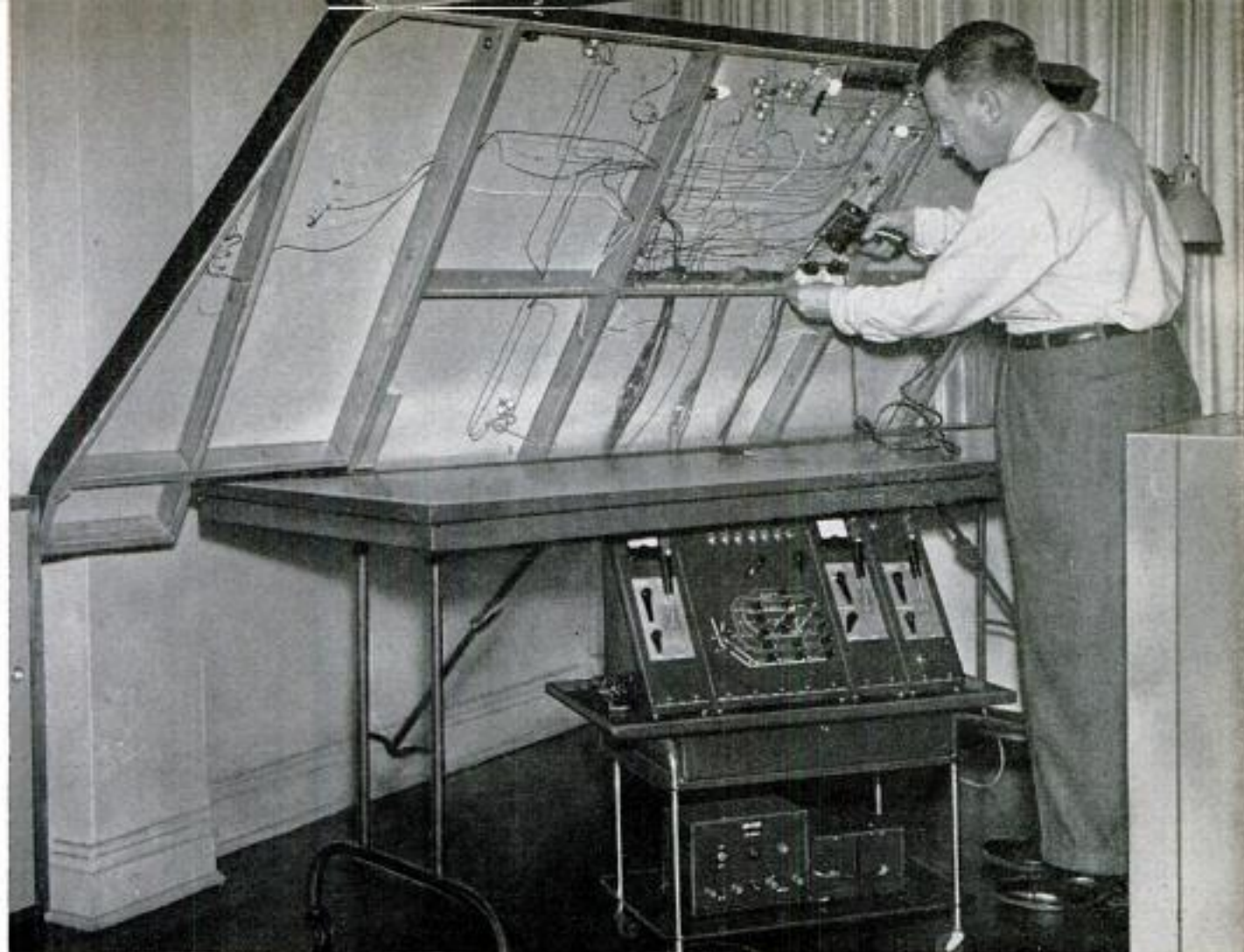
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Layout tilts on hinges for easy access to wiring. Table rolls on casters to convenient working position

ried in with a transformer and converter which changes alternating house current into proper-voltage direct current necessary for HO-gauge operation. A drawer under the control panel is a catchall for wiring gear and rolling stock. Casters on the layout table, control panel and tool cabinet give these units maneuverability.

At the workbench a flexible-shaft dental drill is operated from house current, as is an electric sander attached directly to the worktable surface. In the bench drawer are tools and materials for the particular project under way; Moss merely withdraws the drawer, works "inside" it as it rests on the bench, and returns the entire unit to its place, when desired. With this arrangement, time-consuming selection and replacement of tools and parts are unnecessary, and cleaning up can wait until the project has been completed.

In the tool cabinet, Moss altered the door interior to house shelves for storage of six-inch-long blocks of wood. Each block contains files, chisels, small-nail and parts

vials inserted in specially drilled holes. In this way, Moss obtains groups of related tools at one time instead of having to hunt for individual items; the system also eliminates the separate returning of each tool to its niche. Incidentally, Moss has removed carved Victorian mahogany decorations and refinished the cabinet's exterior in bleached mahogany.

Outside of a conventional desire to add more track and switches, the C.V.R.R. president has one future project in mind: Installation of a coal-screening tippie on top of what is now a dead-end tunnel.

Compact, convenient and portable, the Cactus Valley system is adaptable to apartment living as are few model railroads. Who knows? . . . When they see similar set-ups, landlords may build their own HO lines or reduce rent as partial payment for "engineering privileges" on a tenant's network. Anyway, the tenant can't lose.

Moss places the value of his railroad and equipment, acquired over a 10-year period, at several thousand dollars. ★ ★ ★





### X-15 May Climb 150 Miles

Artist's conception shows a rocket plane not officially announced that is expected to break two world records next year by flying 150 miles high at 4000 miles per hour. Being built by North American Aviation for the Air Force and designated the X-15, the craft will gather information on the effects of its re-entry into the earth's atmosphere. It will be about the same size as an F-100 Super Sabre jet airplane. The present known world speed and altitude records are held by the ill-fated Bell X-2 which, before it crashed, flew 2200 miles per hour at 126,000 feet.



### English Ladder Sections Double as Stretchers

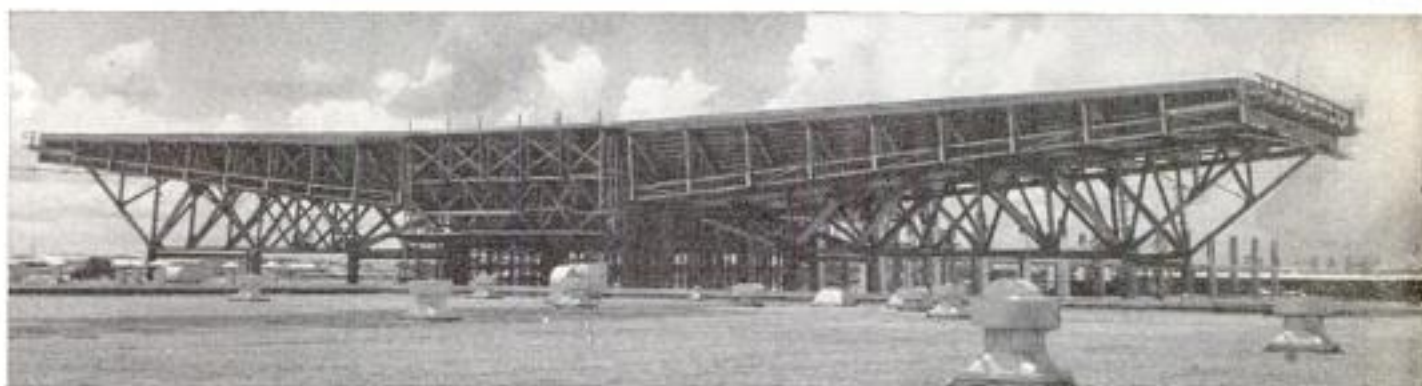
Civil Defense workers in London demonstrate a ladder that also can be used as a stretcher to remove injured persons. Developed by the Gloster Aircraft Company, the device is narrower than an ordinary stretcher so it can be passed through small openings. A canvas container protects the patient. Several of the units can be fitted together to make a longer ladder.

### Wall TV Set 16 Inches Deep

Designed for custom cabinet installation, the 21-inch television receiver, below, is manufactured on a chassis narrow enough to fit into walls or shelves only 16 inches deep. The 110-degree wide-angle picture tube makes it easy to install the receiver in shallow space. Dual eight-inch speakers are provided for installation over the receiver or in any desired location.



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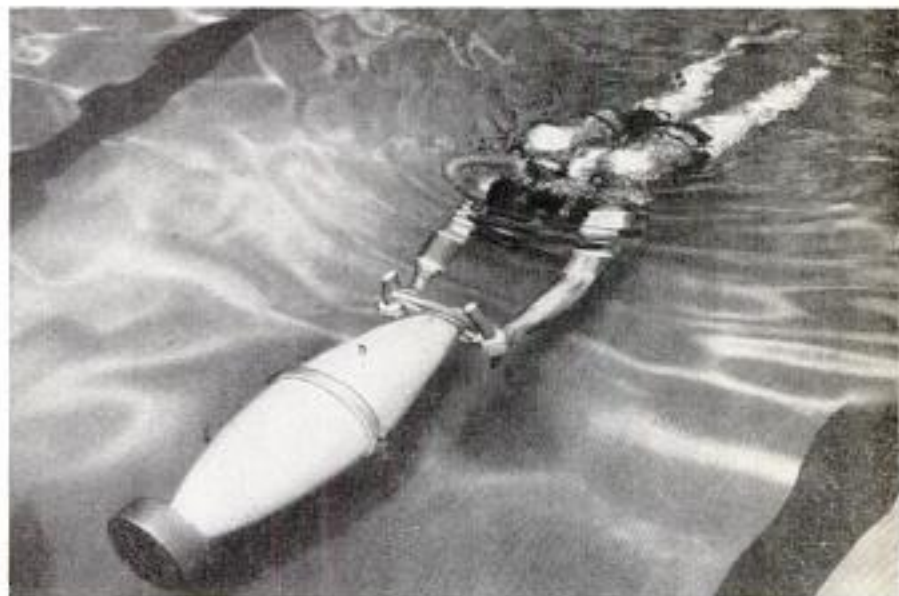
## Cantilever Airport Hangar Will Hold Six DC-8 Planes

Six giant DC-8 jet airliners will be serviced simultaneously in a new hangar at Miami, Fla., International Airport. The structure is believed to have the world's longest span of cantilever concrete with its two "wings" extending 112 feet on each

side of the center section. The roof will withstand hurricane winds of 200 miles per hour. The forms, shown in the bottom photograph, were supported by sand jacks similar to the ones used by the Egyptian pyramid builders.

## Battery-Driven Propeller Tows Underwater Swimmer

Skin divers who really want to go places underwater can now cruise along the bottom of a lake or in sea water while an electric-powered propulsion unit does the work. A propeller driven by a 6 or 12-volt battery is mounted forward on the unit. The underwater enthusiast in the photograph shows how the device is steered by slight movements of the aluminum bar at the rear of the body shell. The manufacturer says the unit can be used at depths up to 100 feet for as long as one hour. Shell is of reinforced plastic.



## Alweg Monorail Train Makes Experimental Run

Shown during a trial run at Cologne, Germany, is a full-size model of the Alweg monorail train. The train hit a top speed of 50 miles per hour. Previous tests with a miniature model did not produce satisfactory results. The full-scale prototype reportedly shows more promise. Alweg is an abbreviation of the name of the Swedish manufacturer.



# NOW ELECTRONIC BRAINS ARE TALKING

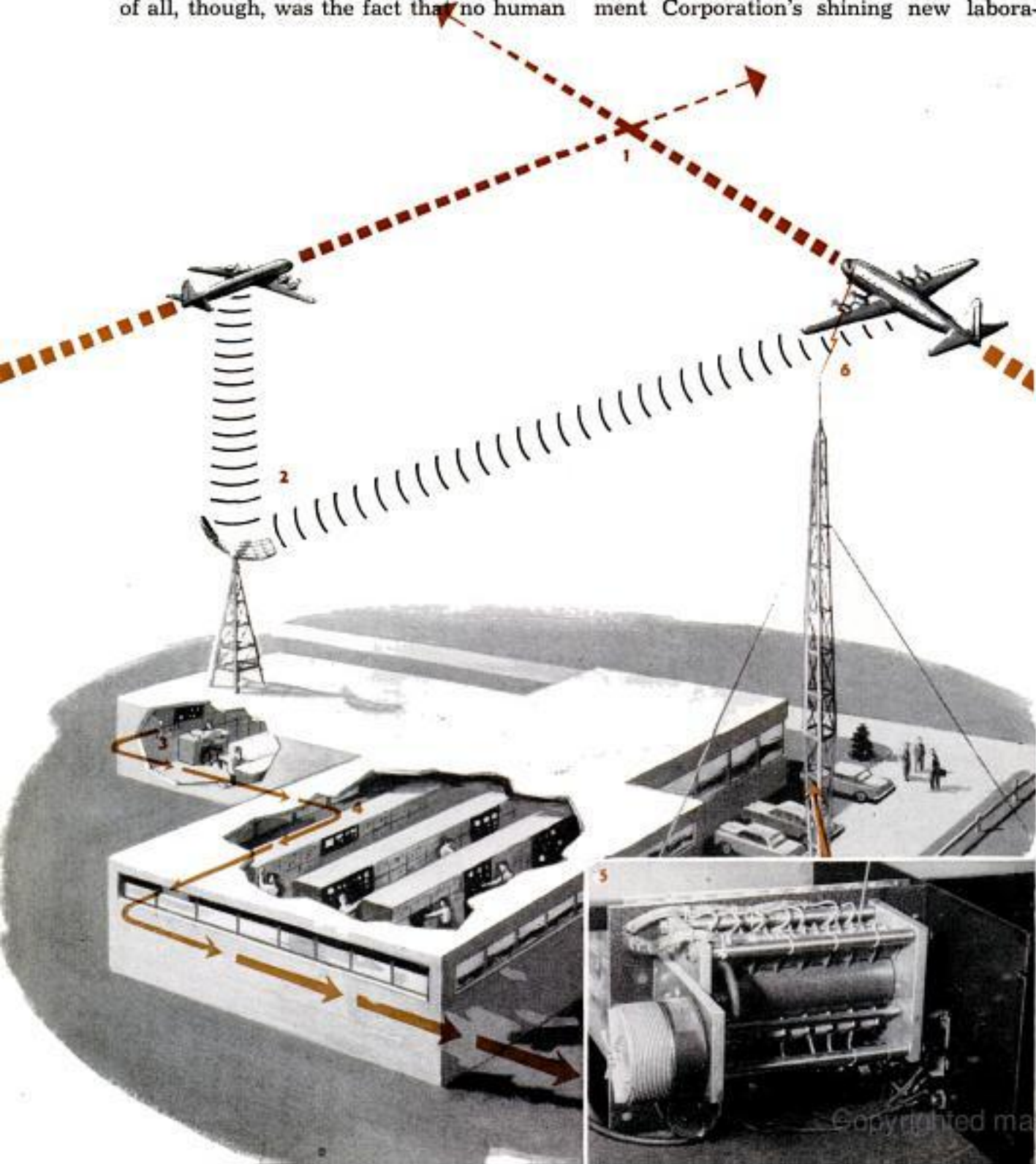
By Richard F. Dempewolff

**R**ED LEADER—vector one-nine-zero—  
angels two-zero over.”

The crisp order containing flight instructions for a formation of interceptor planes came loud and clear from a black box in a Long Island laboratory. There was an eerie quality to the voice. Each word sounded as though a different person said it. Eeriest of all, though, was the fact that no human

being had put that message together or spoken it. The words had been plucked electronically from a “canned” vocabulary, pieced together and broadcast in proper sequence.

The weird “voice,” demonstrated for *Popular Mechanics* by Charles Poppe, one of its developers at the Fairchild Instrument Corporation’s shining new labora-



tories in Syosset, N. Y., is, in effect, a set of "vocal cords" that allows an electronic brain to say what it is "thinking" in any language! Known as Automatic Voice Data Link, the compact unit can take output signals from an electronic computer and translate them instantly into a series of verbal messages that can be broadcast to flying aircraft or put out over a public-address system.

The advantage of an electronic brain that can talk is tremendous, according to Poppe and his boss, R. H. Frye. Along our early warning fence, for instance, the vast SAGE computers that calculate the best course and altitude for an intercept, in many cases feed their answers in digital hieroglyphics on coded tape to human operators. These guidance commands must be deciphered and communicated to the lead intercept pilot—usually by voice radio, since few planes have the expensive equipment that can receive and interpret the computer's code. "As big computers become operational," explains Poppe, "the capability to control large numbers of aircraft . . . requires automatic high-speed communications. With human operators relaying guidance commands, over-all system performance may degenerate due to time lags or operator error."

This is where the new voice comes in. As fast as the electronic brain computes course changes for a flight of interceptors closing in on an unidentified plane, the Voice Data Link translates the information into plain English. These commands are broadcast instantaneously to the lead interceptor over a standard voice channel that any military plane is equipped to receive.

All this is achieved by an ingenious feat of mechanical and electronic legerdemain. The heart of the new Voice Data Link is its vocabulary, which Poppe revealed to us by removing the faceplate from the set. Up top, he pointed out a magnetic drum about eight inches long and 2½ inches in diameter. Eighty short sound tracks, one after another, encircled the drum. Above each one, a magnetic playback head was poised. "Each sound track," explained Poppe, "is a recording of one word repeated over and



Bank of toggle switches at base of Voice Data Link allows selection of words to be used in messages

over. The particular vocabulary on this drum was made by the same man. Oddly, we discovered that his voice came out differently on each track—because he recorded over a period of days. On future models, we know we'll have to record a whole drum at one sitting because people's voices change from day to day.

"This prototype vocabulary," Poppe continued, "was designed for ground-control intercept work. It contains recordings of the words 'zero' through 'nine,' as well as call signs, or squadron designator words like 'red,' 'blue,' 'white,' and so on. Besides these there are a number of what I call 'fixed' words that always come up at a certain place in every message that a GCI station would send to a plane in flight. These words like 'leader,' 'vector,' 'angels,' 'range' and 'bearing' can be programmed to come up at the same place in every message just by flipping the proper toggle switches at the base of the set."

In the message that the voice spoke for *Popular Mechanics*, the words LEADER—VECTOR—ANGELS—OVER were the programmed ones. The rest of the message represented the digital electronic impulses that would be supplied by a huge SAGE brain. The big computer, receiving search-radar data on the position and direction of a moving "blip" in the sky, swiftly calculated a course for our fighter planes to follow in order to intercept the blip. The computer's digital electronic answer, instead of punching a tape, triggered a series of certain recording heads over the revolving vocabulary, and out came a line of chatter, preceded by a "beep-beep" that is programmed into every message to alert the pilot. With programmed words in capitals, and words triggered by the brain's impulses in lower case, this is what the message would look like written out:

(Continued to page 252)

Diagram, left, shows how "voice" unit for electronic computer would function in air-traffic control. Paths of two planes show they will collide (1), according to radar waves received by antenna (2). Position, course and other data are compiled in radar shack (3) and fed into computer (4) which quickly figures new course for one plane. Information is fed to Voice Data Link (5) which selects proper word sequences from magnetic-drum vocabulary. New course is automatically transmitted to one of planes (6)



# KEEPING UP WITH THE ATOM



**A BILLION BBs**—traditional pellets of small-fry marksmen—will shield a new “hot cell” for nuclear research. The BBs actually will make the cell portable. The cell, under construction at the Westinghouse radiation and nucleonics laboratory in Pittsburgh, Pa., has half-inch-thick steel walls spaced 15 inches apart. Between the walls are the 35 tons of BBs. They are the equivalent of 10 inches of solid steel in their ability to shield atomic radiations. When the cell is to be moved, the shot can be drained out through openings near the base of the wall.

☆☆☆

**THE GREAT DEBATE** rages on. What amount of radiation will adversely affect our health—and that of generations to come? Scientists, basing their statements on solid research, still debate the point.

According to Dr. Michael A. Bender of Johns Hopkins University, the amount of radiation now considered safe may be much too high. His radiation experiments are the first to be made on normal human cells. The experiments indicate that the 10-roentgen “maximum permissible dose” to the reproductive organs from birth to 30 years of age, set by the National Academy of Sciences, may

be from three to five times too high. The conclusion is that a significant number of tomorrow's children may have defective health if today's fathers receive anywhere near that amount.

And Dr. Curtis Newcombe of the U. S. Radiological Defense Laboratory reports that some individuals may be very near the maximum permissible concentration of cancer-causing strontium-90.

☆☆☆

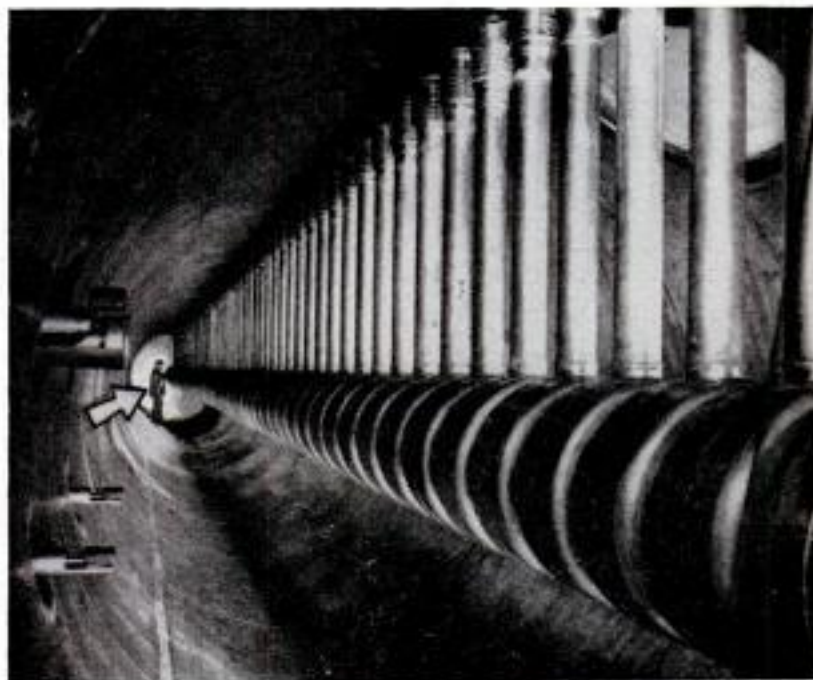
**WILL THERE BE** a sudden break-through in the research to control the hydrogen bomb?

Dr. William Phelps Allis, who heads up a fusion-research project at the Massachusetts Institute of Technology, recently described progress in the field.

Scientists are trying to contain the super-hot gases of fusion power in a “magnetic bottle.” Doctor Allis indicates that there are “leaks” in the bottle. However, he thinks research may be developing a way to plug the leaks by superimposing another magnetic field on top of the bottle. If the method works, Doctor Allis says scientists will have learned to control fusion.

☆☆☆

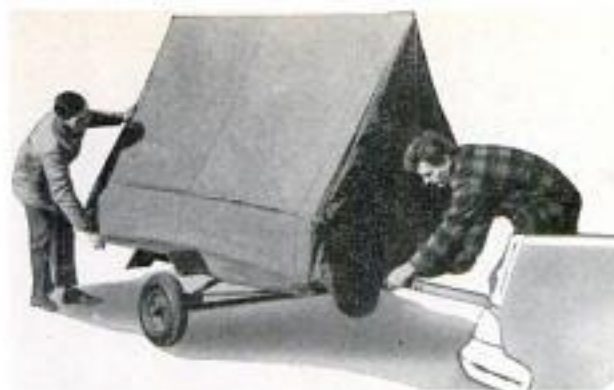
**STRETCHING OUT** like a huge gun barrel, below, is HILAC, the University of California's new atom smasher which is expected to produce superheavyweight atoms. Note the size of the man compared to the barrel, which is 90 feet long.





## Telescoping Trailer Unit Carries 650 Pounds

Versatile unit will carry a heavy load (below), or hold a 5 by 7-foot wall tent or 14-foot boat (left)



When not in use, this telescoping trailer can be stored in a space approximately 24 by 63 inches. On the road, the trailer can accommodate a boat up to 14 feet long and it can safely carry loads up to 650 pounds. The trailer is equipped with five rubber rollers for hauling boats. It also has automotive-type leaf springs, and oversize 5.00 by 8.00 tires to minimize sinking in sand or mud. The unit also can be quickly converted to a utility trailer with a body measuring 4 by 7 feet and a wall tent can be adapted to the utility body.

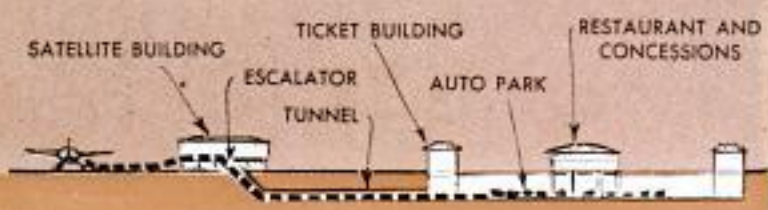
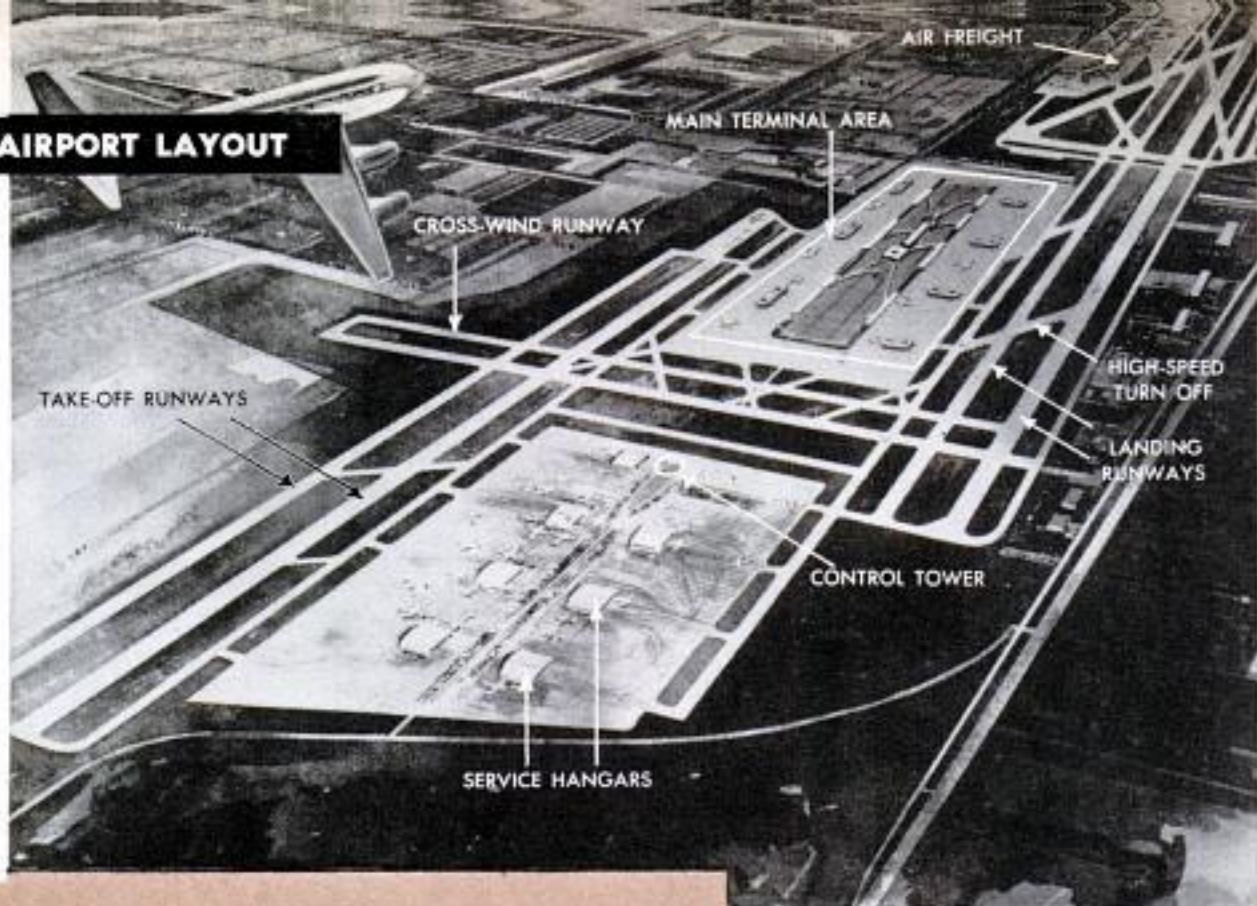
## German Tractor Has Double Set of Wheels for Rails or Road

Track wheels of the German railway shunting tractor, below, are lowered hydraulically to lift the road wheels off the ground. It also doubles as a shovel loader

that can lift an 800-pound load to a height of nine feet while other attachments convert it to a snowplow, grasscutter, street sweeper or a fork-lift truck.

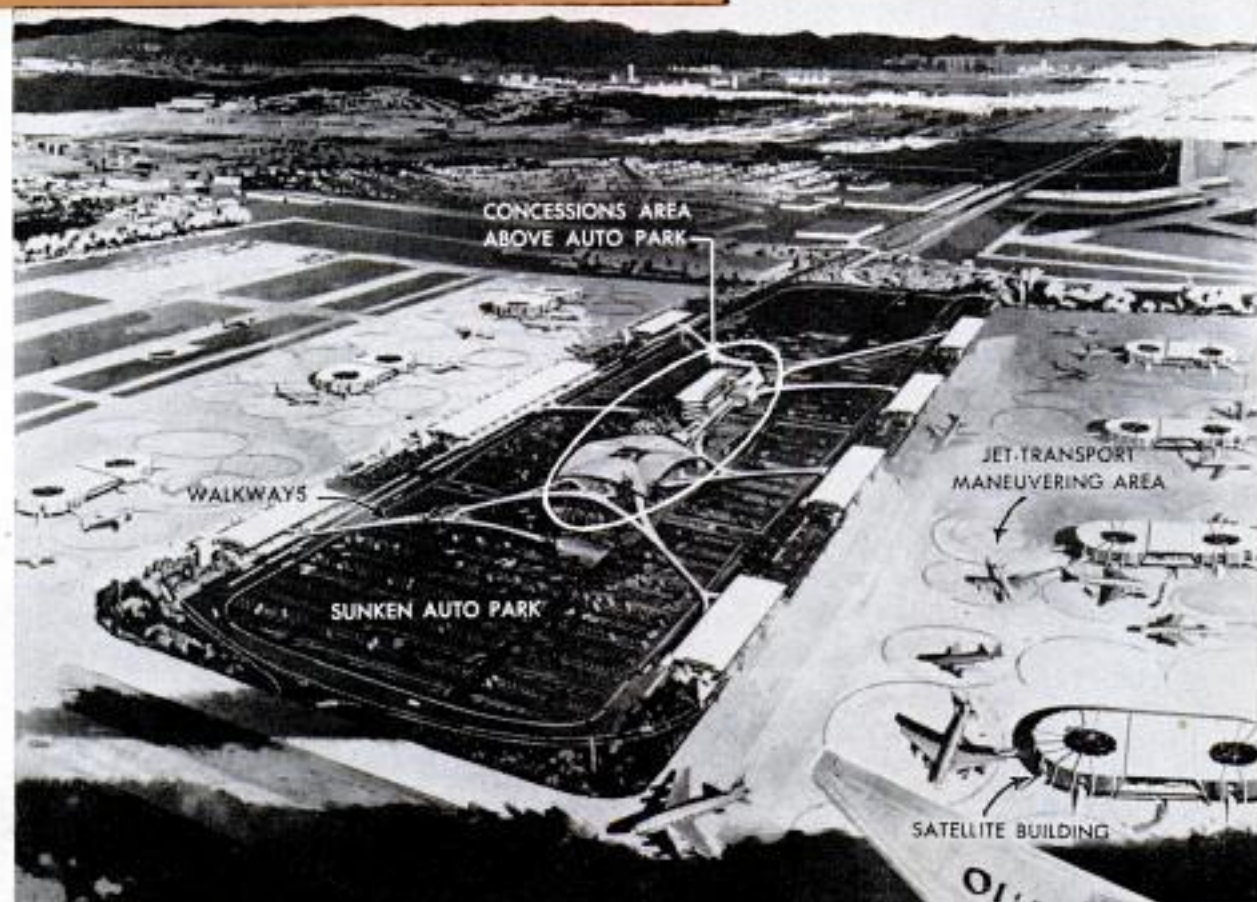


# AIRPORT LAYOUT



By late 1959, Los Angeles will have this airport designed for the jet age. Take-off and landing runways are widely separated

Close-up of terminal area shows satellite buildings clustered around concessions area. Detail at left shows the passenger route



## A PM PANEL OF EXPERTS DISCUSSES

# *Landing Fields for Jetliners*

THE PANEL: J. B. Edwards, Assistant to Chief Engineer, Douglas Aircraft Company; John McDonald, Design Staff Engineer, Lockheed Aircraft Corporation; A. E. Horning, Assistant Regional Administrator (Region 4), Civil Aeronautics Administration; A. R. Bone, Jr., Regional Vice-President, American Airlines

**QUESTION:** Two years from now the airlines will add two new types of large aircraft to their passenger fleets. One is the 400-miles-per-hour propjet Lockheed Electra. The other is the 550-miles-per-hour pure jet and includes the Douglas DC-8, the Boeing 707 and the Convair 880. What will these planes mean to the public?

**BONE:** One aspect of the jet age is that you can leave New York at 5:00 in the afternoon and be in Los Angeles at 7:15.

**Q: In the morning?**

**BONE:** No, the same day. The west-bound flight takes five hours and 15 minutes and you deduct three hours for time change. The flight takes two hours and 15 minutes, clock time.

**Q: Will people be spending more time in taxicabs going to and from the airports than they do in the air?**

**BONE:** It depends on the length of the run, of course. One of the problems is to

improve transportation between a city and its airport, whether on the ground or by helicopter.

**Q: At such fast speeds will you still serve meals in the air?**

**BONE:** The occasions will be reduced. Meals will continue to be served whenever a flight carries through a conventional mealtime.

**Q: Will the jets be able to use the present airports?**

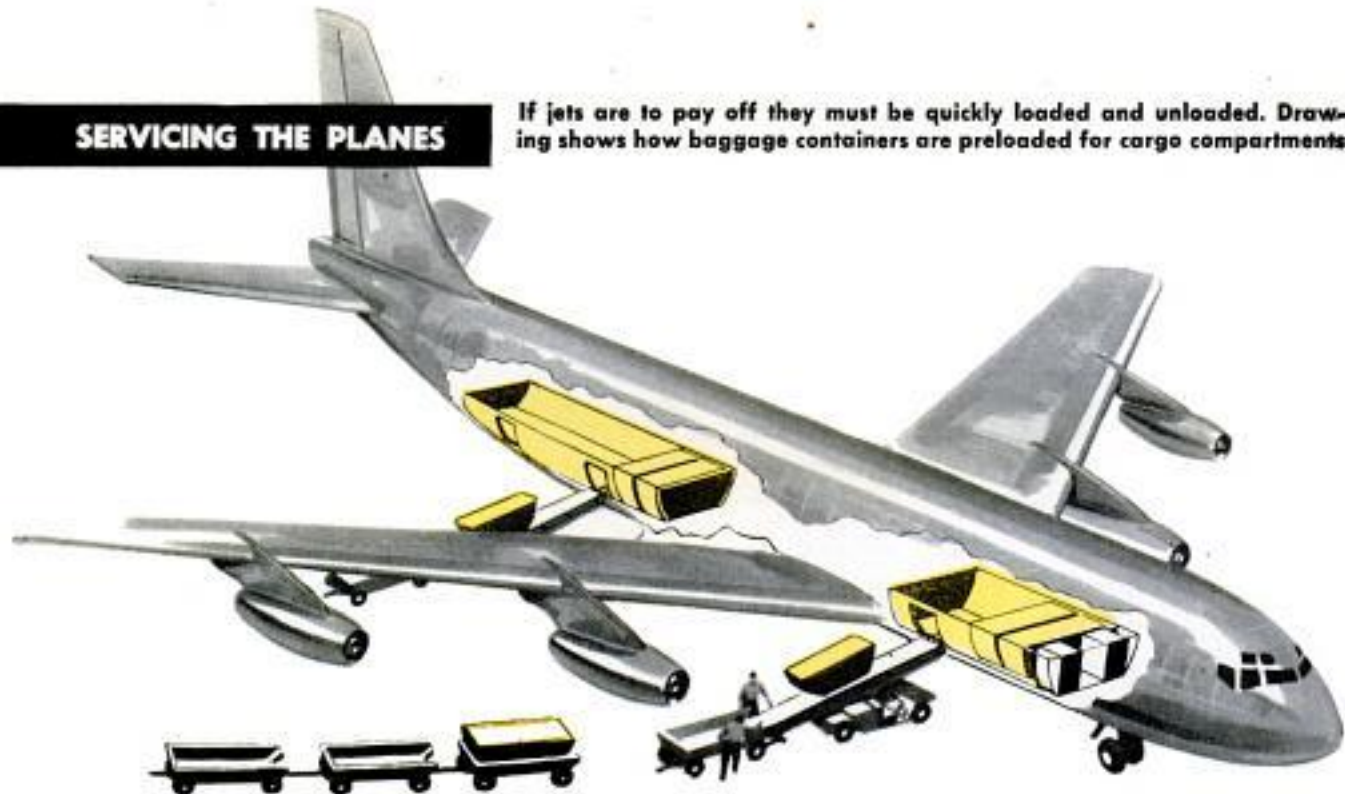
**EDWARDS:** They are designed to use existing facilities at the large terminals, including the present runways. However, a heavily loaded jet departing on a long ocean flight needs a lot of room. The major airports are installing 10,000-foot runways. This provides a safety factor to make it easier to get back to the field in case of engine failure. It also allows for times when there are high temperatures, when a longer take-off run is needed.

### THE PANEL



## SERVICING THE PLANES

If jets are to pay off they must be quickly loaded and unloaded. Drawing shows how baggage containers are preloaded for cargo compartments



BOEING 707

**Q: Are other changes needed at the terminals?**

**BONE:** The jets are influencing airport design. The whole process of moving people to and from the planes is being streamlined, for passengers don't like to waste time on the ground. This applies to present planes as well as the jets, of course. The \$60,000,000 improvement program at Los Angeles International is a good example of what can be done. At Los Angeles the terminal buildings and parking lot are being

placed in the middle of the airport, between the runways instead of at one side. The terminal is really on two levels and you drive down into the central sunken parking. You park near your own airline ticket office, walk in and validate your ticket and check your baggage, then walk via a tunnel to the adjacent "satellite" building where the planes are parked. Here an Escalator takes you up to a waiting room above ground level. This system is an excellent solution of the problem of handling a great

In the Electra most of the fueling and loading operations are performed on one side of the plane. Galley food is loaded through passenger door, followed by the passengers

LOCKHEED ELECTRA



number of people, all in a hurry, with a minimum of delay. Los Angeles will have gate facilities for 60 transports and expects to serve more than 10,000,000 passengers a year.

**Q: Will these passengers have to wait as long for their baggage as they do now?**

**BONE:** The airlines hope not. Several systems of baggage handling are being studied. Too, American Airlines is working on simplified ticketing to speed up the check-in process. Electronic devices for the necessary calculating are being tested.

**Q: Will the airlines need new facilities for servicing the jets?**

**BONE:** We have just built a \$4,000,000 maintenance hangar at Los Angeles that was designed with the jets in mind. It has 200,000 square feet of floor space and provides working stations for 10 aircraft, based on the dimensions of the Boeing 707. On the windward side, the hangar doors are shaped to fit tightly around a fuselage, leaving the plane's tail outside. This arrangement is suitable for our present DC-6 and DC-7 aircraft as well as for the 707 and the Electra. There is room for parking 20 Flagships on the concrete apron, not counting four more planes in the washing area.

**Q: It is said that a large jet consumes from 6000 to 18,000 gallons of fuel on a single flight, as much as 1½ tank cars. Can such a large amount of fuel be loaded rapidly?**

**EDWARDS:** Ground handling has been given a great deal of thought. A jet is an expensive piece of machinery. It needs to stay in the air. For fuel, there are underwing pressure systems that can take on 1200 gallons per minute. If distilled water is used with the fuel, this also is put on board by a pressure system. We expect a complete turn-around of a DC-8 to be accomplished in 30 minutes.

**MCDONALD:** The Electra is specially designed for rapid servicing. Preloaded

baggage containers, single-point pressure refueling, two doors to the main cabin, all help. Passengers embark on one side of the plane, all the servicing and handling of fluids and cargo is done on the other side. We designed the Electra for a turn-around time of 20 minutes. En-route stations could be cleared with as little as 12 minutes on the ground.

**Q: Many people are afraid the jets are going to be extremely noisy.**

**EDWARDS:** This reaction may be based on listening to military aircraft that often use afterburners on take-off. We hope the new jets will be no noisier than our present transports. Muffling devices will be used. The trick is to accomplish reasonable noise suppression without too much loss of power.

**HORNING:** Duration of the noise will be less because of increased performance.

**EDWARDS:** Yes. A military aircraft has a smaller, thinner wing and consequently its climb-out is closer to the ground. We will climb out at 2600 feet per minute, more than twice as fast as at present.

**Q: One suggestion is to park the jet transport against a silencing structure at the end of the runway and to carry passengers out to the plane by bus. This would keep the noise away from the terminal and save jet fuel. Would this be practical?**

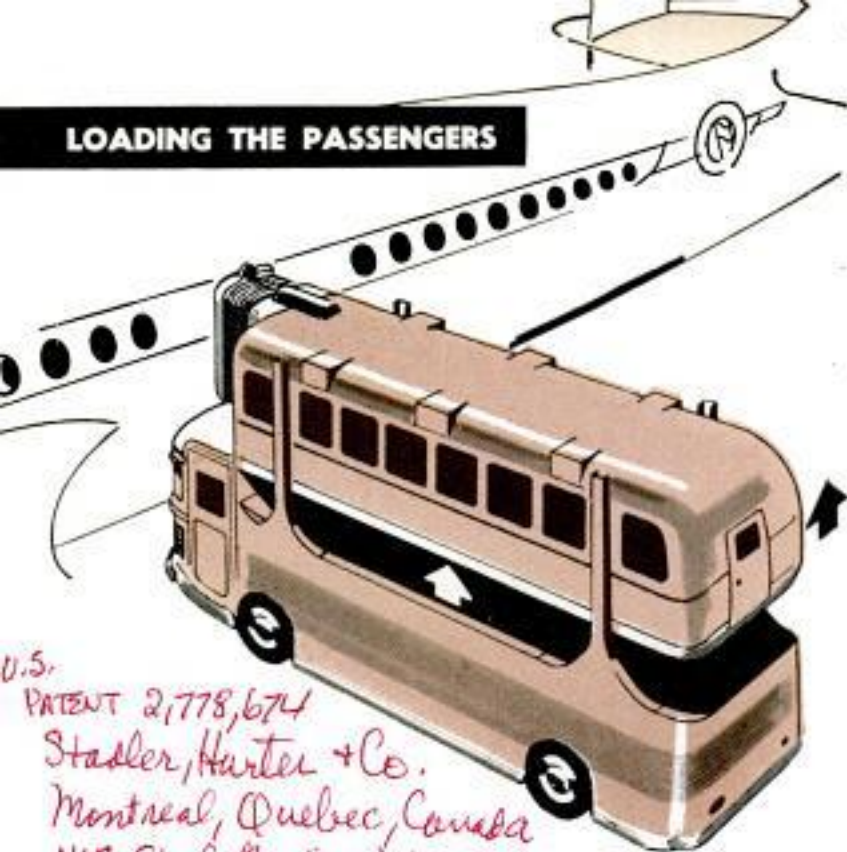
**BONE:** I think it would be impractical. It has been done in Europe and has proven slow and awkward.

**EDWARDS:** We have made tests with a jet aircraft parked against a terminal. Noise was not a particularly bad problem. The power needed for taxiing is only slightly above idling and doesn't produce a tremendous roar. The heated air coming from the exhaust and the odor of the exhaust may be a problem if people are boarding one plane while another is turning nearby. The heat and odor are not objectionable if you expect them, of course. For the public it may be best to use

**Air Force uses noise suppressors with jets. Panel feels they will not be used for commercial jetliners**  
General Sound Control, Inc. photo



## LOADING THE PASSENGERS



U.S.  
 PATENT 2,778,674  
 Stadler, Harter + Co.  
 Montreal, Quebec, Canada  
 1117 St. Catherine W.

Patented airport bus would carry passengers from terminal to plane, elevate them for direct access to the door. Below, passengers arriving at London airport climb aboard coaches

B.O.A.C. photo



Under test by United Air Lines is a telescoping gangplank which wheels out providing sheltered loading tunnel



enclosed or glassed ramps leading to the planes.

McDONALD: The Electra has a very low ground-idle engine speed, and noise on the ground will be at a very low value. We can set the propeller blades at a zero thrust condition so there is no wind blowing all over the passengers walking to the plane.

**Q: Will there be a high noise level inside the cabin?**

EDWARDS: It will be very much reduced from the present.

McDONALD: In the case of the propjet, one of the principal features is the low noise and vibration inherent in the engine design. We are taking additional measures to ensure a really quiet aircraft.

BONE: The fatigue factor in travel will be greatly reduced by the substitution of jet engines, either propjet or pure jet, for the reciprocating engine. There will be a subconscious relief from vibration for the passengers.

**Q: Would JATO units be of help in getting off the ground? And how about reverse-thrust mechanisms for slowing down after landing?**

EDWARDS: We don't expect to use assistance devices for take-off. As far as the landing situation is concerned, the value of reversing is well-known. We reverse the propellers now, after a plane touches down, to reduce the length of the run. For the jets there is a thrust-reversing system that works even better. We intend to use it.

McDONALD: The propjets, of course, have reversible propellers although reversing won't normally be necessary.

**Q: Jet engines have sucked debris up from the ground on take-off and have torn themselves apart. And what happens if an engine swallows a bird during take-off or in flight? Are these problems of major importance?**

McDONALD: It is minimized in the Electra because the intakes are above the engines and not near the ground. There was another problem, whether hail would damage an engine. Allison did some tests

LOCKHEED AIR TERMINALS  
 Burbank, Calif. copyrighted material

Fruehauf Trailer Co  
10941 Harper Ave  
Detroit, Mich

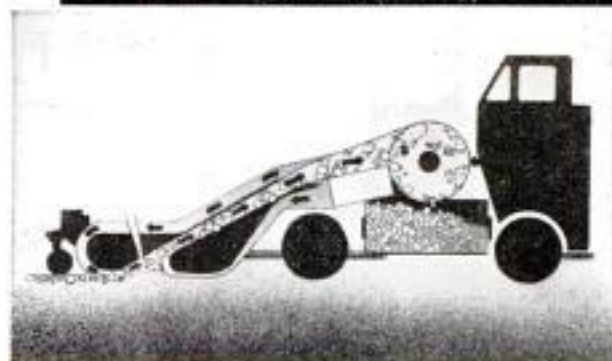


## CLEARING THE RUNWAYS

Big danger to jet engines is picking up debris from runways. This vacuum sweeper can clean damaging debris from a million square feet of runway per hour

in which they fired artificially hardened hailstones into the intake at 425 miles per hour, varying in size from small stones to a three-pound ball of ice. The hail didn't damage the engines at all. Frankly, we were relieved to learn this.

**EDWARDS:** Military records show that around 49 percent of all damage to jet engines is caused by sucking up objects either from the ground or that have been left by mechanics in the jet intakes. The vortex of air picks up small tools, bolts, paper, almost anything lying on the ground in front of the intake. Some military commanders cut down the damage rate by extreme care in keeping the runways swept. We thought of placing screens across the intakes, to be retracted after take-off, but this obviously would cause a serious power loss and is very dangerous from the standpoint of icing which might shut off the air entirely. In the last few months we have developed what we call an aerodynamic screen. This is simply a supersonic blast of air that is bled from the engine and that is directed at the ground in front of the intake. It prevents the formation of vortices and thus the pickup of any object from the ground. As far as birds are con-



cerned, it will be harder on the bird than on an engine.

**McDONALD:** All of us have been greatly concerned with the possibility of a mechanic leaving nuts or bolts in the intake. All the manufacturers are doing the same thing, designing the intake so there will be no access plates or fittings that would tend to feed pieces to the engine. There is no work for a mechanic to do around the intake ports.

**Q: How will the CAA fit the jets into the traffic picture?**

**HORNING:** By the time the jets are in operation we will have the tools to handle them. I'd like to point out that the CAA has been controlling military jets on the airways and in the terminal areas for several years. We know that jet aircraft can

(Continued to page 258)

Another way to prevent debris from being sucked into engine, left, is to blow air jet just in front of engine  
Douglas Aircraft Company drawing





## Electric Car Has \$12 Motor



Simple? You bet. There's nothing to wear out but the brushes in the small electric motor in the foreground, above. No oil changes, no gas bills, no starting problem on cold mornings. Below, at the left is the charger, beside it are the batteries



LOOKING for a cheap second car? The answer, according to Robert Sewell of Spokane, Wash., is battery power. Sewell, while an electrical engineering student at the University of Idaho, built such a car for a cost of \$24.50 and operated it for a quarter-cent per mile.

The electric motor, a little larger than the generator on most cars, is a five-horsepower, direct-current aircraft motor sold as war surplus for \$12.50. The car, a stripped 1947 Crosley station wagon, was rented for \$10 a year from a junk dealer.

"The motor," Sewell said, "is actually too much for the car. I hope to make another one with two small motors and a direct drive. It should be more efficient."

When the car is descending a hill or slowing down, the motor becomes a generator, pumping electricity into the batteries and also helping with the braking.

The car will go 40 miles per hour. Its batteries are charged from house current. A small charger is carried in the car.

"It makes an ideal second car because of its low upkeep," the builder says. "There are no oil, gas, antifreeze, spark plug or oil-filter costs. The only maintenance is an occasional grease job. All I need for a day's run is about seven cents' worth of electricity to re-charge the batteries."





## Ski Without Snow On Plastic Mats

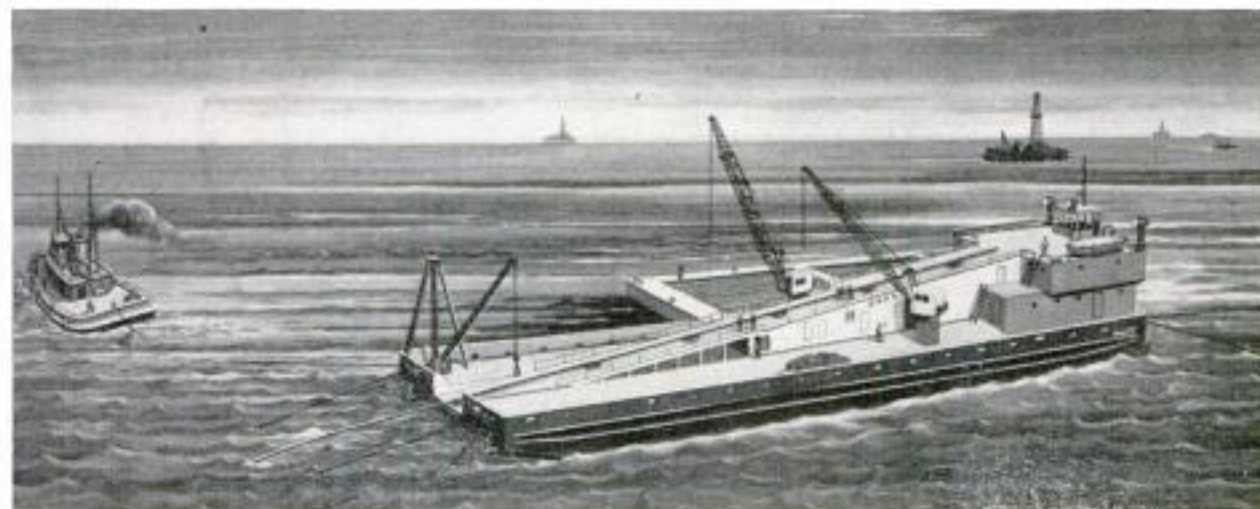
Winter-sports fans in the photograph above have gathered in shirt-sleeve weather to watch ski jumping on a snowless mountain slope in Bavaria. The runway reportedly is slick as ice because it is covered with thick layers of plastic fibers. As shown in the photograph at the right, the mats of plastic are laid on the runway somewhat like a thatched roof. Beneath the plastic mats is a cushion of peat. The ski jump is located at Bischofsgruen, Germany.



## Ship for Laying Pipeline Has a Built-in "Hill"

One of the most unusual ships ever built is the *Magic*, which has a built-in "hill" running from stern to bow. The *Magic*, now under construction, will lay pipelines in the oil fields of the Gulf of Mexico. The hill is a 260-foot ramp on which the pipe

sections are welded and waterproofed. On each side of the ramp is a giant crane which lifts the pipe sections into place. The *Magic* has a complement of 46 men including pipeline workers. The barge will be moved by pulling on anchors dropped fore and aft.





In front of his garishly decorated workshop Pete Logan, left, listens to a customer explain a repair problem

**You need an electric chair, a wooden Indian or maybe a shrunken head? Drop in on Pete Logan of Miami, Fla. . . .**



**By  
Edward Dickson  
and  
Max Hunn**

**"Fixit" Logan makes  
old time cigar-store In-  
dians to order in Miami**

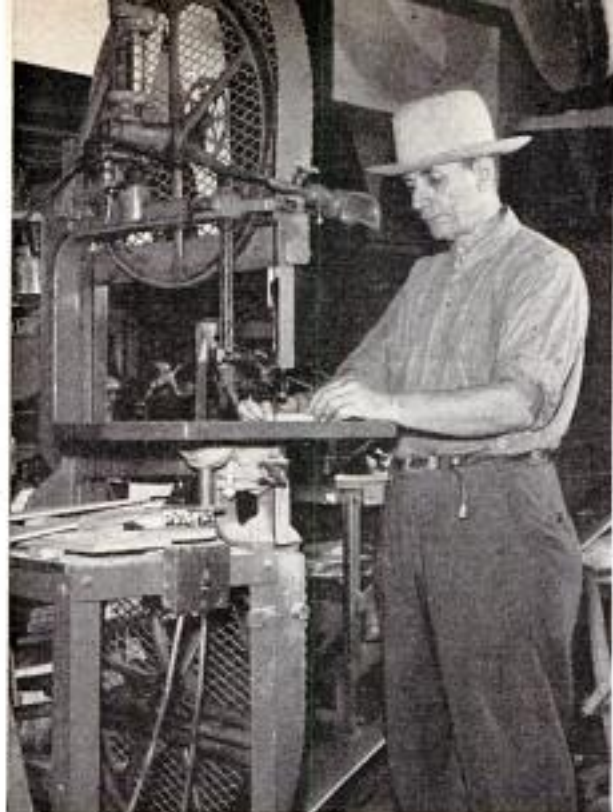
**A** MAN CAME into the shop of Pete Logan in Miami, Fla., threading his way among unusual musical instruments, totem poles and wax-museum figures to find this retired police sergeant whose reputation as "Mr. Fixit" has spread to other countries.

"Will you make a shrunken head of my mother-in-law?" he asked Logan. No longer surprised at the nature of the requests he receives, Logan replied that he would be happy to if the man would provide a photograph from which to work.

Logan made the head. He used chamois skin and tricks of treatment, learned in years of dealing with the unusual, to duplicate the questionable art developed by primitive tribes. The customer's mother-in-law must have had a sense of humor, because the man returned later (bearing no marks of violence) and ordered similar heads made of a number of friends.

Then there was the wealthy South Miami man who lived in a house set far back from the road. This client commissioned Logan to build a miniature railroad with 800 feet of track to run from the road to his house. The newspaper delivery boy was instructed to drop the paper in the train, and the train chugged up to the house with the newspaper. Logan's experience with miniature railroads has been extensive, including the building of a popular train at Miami's ocean-front Crandon Park.

Nor was Logan surprised when an "inventor," complete with detailed plans, asked him to construct a perpetual-motion machine. Logan said he tried to convince the customer that the work would be a



Being left-handed, Logan found a regular bandsaw difficult to operate, so he made this left-handed outfit. He believes it is one of the few in the country



Gay Spanish tunes come from this music box which Logan has repaired. He pumps the handle to start music while young Douglas Jones watches and listens

## FOR CARNIVALS

waste of money, but the man was insistent; thus, Miami's Mr. Fixit added to his list of unique projects the construction of a so-called perpetual-motion apparatus.

Until recently Logan did most of his "fixit" work at a shop in his home. However, at 51 years of age he was eligible for retirement from the Miami Police Department after 31 years of service. He lost no time in setting up a regular establishment—"Logan's Carnival Shop." Gaudy signboards in yellow and red side-show lettering carry out the circus and carnival atmosphere and with characteristic carnival immodesty proclaim Logan "craftsman extraordinary."

A trip through the shop soon confirms his claim. As he explained the nature of his business, he took time out from two projects on which he was working. One job was framing and decorating "crazy mirrors"—the kind that make you appear upside down, tall and skinny, short and fat—for

Made by Logan, this vise holds "horse" carving



Logan works on an eight-foot-tall figure made of plastic laid over glass fiber. This figure, ordered by a Miami Beach motel, will "team up" with a plastic-and-glass-fiber burro to attract attention of passing tourists

a boardwalk show that's in business up in New Jersey.

A few feet away were the nearly completed figures of huge desert wayfarers ordered by a Miami Beach motel to attract attention and to carry out its architectural scheme. In building these figures—a gowned and turbaned traveler and his burro—Logan used glass fiber, which he covered with plastic. At a nearby bench, one of his two assistants, both feminine, was working. The assistant, Dolores Astling, former police radio dispatcher, was putting together a model clipper ship that would serve as a working pattern for the construction of a 10-foot-long craft. The larger vessel would be used by another motel for decorative purposes.

Logan's odd business started many years ago, when he began working with his father on a part-time basis in building and repairing all types of equipment for circuses and carnivals. Throughout the years he worked with the police department, he continued his hobby. Frequently, he obtained leave from police work to handle special requests from shows. Once, he was called to Coventry, England, to check and put in top operating shape all American-built rides used by an amusement park there.





Operating from paper-roll guides, this combination violin-piano music box is being fixed for a museum

Another time he spent several months at an amusement park in Illinois, handling what he describes as his "toughest job." The roller coaster at the park wouldn't roll at one section, and the park's mechanics couldn't find out what was wrong. Logan said he went over the entire layout, checking it and making repeated measurements, because a roller coaster depends on the law of gravity. He finally concluded the track had sunk in various places and told the owner that it would have to be raised. It took a crew of 150 men to jack up the ride to the proper height, but Logan's diagnosis proved to be correct.

A graduate engineer from Brown University, Logan has picked up planning and working knowledge in many fields. He is an electrician, welder, machinist, woodworker, artist, photographic technician and musician (piano and drums). He has accumulated a store of information about odd musical instruments of all types, and work in this field keeps him busy much of the time.

A man in Winnipeg, Canada, sent a broken Swiss music box to Logan. He eliminated the trouble and returned the box in tiptop shape but didn't bill the man because the job had taken so long. The Canadian was so pleased he sent the fixit man a round-trip ticket to California.

Recently, a nationwide search by Logan ended in a Miami secondhand shop. There, he found a 1913 mechanically operated violin-



This 80-year-old forerunner of jukeboxes uses metal plates and has a selector unit similar to late models

and-piano music box. Logan had located and reconditioned it for the museum of his client in Portland, Ore.

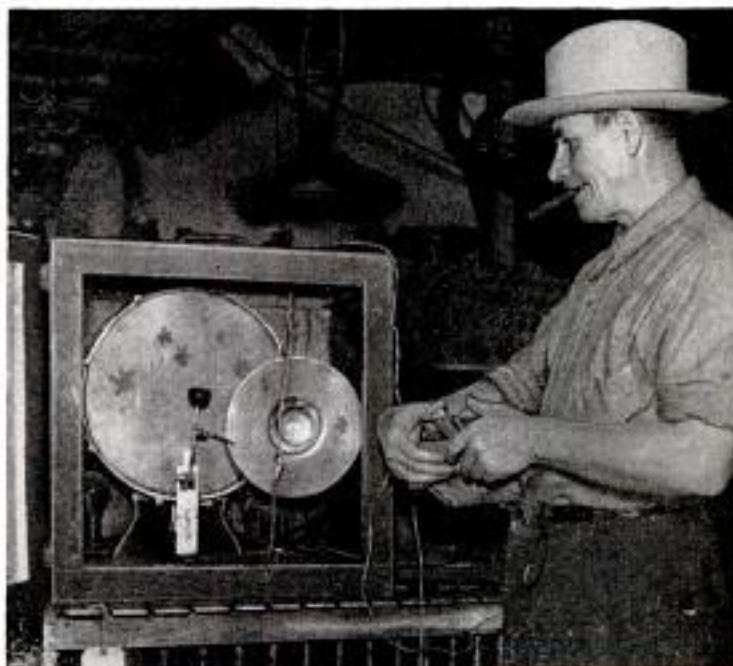
Among items on display at his shop is an 80-year-old forerunner of today's jukebox, a pushcart hurdy-gurdy and a rolling Civil War era music box.

In a corner of his shop is an electric drum made by Logan. Inside a wire cabinet are a snare drum and cymbal. Control levers operate each of these electrically, and the controls can be hand or foot manipulated.

In one part of the shop are circus calliopes. Awaiting repair are a music box

(Continued to page 244)

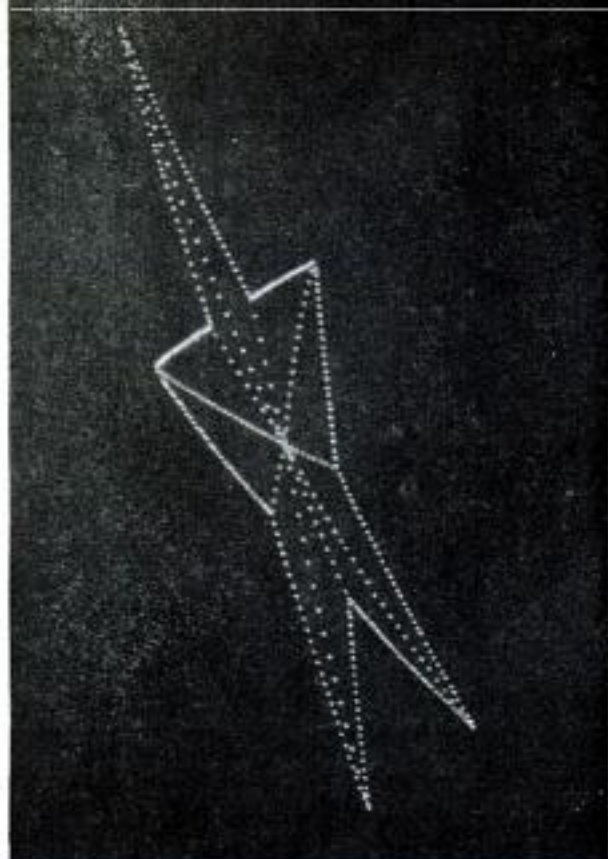
Two electrically operated levers work this trap drum and cymbal, built by Logan. If not melodious, the unit is loud





### Outdoor Tree Is Plastic

Wired for lighting and equipped with sockets for standard Christmas-tree bulbs, the artificial outdoor evergreen, above, is made from a sheet of tough plastic. The manufacturer claims the plastic is highly resistant to weather and breakage.



### Star Visible 100 Miles

Erected by the El Paso, Tex., Electric Company on towering Mount Franklin is this giant star which can be seen for 100 miles from the air. It measures over 450 feet at its widest point and its 459 bulbs require nearly 70,000 watts of electric power.

### West Berlin Glass Blowers Produce Prized Yuletide Ornaments

Unusual Christmas tree ornaments are made by skilled glass blowers in West Berlin. A sample of their work and one of the artists at work are shown below. The trans-

parent glass balls are mouth-blown about tiny trees, Santas, angels and other Yule subjects. The ornaments have a base so they can also be used as table decorations.





### Suction Cup on Ceiling Prevents Tree From Tipping

Here's a simple way to prevent a Christmas tree from tipping. A rustproof rod is attached to the ceiling of the room by a rubber suction cup. The rod comes in two 26-inch sections. The top section is the stabilizing rod and is attached to the suction cup. The base rod is hollow and con-

tains a tension spring. The base rod has two metal straps which are fastened to the tree. The stabilizing rod is inserted in the base rod until the top of the base rod is within eight inches of the ceiling. The spring pressure forces the suction cup against the ceiling, holds tree securely.

### He makes Christmas Trees With Goose Feathers and Wire

With a half pound of goose feathers and a half pound of wire, Frank Sing of Sunnyslope, Ariz., can produce a four-foot Christmas tree. The feathers are washed three times and dried thoroughly. Then he attaches a length of 14-gauge wire to a shaft driven by an electric motor. As the

wire turns he winds the feathers around it, wrapping the feathers with a thinner wire. It takes about a minute to wind two feet of feathered wire. The artificial tree branches are inserted in holes drilled in a  $\frac{5}{8}$ -inch dowel. He also makes wreaths and artificial ocotillo (desert shrubs) from feathers.





# Walt Disney's **MECHANICAL WONDERLAND**

By  
Tom McHugh

Photos  
Copyright by  
Walt Disney  
Productions

**T**AKE ONE CREATIVE GENIUS with ideas, engineers with mechanical know-how, a 160-acre orange grove in Anaheim, Calif., and mix thoroughly with \$19,000,000. The result? Disneyland, U. S. A.

Walt Disney, the genius behind this playground, has a mind that is constantly busy with new ideas. In fact, he used to bemoan the fact that there was little to do on week ends.

But that was two years ago. Now, Walt has a new hobby to play with on week ends. Each Saturday he tours Disneyland, checking the operation of the rides and imagining new adventures for his visitors. The park is a veritable multimillion dollar toy for him.

The idea of Disneyland started about 20 years ago—almost as long ago as Mickey Mouse. Walt envisioned a "magic kingdom" based on his own film characters.

This original idea mushroomed into a giant dream with its separate realms of Fantasyland, Frontierland, Adventureland, Tomorrowland and Main Street.

In Fantasyland, for example, Walt wanted visitors to relive the experiences of his cartoons. If they were going to be Peter Pan, they would fly through the air



over London and be pursued by the Crocodile and Mr. Smee.

The ideas sounded wonderful but to convert them into actual rides required the services of some very clever engineers and art directors. Among several, Walt went to Robert Matthey, the man who worked on "man-eating plants" for Tarzan movies and a giant make-believe squid for *20,000 Leagues Under the Sea*.

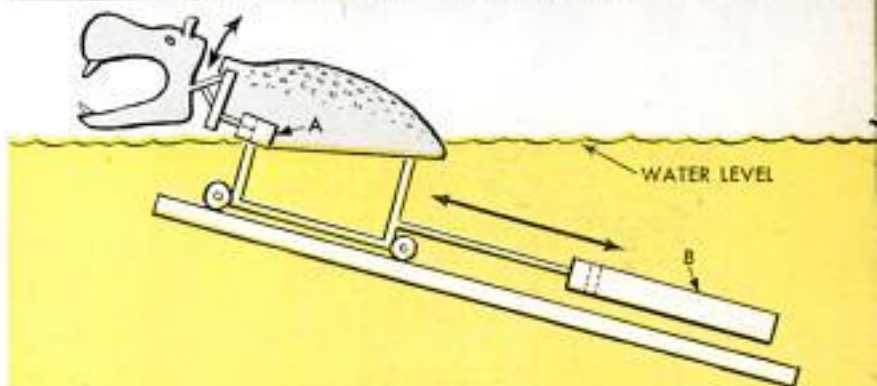
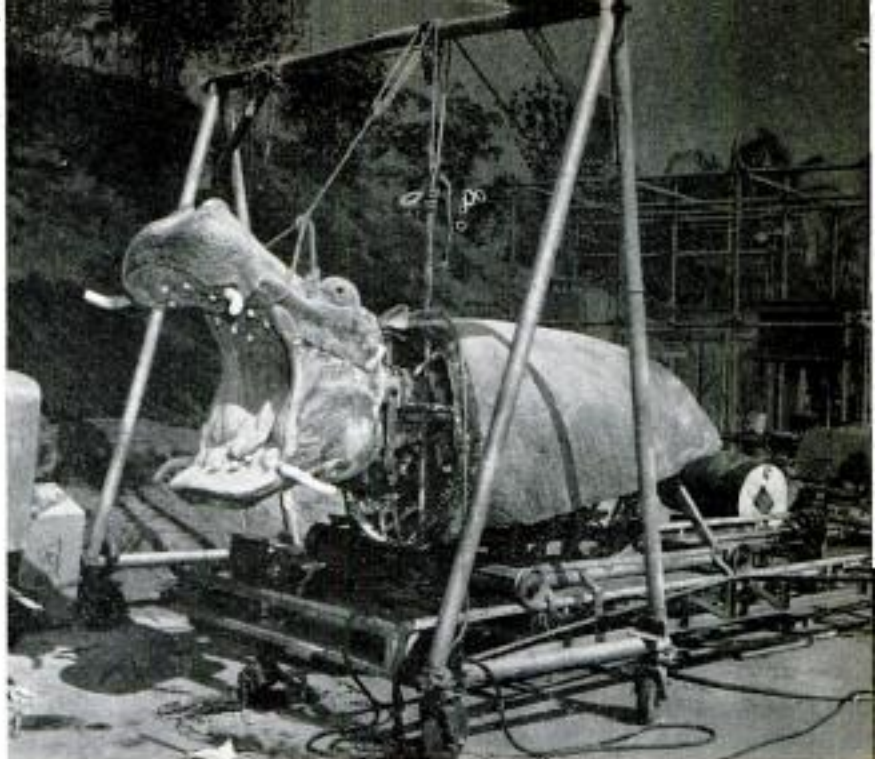
Walt told Matthey, "In Adventureland, I'd like to have mechanical animals that look real, animals that wiggle their ears and open their mouths."

A few weeks later, Walt went down to Matthey's workshop, which then looked more like a museum with its mass of animal skins and molds. Matthey was particularly proud of a group of alligators that moved in a circle and opened their mouths. Walt, too, was pleased with their operation.

Matthey went on to explain how a special drive belt would fall off and stop the operation if any part failed to work.

Walt then looked at him and said, "But I don't want them to stop."

A few weeks later Walt looked at a redesigned model that didn't have this belt. It didn't need it because Matthey had made the operation of the alligators foolproof. They went through hundreds of cycles in a test tank.



Anatomy of mechanical hippopotamus includes a glass-fiber hide and hydraulic cylinders (A and B) that move head and body

Here's how hippo appears to visitors aboard the jungle-river boat. Boat cuts beam of electric eye to trigger animal action





Peter Pan ship carries its passengers over the London rooftops en route to Never-Never Land. Control panel, at right, flashes lights to report the location of each ship of the Peter Pan ride along overhead monorail



Frontier cabin is left in flames after attack by savages. But flames really come from gas jets and building is concrete



A centrally placed, five-horse-power electric motor ran to a reduction gearbox. The output shaft from here engaged a circular driving chain 20 feet in diameter. This chain pulled the trio of alligators around in a circle.

Levers running from their mouths rode on circular rails alongside the chain. Elevations in the rails then opened the mouths of the 'gators.

As foolproof as this design first appeared, Matthey was rebuffed by a new factor in actual operation. Mud and sand on the bottom of the jungle river soon began eating up the chain.

Matthey is now in the course of testing still another design that won't have the chain. This time, the alligators will float instead of riding on a circular track. They'll also be mounted on an arm that will revolve about a central pivot. Water jets underneath the alligators will push them on their circular path, thus eliminating any moving chain. Rudders similar to those on a submarine will push the 'gators to the surface and then submerge them. These rudders will work off a cam at the center.

"Our biggest problem in building these mechanical animals was one of finding durable materials," Matthey complained. "Animal skins of rubber or fabric soon cracked and split under the vicious attack of sun, wind and rain. We finally chose glass fiber for the animals. We jointed any moving parts much like a suit of armor."

Matthey molded glass-fiber animals like his hippos in giant forms. He saved all his forms for making replacements.

He first thought of running his mechanical hippos with an oil-hydraulic system. But this soon appeared out of the question. Any leaks would contaminate the water and form an ugly slick.

He then chose water as a liquid for his system of plungers and motors. Minor leaks would never show in the jungle river.

The heart of his system, a centrifugal water pump, now pushes water through a large main.

Quick-action valves distribute water to the cylinders in the hippos at the proper time. The valves are controlled by cams which revolve on a shaft. The size and

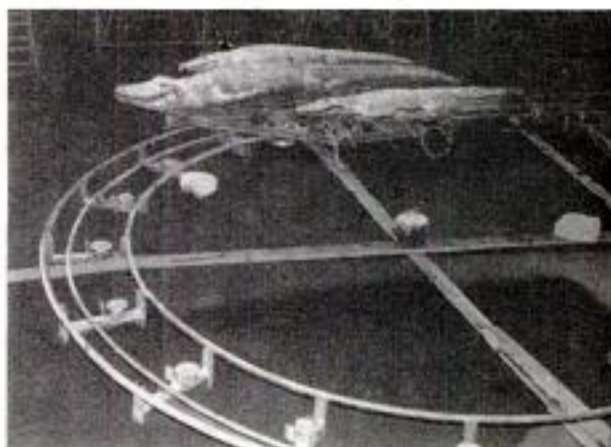


This time it's alligators threatening the jungle-river boat. Lever on a guide rail opens alligator jaws

shape of the cam determines whether the valve will open quickly or slowly, for a short or long period, and for a small or large portion of water.

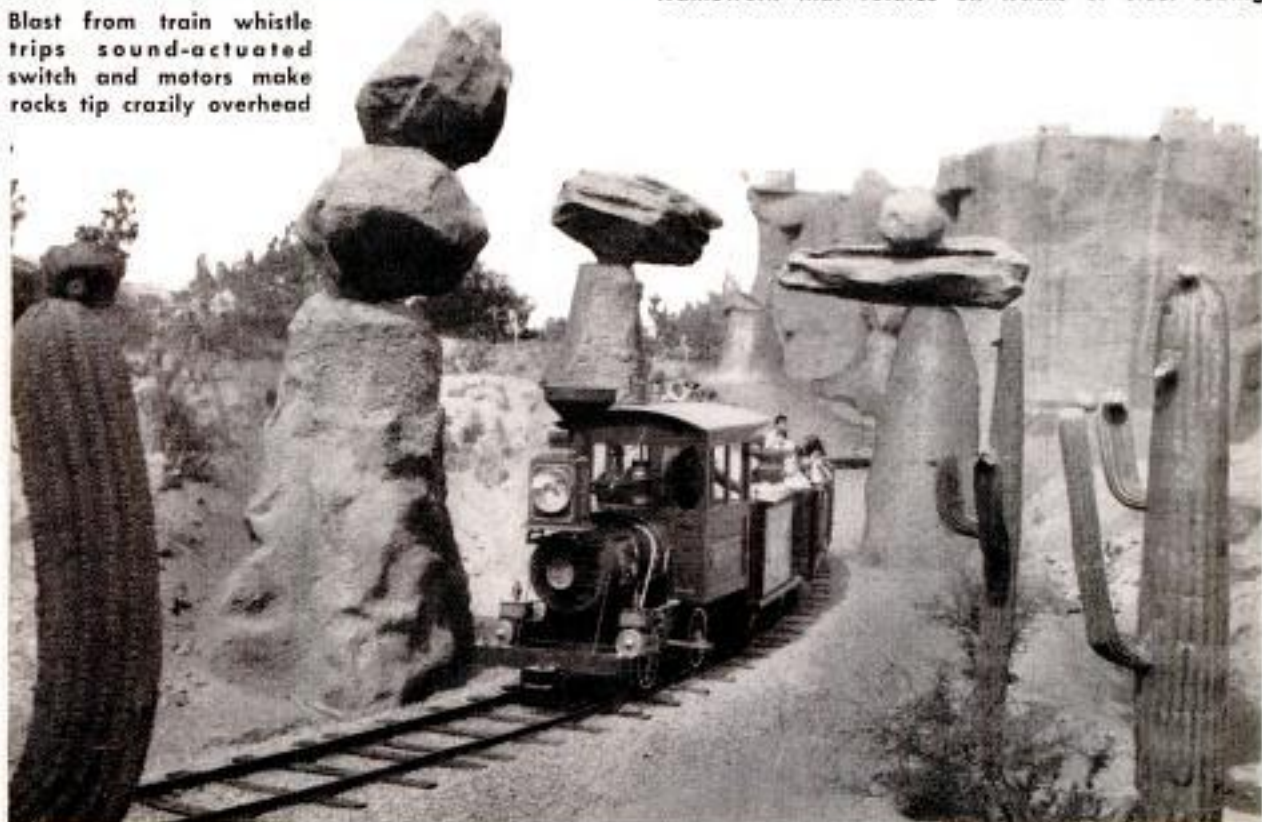
These spurts of water move plungers which then move the hippos. The charging hippos, for example, have three cylinders. One pushes the hippo back and forth for eight feet, another pushes it up and down, and still another lifts its head. Smaller hippos have just one cylinder to move them up and down.

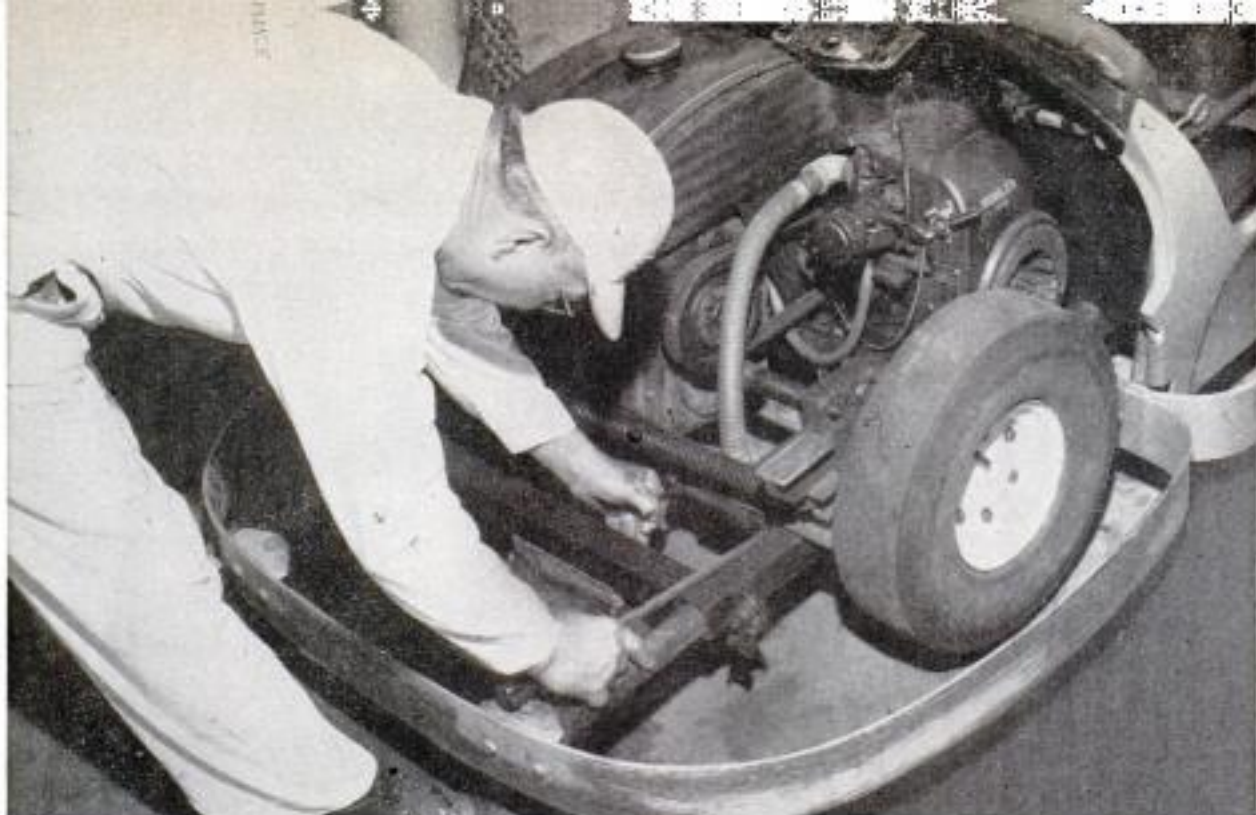
Each hippo also has a water motor to wiggle its ears. Seven jets in this motor shoot streams of water against a small turbine. The shaft from the turbine connects



Mechanical alligators, out of water, are seen on framework that rotates on tracks of steel tubing

Blast from train whistle trips sound-actuated switch and motors make rocks tip crazily overhead





Engine and rear wheel assembly of Autopia cars are removed in a few seconds by disengaging a sliding pin

Midget cars with glass-fiber bodies and gas engines travel Autopia freeway at about nine miles per hour



Mr. Smee aims blunderbuss at approaching Peter Pan ship. Electric motor rocks rowboat back and forth



to rods running to the movable ears much the same as an auto crankshaft connects to rods running to pistons.

Mattey also used plungers in cylinders to operate other attractions.

#### Train Is Illusion

In the Mr. Toad Ride he wanted to imitate the twin headlights of an approaching English train. As the visitor heads straight toward this train in a midget car, a head-on collision seems imminent.

Actually, the approaching train is an illusion. Its headlights are made from two lamps masked in front by two irises, similar to those in cameras. The approaching car trips a switch which operates a solenoid valve. This valve shoots air into a cylinder that in turn opens each iris and pushes them in opposite directions. The "headlights" thus get bigger, brighter and farther apart. A speaker blasting forth the noise of a chugging train completes the illusion.

In another part of this ride, jiggling devils dance weirdly against a fiery background. Here, Mattey used a small motor to turn a cam which hits a microswitch at odd yet frequent intervals. The switch trips a solenoid valve that shoots air against a plunger. The plunger in turn connects to a long spring-steel rod, on the end of which is fastened the devil. Irregular cycling of the valve gives the devil many odd motions.

#### Rugged Test for Tiny Cars

Elsewhere in Disneyland, Bob Gurr, director of special vehicle development, tested his Autopia cars. Nowhere do cars get



rougher daily treatment. But they're as maintenance-free as a midget car can be.

Bob supervised the building of 11 designs, then put each through a grueling 300-hour test. The patrons drove the car all day. Then special drivers took over to run it all night. Mechanics added gas and oil but never laid a wrench to the car.

Some of the early designs lasted only a few hours. Bob hauled these failures back to the machine shop, evaluated them, then redesigned and rebuilt them.

And back they went to Autopia for another test.

#### One Pedal Controls Motion

Finally, the 11th car ground around the course for two weeks without any failures. Bob chose this one as the new Mark IV.

Bob's biggest problem was one of finding a small gas engine to stand up under these

(Continued to page 230)

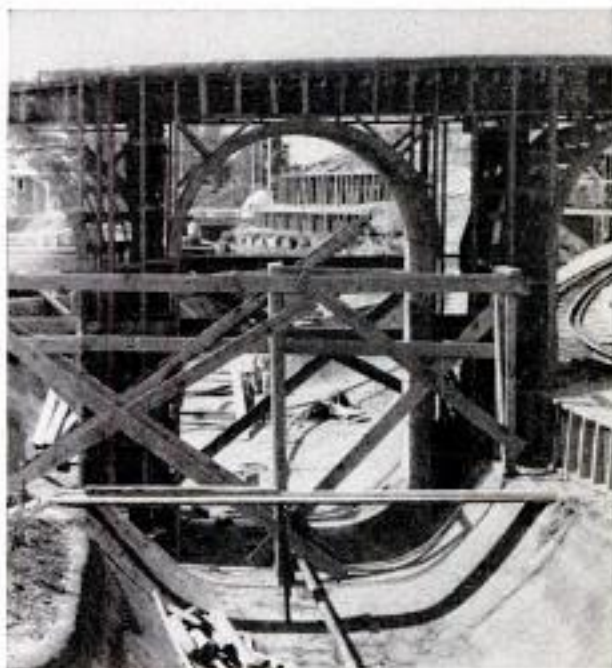
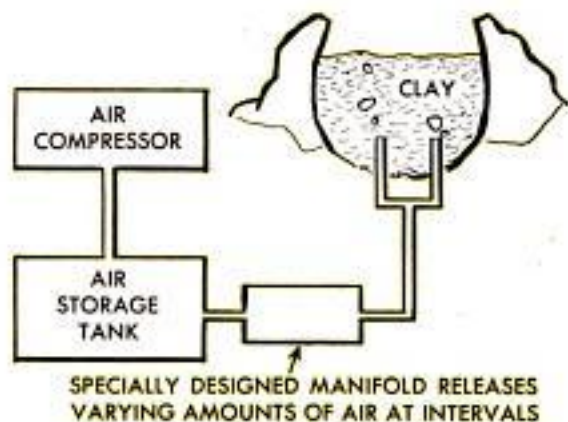
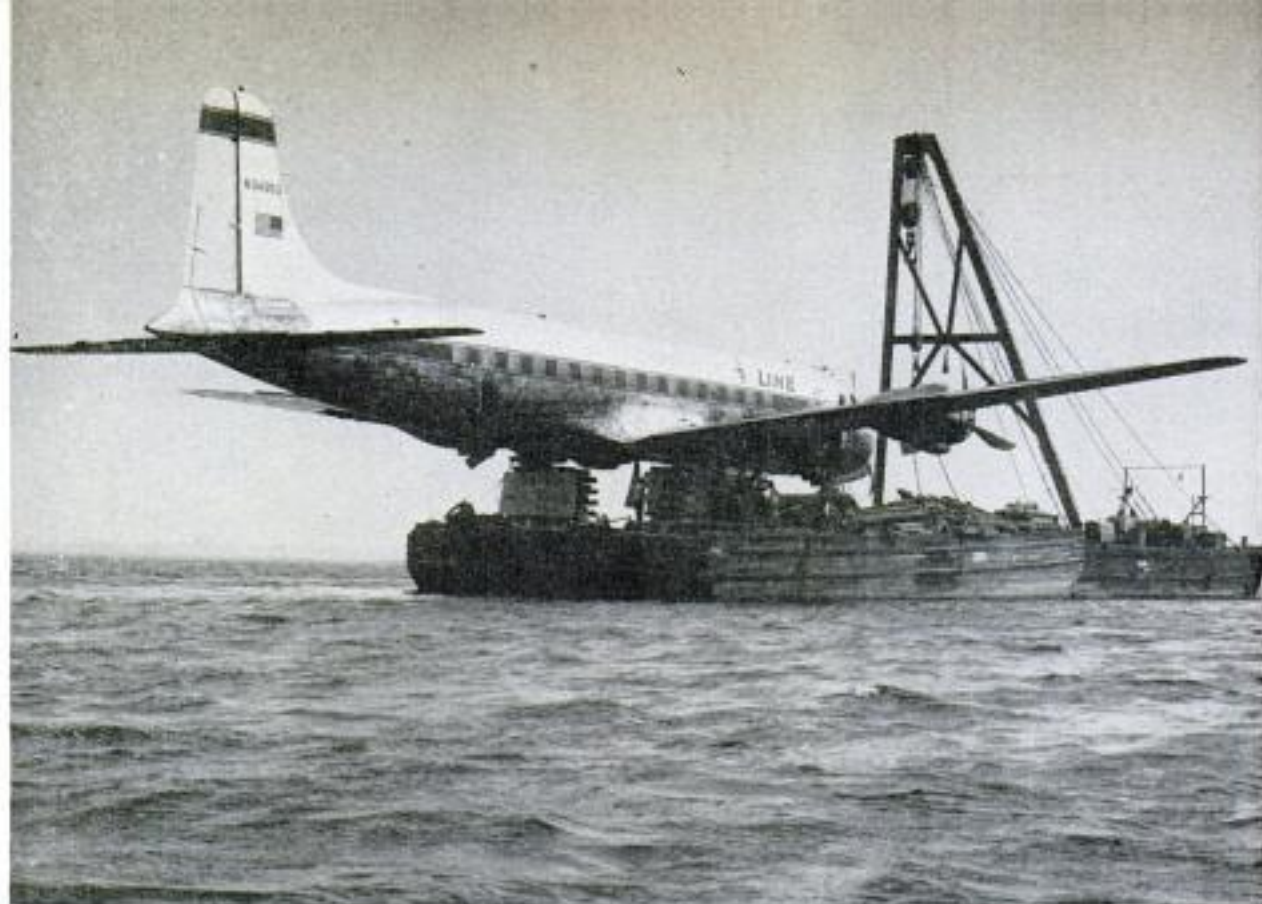


Diagram below shows mechanism of bubbling soft clay, lower right, in Rainbow Desert "paint pots"

Above, before and after views, of Storybook Land. Note monorail on the canal bed to guide small boats

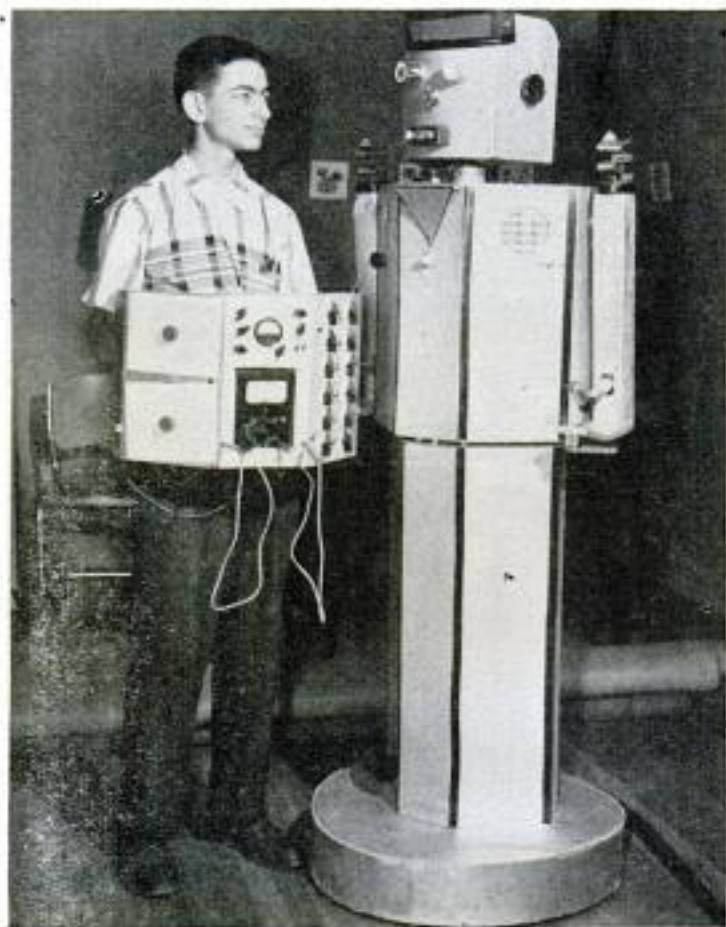




## Barge Sunk in Mud Flat to Recover Downed Plane

Salvaging a plane that made a forced landing on a mud flat on Long Island was a tough problem. Lifting the plane by crane might have sprung its frame. Finally a channel was dredged to the mud flat,

where a barge was sunk. The plane was pulled by a bulldozer onto the barge and the barge refloated. Later the craft was towed to a spot where it could be unloaded. It was flying within a week.



## Robot "Sees" Objects And Senses Humans

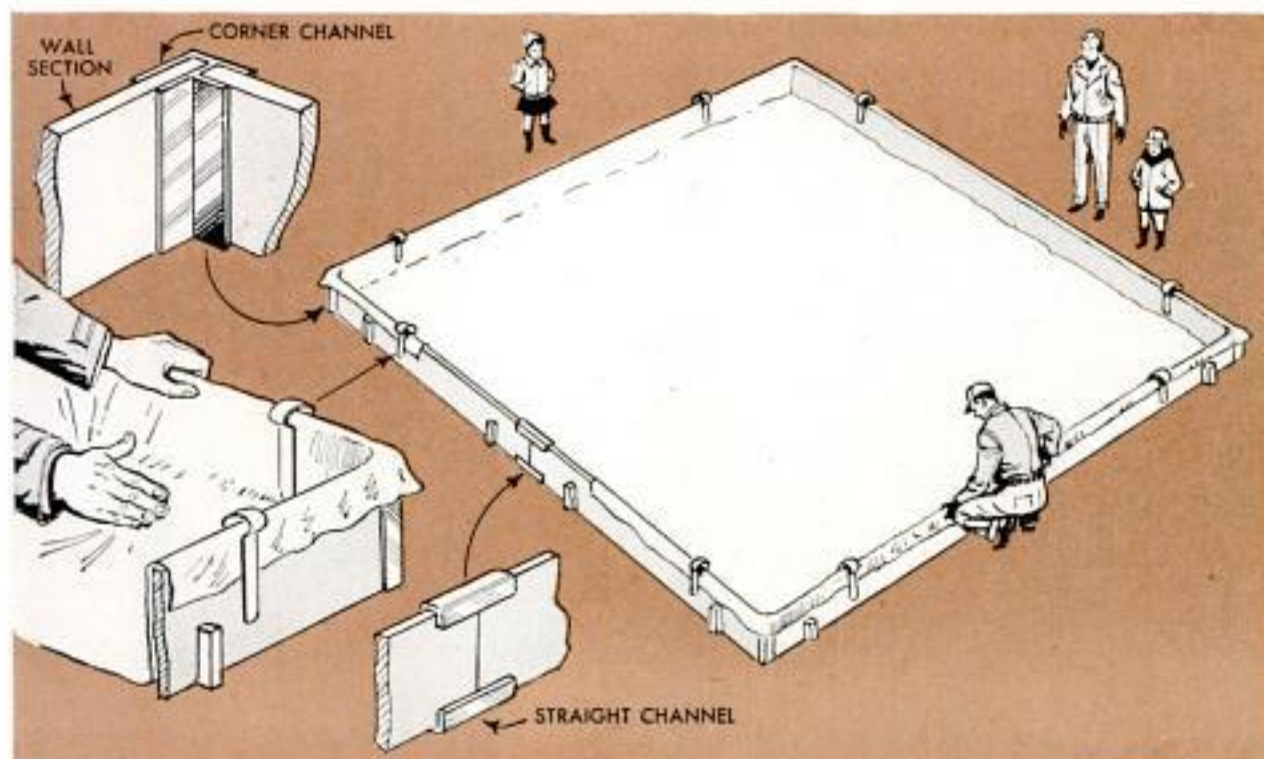
Built by a 13-year-old boy, a six-foot robot is capable of "seeing" an object and sensing the presence of a human being. Donald S. Rich of Kew Gardens, N. Y., has also endowed his mechanical man with the ability to move its arms, pick up objects manually or magnetically, roll forward or backward on powered wheels and calculate numerical problems with an electronic computer. The robot's light-bulb eyes send out beams. If the light beams strike an object and are reflected into a photoelectric cell located in the mouth, the robot halts, preventing it from bumping into anything. The robot also senses a human being's presence through a capacity-operated relay. Current induced in the instrument by the proximity of a person will stop the robot. The computer, which adds, subtracts, divides and multiplies, fits on the robot like a vest. Westinghouse provided many of the parts for the robot.



## Back-Yard Rink for Ice Skaters

KIDS CAN ICE SKATE in their own backyard on rinks that can be folded up for between-season storage. The rink consists of edging boards and a one-piece sheet of Bakelite polyethylene film. It can be set up on any level area of the lawn or garden. The edging boards are assembled into a frame with the aid of special channel

strips. The sheet of film then is laid out over the frame and held in place with metal clips. The rink requires about two inches of water to provide a smooth skating surface. The sheet of film will hold the water in place during thaws. The skating rinks are available in sizes ranging from 12 by 12 feet to 18 by 36 feet.





Cadets at the Wisconsin State Crime Laboratory watch the instructor show how to photograph footprints

Future traffic cops learn self-defense so they can handle drunks, criminals or other unruly characters



# School for Courteous Traffic Cops

*By Phil Hirsch*

POPULAR MECHANICS

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At the scene of an "accident," state-patrol cadets learn that some insignificant clues are the most valuable

**I**T ISN'T OFTEN that a motorist thanks the police for giving him a ticket, but that is exactly what an attorney in Racine, Wis., did recently.

The attorney wrote the following letter to the Wisconsin State Highway Patrol after receiving a summons because of a noisy automobile muffler:

"I want to thank you for the pleasure of receiving a ticket. I was impressed by the officer's clean appearance, his courtesy and his knowledge of the law. I asked him sev-

eral rather complicated questions about my violation. His answers were well thought out and showed a real grasp of the subject."

The patrolman who received these bouquets earned them at the Wisconsin Patrol Academy, which many traffic experts consider the toughest, most thorough police training school in the world. The letter is part of a steady stream of fan mail that has been pouring into state-patrol headquarters ever since October 1955, when the academy opened. Here are a few more:

Cadet instructor trains men in techniques for handling "tough guys" who are searched while they are off balance





Traffic-school students learn proper method of handling injured persons from American Red Cross experts

A woman wrote to tell how an academy graduate came to her rescue when she had a flat tire miles from the nearest town.

A farmer said he would "never forget" how two academy-trained officers saved his young daughter's life. Seriously injured in a head-on collision, the little girl was bleeding profusely when the officers arrived. Quickly, they stopped the bleeding and rushed her to a hospital. "The doctor told me she would have died if your men hadn't known what to do, and done it promptly," the father reported.

Last year, several academy graduates were assigned to a heavily traveled, accident-infested stretch of U. S. Route 41, near Milwaukee. The first three months they were on the job, there were 25 accidents. By comparison, there had been almost twice as many accidents on the same road during the identical period of 1955, without academy-trained officers on the job.

#### Officers Devoted to Duty

Graduates of the new school not only are among the best-trained traffic cops in the world; they also have an unusually intense devotion to duty. Many leave well-paying jobs to join the patrol. One recruit, for example, was making \$600 a month as an engineer; he is now earning \$321 a month as a patrol officer. Another trainee, the father of six children, mortgaged his home to supplement the \$226-a-month salary he would make as a cadet at the academy.

"Men like this aren't likely to lie down on the job, nor are they likely to overlook violations or accept bribes," explains the academy's quiet-voiced Director of Training, Sgt. James L. Karns.



"Well, you see it was like this. . . ." Students gather around fellow cadet being subjected to lie detector

The school is located at Camp McCoy, an Army base northwest of Madison, near the Wisconsin Dells. When the first class was being formed, 1300 men applied. All of them took a 2½-hour written exam and a rigorous physical. Only 50 were finally accepted. You can get some idea of the academy's standards from the fact that its typical cadet has an IQ approximately five points higher than that required by the Army for admission to Officer Candidate School.

The course squeezes the equivalent of a year of college into 13 weeks. From reveille at 6 a.m. until lights out at 11 p.m., recruits have little time to relax. They're in class 10 hours a day during the week and half a day on Saturdays. Each night, they have between two and three hours of homework. Also, there are a number of special details. A couple of nights a week, for example, three or four cadets—under the command of a regular police officer—are sent out to patrol the highways around the academy. They leave at 7, right after dinner, and seldom finish before midnight.

#### Just Like the Army

Every night and morning, the barracks have to be cleaned. The fussiest housewife would find little to criticize if she accompanied academy officers on inspection tour. Floors are scrubbed daily, windows are washed at least once a week. Demerits are handed out if a bed isn't made properly, if there's so much as a scrap of paper on the floor, even if a recruit doesn't line his shoes up properly underneath his bed.

(Continued to page 240)

POPULAR MECHANICS



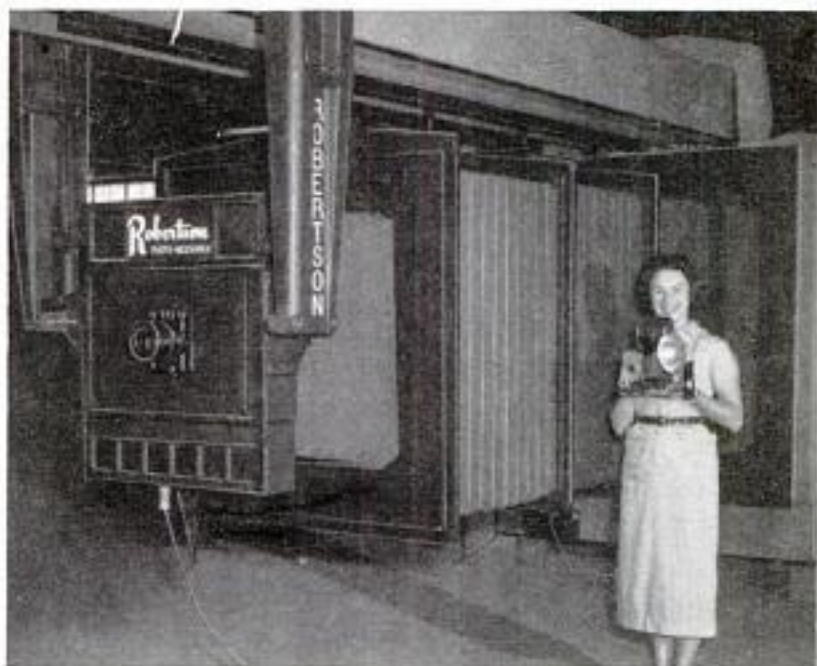
## French-Built Light Jet Trainer Has V-Shaped Tail

Two Turbomeca Marabore jet engines power this French light jet trainer which features a broad V-shaped tail design.

Fuel is supplied from wing-tip tanks. Periscope binoculars in the front cockpit help the instructor watch the students.

## Five-Ton Camera Helps Build Planes

Thirty feet in length and weighing five tons, this camera was built for a California aircraft plant. It will be used to reproduce templates, or patterns, on plates of steel or aluminum. It can project the image of a drawing to a size of 5 by 12 feet within  $\frac{1}{2000}$  inch accuracy. The lenses alone are valued at \$3000. The huge camera uses film 42 inches wide and it can be focused either by hand or electrically with a special interlocking device.



## Hair-Size Hole Made by Drill

Operating at a frequency of 28,000 cycles per second, a tiny brass drill bit tipped with diamond paste can bore a hole about the diameter of a human hair. The sound waves, twice as high in frequency as a person can hear, produce a current which drives the drill like a jack-hammer. The drill was devised for boring holes in ceramic magnets (see inset) which are nearly as hard as diamonds. Fine coil wires are threaded through the holes which are made into the "memory cores" of electronic computers.



Melaleuca pods filled with seeds are shaken to empty the pods. James Stokes gathers the tiny seeds to sell by the pint

## HE DECORATES WITH WEEDS

By Max Hunn

This large piece of Melaleuca bark will be sold by the pound to florists who will sell it as a vase covering



**T**HE BEACHES, PINE and palmetto lands of southwest Florida provide 66-year-old James A. Stokes of Fort Myers with materials for one of the most unusual wholesale florist businesses in the country.

A former constable, Stokes now "takes into custody" such items as sea oats, okra, highland sponge, Melaleuca bark, eucalyptus branches, pine cones, palmetto fronds, floral buttons, cabbage-palmetto berries, fan-tailed millet, sea-grape leaves, Spanish bayonet stalks, ferns and hatpin flowers.

He gathers these plants usually with the help of but one person, since his operation is fundamentally a one-man business. He hauls wild plants to his factory, dries them in the sun, and stores them in an open-sided warehouse until needed.

Although he dyes and tints some items carefully



Palmetto buds are shredded on this nail-studded board. The end product may wind up in your home

by hand, other specialties he sells in their natural state. Several of his customers prefer to do their own coloring. Stokes regularly stocks sea oats, dyed red, purple, yellow



Stokes demonstrates method by which he dyes sea oats. Bunches are dropped into vat of boiling dye

low and green; and eucalyptus and Melaleuca sprays in silver, gold and bronze. He dyes many woodland plants to order.

Retail florists use Stokes' items for

Freshly dyed items hanging in sun are sea oats, eucalyptus and Melaleuca plants, all gathered in Florida





Stokes holds freshly shredded palmetto buds, which he may dye or sell in their natural state to florists

Newest experimental items are Stokes' pampas-grass plumes. These silky samples are hanging in his storage warehouse

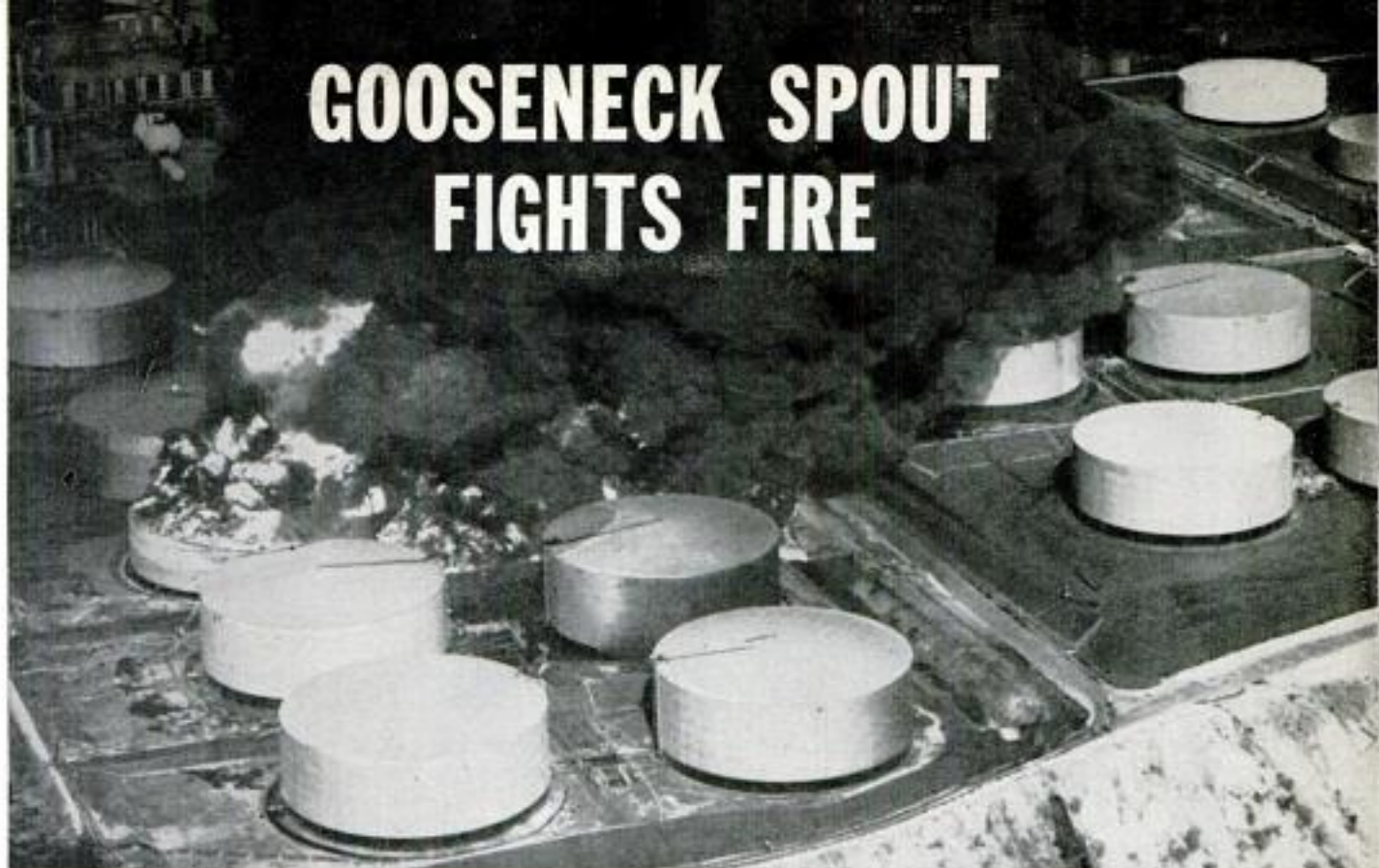


dances, dinners, weddings, funerals, home decor and window dressing. Fall is his busy season, when florists stock up for the Christmas trade. But Stokes gathers the year 'round.

In the wholesale business large orders are commonplace. Quoting prices in units of 50, 100 and 500, or per pound and bushel, Stokes thinks nothing of receiving an order for 100,000 eucalyptus clusters or *Melaleuca* branches or for 20,000 sea-grape leaves. Once he was asked to supply two railroad cars of palm buds for the Easter season. He doesn't estimate such orders but carefully counts them out by hundreds.

Stokes has found the *Melaleuca* to be one of his most versatile sources. The branches or sprigs, when dyed, are popular decorations—the bark now is being used to cover vases—and even the tiny *Melaleuca* seeds are valuable. He gathers these by shaking the drying branches over a large, shallow cardboard box. He then sells the seeds by the pint for planting in windbreaks. ★ ★ ★

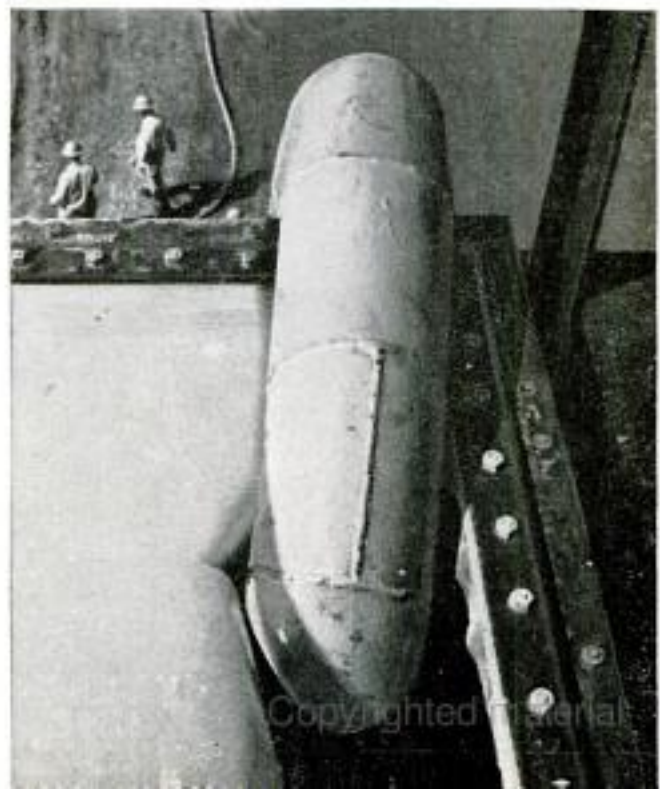
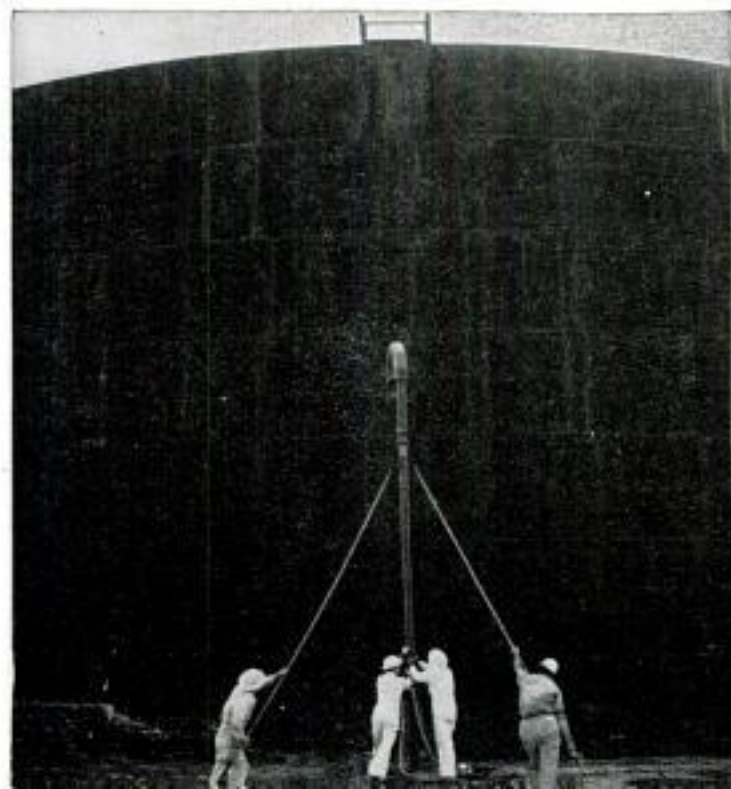
# GOOSENECK SPOUT FIGHTS FIRE

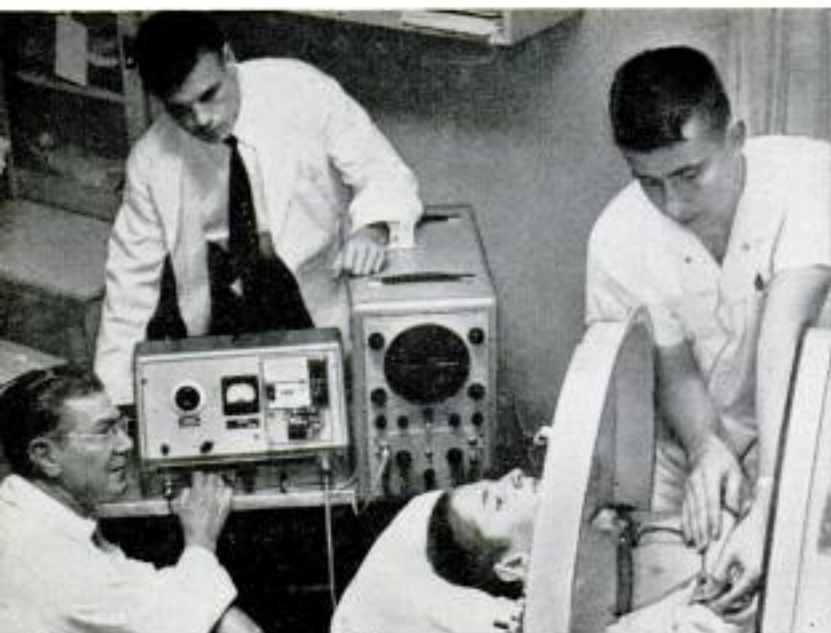


One burning oil tank in a storage farm may start a general holocaust unless fire is quickly controlled

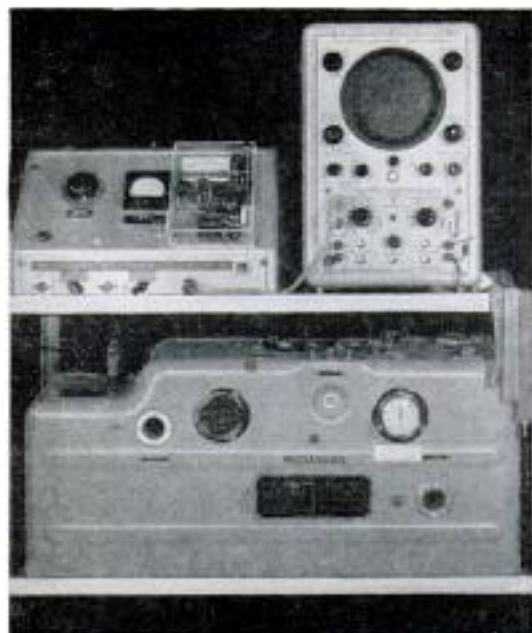
**OIL-TANK FIRES** are brought quickly under control with a newly developed gooseneck spout that shoots foam. It punctures the top of a tank like a giant juice-can opener. The spout is raised into position by hydraulic pressure in three or four minutes. Guided by a guard rail, the spout's sharp "beak" penetrates a plastic cover on the roof of the tank to pour a large quantity of foam on the burning oil. Only four men are needed to handle the tower, which was developed by L. J. Grossheim of the Shell Oil Co.

Newly developed gooseneck-spout tower extinguishes fire in one third the usual time. Tower is raised hydraulically, and spout's "beak" punctures hole in roof to smother fire with foam





Electronic engineers, above, adjust control equipment for iron lung while an assistant applies electrodes to the first patient to use electronic system. Most victims can still control a few muscles and this contraction generates minute voltages that



are detected by the electrodes on the patient's skin, then relayed to the electronic gear. Apparatus used, above, shows respirator control, top left, and the monitoring oscilloscope, top right. Conventional Monaghan respirator control and blower is below

## MECHANICAL AIDS FOR THE DOCTOR



Above, a "patient" connected to electronic apparatus is tested for tensions that may lead to such ailments as heart disease, high blood pressure and ulcers. The round screen on the oscilloscope measures the electrical discharge from muscular activity in millionths of a volt. A rapidly fluctuating line on the screen indicates the amount of tension in a patient. If tension is shown, patients are taught to relax

Below, the first artificial larynx of its kind has electronic vocal cords that will help 50,000 afflicted Americans to talk. Powered by transistor generators no bigger than a pencil point, this apparatus can be worn in a man's vest pocket or on a woman's necklace. A "hearing-aid-in-reverse," the "voice box" of the system is held by James R. Trammell of Cleveland, who helped develop the device chiefly for cancer victims who have the highest praise for it





Right, supersonic waves are aimed with pinpoint accuracy to help neurosurgeons perform brain surgery without destroying healthy tissue or causing excessive bleeding. After a portion of the patient's skull has been removed, this apparatus is focused on the part of the brain to be treated. Converging sound waves pass through all other brain tissue without disturbing it except at the focal point of the sound waves. This technique may replace methods involving direct cutting of tissue or coagulation by electrically heated wires inserted in tissue to be destroyed. A result of seven years' experiments on animals, the \$100,000 machine now is available for human brain surgery. It offers new hope to patients

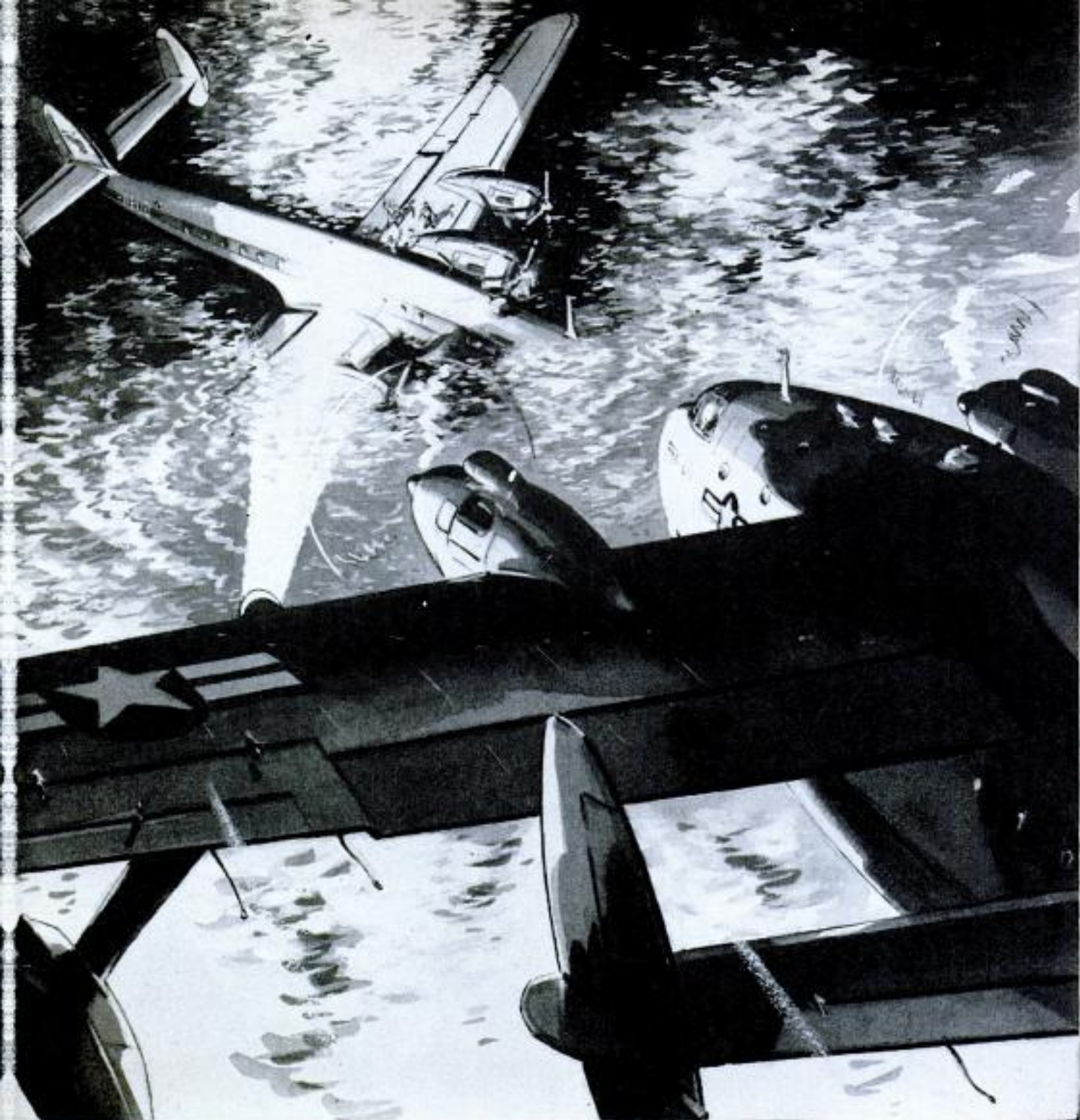


This small water-powered mechanical heart made of plastic soon may replace faulty human hearts. Each artificial heart is about as large as a fist. It contains four flexible chambers surrounded by a stiffer shell. The experimental manmade heart is inserted in the body and connected by a tube running outside the chest wall to a hydraulic pump. Water pressure from this pump presses and releases the chambers the same way an actual heart muscle operates. Blood is pushed in the correct pattern through the four chambers, which have thin valves, and out through rings that connect the chambers with the body's circulatory system. It's from New Zealand



At right, emergency oxygen supplies strapped to a rescuer's back can be carried to a victim of illness or injury. The two-tank, 20-pound unit automatically adjusts oxygen flow to an individual's lungs. A dial on the device can make it force 100 percent oxygen into a person's lungs or suck obstructions from his throat. Two masks are available, one each for victim and rescuer, for use where air has been contaminated. Either mask can be held or strapped onto the wearer. Up to 200 feet of tubing can be attached to this resuscitator, making it possible to lower a lightweight mask to a person trapped in an inaccessible spot during rescue operations





Survivors of ship or aircraft accident at sea can be located in darkness with help of flying searchlight



## Powerful Airborne Rescue Lamp

DEVELOPED originally to locate enemy ships at night, powerful aircraft searchlights are an important aid to air-sea rescue operations. In the photograph, left, is a new searchlight which has a peak output equal to the lights of 10,000 automobiles concentrated on one spot. The lamp can burn as long as the supply of carbons is maintained. Mounted on a helicopter, it can illuminate areas where electric power has been knocked out by tornado or flood.



South wall with 830 square feet of solar-energy collecting plates is sloped 30 degrees from vertical

## Albuquerque Solar Building Tests Radiant-Heat System

SOLAR ENERGY keeps a small office building warm all winter long in Albuquerque and helps to cool it in summer. Outdoor temperatures in the winter drop well below freezing in Albuquerque and yet the temperature inside the building stays at a comfortable 72 degrees. In the summer, with outside temperatures well above 100, the temperature in the solar building never climbs above 78 degrees.

The building and its solar system were designed by Bridgers and Paxton, an engineering firm that occupies part of it. Roger Haines, their chief engineer, says that so far the system is operating at about half the cost of conventional gas heating.

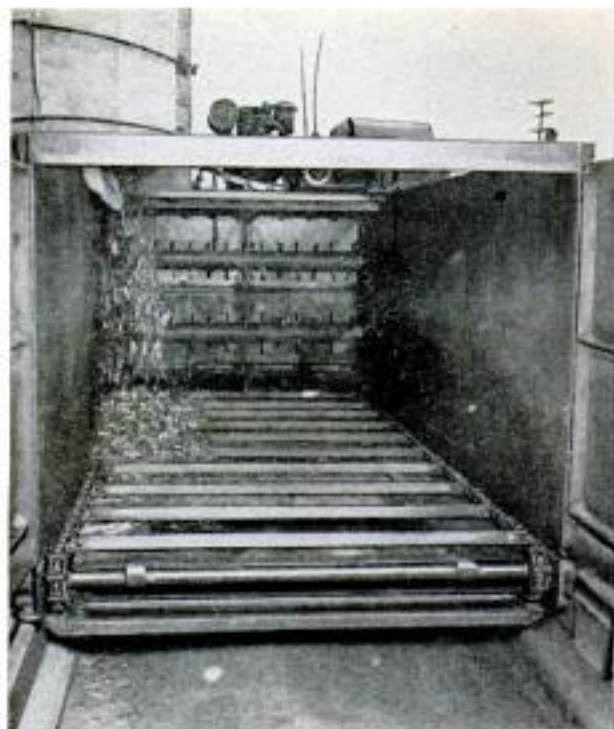
The building uses its sloped south wall as a heat-collecting surface. Water is circulated behind flat backplates in this wall and is heated to as high as 140 degrees by the sun. The water is then pumped to an insulated 6000-gallon storage tank. Hot water from the tank is circulated through radiant-heating coils buried in the floor and also heats the incoming ventilation air. It is then pumped back to the heat collector to absorb more heat.

In prolonged cloudy winter weather the solar collector is bypassed and the hot water in the storage tank is circulated through a refrigeration apparatus. The refrigeration unit acts as a heat pump; it extracts heat from the water and combines this heat with its exhaust heat to maintain the same room temperatures.



Control panel, above, adjusts heating and cooling circuits. Black heat-collecting plates, below, warm water circulating behind them to 140 degrees





## Car Rolls Along Manger to Feed Cows

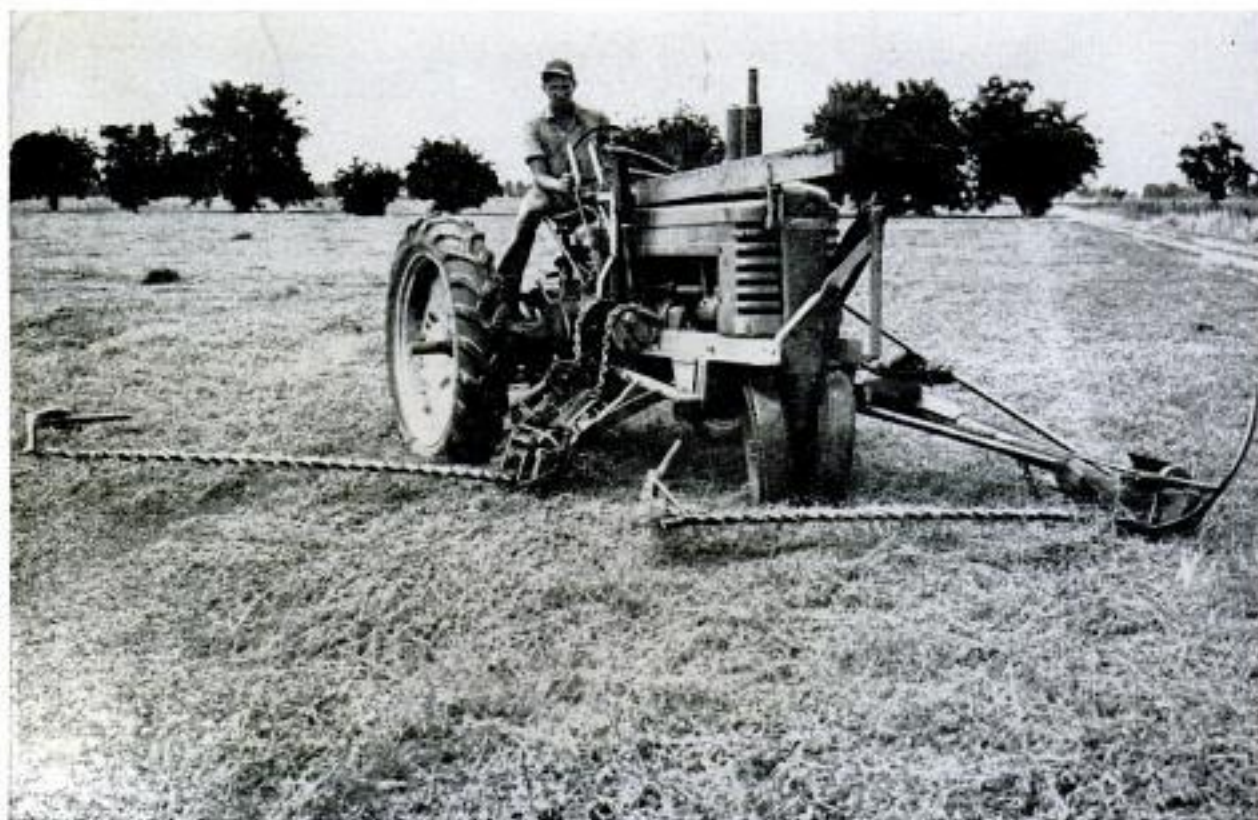
Daily feeding time for 200 cows has been cut about two hours by a powered car that drops silage (above right) while running on rails along the manger walls.

Equipped with a three-horsepower engine, the car can move either way along the 310-foot manger. It is loaded from two silos adjacent to the manger.

## Two Sickles on One Tractor Cut Mowing Time

Hay-mowing time can be halved by two mowing sickles mounted on a tractor. One sickle bar is mounted at the side and the

other in front of the tractor. The combination cuts a swath 16 feet wide. Both sickle bars are powered through a dual gearbox.





### Truck-Powered Winch Loads 100 Hay Bales in 45 Minutes

One hundred bales of hay are loaded on a truck in 45 minutes by a powered winch fastened under the truck bed. As the driver

guides the vehicle, he operates the winch. Each bale is lifted by cable threaded through pulleys attached to pipe.

### Alfalfa Hopper Towed by Harvester

Cut-up alfalfa now can be fed into a self-dumping hopper towed behind a harvester-chopper. The hopper permits the harvester to operate almost continuously without having to wait for a truck to be driven alongside to receive the chopped alfalfa. While one truck carries away a load of alfalfa, the harvester is under way again filling the hopper. The alfalfa is blown into the front of the hopper. When a truck backs up to the hopper to receive a load, two eight-foot hydraulic rams raise and up-end the hopper over the truck, allowing chopped hay to fall in.

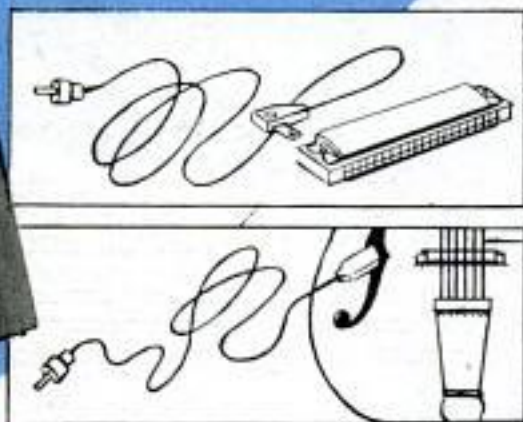
Retracted, the hopper resumes its position behind the chopper. Power for the hydraulic rams is from the chopper engine. This harvester is used on the V. C. Britton ranch, Firebaugh, Calif.





## Transistorized Instrument Amplifier

By Lou Garner



**H**ERE IS a general-purpose audio amplifier with enough gain and power output for typical applications around the home or in small gatherings. It may be used as a phono amplifier, a low-power

Fig. 1. Rear view of assembled system with back cover removed. Cover cut to make controls accessible



public-address amplifier, or as a musical-instrument amplifier.

For applications requiring a relatively low power output, transistorized equipment offers numerous advantages over vacuum-tube circuitry. First, because transistors require only a small amount of operating power, equipment of this type can be battery operated and can be used anywhere with never a thought or worry about the location of the nearest electrical outlet. This, in addition, eliminates the a.c. hum so often encountered in vacuum-tube models. Second, because of the ruggedness and long life expectancy of transistors, extremely reliable and trouble-free performance is obtained. Finally, the use of low-voltage batteries eliminates all danger of electrical shock to the builder as well as the operator.

### Circuit Description

This amplifier uses three low-cost transistors in an R-C coupled arrangement, plus a transformer-coupled power-output stage; see the schematic diagram, Fig. 4. The input stage, TR1, consists of a common-collector amplifier which has relatively low gain but provides the high input impedance desirable in an amplifier of this type. This is followed by two grounded emitter stages which provide

the necessary amplification to drive the 2N255 power transistor used in the output. A "losser type" tone control consisting of C5 and R8 permits treble-frequency attenuation.

Unbypassed emitter resistors, R4 and R7, in the second and third transistor stages serve a dual function: They effectively raise the input impedance of their respective stages, thus minimizing the interstage impedance mismatch and they introduce a small amount of degenerative feedback which, in turn, improves circuit stability and reduces distortion. In all other respects, the circuit is straightforward, with no added frills to increase the cost of construction. Yet, the unit is capable of excellent performance in the applications for which it was designed.

### Construction

You can have as much fun building this

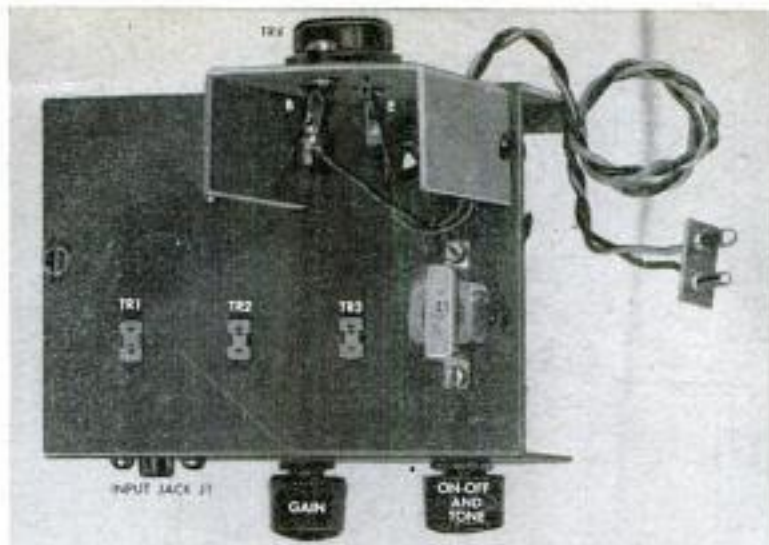
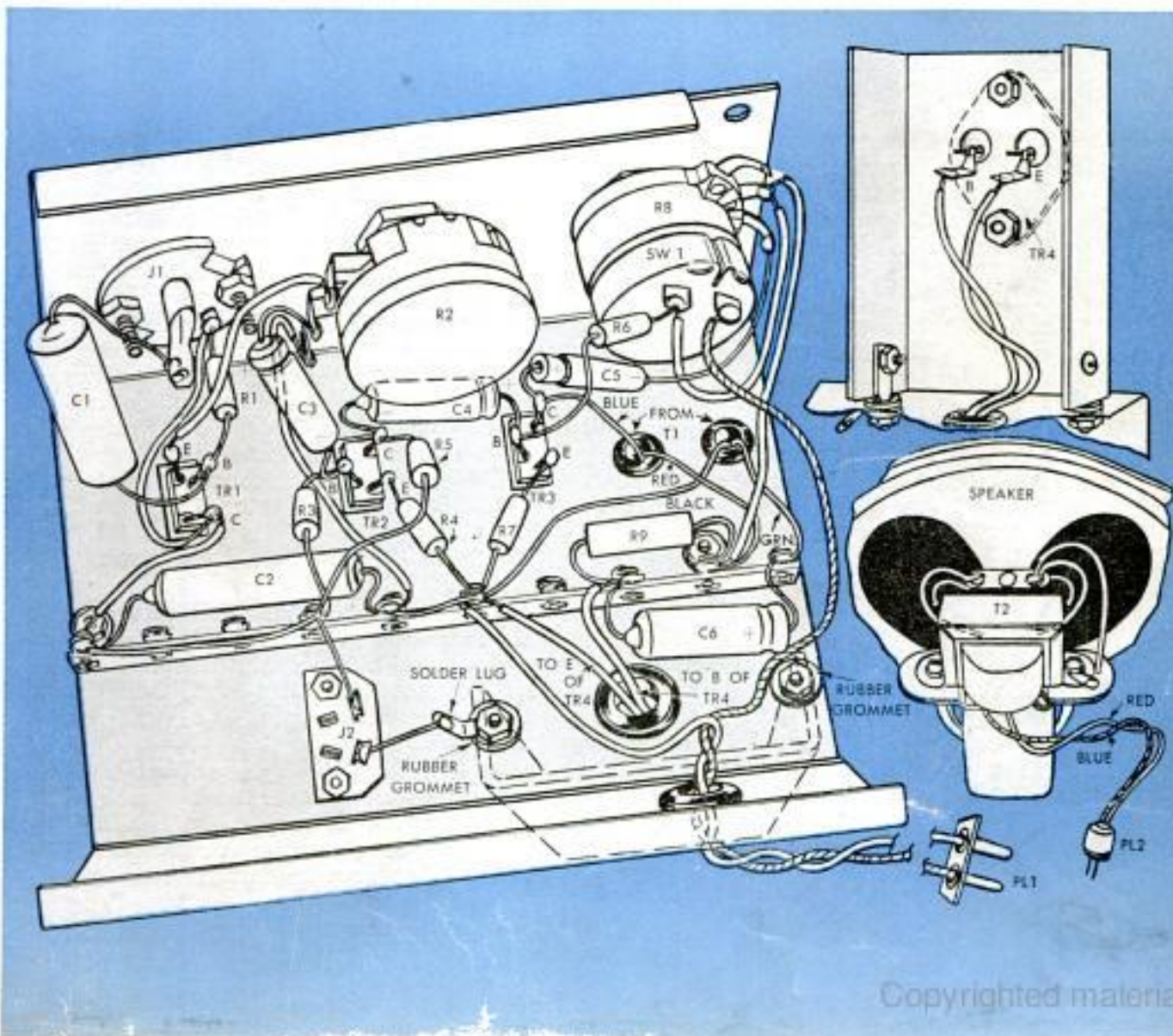


Fig. 2. Top view of amplifier. Note two-chassis construction with smaller unit serving as "heat sink" for the power transistor

amplifier as you will have using it. The necessary components may be purchased, as a complete package, in kit form or, if you already have some of the specified parts on hand, you can save money by buying only the additional parts needed to

Fig. 3. Pictorial wiring diagram of amplifier. Insets show mounting of subchassis and output transformer



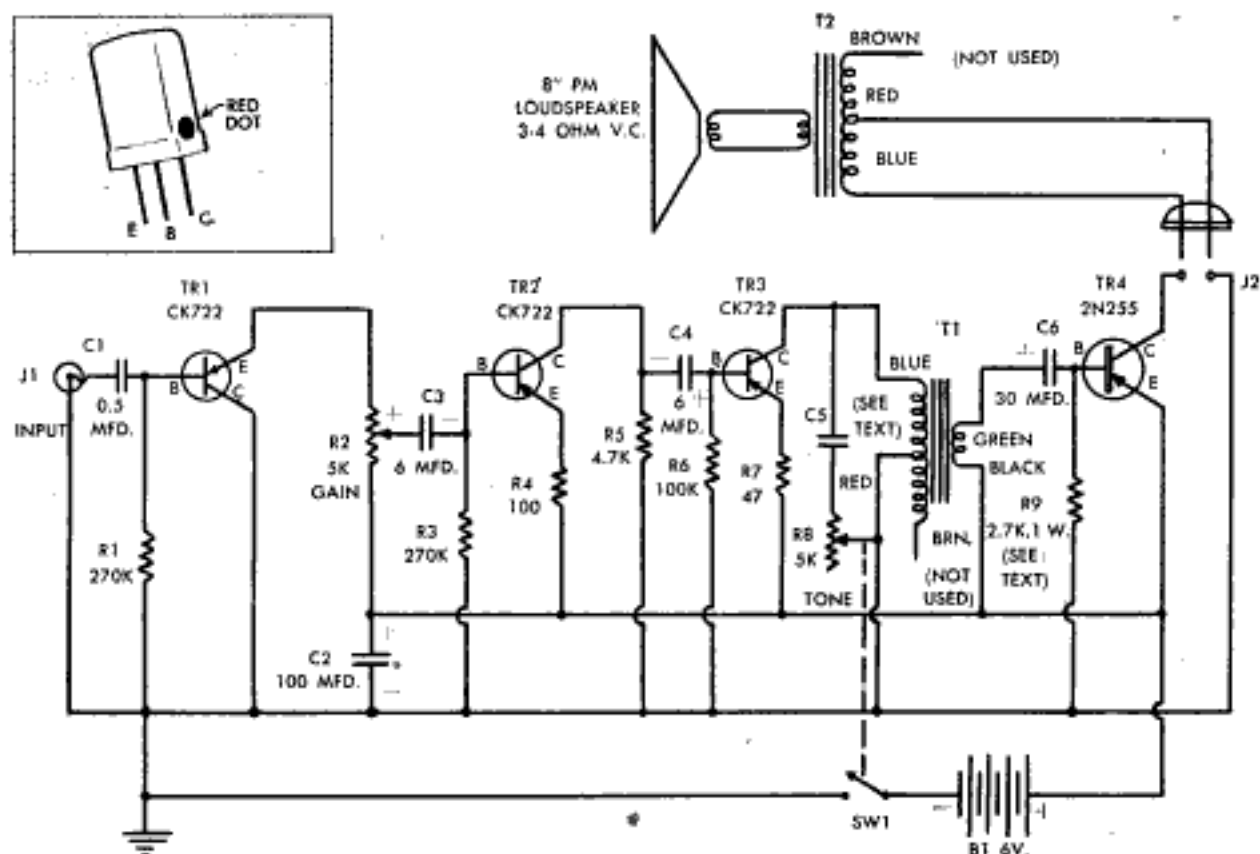


Fig. 4. Amplifier schematic diagram. Inset identifies equally spaced leads of Raytheon CK722 transistor

complete construction of the amplifier.

The main amplifier is assembled on a  $3\frac{1}{4} \times 4\frac{1}{2} \times 2$ -in. aluminum chassis. A separate chassis,  $2\frac{1}{8} \times 1\frac{1}{8} \times 1$ -in., serves as a "heat sink" for the power transistor, TR4, and is mounted on the main chassis with a pair of spade bolts. Rubber grommets or a combination of flat and shouldered fiber washers are used to insulate the heat-sink chassis from the main unit.

Amplifier wiring is illustrated pictorially in Fig. 3. Circuit layout is not particularly critical and the individual builder has considerable freedom of choice in the placement of the parts so that the amplifier can be constructed to fit into practically any available cabinet. It is suggested, however, that the two-chassis layout be maintained and that good wiring practice be followed throughout. The wiring to the input and output elements of each transistor stage should be kept reasonably well separated and short, direct leads should be used in all signal circuits.

If the chassis is homemade, the appearance of the completed unit can be improved if the chassis is given a coat of enamel before the parts are mounted. Controls may be labeled with commercially available decals which should be protected, after application, by two or three coats of sprayed-on, clear acrylic plastic.

All parts, except the three small transistor sockets, are mounted to the chassis

with standard machine screws and nuts. The latter are held securely in place with press-on spring clips which are supplied with the sockets.

Since transistors are easily damaged by the application of excessive heat, the wires to the base and emitter of the 2N255 power transistor are not soldered to these element leads. Instead, the wires which connect these elements into the circuit are soldered to two miniature-tube socket pins (these can be obtained by breaking up any standard seven or nine-pin miniature socket) which are then fastened to the transistor leads for a secure connection. The body of the 2N255 is bolted directly to the heat-sink chassis. Since the transistor's collector element is connected internally to the body, the collector is wired into the circuit by means of a ground lug fastened to one of the heat-sink-chassis spade lugs (see Fig. 2).

Output transformer, T2, is mounted on the frame of an 8-in. PM loudspeaker and the red and blue leads of this unit are connected to the main-amplifier chassis through a simple plug-and-jack arrangement, PL2 and J2.

A sloping-front speaker baffle serves as a cabinet for the entire assembly. Final installation is shown in Fig. 1. Small aluminum brackets and a glued wooden block provide a secure mounting for the 6-volt

(Continued to page 248)



# X698 Make Your TV Set Safe!

By Lothar Stern

IT DIDN'T take an unfortunate accident to acquaint servicemen and technicians with the dangers of television receivers, but the tragic death of a six-year-old boy early last summer, as a result of touching the metal cabinet of a portable set, caused considerable consternation among thousands of TV fans many of whom had purchased the same type of unit. The name of the set is unimportant. It could have been any one of a hundred different models by some of the best-known manufacturers in the field. What is important is the fact that the lethal receiver had successfully passed rigid requirements of the Underwriters Laboratories and that there are millions of sets of similar design in daily use. Even more important is that set owners become acquainted with the conditions that can turn an ordinary receiver into a potential killer.

## Why Sets Can Be Dangerous

In the early days of television, ordinary radio tubes were employed for all TV circuitry. These required a relatively high plate voltage for proper operation and necessitated the use of a power transformer to step up the line voltage to the proper value. The transformer, however, did more than that. It effectively isolated the metal chassis of the set, which is actually a part of the receiver's electrical circuitry, from the power line so that the chassis was neutral and could not acquire an electric charge. But with progress came new tubes capable of operating at lower voltages and, gradually, the heavy and expensive power transformer began to disappear from modern sets. Many of today's receivers, including most portable models, are of the transformerless type. Instead of being isolated from the power line, the metal chassis of such sets is actually connected to one side



Technicians demonstrate how charged metal case of defective TV set can light a lamp. Simultaneous contact with case and grounded object could be fatal

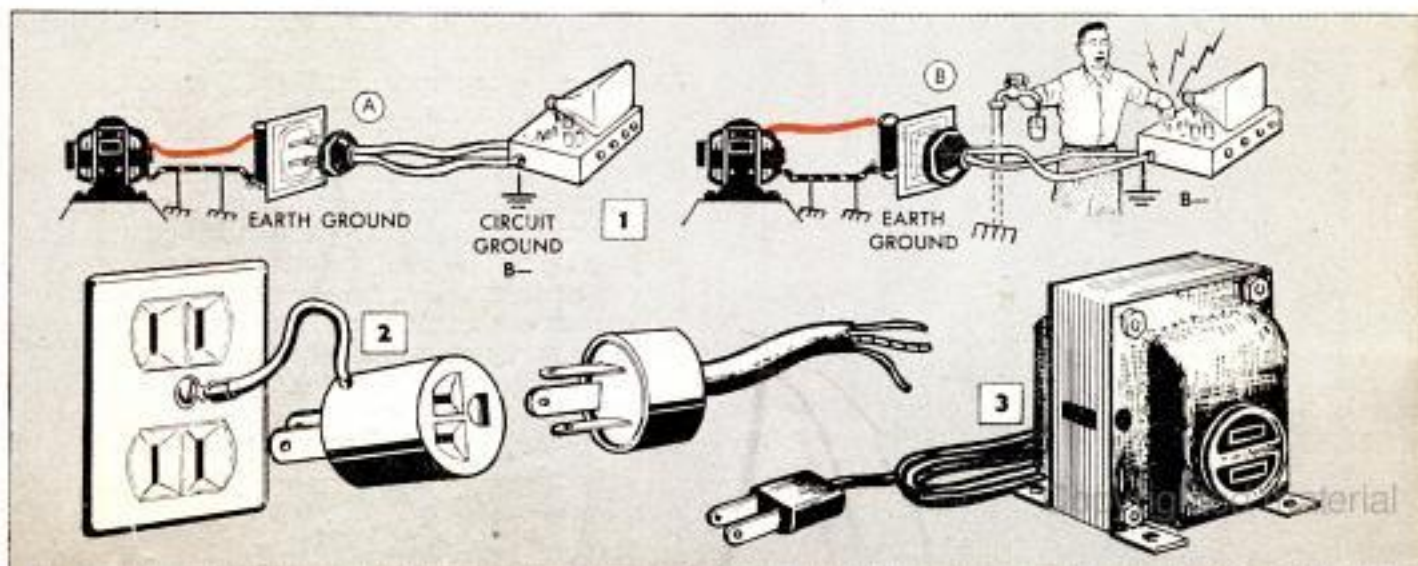
of the line, and herein lies the danger.

One wire of the commercial power line which is fed into your home is grounded at the power station and, again, at a point where the line enters the house. When the line-cord plug of a transformerless set is inserted in the wall outlet so that the wire which is connected to the metal chassis goes to the grounded, or "cold," line wire, Fig. 1A, no danger exists. But, if the plug were reversed in the wall outlet, Fig. 1B, the chassis would be connected directly to the "hot" wire of the power line. In this event, simultaneous contact with the chassis and some externally grounded metal object, such as a water faucet or a radiator, would place your body across the power line just as surely as if you were to place your fingers directly into the wall socket. The result would be a painful or, in some cases, fatal shock.

## Manufacturers' Precautions

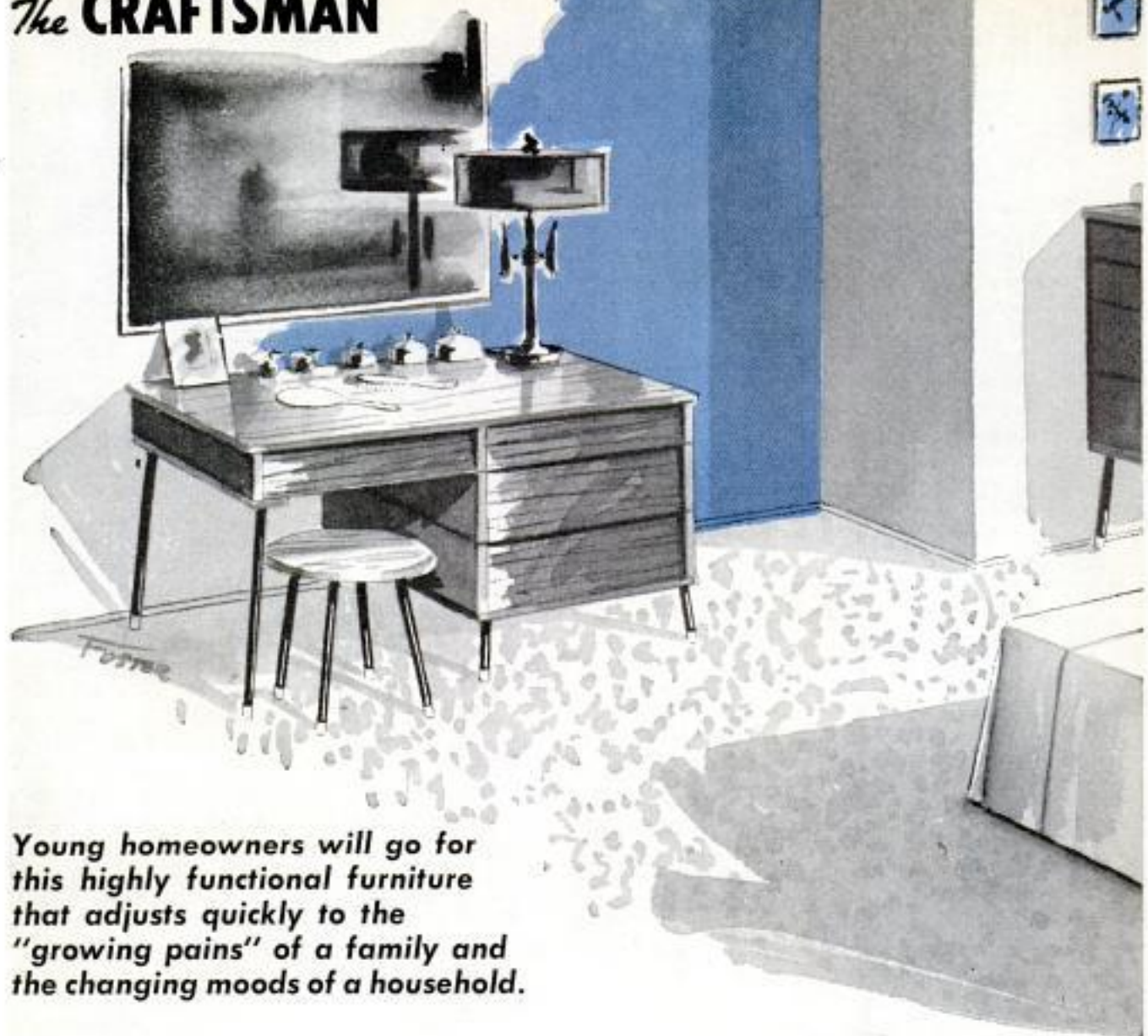
Aware of these dangers, no manufacturer would market such a set without installing it in a wooden cabinet or an insulated metal case. With wooden cabinets, great care is taken that all mounting screws or metal parts touching the hot portion of the

(Continued to page 244)



WTM 59

# The CRAFTSMAN



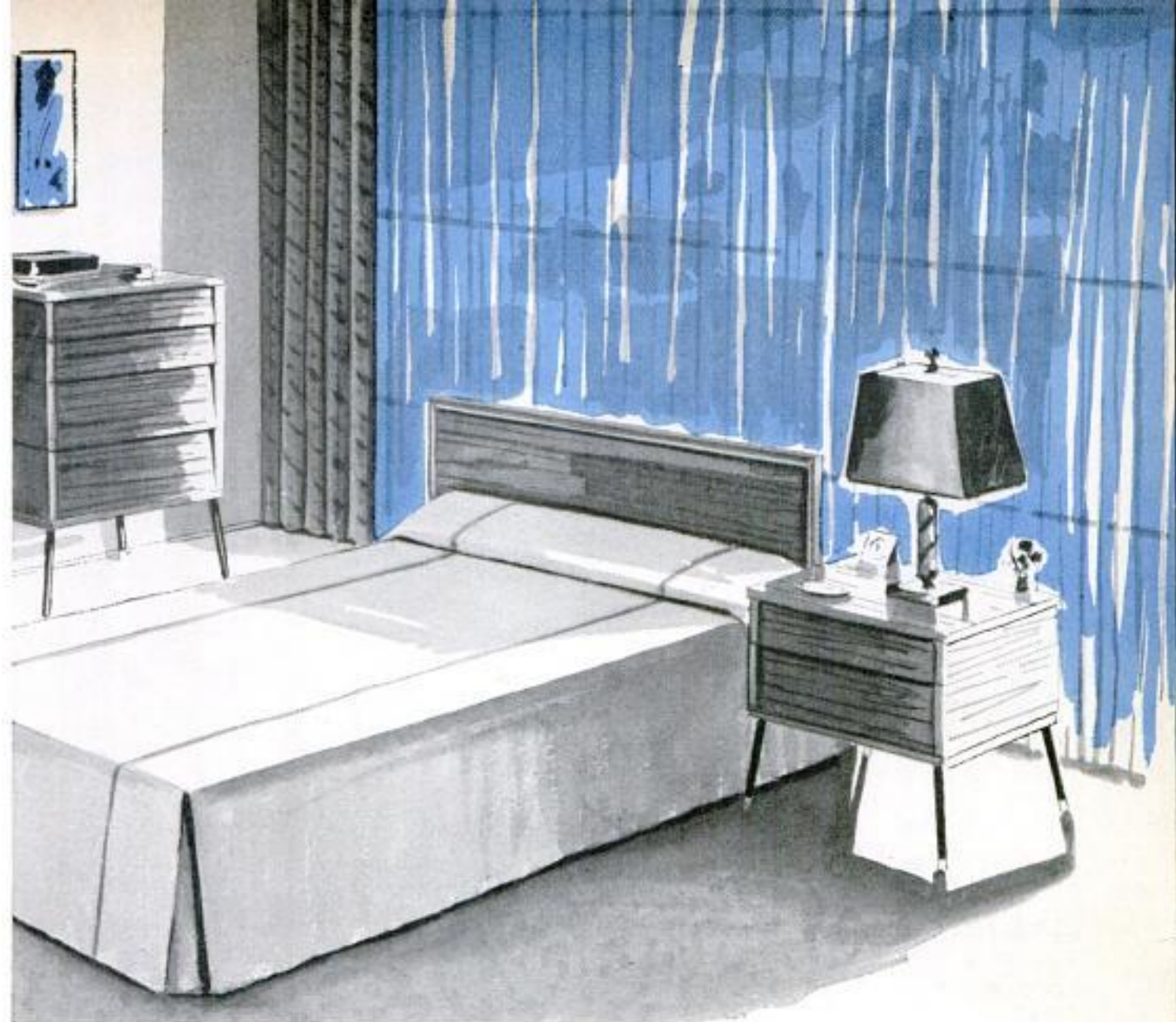
Young homeowners will go for this highly functional furniture that adjusts quickly to the "growing pains" of a family and the changing moods of a household.

## Stacked-Drawer

By Tom Riley



HERE IS build-it-yourself furniture that is ideal for the young couple who have little cash, but own a circular saw and have the desire for fine furnishings. The furniture is easy to make and yet has all the eye appeal and quality look of expensive purchased furniture. You assemble the pieces by stacking two or more individual drawer units, attaching ready-made legs and adding a simple top. This assembly method makes the furniture completely functional. When you tire of one grouping, you can unstack the drawer units and rearrange them to make completely new-appearing pieces. And when more storage space is needed, you simply add another



## BEDROOM FURNITURE

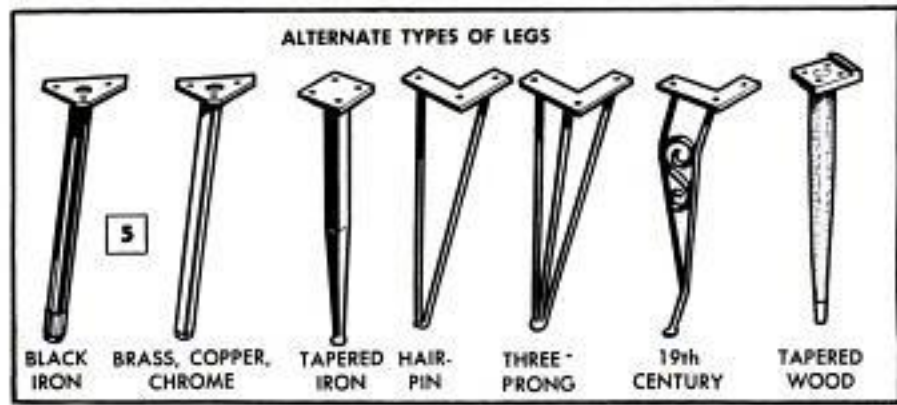
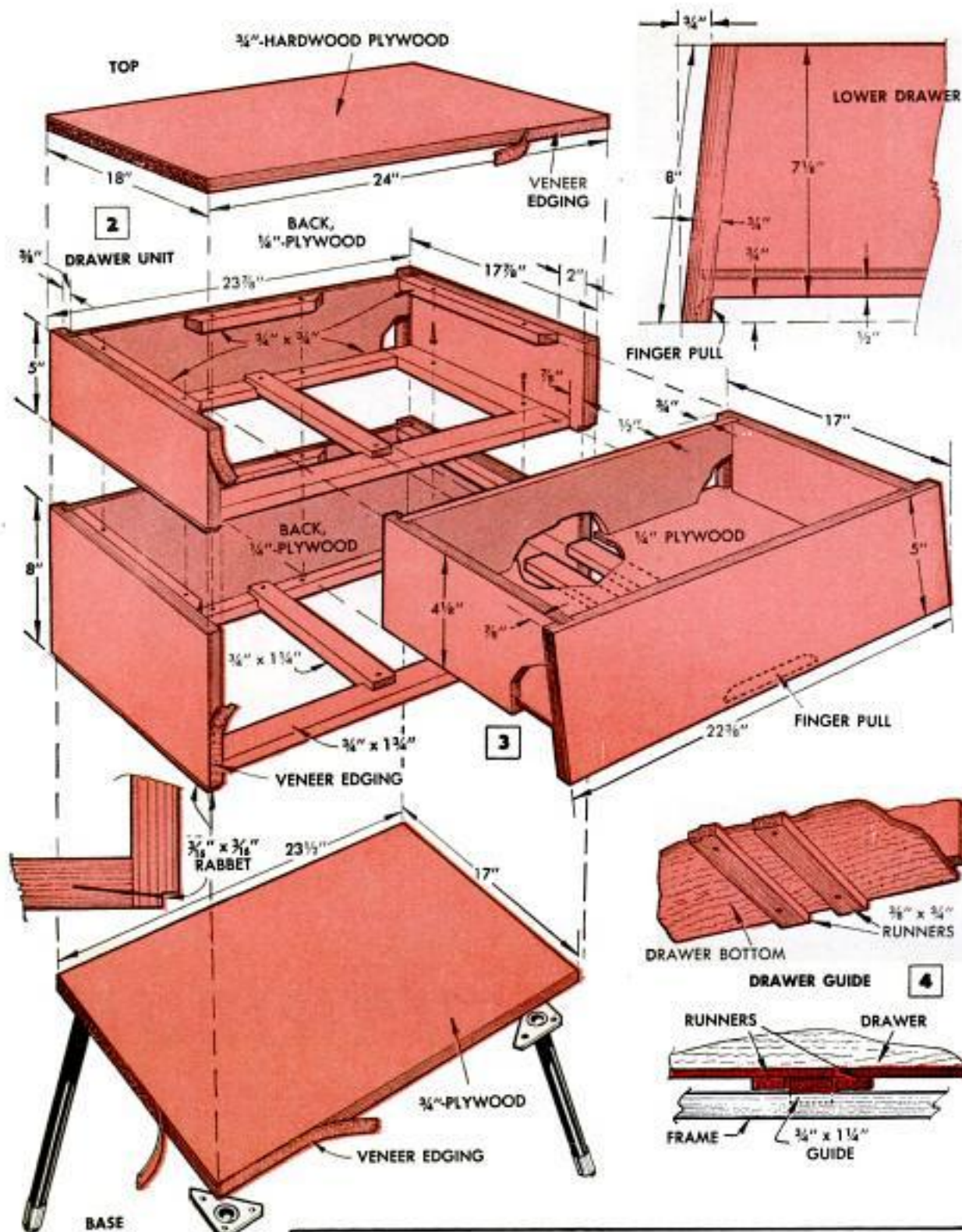
drawer to the stack, or make a double chest from a single one by adding a stack alongside. To provide both shallow and deep drawers, the units are built in two heights, 5 in. and 8 in. These two dimensions also allow you to assemble vanity bases and other pieces that will work out to the proper height when using ready-made legs of standard lengths. Fig. 9 shows how legs of various lengths are used on different pieces of furniture and, also, how the drawer units can be assembled to produce a variety of furniture.

### Drawer Units

Building the drawers and their outer frames can be a production job. In other words, you can cut all similar pieces at the same time with the same setting of

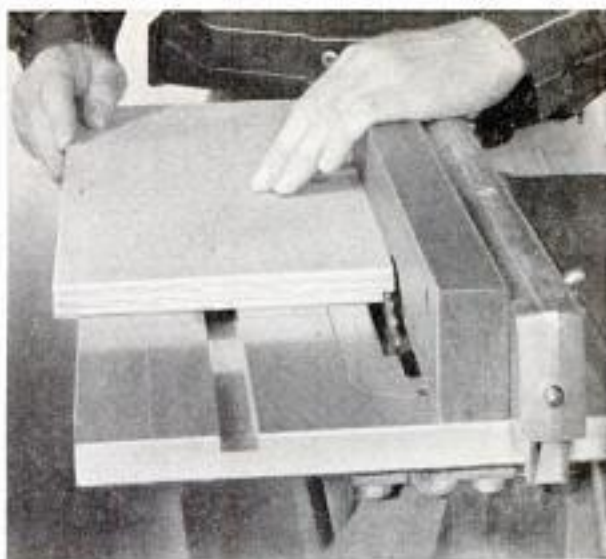
your circular saw, simplifying the job and assuring greater accuracy. Only the drawer front and the two sides of the drawer frame need to be hardwood. And these can be either solid stock, or hardwood-faced  $\frac{3}{4}$ -in. plywood. When plywood is used, cover the end grain with plywood-veneer tape. Figs. 2, 3 and 4 give construction details of both the 5-in. and the 8-in. drawers. Note in the right-hand detail in Fig. 2 that the top of the drawer is offset  $\frac{3}{4}$  in. To maintain this offset on both the 5 and 8-in. drawers, different angles must be cut on the drawer sides. On the 5-in. drawers, the sides are cut at an 8-deg. angle; on the 8-in. drawers the sides are cut at 5 deg.

In Fig. 3 a  $\frac{3}{16}$  x  $\frac{3}{16}$ -in. rabbet is indicated along the bottom edges, as well as the front and back of the frame sides. This





Above, veneer tape is applied to the edges of all plywood. Above right, rabbet is cut along bottom edges, front and back of drawer-frame assemblies



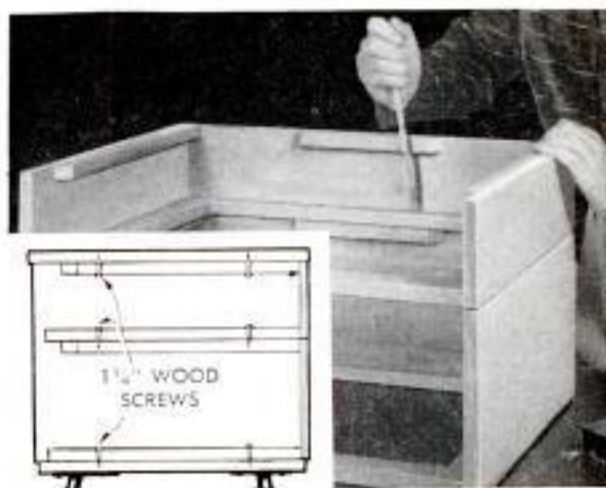
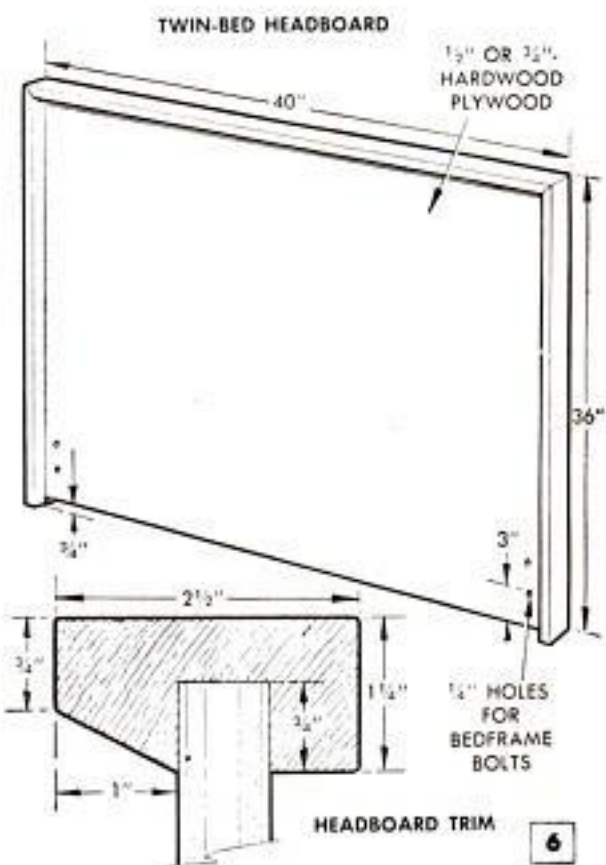
rabbet becomes a decorative groove when the drawers are stacked, and hides any small variation in the width or lengths of the drawers. Handles can be installed on the drawers or they can have hidden finger pulls cut on the inner edge of the bottom of the drawer fronts, as indicated in Figs. 2 and 3. There need be no exposed nails or screws showing on the drawers or frames. Glue and clamp all components of drawers and frames. Use nails on the drawer back only. To attach the inner pieces of the drawer frames, glue and nail or screw from the inside. Where it might seem imperative to nail the front framing into the side pieces, small finishing nails can be hidden by being driven through the rabbet, as indicated in the left-hand detail, Fig. 3. Notch the center drawer guide into the framing so it projects only  $\frac{1}{2}$  in. above the frame. Then turn the assembled drawer-and-frame unit upside down and position the two runners on the drawer bottom.

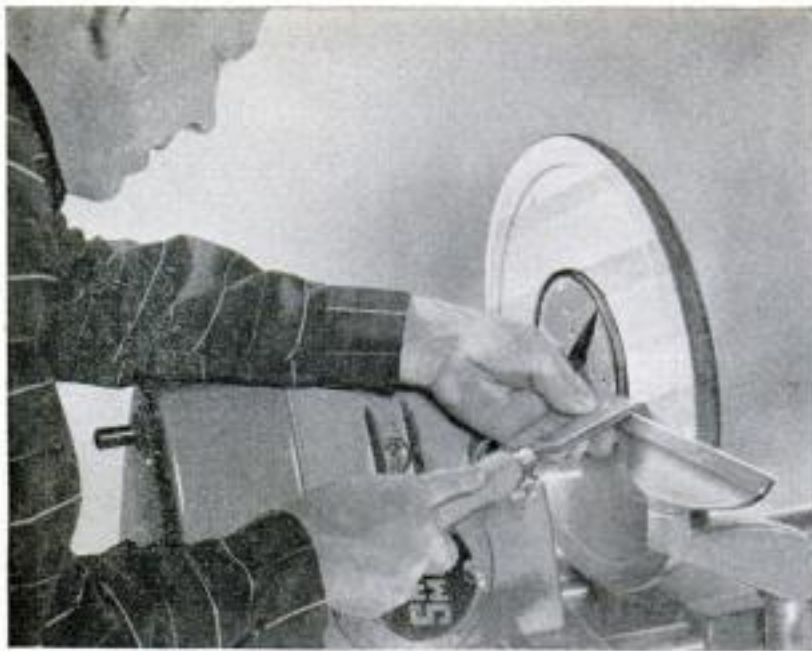
### Tops and Bases

The simple tops for the stacked-drawer furniture are sheets of  $\frac{3}{4}$ -in. plywood, and will be 24, 48 or 72 in. long to cover a single, double or triple side-by-side assembly. Use hardwood-faced plywood and tape the exposed edges. With all tops 18 in. wide, the dimensions will provide a slight overhang all around to cover any variation in the sizes of individual units. Fig. 1 illustrates the effect of this overhang.

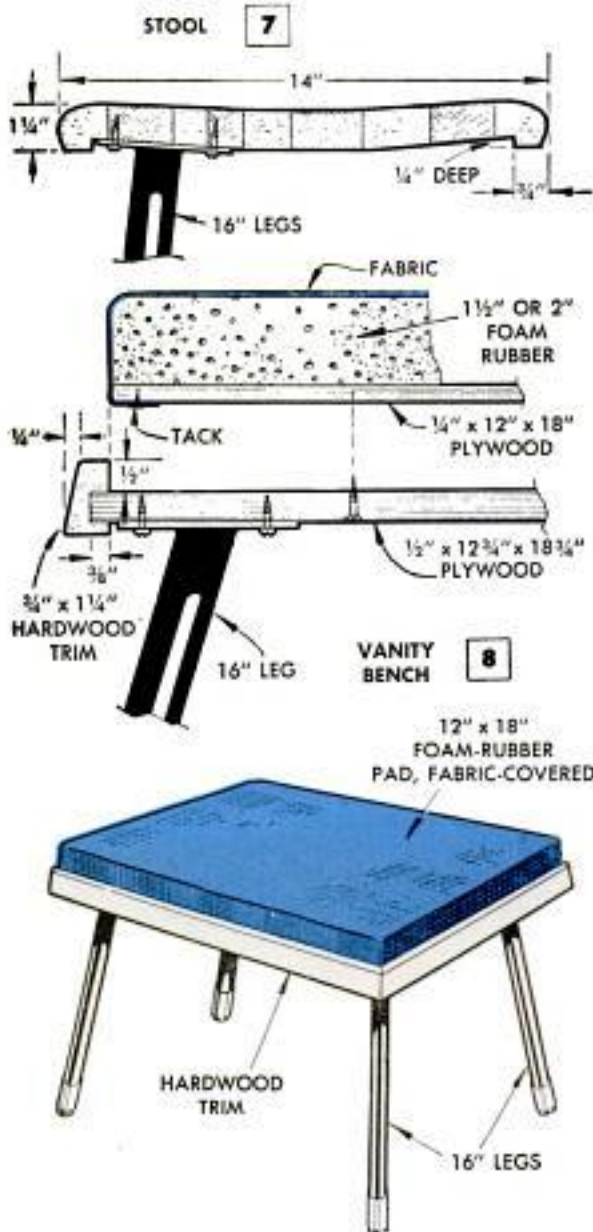
Bases for single or multiple units are cut from sheets of  $\frac{3}{4}$ -in. fir plywood, and should be slightly smaller in dimensions than the bottom of the piece of furniture. This keeps it clear of the drawers and the

One above the other, or side-by-side, drawer units are held together by screws driven through frames





Upper right-hand photo, "chopping block" vanity stool is made by gluing together strips of hardwood of contrasting grain and color. Left-hand photo shows how bevel is turned on bottom of seat for leg angle



rabbet on the lower edges of the drawer frame. The edges of the base can be taped, or strips of  $\frac{3}{4}$  x 1-in. hardwood can be used. The latter extend  $\frac{1}{4}$  in. below the base to cover the edges of the leg plates.

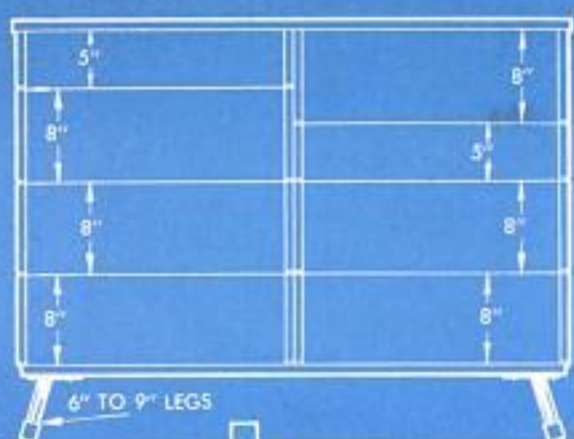
Matching headboards, Fig. 6, are easy to make. Simply cut a  $\frac{3}{4}$ -in. groove in lengths of trim stock to fit on three sides of a sheet of  $\frac{3}{4}$ -in. hardwood-faced plywood. Miter the two corners of the trim. For a single bed the headboard is 40 in. wide, for a double bed it is 65 in. wide.

### Vanity Stools and Benches

The latest idea in vanity seats is a light-weight three-legged stool. The top can be turned from a single piece of hardwood and ready-made legs attached. Less expensive is the "chopping block" stool, Fig. 7. Scrap lengths of hardwood are glued and clamped together to form the seat which is turned on a lathe. The bottom side of the seat is beveled as indicated, both to hide the leg plates and to give the legs a greater angle. The legs of a three-legged stool must be angled as much as possible to provide stability when sitting near the edge. Detailed in Fig. 8 is a vanity bench, which is preferred for a large vanity. The seat consists of a piece of  $\frac{1}{2}$ -in. plywood to which four legs are screwed. A piece of foam rubber 12 x 18 in. then is cemented to a piece of  $\frac{1}{4}$ -in. plywood and it is covered with fabric that is folded under and tacked to the plywood. This assembly is dropped onto the bench and attached with screws.

Although all furniture described in this article is for a bedroom, stacked-drawer construction also could be used for dining-room and living-room furniture. ★ ★ ★

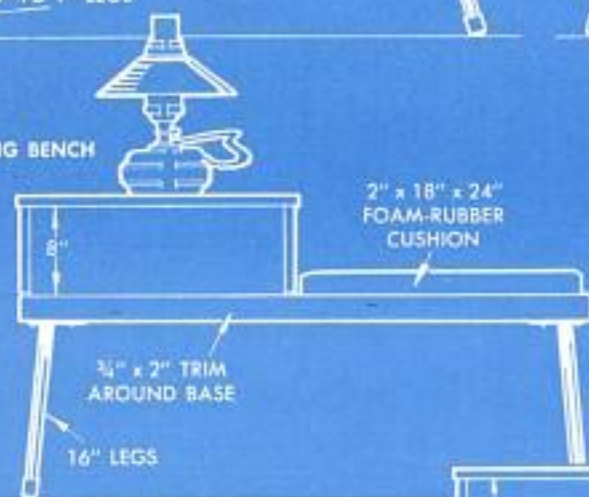
DOUBLE CHEST



SINGLE CHEST



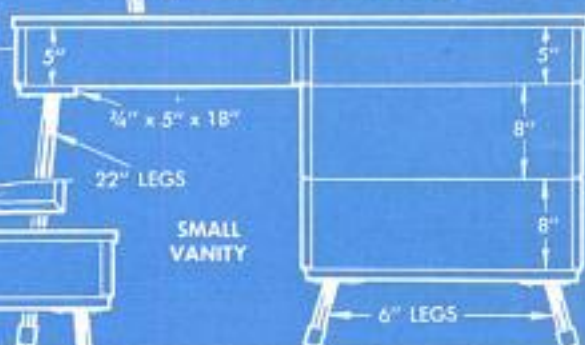
DRESSING BENCH



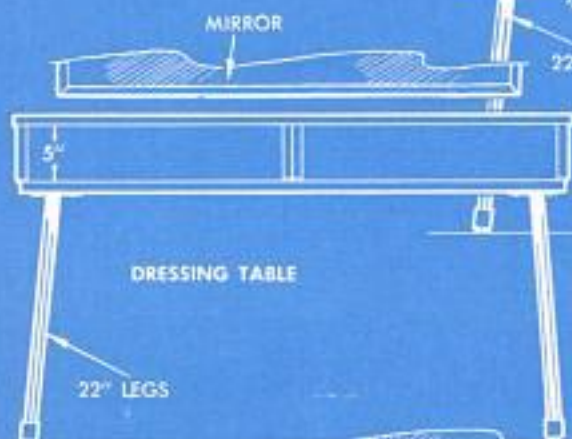
NIGHT STAND



MIRROR

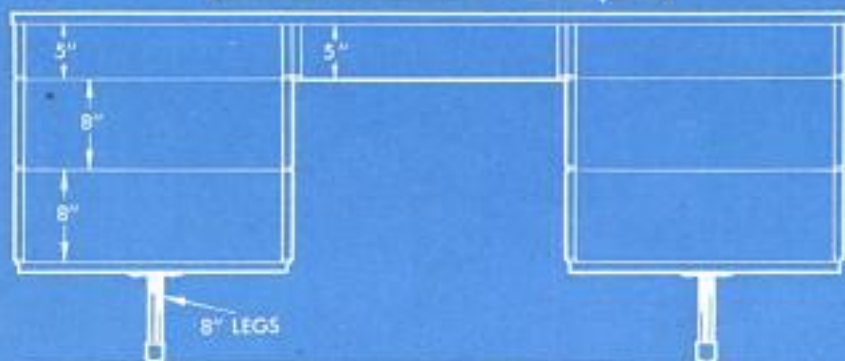


SMALL VANITY



DRESSING TABLE

LARGE VANITY





### "Handles" on Doghouse Carpet

Difficulty in removing or replacing a carpet in a doghouse for cleaning is overcome by sewing a hem along each side and inserting dowels in them. The dowels provide convenient "handles" for lifting the carpet out through the narrow door.

### Plastic Bottle Is Glue Dispenser

When applying glue on a number of small surfaces, as when assembling miniatures or models, try using a plastic catchup container for a dispenser. Also, the closed dispenser keeps the glue fresh longer.

### Improved Darkroom Sink

If your darkroom does not have running water for maintaining the developer at the desired temperature, a means of doing this can be improvised. Simply place the developing tray in a larger container and fill the latter with water of the required temperature. Also, the outer container catches any overflow of developer, preventing it from staining the floor or table.

Robert C. Florian, Chicago.



☛ Metal kitchen foil provides an ideal shield when painting a surface that is close to a fixed object.



### Drawer Under Stool

Take advantage of the wasted space under a kitchen stool by installing a small drawer in which small items can be stored. Cleats are attached along the sides of the drawer at the bottom to ride on runners screwed to the stool legs.

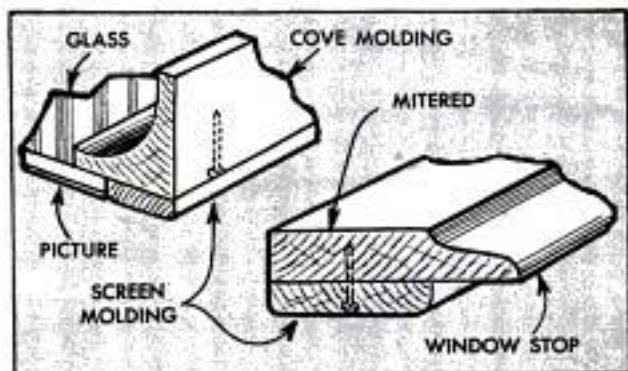
### Quick-Thawing Frozen Meat

When it is necessary to thaw frozen meat in a hurry, drop it into a plastic bag and seal the neck of the bag with a rubber band. Place the bag in warm water, and the meat will thaw quickly.

### Easy-to-Make Picture Framing

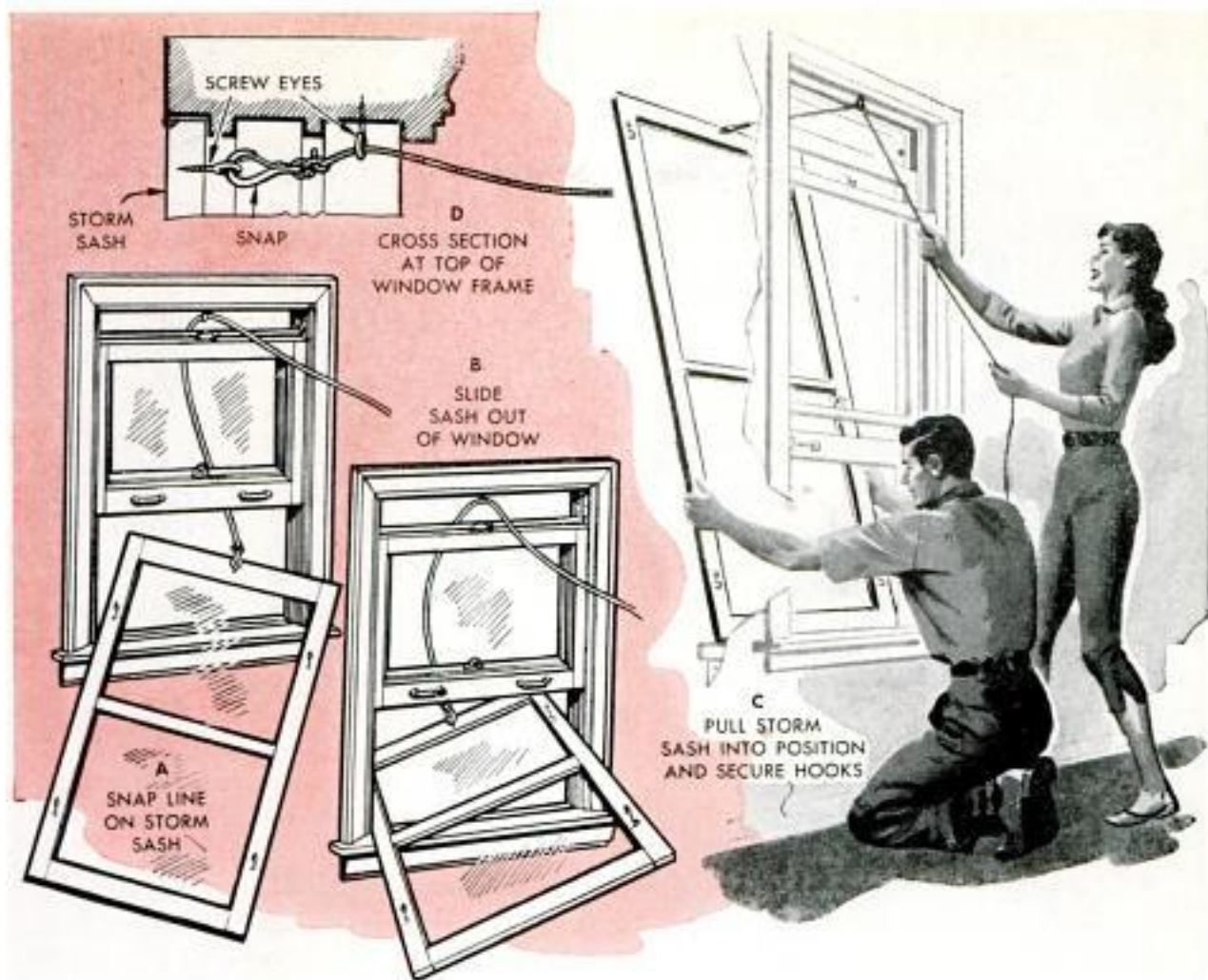
Ordinary window stop and some  $\frac{3}{4}$ -in. screen molding are all you need to make attractive picture frames quickly. The screen molding is glued and nailed to the back of the stop material to form a rabbet for the glass, after which the built-up strip is cut up and mitered to make a frame of the desired size. A frame with more depth can be formed with cove molding.

Herbert E. Fey, New Braunfels, Tex.



☛ One easy way to dry children's overshoes is to place them over the ends of the legs of an inverted card table.





## Installing Storm Sash Without Use of Ladder

You can install full-length storm sash from inside the house and thus completely eliminate the need of a ladder with its customary handling difficulties and attendant hazards by following this simple method. All that is necessary is to have the windows in good operating condition, and have someone available to help you. Each window casing is fitted with a large screw eye. This is driven into the top of the frame, centrally between the sides, and directly over the edge of the lower sash of double-hung windows as shown in detail D. The screw eyes are left in place permanently. Screw eyes also are driven into the top crossrails of the storm sash. Next, a 10 or 12-ft. length of strong rope, such as sash cord, with a swivel snap securely fastened at one end, is brought through the screw

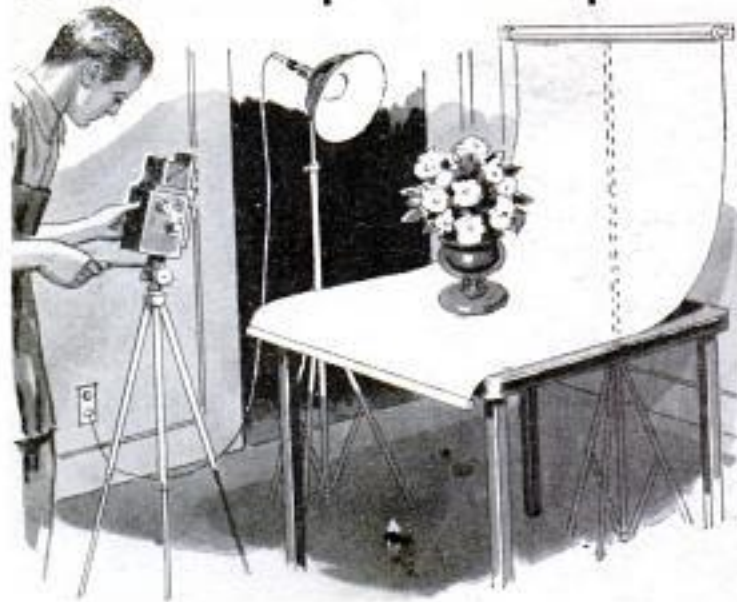
eye in the window casing, and the end with the snap is dropped down on the outside of the window to sill level. The snap is attached to the screw eye in the storm sash, detail A, which then is pushed out of the window while held in a diagonal position as in detail B, since it is wider than the window opening. While a helper pulls on the rope as shown in detail C, you push the sash out and guide it until it can be fastened to the window casing by means of four hooks and eyes. Then the rope can be removed. Storm sash so fastened cannot be swung out for ventilation and must be provided with vents. To remove the sash, you first attach the rope and then follow the exact opposite sequence as used to install it. Screens can be installed and removed in the same way.

### Utilizing All Pigment Assures Identical Paint Colors

Using every bit of coloring from the tube is the secret of exactly duplicating a color when tubes of coloring are mixed with a base paint. To do this, slit each tube of coloring with a razor blade while it is held over the container of paint. Then, after all

the coloring has run out of the tube, drop it into the container and mix the paint thoroughly. When the tube is removed, it will be clean of color, the paint solvents having removed it while the paint was being mixed.—R. J. Ahrens, Somerville, N.J.

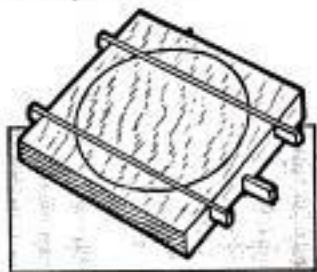
## Curved Backdrop for Close-up Photos Eliminates "Horizon"



When taking a close-up photo on a table, you can avoid the distracting "horizon" line caused by the table edge by arranging a flexible, vertical backdrop to lie across the table in a sweeping curve. An ordinary window shade is ideal for this purpose. It should be light-colored on one side and dark on the other, and arranged so that either side can be used. The shade is mounted on a wooden cross piece having a blind hole at its center to permit its attachment to a light stand. Shadows produced on the background by subjects to be photographed are eliminated by adequate illumination from a number of lamps.

## Keep Wheels From Splitting

Try this trick to prevent the splitting of large wooden wheels for toys. Before cutting them out, glue wooden splines in slots cut across the grain.



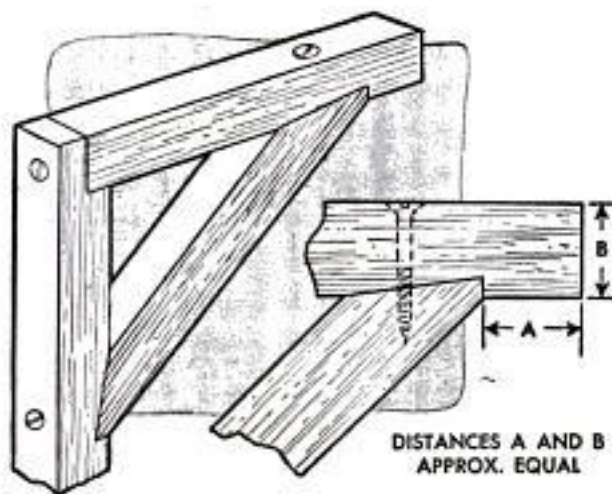
## Auger Becomes Lamppost

Strikingly modern in appearance, the steel post for this yard lantern has its origin in a piece of ordinary farm machinery. It is the auger from a dismantled grain conveyor.—L. H. Houck, Jefferson City, Mo.



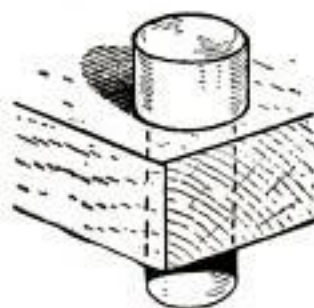
## Heavy-Duty Shelf Brackets

When wooden shelf brackets must bear heavy loads, they should be constructed as indicated to provide maximum strength. The top of the vertical member is notched to form a step on which the horizontal member rests. Generally, distances A and B should be about equal. Only three screws are required. Lag screws are used to fasten the bracket securely to a wall stud. The lag screws should be driven into wall studs wherever possible.



## Miniature Bench Anvil

Dropped into a hole bored in one corner of a workbench, a pipe nipple fitted with a cap makes a handy anvil for straightening nails and other small pieces of work.





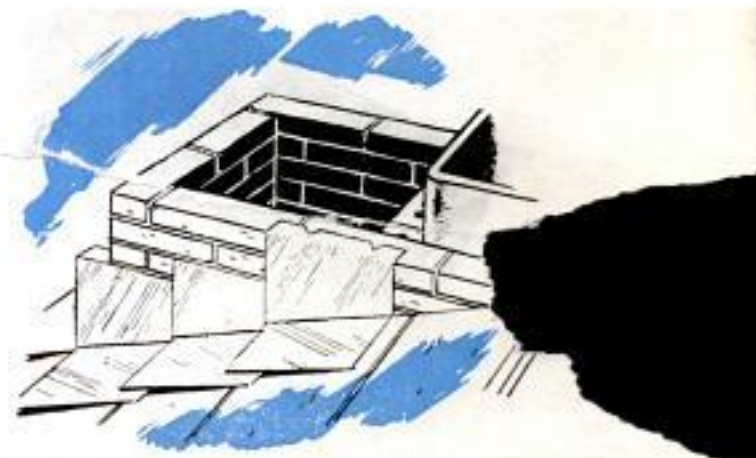
Openings between bricks are filled with a grout made by mixing 1 part portland cement to 3 parts sand

# FROM THE GROUND UP

By John O. Bull

## PART II

**I**N CONTINUING skyward with the chimney part of your fireplace, it is most important that you use a level frequently at the corners so you won't wind up with a leaning tower of Pisa. As described last month, the chimney consists of an inner and outer wall of brick, the



Metal flashing is anchored in mortar by notching with tin snips and then bending edge back at right angles

Left, cross rods 6 to 8 in. down from the top support fill. Center, bricks rest on rods and on shoulders formed at ends by split bricks. Note notched brick. Right, scrap and common brick are utilized for fill





Top of chimney is reached with 18 courses above the ridge. Here fill is completed and ready to be grouted



Grout is forced down between bricks with short 2 x 4. Flue can be flush or left projecting a few inches



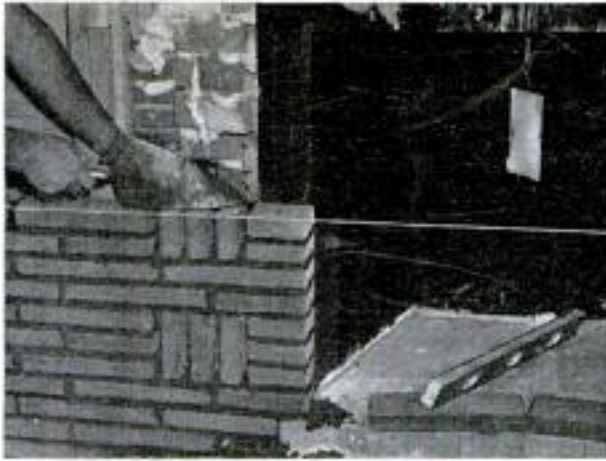
inner one being of common brick and enclosing the flue tile. When you arrive at the roof line, copper flashing must be worked into the brick courses to keep roof water from running down between the chimney and the side of the house. The pieces of flashing are added as the courses rise and are bent and lapped in the manner shown. The top of the chimney is reached when you have gone about 18 courses above the roof ridge. However, while you are still three or four courses from the top, steel rods are mortared in place crosswise to support the bricks that cap the well on each side of the flue. These bricks are mortared in place, and as you continue to go up the remaining three or four courses, scrap and common brick are used as fill. When you have reached the top, your chimney should look like the photo in the upper left-hand corner. Notice that except at the four corners, the top course is laid with the bricks placed on edge. Finally, the voids between the bricks are filled with grout and sloped four ways from the flue. You have a choice of keeping the latter flush with the top or a few inches above it. This completes the chimney part.



Above, scrap block and brick are used as hearth fill. Below, fill topped with grout, level with firebrick

Hearth tile is laid in thin layer of mortar. Note tile is  $\frac{3}{4}$  in. above firebrick to form lip for ashes





Grillelike openings for the air ducts are formed by cutting the bricks to size and standing them on end

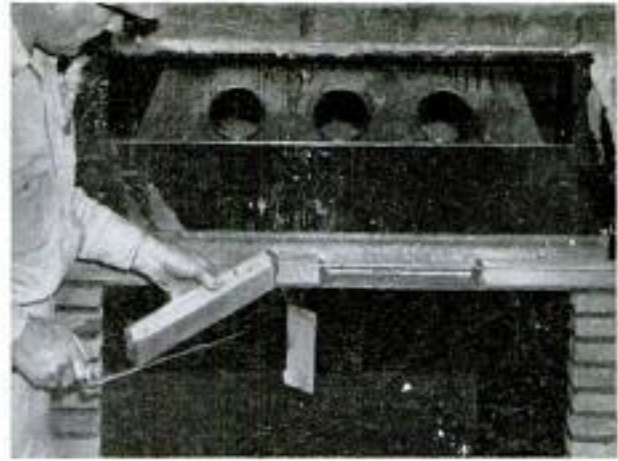
Whether you proceed as extensively as done originally, and face the entire wall with brick, or just face the steel liner itself, the same procedure is followed. In referring to the plan view in Part I, Fig. 8, you'll notice that a 1/2-in. airspace is left between the wall studs and the brick facing, and that the glass-fiber insulation that covers the liner is brought around to fill this space at the front. Do not attempt to mortar over this opening as it will only crack out later.

Start the brick facing even with the inner edges of the liner and carry it each way as far as you wish. Metal wall ties are used every few courses and duct openings are formed on each side, three courses high, by standing the bricks on end at the points where the cold-air ducts are located. A lintel of 3-in. steel angle is used to bridge the fire pit 14 courses up. See Part I, Fig. 5. Five courses up from the lintel a grille is formed of brick as before for the heat ducts. The raised hearth is made six courses high and is filled in with scraps of block and brick, after which it is grouted over and struck off level to provide a solid base for the hearth tile. ★ ★ ★

A grout of equal parts of white sand and white cement is used to fill voids between the hearth tile



NOVEMBER 1957



Space across lintel is evenly divided by laying loose brick in place and cutting off where necessary



A 10-percent solution of muriatic acid is used to clean brick of mortar stains, then rinsed with water



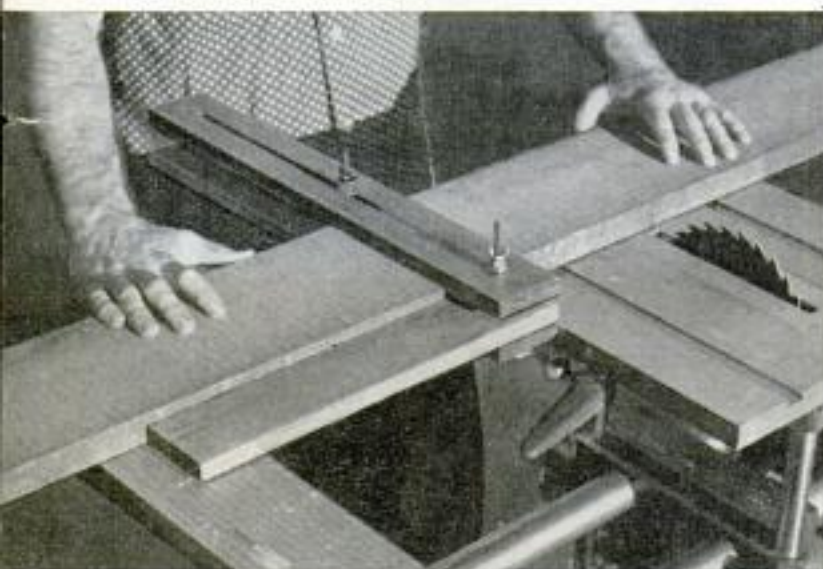
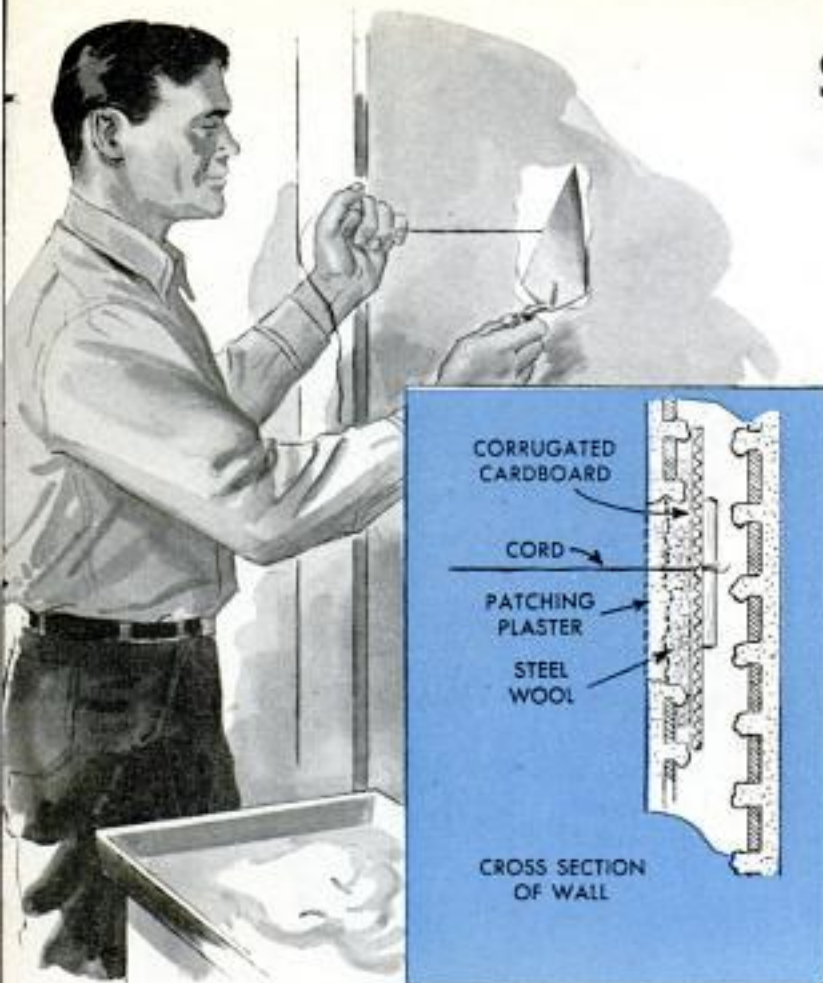
Hearth tile is cleaned with sponge and water. Thin coat of linseed oil is then applied and polished



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## Support Holds Plaster Patch

To patch a hole in a plastered wall that goes through the plaster base, some sort of backing support must be provided to hold the soft plaster in place until it sets. A strong, lightweight back support can be made by stapling a layer of steel wool to a piece of corrugated cardboard, then threading a length of cord or string through the center and anchoring this with a short stick. The steel wool provides some resiliency and flexibility so it will fit snugly against an irregular surface such as keyed plaster on lath. The assembly should be small enough to slip through the hole edgewise, yet large enough to practically close the hole from the rear when pulled back with the cord, which is held while the patch is troweled flush. Large, thick patches usually are built up with several applications of plaster. When the patch is dry, cut off the string and sand the plaster to feather the edges.



## Crosscut Jig for Wide Stock

If you have ever tried to crosscut a fairly wide piece of stock on a table saw using a regular miter gauge, you will appreciate the advantages of this crosscut jig. It consists of an L-shaped assembly in the form of a try square that clamps to the work and slides along the edge of the saw table. The jig consists of three pieces, two of which are slotted to take clamping bolts. The lower slotted piece is attached to the aligning member with glue and screws so that the two are at exact right angles.—Roy H. Copperud, Stockton, Calif.



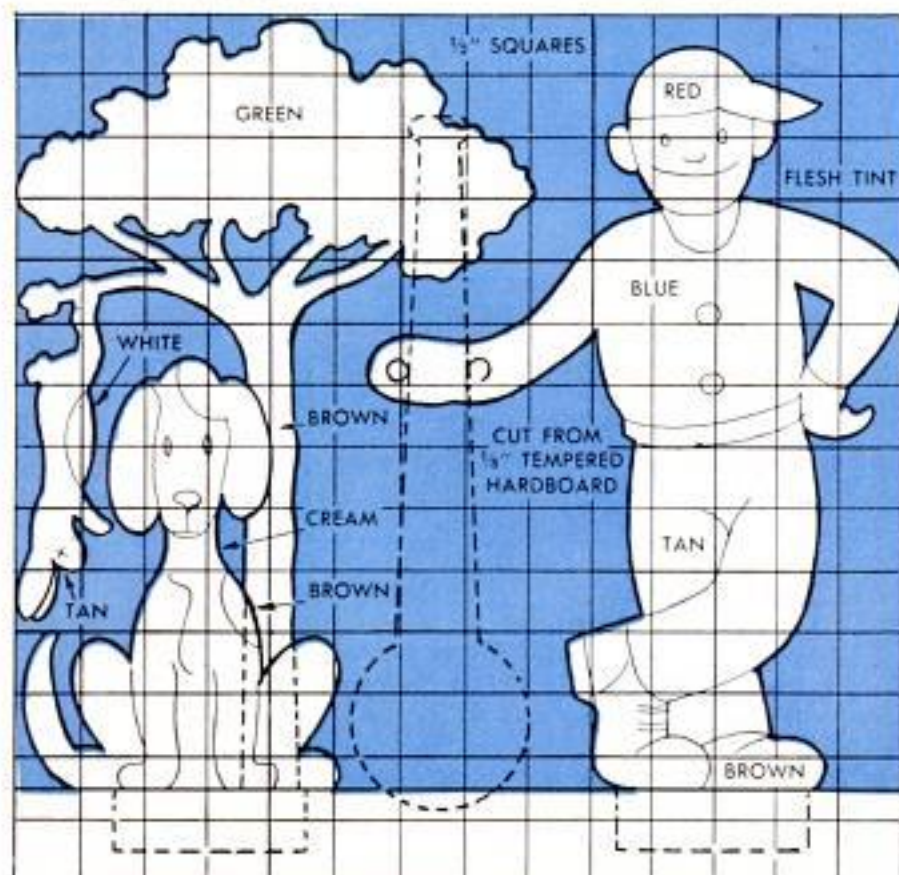
## Fire Hose Washes Streets

Ideal for any small town is this street washer used in Kooskia, Idaho. It consists of a 5-ft. length of 2-in. pipe to which four  $\frac{3}{4}$ -in. pipe nipples are welded to provide nozzles. An 8-ft. length of 2-in. pipe is connected to this assembly with an elbow, and extends behind the tractor where a fire hose is coupled to it. Slow driving minimizes wear on the dragging hose.

Roscoe LeGresley, Kooskia, Idaho.

# Happy-Hunter Pipe Rack

Pipe smokers who are hunting enthusiasts will get a chuckle from this "Nimrod and his gun" pipe rack. The single pipe is held by the hunter as though it were a rifle or shotgun, while he poses proudly with his faithful rabbit dog and the game taken in a day of strenuous hunting. The three figures are jigsawed from  $\frac{1}{8}$ -in. hardboard, using patterns drawn with the aid of the squared drawing. Paint the figures as indicated. The base for the rack is cut from  $\frac{3}{4}$ -in. stock and has three slots in it to receive the tabs on the bottoms of the figures, which are glued in place. Cement a piece of felt to the underside of the base to prevent it from scratching polished table-top surfaces.



## Pencil Used as Thread Gauge

It sometimes is difficult to tell the number of threads per inch in a tapped hole, and, accordingly, to choose the right screw when you go to the hardware store. Force a sharpened pencil into the hole, rotate it a couple of times and take it with you. The thread will make an impression on the soft wood of the pencil that can be seen easily.

William R. Kemp, Glendale, Ariz.

## Economy for Furnace Filters

One homeowner saves on the cost of replacing the filters in his warm-air furnace by using two 1-in. filters instead of a single 2-in. unit. When the lower filter becomes dirty, it is discarded. The upper filter then is moved down and a new filter is placed on top of it. Thus, only a 1-in. filter needs to be purchased when it is time for renewal of the filters.



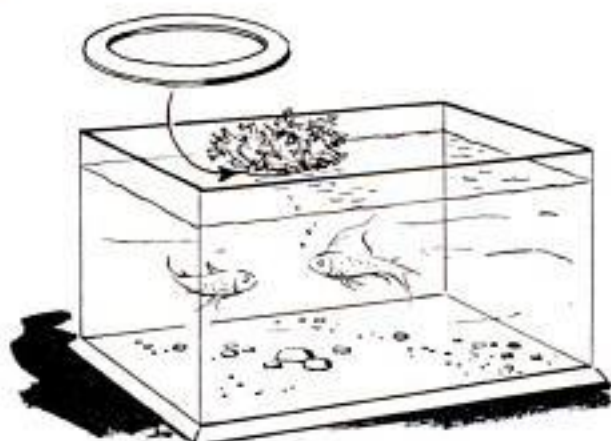
# Solving HOME PROBLEMS

**HI-FI RECORDS** will remain clean and free of damaging body oils and perspiration if you remember to handle them only while wearing clean cloth gloves



**NICKS IN FURNITURE** can be touched up by using wax crayons that come in dozens of colors to match any wood. Rub crayon on and polish with soft cloth

**FREE "FROZEN" TUMBLERS** by applying glycerin along rim of lower one, and also between tumblers. Let penetrate a few minutes, then pull tumblers apart

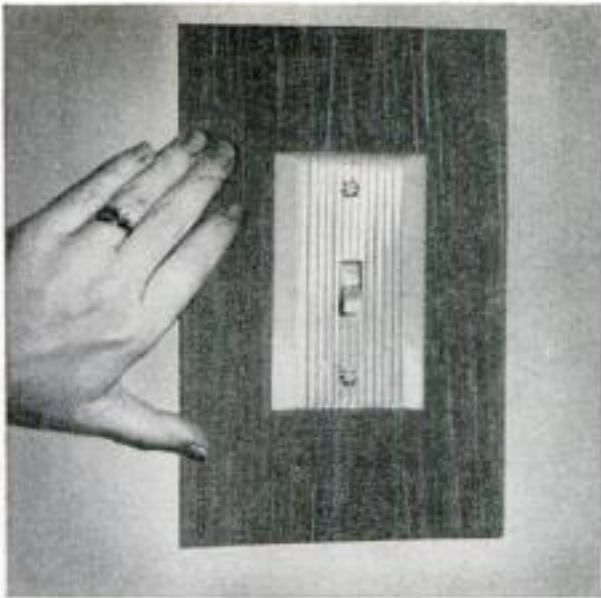


**FLOATING PARAFFIN RING IN AQUARIUM** confines floating plants. Melted paraffin is poured in shallow pan, ring is cut while paraffin is still warm

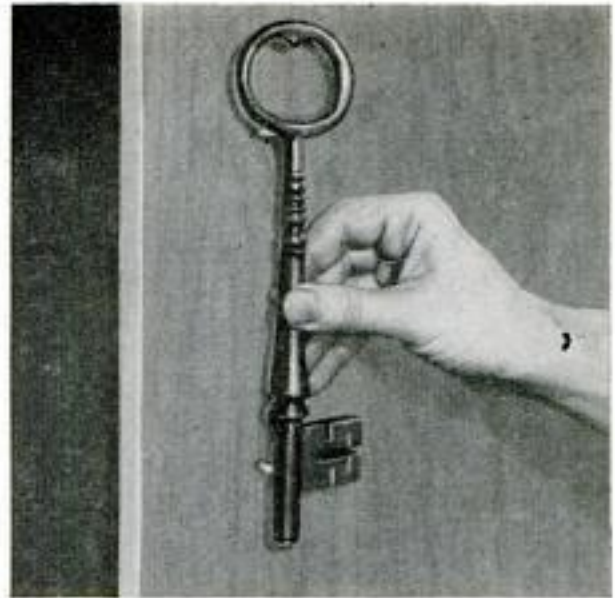
**RECORD PAINT COLOR AND AMOUNT** required in each room by dipping tongue depressor in paint and marking name of room and quantity of paint on it







**WALL AROUND SWITCH PLATES** stays clean and smudge-free when scraps of plastic laminate left over from work counters are fitted under plates



**UNUSUAL PULL FOR SLIDING DOOR** is made from souvenir brass key. Drill and tap blind holes near each end, use pipe spacers and attach from inside

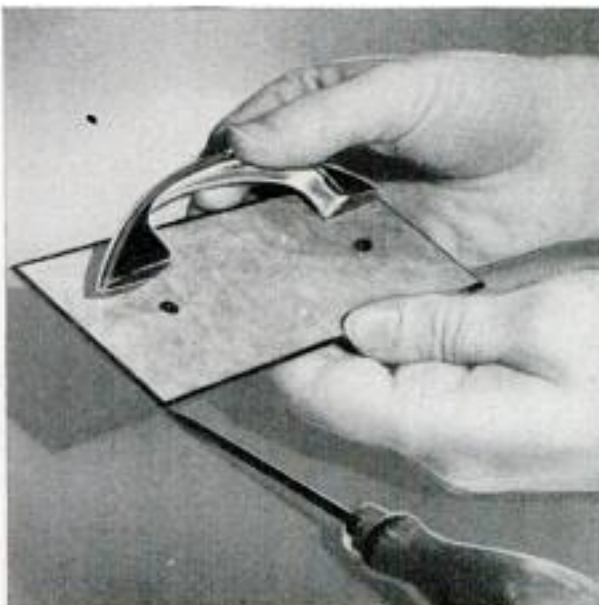


**HANDY SEWING KIT** for traveling can be made from paper matchbook cover. Three shades of thread are wrapped on notched cover, needles and pins are pressed into stubs of torn-off matches. Kit will fit conveniently in your pocket or in purse

**HOLD DOWN CORNERS** of curling calendar leaves by sticking photo-corner mounts on calendar back so they catch lower corners of the leaves as shown



**JIG FOR LOCATING BLIND HOLES** for cabinet door and drawer pulls is made by holding cardboard over flat of pull and punching through to holes with awl



**PROPER WAY TO POUR LIQUID** from square or rectangular can is to have spout at top. Air enters smoothly, prevents gurgling and waste of material





## Handy Sawhorse Has Removable Legs

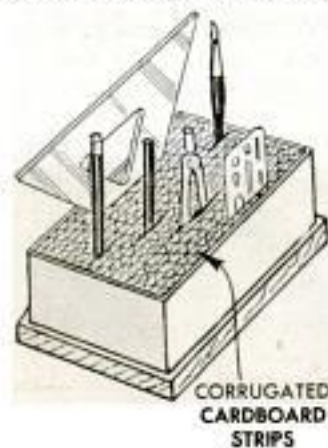
Quickly disassembled for storage, space-saving sawhorse consists of a length of 2 x 6 and four pipe legs. Four pipe couplings are inserted in holes bored in the 2 x 6 and cemented in place. To assure that the couplings will not turn, drill a hole through the 2 x 6 and couplings, then insert a nail or wood screw as indicated. Crutch tips on the ends of the pipe legs prevent marring the floor.

## Hair Drier Is Drawing Aid

When drafting or drawing with pen and ink, keep a portable hair drier handy to speed up the work. Applying the drier for a few moments will dry an area so further work can be done without smudging.



## Cardboard Drafting-Tool Holder



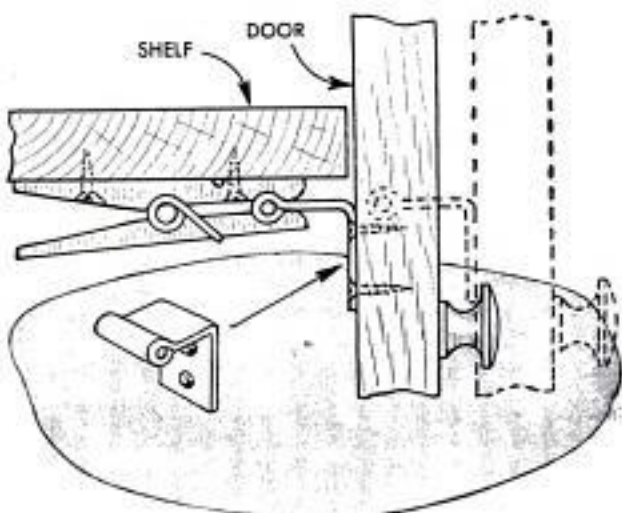
Strips of corrugated board and a cardboard box can be used to make a handy pencil and drafting-tool holder. Spread glue in the bottom of the box and insert the precut strips of corrugated board. Do not glue the strips themselves together. Cement the cardboard box to a wooden base

so that it has sufficient weight to remain in place when tools are removed or inserted.

☞ Clean crystal lamp bases with a solution consisting of a few drops of ammonia in clear lukewarm water, applied with a soft cloth. Rinse with a cloth wrung out in clear water and wipe dry.

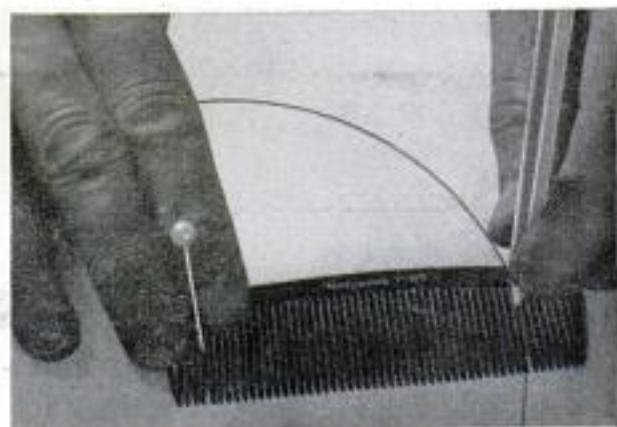
## Improved Cabinet Catch

Friction catches for cabinets can be improvised from a spring-type clothespin and a sheet-metal strip. The clothespin first is disassembled to permit countersinking two screws in one leg, which is screwed to the cabinet shelf. The end of the sheet-metal strip, which is 1/2 in. wide, is wrapped around a 16d nail to form a loop. Bent to an L-shape, the strip then is screwed to the cabinet door.



## Compass Improvised From Comb

In an emergency, a compass can be improvised by using a comb, a pin and a pencil. Fine teeth in the comb permit fairly small adjustments in radii.





Coins for parking meters are carried conveniently in aspirin tin to which suction cup has been screwed



Space-saving container for lenses and filters is aspirin tin. Filters are protected by fold of cloth

IF YOU ARE A MODELMAKER, photographer, businessman or just a motorist, take a second look at an emptied aspirin box before you discard it. It has not outlived its usefulness. Miniature hinges for modelwork require only that the hinged portion of the aspirin box be cut away. For photographers, the boxes are ideal as compact filter and lens holders. Place each filter inside a fold of cloth, which also can be used for cleaning. Postage stamps, which seem to stick together when carried in pocket, purse or billfold, remain clean and dry when carried in an aspirin box. And while it is impractical to carry a full-size rubber-stamp pad in your pocket, a miniature, pocket-size inking pad is easily made by placing several thicknesses of flannel inside an aspirin box and saturating it with stamp ink. A couple of small rubber stamps and this stamp pad require very little space. Coins for parking meters are kept conveniently at hand in an aspirin box to which a suction cup is screwed. The cup permits the box to be attached to the instrument panel of an automobile.

Simply cutting off hinged portion of an aspirin tin will provide neat hinge for makers of small models

## SAVE THOSE EMPTY ASPIRIN BOXES

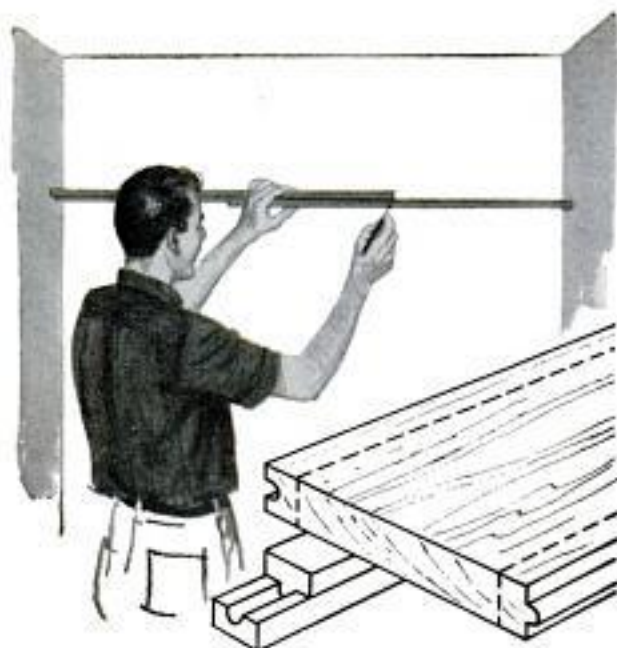
By Kenneth Murray



Aspirin tin becomes miniature, pocket-size stamp pad when filled with ink-saturated flannel cloth

Even on humid days, stamps carried in your pocket remain clean and dry inside protection of aspirin tin





### "Extension Rule" Aids Measuring

Measuring for closet shelves is easy with this handy inside "extension rule." The two sections are cut from a length of tongue-and-groove lumber as in the detail. Use of the rule saves time too, as measurements can be transferred directly to the stock being cut. If the rule cannot be removed in the extended position after measuring, mark the point of overlap on one of the sections as indicated in the illustration and realign after removing.

### Candle Flame Speeds Saw Filing

To make it easier to see that you have correctly filed the teeth of a saw blade, first pass the blade through the flame of a small candle. Filing the teeth will remove the soot deposited by the candle, and show a bright area that is seen easily.

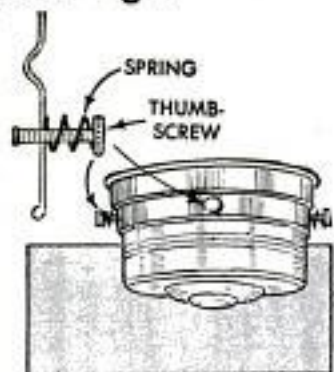


### Suction Cups Hold Drying Rack

This lightweight, metal drying rack for week-end guests is held on the bathroom wall by two suction cups. Constructed of aluminum angles and rods as shown, the rack is easily removed and stored when not in use. All corners and edges should be filed smooth and the completed rack should be enameled to prevent damage to towels. — Sam Grant, New York City.

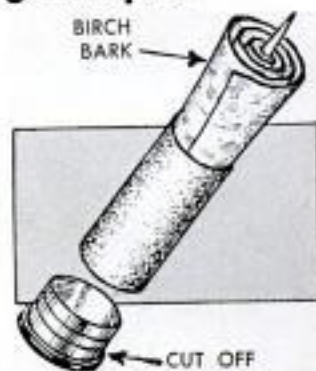
### Coil Springs on Thumbscrews Keep Ceiling Fixture Tight

Here is inexpensive insurance against the risk of injury caused by a falling overhead-lamp shade in places where vibration tends to loosen the small thumbscrews holding it. The screws are held in place by means of short compression coil springs. These are formed by stretching a tension-type coil spring to separate the coils. Stretching the spring in this manner changes it to a compression spring, and short lengths of it are cut off and placed on the screws.



### Torch for Starting Campfire

This birch-bark torch offers a dependable means of starting a campfire under the most adverse weather conditions. Also, it can be used as an emergency flare that will burn brightly for a considerable time. To make the torch, simply cut off the metal portion of a spent shotgun shell. Then, wind strips of dead birch bark around a small twig or splinter of wood and insert the roll in the waterproof section of the shell as shown.



Ben C. Robinson, Newcomerstown, Ohio.



## MORE STORAGE UNDER STAIRS

**S**TORAGE UNDER STAIRS usually amounts to a large closet-type cabinet that tapers to nothing at one end, which means that about one third of it is wasted and becomes a catchall. However, you can get the most from such space and in a most practical way by installing large bin-type drawers, as shown above, which pull out to make access highly convenient. The number and sizes of drawers will vary with each individual situation, but construction of all drawers is similar.

Start construction by removing the plaster and lath, or wallboard, the full width between the studs and down to the baseboard and up to the stairway trim. Next, nail two 2 x 4s to the floor on edge to provide drawer runners. It may be necessary to notch the ends of the 2 x 4s to fit over the 2 x 4 wall plates, or they may have to be blocked up, but in either case they should have their upper edges located slightly higher than the top edge of the baseboard. Now, finish the sides of the wall

opening with wood trim to match that used on the stairway. Also, trim the inner edges of the opening on either side, setting the trim back from the face of the wall trim an amount equal to the thickness of the wood used for the drawer front.

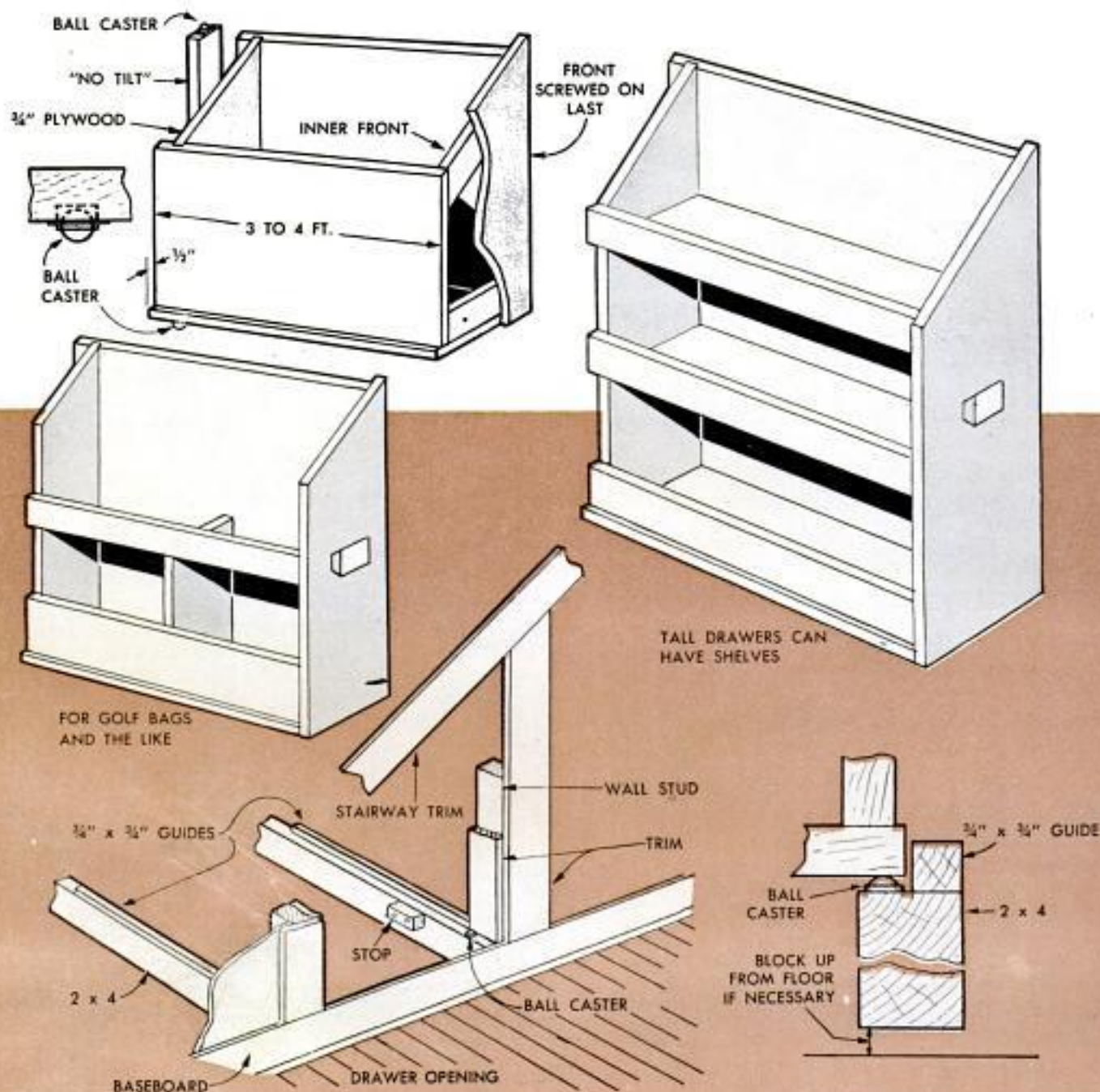
Next, build the drawer or drawers, as the case may be, of  $\frac{3}{4}$ -in. plywood, using glue and screws for all joints. Butt joints are acceptable, but if power tools are available, make dado joints for extra strength, where possible. The inner front can be made of two or more 2 x 4s or a single piece of plywood. Note that the drawer bottom extends  $\frac{1}{2}$  in. beyond the sides. The bottom is the width of the finished wall opening, while the height of the drawer is  $\frac{1}{2}$  to 1 in. less than the height of the finished opening to assure ample clearance. As indicated in the details, the drawer may be a large container, have shelves or be partitioned, depending on what it is to hold.

Nail one  $\frac{3}{4}$  x  $\frac{3}{4}$ -in. guide strip to one runner, slide the drawer in place, then

attach the other guide strip, allowing about  $\frac{1}{8}$ -in. clearance between guides and drawer. Remove the drawer and install a ball caster near the front end of each runner as indicated, and one or more near the rear of the drawer bottom. The casters should be allowed to project only about  $\frac{1}{4}$  in. Replace the drawer and slide it back and forth several times to permit the casters to form grooves in the wood of the runners.

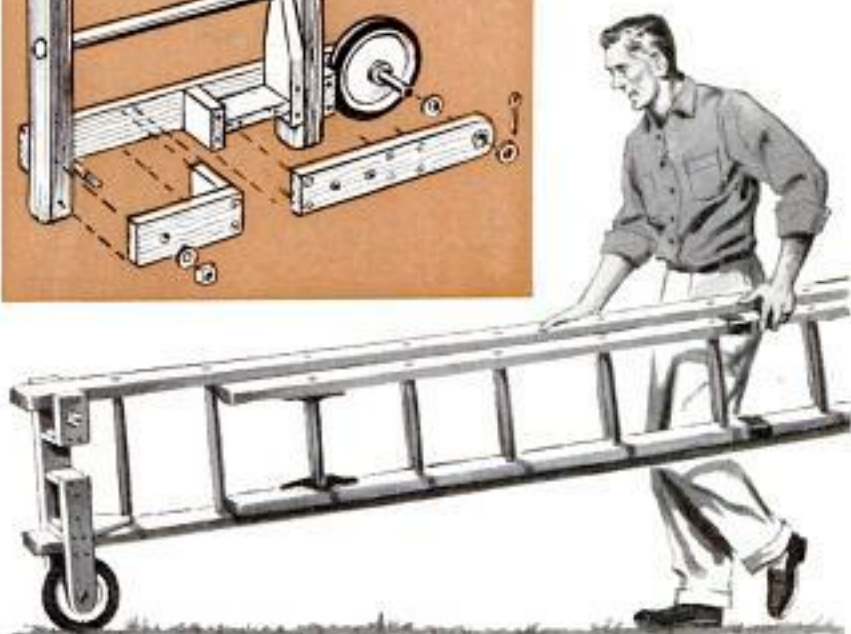
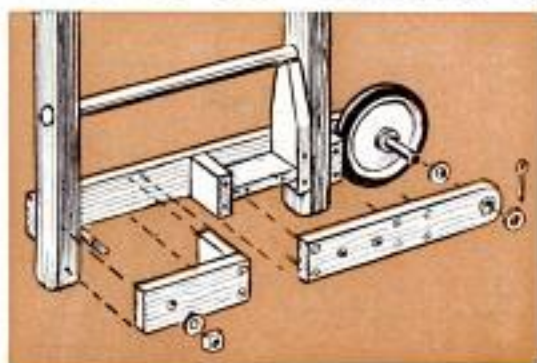
The front of the drawer now can be installed. It may be  $\frac{3}{4}$ -in. plywood like the rest of the drawer, hardwood-faced plywood or any wood of your choice of reasonable thickness. Cut the front to fit the wall opening and attach it to the drawer with  $1\frac{1}{4}$ -in. No. 8 wood screws—no glue—driven from the inside of the drawer. Drill the pilot holes through the inner front slightly oversize, to about  $\frac{5}{16}$  in., so the slant-topped drawer front can be moved slightly in any direction to obtain perfect

alignment with the wall opening. If the stairway should settle in time, the screws can be loosened and the fronts realigned, or they can be removed completely for planing. Glue and nail a small stop block to the inner edge of one runner, and another on the underside of the drawer, positioning them so the drawer will stop when two thirds open. If the underside of the steps is exposed, install a "no tilt" board on the drawer back as indicated, so the ball caster does not quite touch the step. If the underside of the steps is not exposed, secure a board to the stairway framing above the drawer to provide a contact strip for the no-tilt member. The no-tilt piece will have to be installed from inside the closet after the back of the drawer has been lifted to clear the stop blocks and the drawer installed in place. This is done by driving screws through the drawer back while holding the no-tilt piece in place. ★ ★ ★



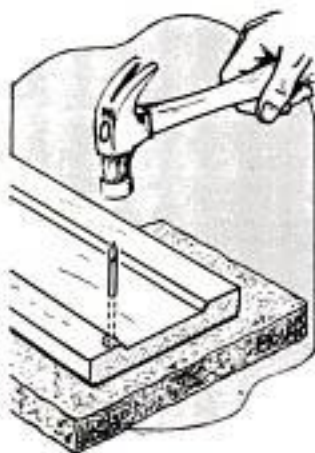
## Extension Ladder Wheeled to Job With Aid of Dolly

Heavy extension ladders are moved about easily when fitted with this one-wheeled dolly that permits them to be rolled, rather than carried, to the job. No holes are drilled through the ladder; the clamping effect of two L-shaped members holds the wheel assembly in place. The tapered member of the assembly has a half-round notch cut in the upper end to permit it to bear firmly against the bottom ladder rung. The dolly is positioned high enough so that it does not interfere with normal use of the ladder. —John W. Nash, Sayville, N. Y.



## "No Splinter" Nail Removal

Avoid splintering the face of finished lumber when driving out old nails, by placing the lumber face down on a piece of insulating wall-board. The soft board will permit easy entrance of the head of the nail, but holds back the surface of the wood.



□ When jigsawing thin plywood it is much easier to get a clean cut, if the material is given a coat of shellac first. The shellac forms a hard film that prevents the plywood from tearing along the cut.

Howard E. Moody, Upper Jay, N. Y.

## Sauce Bottle Is Shop Dispenser

Shop fluids that are dispensed a few drops at a time, such as solvent to remove a spot of paint, or turpentine to clean a few smears of paint from your hands, are kept ideally in a soy-sauce bottle. The regular stopper of the bottle has a small opening.



□ Before painting the inside surfaces of a cupboard, remove the doors and shelves. Then paint the back, and then the sides. If the doors will not come off, do not paint the outside until the surfaces on the inside of the cupboard are dry.

## Truck Converted To Home

Constructed from steel angles and 22-ga. sheet steel, this body fits over the bed of a pickup truck to convert it to a mobile home. Center windows on each side swing out, and doors at the rear can be removed for added ventilation. —Fred R. Edwards, Turon, Kans.





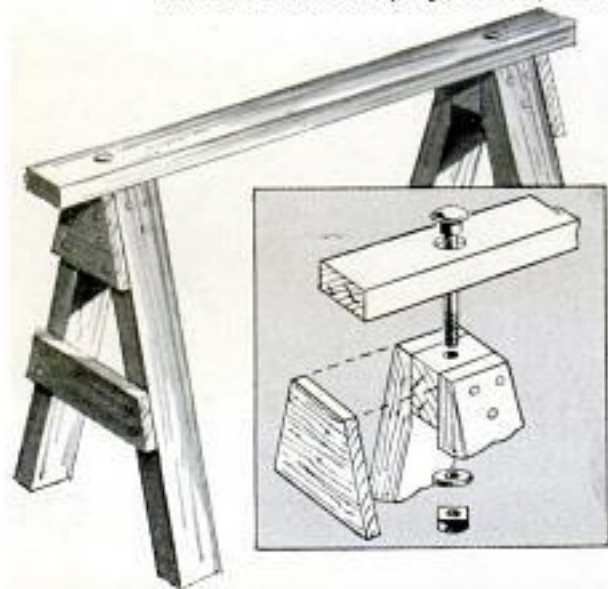
### Hot Paper Cup Held Comfortably With Improvised Handle

Next time you are on a picnic and find that coffee has made a paper cup too hot to hold comfortably, improvise an "insulated handle" from a sheet of paper. A paper towel or napkin folded to form a strip of several thicknesses, or a strip of light cardboard, can be used. The strip should be long enough to fit around the cup snugly just under the rim, and extend enough to permit gripping it between thumb and forefinger.

### Sawhorse Easily Disassembled For Compact Storage

Here is a sturdy sawhorse that can be disassembled in a few minutes simply by removing two bolts from the top piece and legs, for compact storage in the workshop or carrying to another job in the trunk of a car. Except for the cross pieces on the legs, the sawhorse is made of 2 x 4s as shown in the detail.

Samuel Searfoss, Syracuse, Ind.

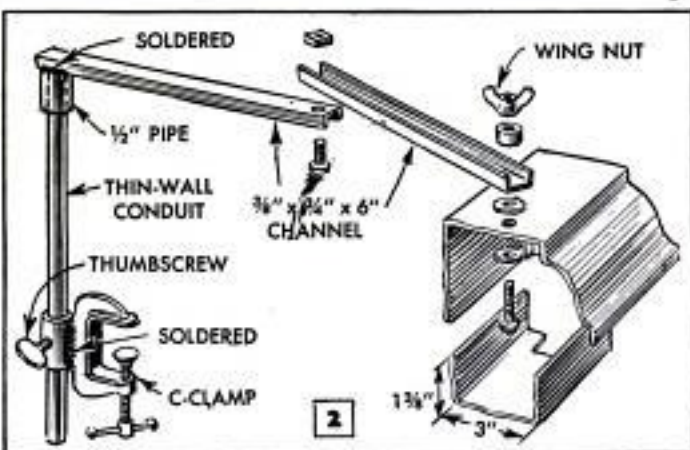


## Fluorescent Fixture From Eaves Trough

By Ralph T. Moore

A FLUORESCENT-LIGHT fixture for a drawing board, over a workbench or other similar installation is easy to make by installing one or two lamps in a reflector assembly made from a length of 5-in. eaves trough as shown in the drawing and details. Either aluminum or galvanized material may be used, in lengths of 50 and 25 in. for 40 and 20-watt lamps, respectively. For end pieces on the reflectors, manufactured end caps are used, or the end pieces can be made by cutting a pattern block of wood and using it for shaping the flanges as shown in Fig. 1. When cutting the metal end pieces, allow  $\frac{1}{2}$  in. for the flanges. Galvanized end pieces are soldered in place, aluminum ones are riveted or bolted. To accommodate two lamps in one fixture, simply cut down the back sides of two equal lengths of trough to leave 1-in. flanges for riveting or soldering the two sections together, as shown in Fig. 3. The end sections for the latter are made in the

Flanges on ends of light fixtures are shaped on wooden pattern block jigsawed from 1-in. stock



POPULAR MECHANICS





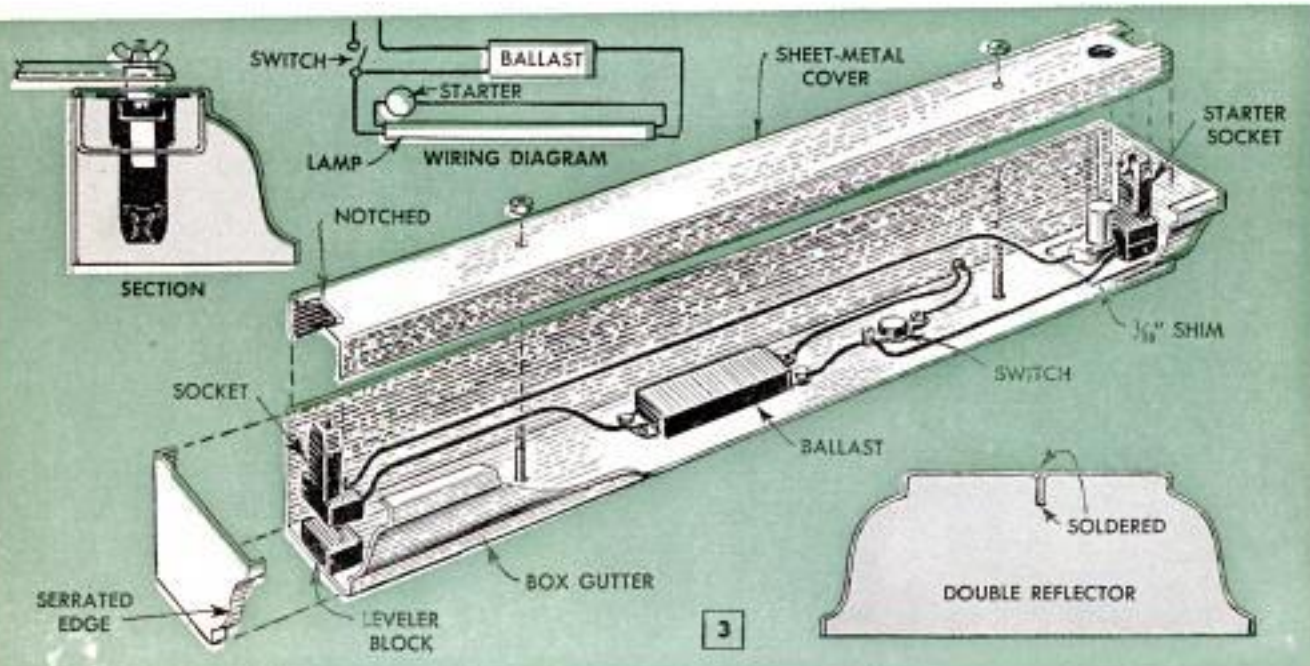
same way as for a single-lamp fixture.

Installation of the lamp circuit, including two end sockets and one starter for each lamp and one ballast of suitable capacity for each fixture, is the same or similar for all fixtures. Follow the diagram for wiring printed on the ballast, or the one shown in the detail. After bolting the sockets, switch and ballast in place, a cover piece  $1\frac{3}{8} \times 3$  in. is formed from 28-ga. galvanized sheet steel and two cutouts made at one end of the cover to accommodate the socket and starter. This cover, the length of which

is determined by the length of the lamp used, is then bolted to the reflector as indicated in the detail. Be sure to insulate all connections and electrical parts mounted on the fixture.

The completed fluorescent fixture can be screwed to a wall, ceiling or other place, or attached to the adjustable brackets, Fig. 2. A thumbscrew on the lower end of each bracket permits adjusting the light to the desired height. The channel-steel members are pivoted for easy adjustment on a horizontal plane. ★ ★ ★

To accommodate 20-watt lamp, a 25-in. length of eaves trough is required, 50-in. length for 40-watt lamp



## Dolly for Camera Tripod Made From Stove Casters



Easy movement of a camera tripod to permit shooting from various angles is assured when the tripod is mounted on a dolly consisting of three stove casters. About 9 ft. of heavy cord or light chain is used to keep the casters aligned. The casters and chain fold to form a package that can be carried in a camera-equipment case.

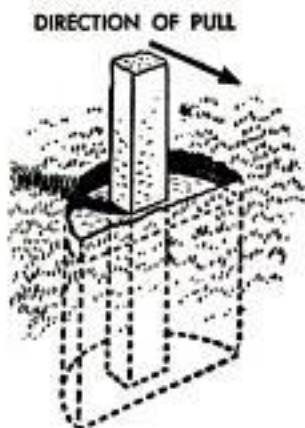
## Novel Miniature Drums Made From Tin Cans

Dress hooks and eyes hold the cords on these novel containers, made to resemble drums. Food tins covered with sheet plastic are used for the containers. The hooks are simply fitted over the top edge of each can, but holes must be punched in the bottoms of the cans to accommodate the ends of the hooks.—Fritz Snyder, Dover, N. J.



## Concrete Form for Postholes

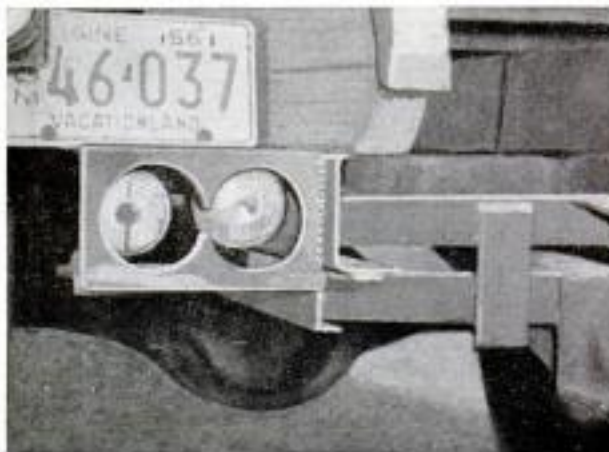
When setting clothesline posts in concrete, dig the forms so that the side of the hole toward the direction of pull is flat. Greater resistance to the pull is offered by the flat surface than would be presented by the usual rounded form.



## Steel Guard Protects Taillights

Guards cut from 1/4-in. steel plate are welded over the stoplights and taillights on the trucks used in one orchard to prevent breakage by low tree limbs.

Charles L. Stratton, Windham, N. H.



## Tying a Cigarette in a Knot Without Breaking the Paper

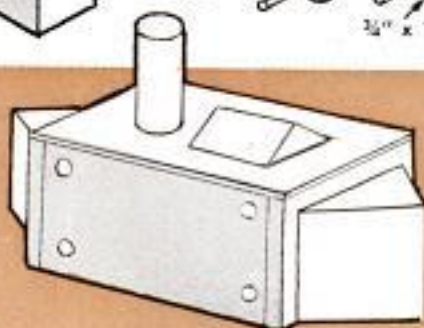
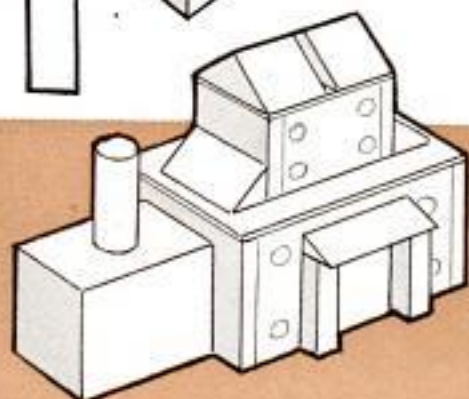
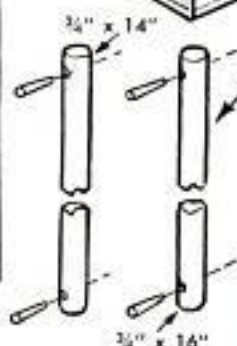
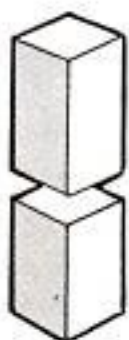
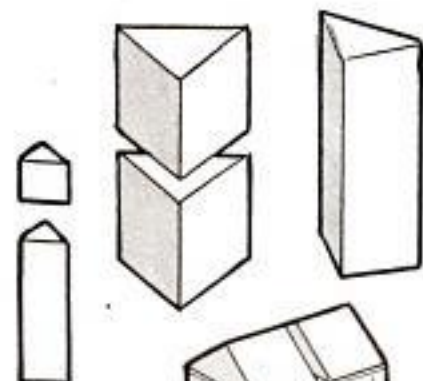
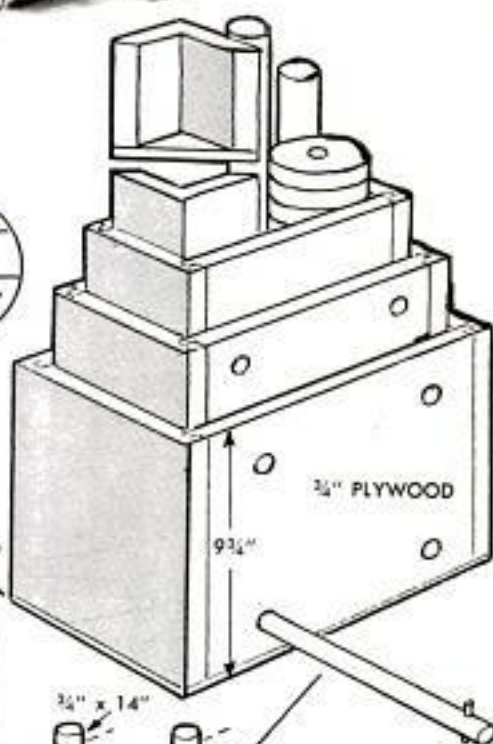
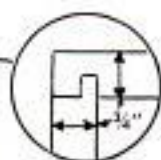
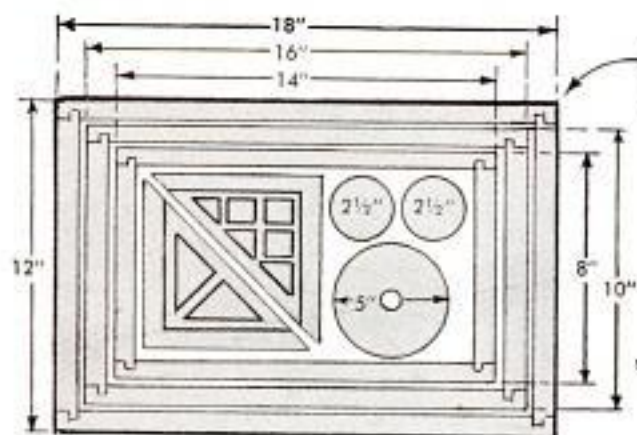


Can you tie a cigarette in a knot without breaking the paper? The trick is not as difficult as it might seem. First, the cigarette must be king-size without a filter. Wrap it tightly in a double thickness of cellophane and twist the ends of the cellophane tightly against the ends of the cigarette. The cigarette can then be tied in a knot, straightened and removed from the cellophane and smoked.

# "BOX BLOCKS"

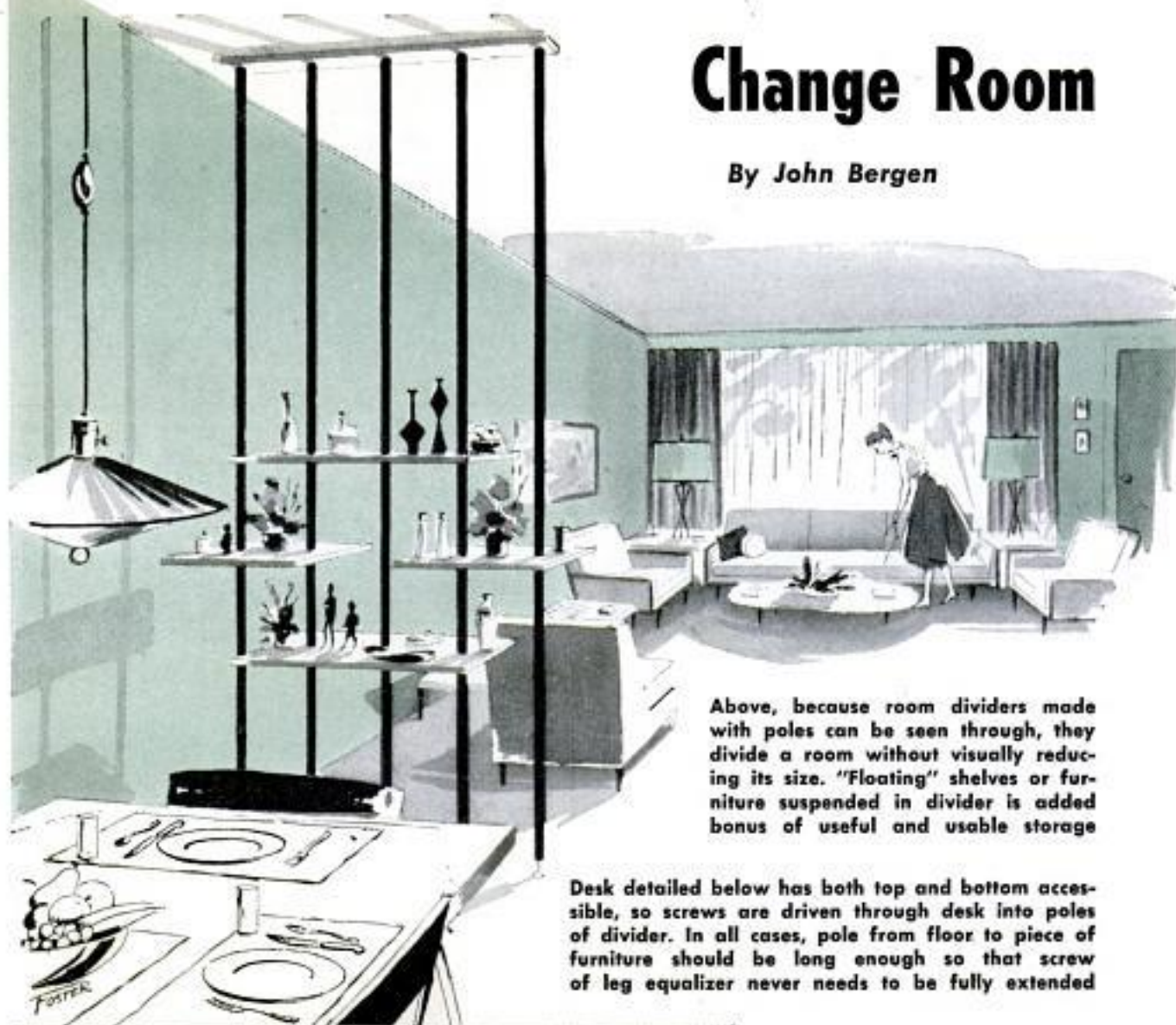
## Will Delight Any Child

YOUNGSTERS love to play with blocks, disks, cylinders and boxes, assembling them in various ways to produce, in their imaginations, anything from a fairy-tale castle to a snorting locomotive. This set of giant "box blocks" will delight any child, including as it does, real axles and wheels that allow him to construct toys that can be wheeled around. Dad will find the set easy to make. Wheels can be bandsawed, axles are lengths of dowel and the solid blocks can be scraps left over from a woodworking project. The boxes should have drawer-type joints.



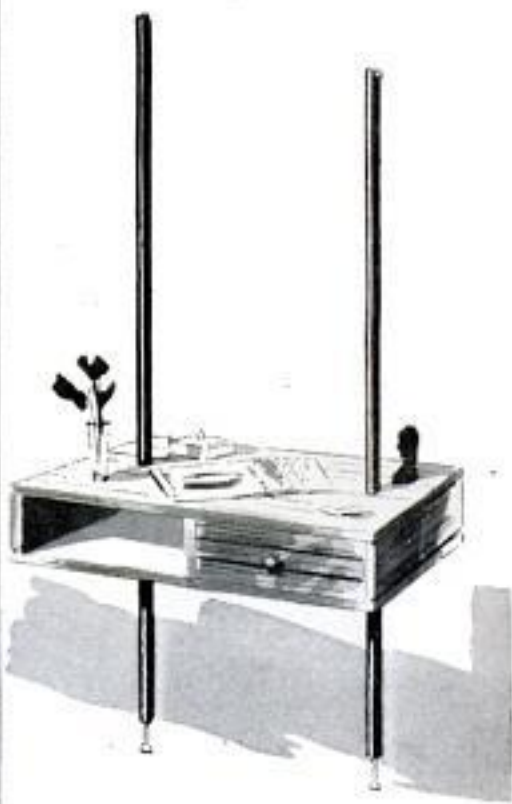
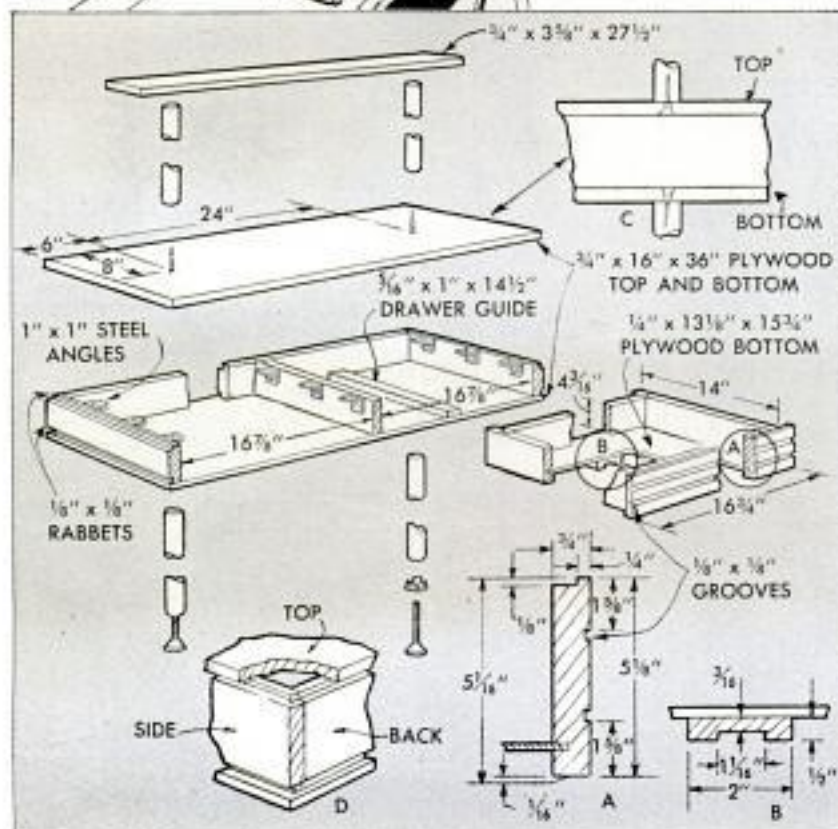
# Change Room

By John Bergen



Above, because room dividers made with poles can be seen through, they divide a room without visually reducing its size. "Floating" shelves or furniture suspended in divider is added bonus of useful and usable storage

Desk detailed below has both top and bottom accessible, so screws are driven through desk into poles of divider. In all cases, pole from floor to piece of furniture should be long enough so that screw of leg equalizer never needs to be fully extended



# Decor With These Movable Dividers

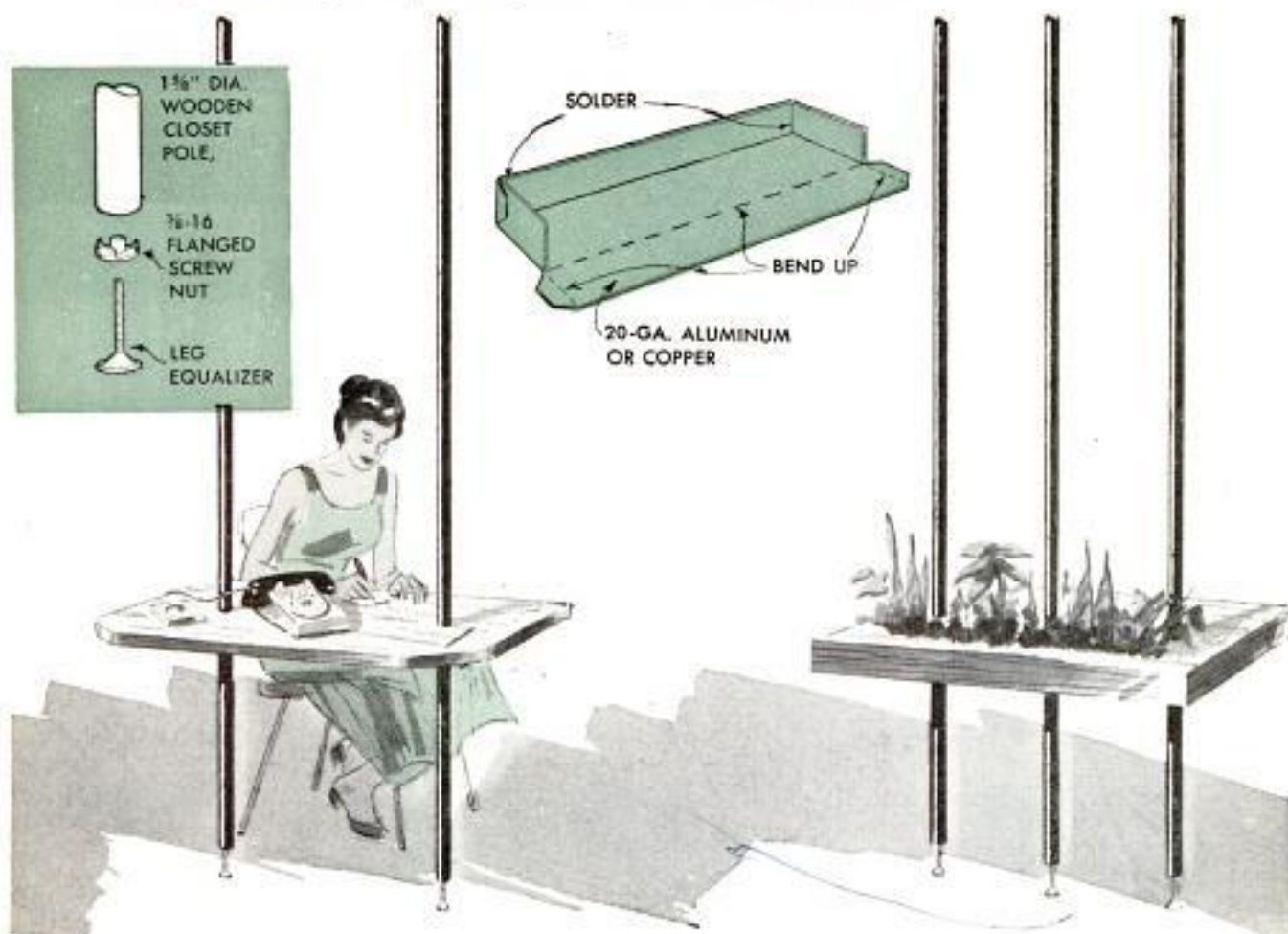
To move these dividers to the opposite side of the room, or to another room, just loosen the leg equalizers, or "jacks," which hold them in place.

ROOM DIVIDERS that consist mainly of large-diameter dowels are a popular means of dividing areas in a modern home without visually decreasing the size of a room. With the aid of screw-type furniture-leg equalizers and a number of 1 $\frac{3}{8}$ -in.-dia. closet poles, any craftsman not only can duplicate these room dividers at moderate cost, but can add attractive "floating" furniture as well. The leg equalizers permit the dividers to be wedged against the floor and ceiling, no nails or screws being used to attach the ends. Thus, no damage is done either to the ceiling or to the floor. Also, this method of installation permits the dividers to be moved about easily when it is desired to rearrange furniture or to change the appearance of a room. And if you move to another home, the dividers can be taken down and moved with the other furniture.

Illustrated on these pages are a set of shelves, a writing desk, a telephone table

and a planter that can be incorporated in a room divider. Dimensions of the desk are detailed; the other items consist mainly of flat sheets of plywood or solid stock. The planter can be built as a box, with a lining of copper or aluminum, or simply as a flat table in which openings are cut to receive the metal liners. An apron around the table gives the illusion of greater thickness.

The upper ends of the poles are glued and screwed in holes made in a 1 x 4 bearing plate. Where the poles pass through the shelves, each one can be toenailed by driving a long finishing nail at an angle through the pole and into the shelf from the underside. The top of the bearing plate can be padded with a strip of felt to keep from marking the ceiling. The bearing plate can be painted to match the ceiling if it is desired to make it less conspicuous, or it can be painted to match the poles which might provide a contrast to the rest of the room decor. ★ ★ ★



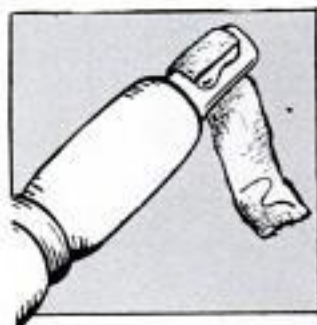
## Tack Driven Into Frame Corrects Sagging Cabinet Door



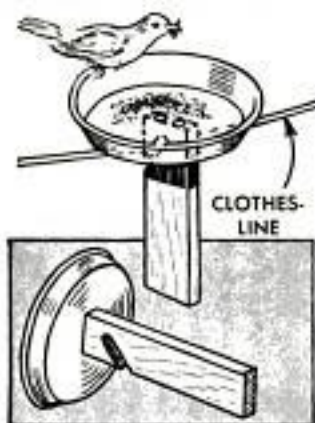
When the door on a wooden kitchen cabinet sags so that it is difficult to open and close, the defect often can be corrected temporarily with a rubber-headed tack. Drive the tack in the position indicated. As the door is closed, the tack will force the lower edge upward.

## Repairing Loose Chair Rungs

To tighten turned chair rungs or legs that have become loose, wrap the tenons with glue-soaked strips of cloth. Fit the tenons into the legs and clamp tightly with bar clamp until dry.

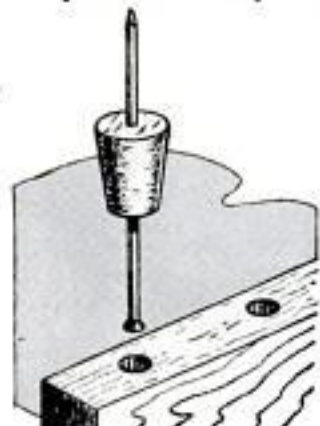


## Hook-on Bird Feeder



Simply hooked over a clothesline, this bird feeder is easy to remove for filling. It consists of a 2 x 4, notched as indicated, with a cake pan nailed to the end. The weight of the lower portion of the 2 x 4 counterbalances the pan and the birds.

## Adjustable Depth Gauge



Ideal for checking depth when drilling blind holes for dowels, this simple depth gauge is made by driving a finishing nail through a cork. The gauge is easily adjustable by sliding the cork on the nail. Holds any setting without slipping.

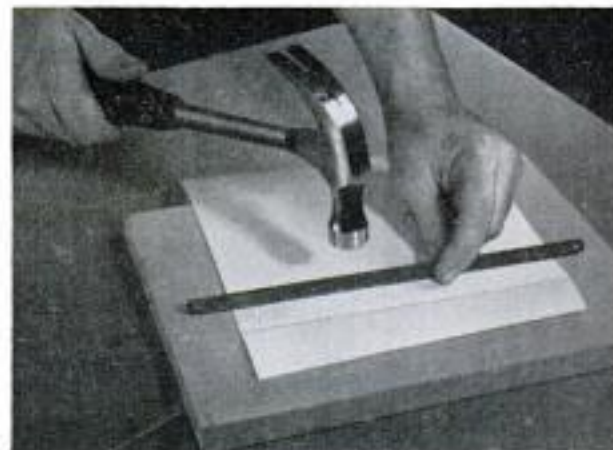
## Reconditioning Paintbrushes

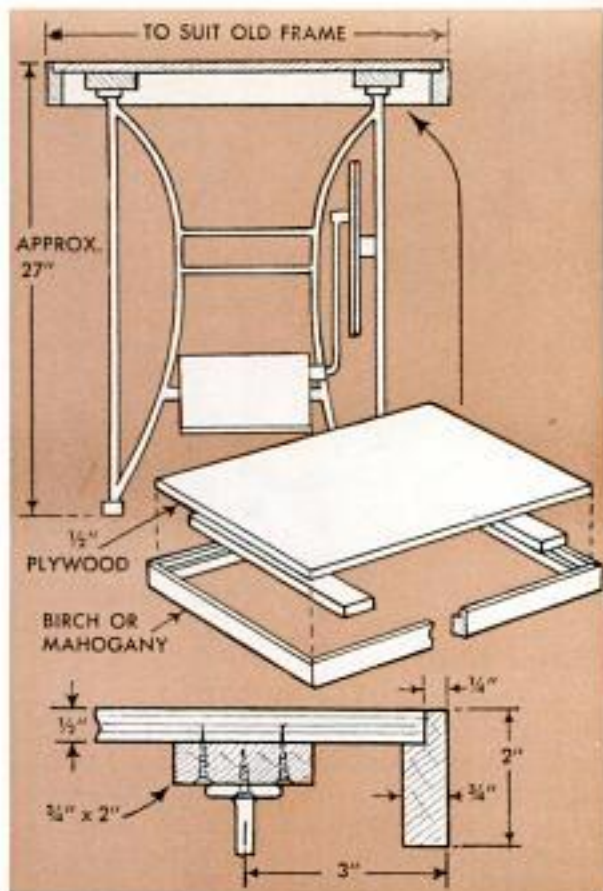
Old paintbrushes that have become frayed and misshapen from much use can be reconditioned by dipping them in a water-soluble adhesive after they have been cleaned thoroughly. When the adhesive has set, reshape the bristles by sanding, then soak in water to remove the adhesive.



## Saw Blade Perforates Paper

Straight-line perforation of a small number of sheets of paper can be done by using a coarse hacksaw blade. Place the paper on a flat, fairly resilient surface, such as linoleum or soft wood, then tap the saw blade until the teeth just puncture, but do not cut, the paper.





## Lamp Table Made From Old-Fashioned Sewing-Machine Frame

Unique and attractive in appearance, this lamp table with "wrought iron" legs is made from an old-fashioned, treadle-powered sewing-machine frame. The original top on the machine is removed and replaced with one made as shown in the details. Dimensions of the top will vary with different machines, but should be of a size that gives a measurement of 3 in. from the center of a leg to the outside edge of the table-top apron. The 1/2-in.-plywood top is

fitted in a rabbet cut in the apron that is made from 3/4 x 2-in. stock. Corners of the apron are mitered for neater appearance. Two cleats, also cut from 3/4 x 2-in. stock, are screwed to the underside of the plywood top, both to provide rigidity and to permit using longer screws for fastening the top to the sewing-machine frame. The table apron can be light to match the plywood, or dark for contrast. Lock treadle with a bolt.—Hi Sibley, Nuevo, Calif.

## Wooden Handle in Push Broom Tightened by Inverted Screw

When the wooden handle on a push broom no longer can be tightened in the broom because the threads are worn, drop a wood screw into the hole in the broom as shown, so the screw jams between the threads.



☛ When mixing concrete, avoid the use of shale, soft limestone or any material that crumbles or slivers as an aggregate.

## Tailor's Chalk Kept Sharp With Notched Knife Blade

Keeping a sharp edge on the special chalk used to mark clothing for alterations is no problem when a notched knife blade is used. The chalk simply is drawn across a V-notch ground near the heel of the blade of a knife.



☛ An easy way to test the accuracy of a bathroom scale is to place a 5-lb. bag of flour or sugar on it.



### Putty Knife Is Nailing Guard

When nailing quarter round in place, protect the baseboard from denting or splintering due to a misdirected hammer blow by using a wide putty knife. Hold the putty-knife blade against the baseboard directly behind the nail to be driven. Do not let it slip behind the quarter round.

### Putty Levels Wobbling Furniture

Occasionally it is more satisfactory to lengthen the one short leg of wobbling furniture than to shorten any of the others. Put wood putty under the short leg, using wax paper to keep it off the floor, then press down on the item of furniture until it levels. Trim and sand putty to shape.



☐ Furniture scratches may be concealed by rubbing them with a solution of equal parts of boiled linseed oil, turpentine and white vinegar.



### Planter Made of Hornets' Nest

An unusual planter was made for one home from an abandoned hornet's nest. One end of the nest was cut off, loose debris was removed from the inside and the outside was shellacked. A wire was forced through the nest to serve as a hanger after the shellac was thoroughly dry.

### Lighted Card Is Focusing Target

When photographing some subject that is in a dimly lit area, use a playing card held on the end of a flashlight with a rubber band as a focusing target. With the light turned on, the card is visible on the ground glass. Photoflash, of course, provides light for the exposure.



☐ Clogged gas-stove burners should be removed for cleaning, the holes cleared with a pipe cleaner or wire and units washed in hot soapy water before replacing.





## “CANTILEVER” DESK For the Home Office

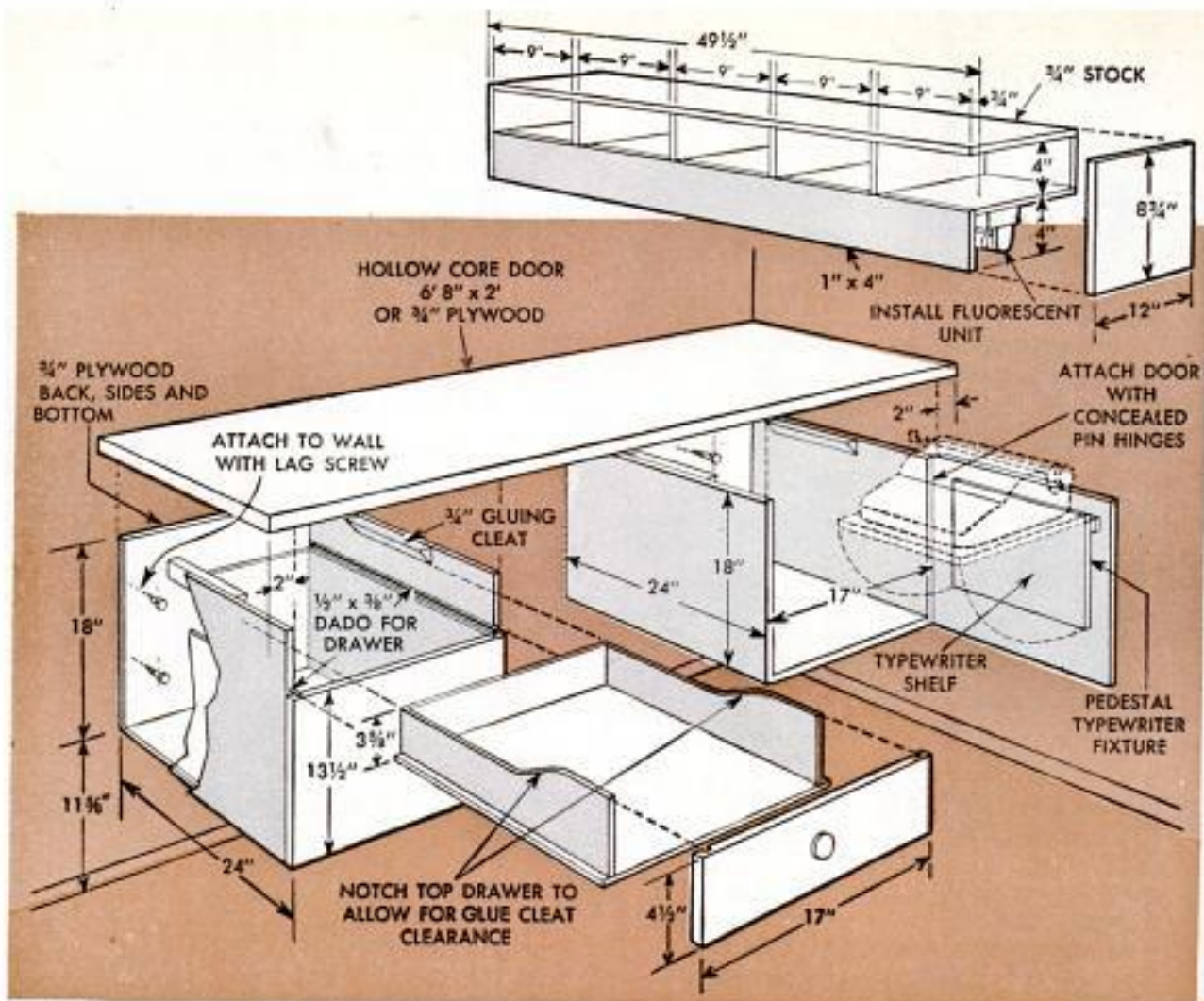
*includes pigeonhole wall rack with built-in fluorescent light*

**T**HIS ALL-MAHOGANY DESK and wall rack is ideally suited for part-time free-lance writers, owners of small businesses and others who need an office in the home for handling correspondence and keeping records. The secretarial-style desk accommodates a full-size typewriter in a compartment on the right side and the rack above has five compartments, or slots, for filing correspondence and storing

stationery. Both units are attached to the wall studs as shown in the drawing and details, requiring a minimum of space for this compact little office and permitting unrestricted access for cleaning under the desk. A shallow drawer in the left pedestal of the desk provides convenient storage for pencils and other miscellaneous items. A deep drawer under the shallow one permits installation of a handy filing system

DESK		LIST OF MATERIALS			Specifications	
Pieces	Description	Thickness	Width	Length		
1	top	1 3/8"	24"	80"	Hollow-core door or good 1-side 3/4" plywood	
1	typewriter shelf	3/4"	14 1/2"	21"		
4	ends	3/4"	23 1/4"	18"		Good 2-side plywood
2	bottoms	3/4"	23 1/4"	15 1/2"		"
2	backs	3/4"	15 1/2"	17 1/4"	"	
1	door	3/4"	18"	17"	"	
1	drawer front	3/4"	4 1/2"	17"	"	
2	drawer sides	1 1/2"	4"	22 1/2"	"	
2	drawer sides	1 1/2"	12"	22 1/2"	Good 1-side plywood	
1	drawer back	1 1/2"	3 1/8"	14 1/4"		
1	drawer back	1 1/2"	12"	14 1/4"		
2	drawer bottoms	1 1/2"	22 1/2"	16 1/4"		
4	gluing cleats	3/4"	3/4"	1"		
<b>LETTER PIGEONHOLES</b>						
2	ends	3/4"	12"	8 1/4"		
1	top	3/4"	12"	48"		
1	bottom	3/4"	11 1/4"	48"		
1	back	3/4"	4"	48"		
1	apron fascia	3/4"	4"	48"		
4	dividers	3/4"	4"	11 1/4"		

**NOTE:** Unless otherwise specified, material to be solid Philippine mahogany



for important papers. The compartment in the right-hand pedestal accommodates a typewriter that is bolted to a hinged shelf attached to the door as shown. The shelf is fitted with a brace to keep it in a horizontal position when the typewriter is in use. The door is attached to the desk with concealed pin hinges so that no part of the hinges is visible when the door is closed.

The combination rack and light can be attached to the wall facing the right side of the desk as illustrated, or it may be installed over the desk as desired. When the rack is located over the back of the desk, the fluorescent unit installed on the underside of it provides an even distribution of light over the entire work area. The latter arrangement is ideal when the entire desk top is needed for drawing or sketching work, laying out a large quantity of material or doing other work.

If you wish, a veneer-faced flush door can be used for the top. Being thicker than plywood, it will improve the looks of the desk. Added thickness to a plywood top can be gained by gluing and screwing 3/4-in. strips around the edges on the underside and then banding them with veneer tape. In this case, extra cross strips should be added to accommodate the gluing cleats.

All members are assembled with glue and wood screws. The completed units can be stained and varnished as desired. The top should be given several coats of spar varnish, or a glass top can be provided. When attaching the desk to a wall, be sure to drive the lag screws into wall studs for proper support. If it is impossible to secure the desk to wall studs, legs or a suitable base can be screwed to the bottoms of the two compartments to provide the proper work height of 30 1/2 in. ★ ★ ★

Courtesy Philippine Mahogany Association

## Protecting Garbage Cans

To discourage rust from forming in garbage cans and wastebaskets, coat the inside with paste wax. An even coating can be applied by melting the wax so it may be spread with an old paintbrush.

196

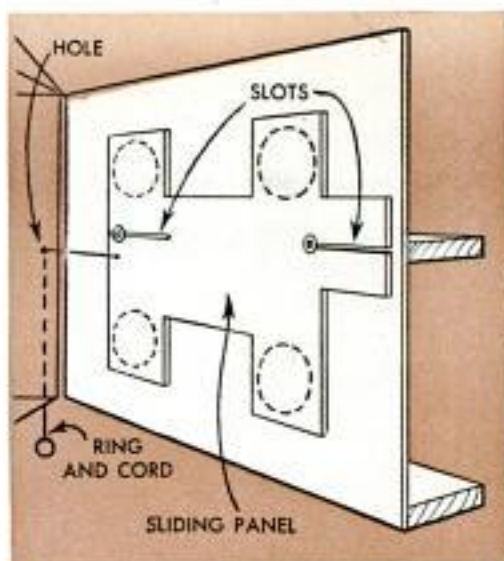
## Can Covers Catch Drips

When using paint remover to remove the old finish from a chair for example, can covers placed under the legs to catch the drips give better assurance than newspaper against damage to floor or other finish.

POPULAR MECHANICS

## Door Bars Sparrows From Martin House

If you want to keep sparrows and other winter birds out of a martin house until the martins arrive in the spring, install a sliding panel that can be pulled across the entrances on the inside as shown in the detail. The panel is  $\frac{1}{8}$ -in. hardboard slotted to move horizontally on two screws. Nest dividers are set back about  $\frac{1}{2}$  in. to accommodate the panel. When the house is cleaned in the fall, the panel is pushed across the entrance by hand. A cord tied to one end of the panel and led through a hole in the side



of the house as shown, is used to open the house when the martins arrive.

Enno R. Haan, Evanston, Ill.

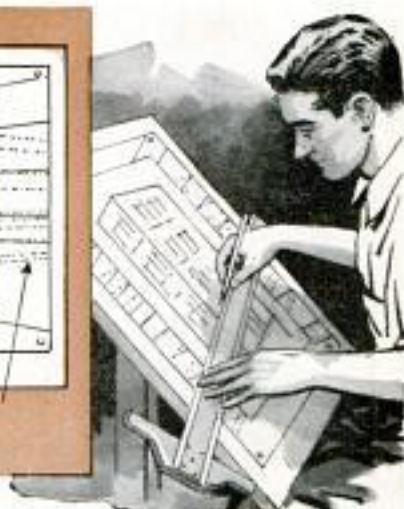
## Tetrachloride Cleaning Makes Electric Clock Run Like New

The next time one of your electric clocks begins to run slow or emit an ominous buzzing, don't throw it away. Most likely all that is needed to correct the condition is to remove the accumulation of dust that has filtered through the openings in the back of the case and collected on the moving parts. The actual cleaning is a simple operation. First, remove the screws at the back of the case so that the works can be taken out, being careful not to damage the hands on the clock or scratch the face. When the works have been removed, hold them over an empty coffee can or other container and flush the gears and shafts with carbon tetrachloride using an eye dropper to apply the liquid. After all foreign matter has been removed, flush the parts with clean fluid once more and allow it to evaporate before reassembling the clock. One precaution that must be ob-

served is to hold the works in a position that will prevent cleaning fluid from contacting the coil terminal wires and loosening them. If the clock does not run properly after cleaning it in this manner, the trouble may be in the small synchronous motor that drives the works. Since this motor is a sealed unit, dirt cannot foul it, except at the point where the shaft and pinion extend from the housing and engage the gear that drives the clock. Usually, this trouble can be remedied by removing the motor unit and soaking it in carbon tetrachloride. Then, the end of the motor having the shaft and gear is submerged for an hour in a cleaning-lubricating fluid of the type used by radio servicemen for cleaning switch contacts. Before doing the latter, it may be necessary to heat the motor slightly so that the vacuum created when it cools will draw the fluid into the bearing.

## Lines on Underlay Aid in Sketching

Guide lines marked on underlay sheets can be substituted for vanishing points beyond the edges of the board. On the floor or a large table, mark off several of the sheets with the vanishing points at various distances, making one set of lines solid, the other dotted. You then can mount the drawing over the proper sheet.





### Protect Tools From Corrosion

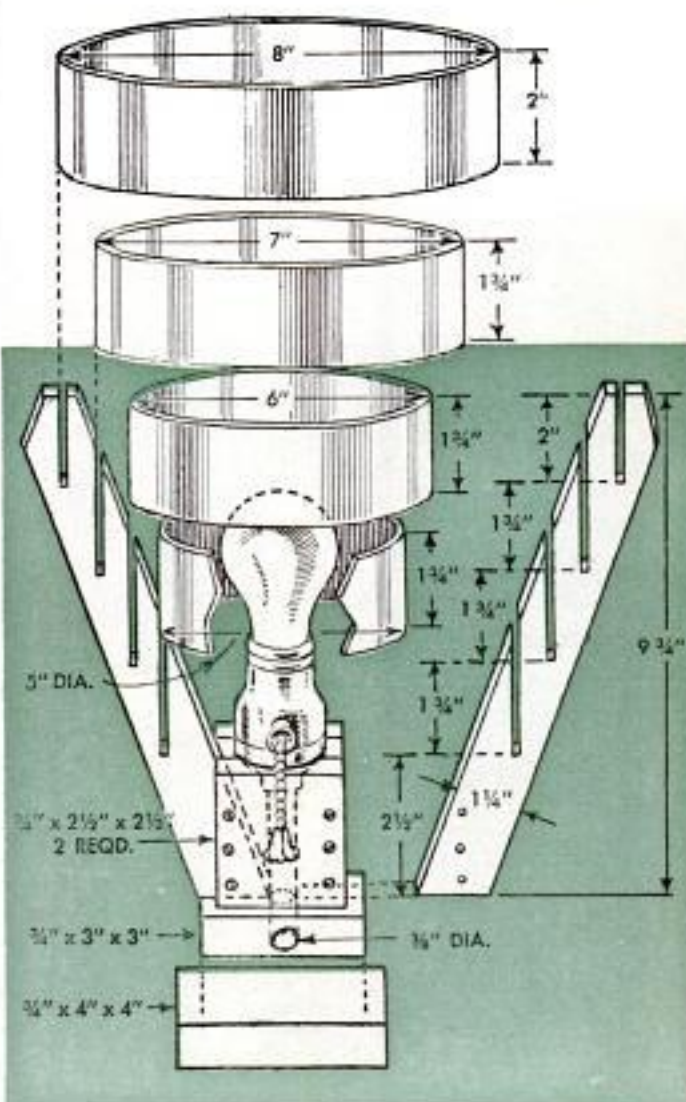
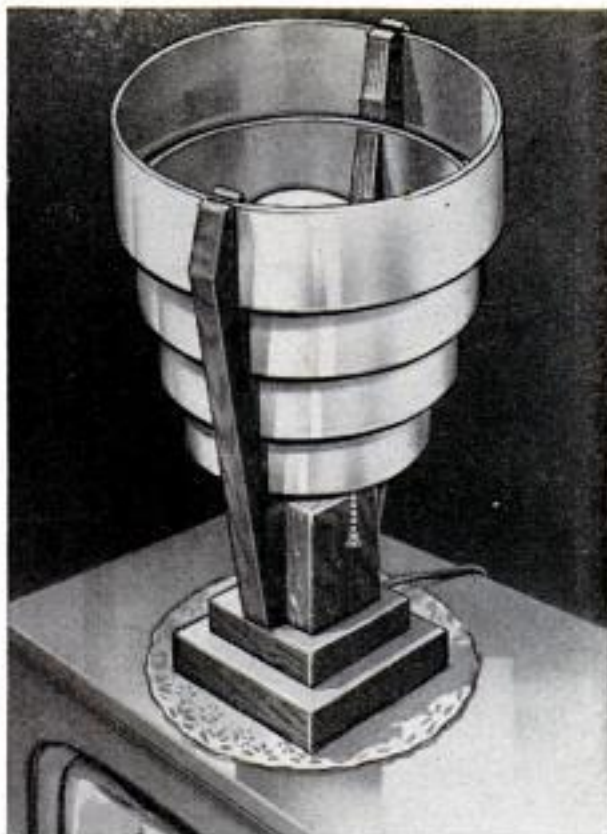
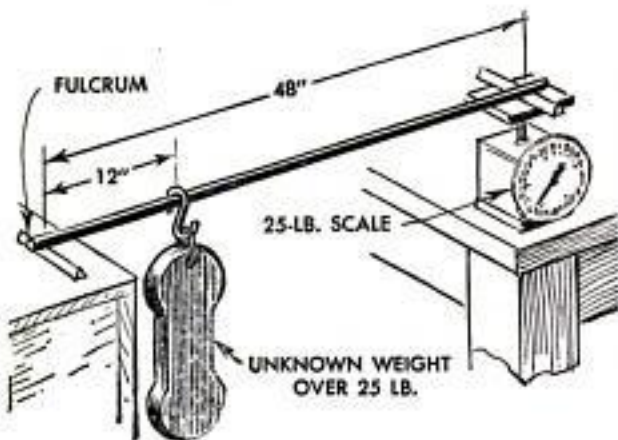
Tools that are not used very often can be protected from corrosion by applying a thin coating of an anticorrosive lubricant as shown in the photo. The tools should be coated after each use and each time they are cleaned.

### Make Handsawing Easier

Less effort is needed when using a hand-saw or hacksaw if pressure is applied only on the forward stroke. Also, wear on the teeth will be reduced if the saw is lifted slightly on the return stroke.

### Upping Small-Scale Capacity

When an object you want to weigh exceeds your scale's capacity, try using the setup shown below. A 4-ft. length of rigid pipe serves as a beam that is supported at one end by a fulcrum on a table and at the other end by a fulcrum on the scale. The weight of the pipe is noted on the scale—2 lb. in this instance. Then, the object to be weighed is hung on the pipe at a distance from the table fulcrum equal to one fourth the distance from fulcrum to scale. Again the weight is noted—17 lb., and the 2 lb. subtracted from it. The result, 15 lb., multiplied by 4 equals the total weight of the object.—W. M. Wayne, Miami, Fla.



# MODERN TV LAMPS

CALIF.

By M. C. Anderson

15100 THOITS ST., SAN LORENZO,

THE TWO LAMPS illustrated in this article are so easy to make that any homemaker can assemble both of them in one evening. Tiers of metal Venetian-blind slats that form the shade on the lamp shown on the opposite page direct most of the light upward, making it an ideal lamp for use where indirect lighting is desired. To make this lamp, simply cut the various members to size as shown in the details, and make the saw cuts in the arms that support the slats. The arms, cut from  $\frac{3}{4}$ -in. material, should be clamped together when making the saw cuts. Drill the hole in the base for the lamp cord. A pull-chain-type light socket screwed to a length of threaded electrical pipe which is clamped between the two vertical blocks of the base, completes the job. It is important to make the saw cuts exactly as indicated so that the shade tiers overlap  $\frac{1}{4}$  in.

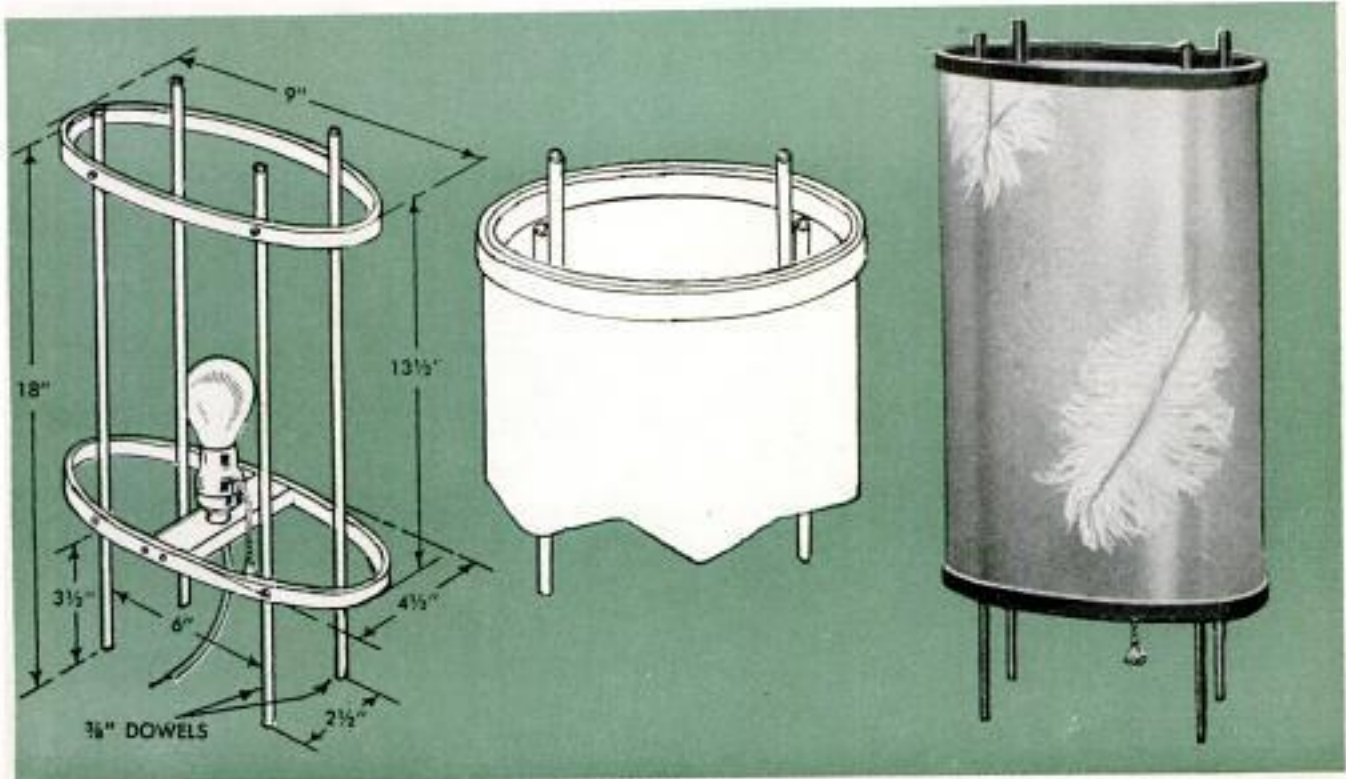
The lamp shown on this page requires even less time to make. Wooden dowels are used for uprights. Two pairs of embroidery hoops, of which the inner one of each pair is screwed to the uprights as shown, provide a means of clamping the translucent-plastic shade. Material for the latter is ob-



Low-wattage bulb in lamp produces soft glow for most effective display of design in plastic shade

tainable in most variety stores. The ends of the plastic lap  $\frac{1}{4}$  in., the lap being centered over one of the dowels at the back of the lamp to prevent light leaks. Pilot holes are drilled for the screws to prevent splitting, and the heads are countersunk for proper clearance between hoops. ★ ★ ★

Ends of plastic material must lap  $\frac{1}{4}$  in. when clamped in hoops. Lap is located over dowel at back of shade





## Fence Supports Temporary Walk

When planks are used as a temporary sidewalk for a new home before the permanent concrete walks are installed, they sometimes have a tendency to sink or slide underfoot when the ground is muddy. To prevent this, first lay snow fencing on the ground to provide a firm, "floating" base.

## Handholes in Oil Drum

To permit easier handling of an oil drum when it is used as a trash container, cut handholes directly in the drum. Mark semicircles near the top edge, flat sides up. Cut only the circular part, fold up resulting flap and cover with split hose.



## Quick Repair for Chipped Trays

When an enameled darkroom tray has been chipped down to the bare metal, a quick, chemical-proof repair can be made with common household paraffin. Hold a lighted match under the chipped spot until the metal heats a bit, then rub the paraffin over the exposed metal until a layer is deposited. This will adhere well with solutions of normal temperature, will not affect photochemicals.

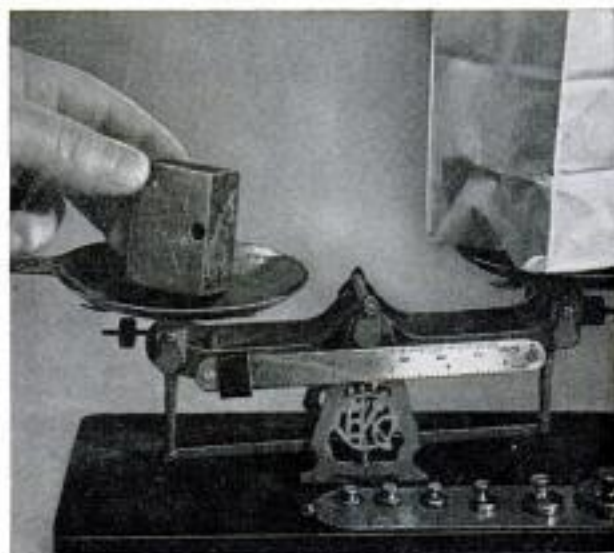


## Cleaning Wooden Counter Tops

Light stains on wooden counters can be removed with scouring powder. Household bleach will remove stains that penetrate the wood surface. After bleaching or scouring, restore natural color with olive oil.

## Photo-Scale Capacity Increased

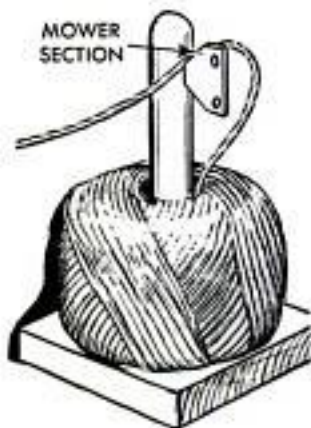
Darkroom scales, generally equipped with weights that total only a few ounces, can be used to weigh dry materials up to 1 lb. without overloading. Obtain a piece of metal that weighs exactly 1 lb., or, with the aid of a scale, pour dry sand into an empty tin can to produce a 1-lb. weight. The weight then is used as indicated, dry chemicals being poured into a paper bag.



POPULAR MECHANICS

## Spindle for Binder Twine

Waste and tangling of a ball of twine used for odd jobs around the farm are avoided by using a spindle consisting of a length of fork handle fitted in a hole in a square of 2-in. stock. A mower section is driven into the upper end of the spindle as a cutter.





## Air-Drive Outboard Motor Powers Ice-Fishing Sled

*Prototype used 2-cycle, 4-h.p. air-drive outboard motor.* By Ben C. Robinson

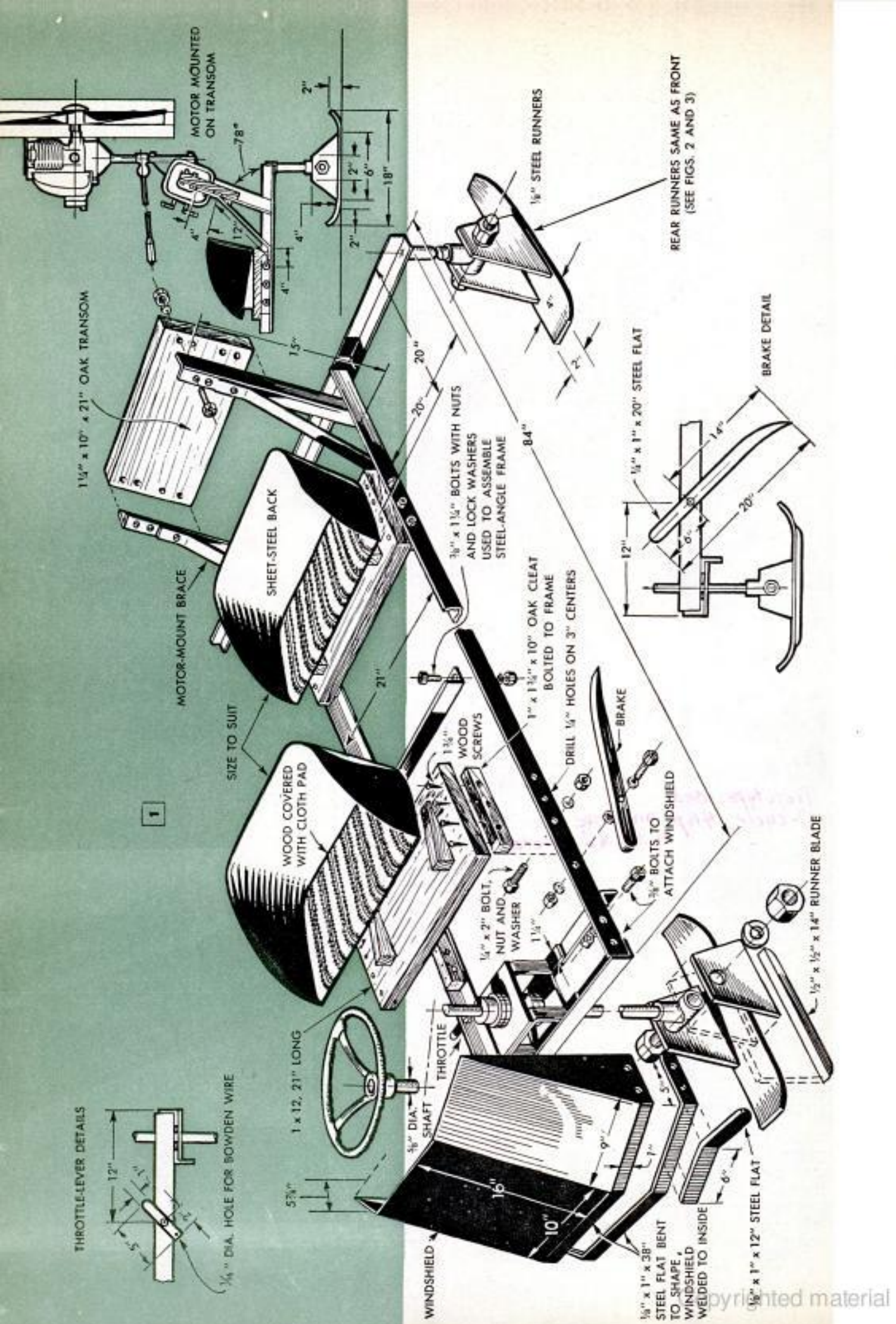
**I**F YOU OWN an air-drive outboard motor, don't store it away when winter comes. Instead, clamp it to the transom of this two-man sled and go ice fishing the modern way. Rather than trudging across a frozen lake in search of a good fishing spot, crank up the outboard and whisk across the ice at automobile speeds. Locations that would require hours of walking to reach on foot are only minutes away by this air-driven sled.

The iceboat described in this article, Fig. 1, is rugged and simple to build. It was designed to carry two good-sized men at speeds of about 10 m.p.h. over snow and rough ice, and at speeds up to 40 m.p.h. and more, depending on the horsepower of the motor used, on smooth ice. For the main frame of the sled,  $\frac{1}{4}$  x  $1\frac{1}{2}$  x 2-in. steel angles are used to assure adequate strength. For a one-man version of the

sled, lighter angles could be used. But even with the heavier members, two men can lift the sled after the motor is removed, and slide it onto the bed of a pickup truck, or on a car-top carrier. A few modifications on a regular boat trailer would permit the sled to be carried on it. The details, Fig. 1, show the frame bolted together, which is entirely satisfactory and permits easy disassembly for summer storage. However, an even more rigid frame will result if welded construction is used. No dimensions are

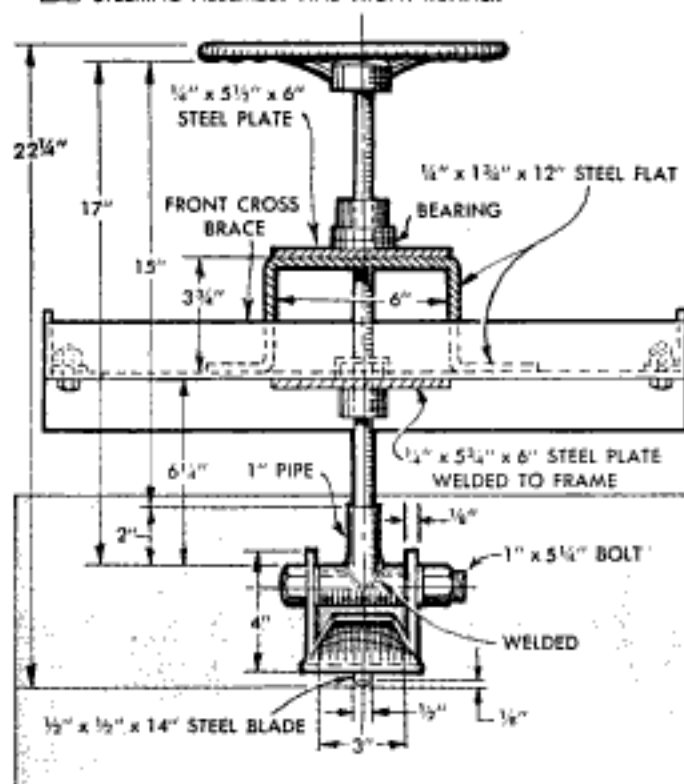


Bait is no problem when ice fishing. The onion-like bulbs on dried goldenrod stalks contain grubs that are tempting morsels to hungry fish

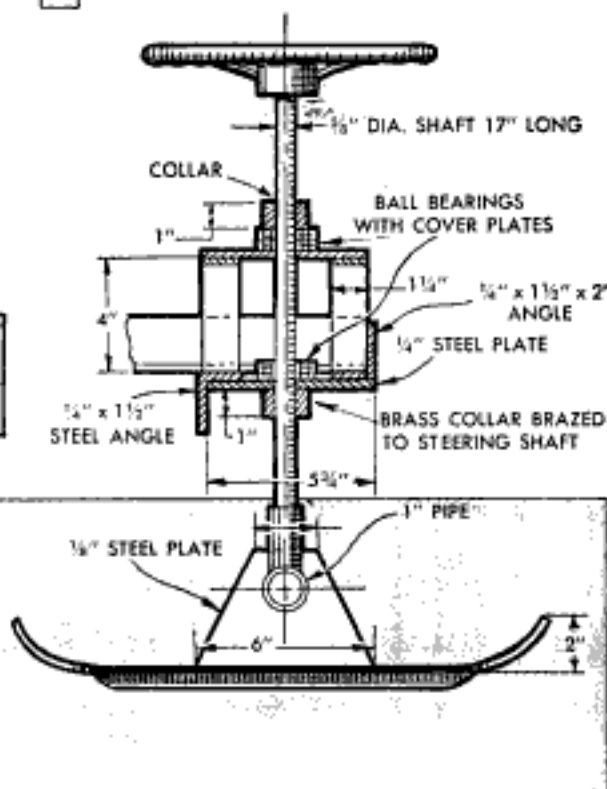




2 STEERING ASSEMBLY AND FRONT RUNNER



3



given for the seats. This is to permit the builder to custom-build the seats for himself and his favorite fishing partner. For a deluxe version of the sled, bucket seats from a car or bus, picked up at an automobile graveyard, would add a touch of comfort. It must be kept in mind that any additional weight, such as the bucket seats, will reduce the over-all performance of the sled and make it more difficult to carry.

The windshield, Fig. 1, is bent from sheet metal to the dimensions given. Here again, personal requirements or ingenuity might suggest some modifications. An extension of clear sheet plastic could be added to the metal windshield to provide greater weather protection. Such a windshield addition might be permanent, or could be clamped to the metal portion of the shield with thumbscrews turned into nuts tack-welded to the metal.

As indicated in Figs. 2 and 3, the steering and front-runner assembly are the most complicated parts of the sled, although they are not difficult to fabricate. The steering wheel can be salvaged from a wrecked auto or one can be bent from tubing or pipe. In the latter case, a half wheel, such as used in an airplane, will be adequate, as the front runner is turned through an arc of only 180 deg. or less. The steering shaft is a length of 3/8-in. shafting. It rotates in two ball bearings as indicated, but the weight of the sled is supported on a brass collar brazed to the steering shaft. A second brass collar, above the steering

assembly, is held on the steering shaft with a lock screw and prevents the sled from moving upward on the steering shaft.

Each of the three runners on the sled pivots on a 1-in. bolt that runs through a T-shaped fitting welded from 1-in. pipe. The lower end of the steering shaft is adapted to fit into the fabricated pipe tee in one of two ways: Either by welding a short length of 1-in. shafting to it, or by using an adapter sleeve with an i.d. of 5/8 in. and an o.d. of 1 in. The sleeve is welded to the shaft and to the tee. Short lengths of 1-in. shafting are welded to the frame extensions and into the pipe tees on the two rear runners.

Indicated in Fig. 1 is a single, hand-operated brake. This is efficient for moderate speeds, but should be replaced with a double, foot-controlled brake, if the sled is to be run at higher speeds. Two sharpened shoes, such as shown, are used, one being located on each side of the sled on the ends of a rotating shaft. A foot pedal is welded to one end of the shaft at a convenient angle. A light spring is used to keep the brake up and clear of the ice. A Bowden cable is run from the throttle on the motor to a small lever pivoted on the side of the sled at a point within easy reach of the driver's hand. If the sled is a one-man model, and the driver sits just ahead of the motor, the Bowden-cable setup would not be necessary. In this case, the hand throttle on the motor would be within easy reach. ★ ★ ★



### Improved Easel Holds Screens

When painting screens or reglazing storm sash, they can be positioned at a comfortable working height on an improvised easel, consisting of a wide board rested on one of the rungs of a ladder. One end of the board is allowed to project a couple of inches, while the other end is rested on the ground as shown.



### Gallery Doors Conceal Kitchen

To make a small cottage appear more spacious and attractive, the owner of one such building fitted gallery doors across the Pullman-type kitchen. Between meals the doors are closed, concealing the sink and cabinets. The louvers in the doors provide ventilation necessary to minimize the moisture problem around the sink.



## Enrich Your Life With the Marvels of Hi-Fi! Thrill to a Pocket-Size Transistor Radio . . .

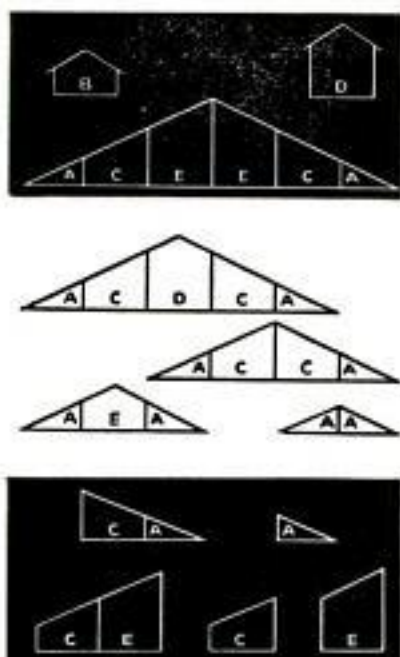
Have you been wanting a Hi-Fi set for your home . . . a portable transistor radio no bigger than your hand . . . and any of the other pieces of electronic equipment that are adding so much enjoyment to modern living? Then here's how you can have them, at merely a fraction of the usual purchase price. Using Popular Mechanics new book—*Electronics Made Easy*—

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servicing, how to use test instruments and make your own, and how to convert old radios into inter-com systems and other devices. It's fun and easy to build your own electronic equipment with the help of this book which contains numerous do-it-yourself projects. Send for your copy of *Electronics Made Easy*. It's your key to the most fascinating hobby of these times **\$2.95** for just.....

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**CUPOLA** comes as a do-it-yourself kit with all parts cut to size and sanded ready to assemble and finish before installing on garage or barn. Roof is of metal, all other parts being of wood. Installation is simple, as the lower rails, or panels, are left full width for cutting to fit ridge

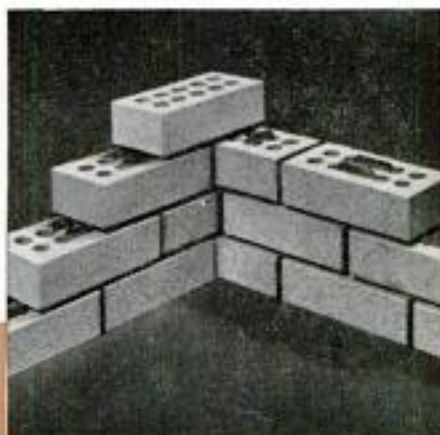
Harry I. Hoy,  
17W164 Oakdale Dr., Bensenville, Ill.

**CRACK FILLER** comes in a tube ready-mixed. Available in colors to match almost any wall finish, also in four wood tones for furniture and paneling. Special applicator forces material into narrow cracks

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**MORTAR-JOINT SPACERS** enable do-it-yourselfers to lay bricks with mortar joints of uniform thickness. Spacers control both the horizontal and vertical joints. Only two spacers are required for each individual brick. Spacers are withdrawn from the vertical joints as each brick is laid

Sigl Plumbing and Mfg. Co.,  
430 Delaware Ave., Buffalo 2, N. Y.





## Guard Rail on Drafting Board Protects Oversized Drawings

Large drawings that overhang a drafting table can be protected against soiling and creasing by having a guard rail on the front edge of the board to prevent the draftsman from leaning against the drawing. The rail can be a fairly heavy curtain rod fitted in brackets, or it may be a piece of tubing flattened and bent at the ends for screwing to the board.

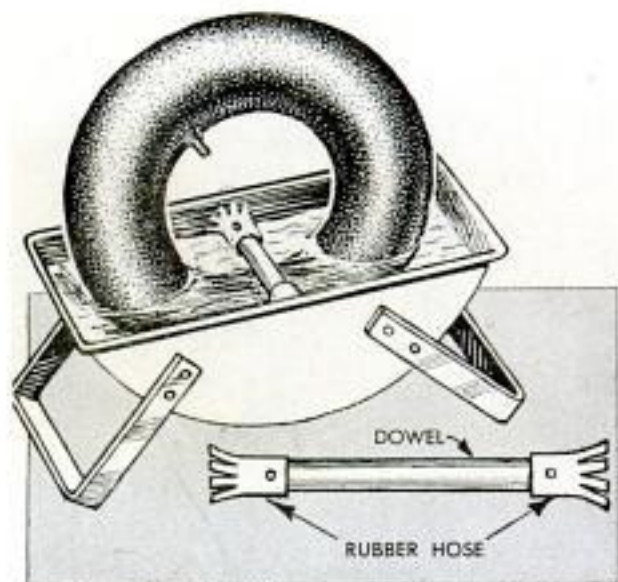
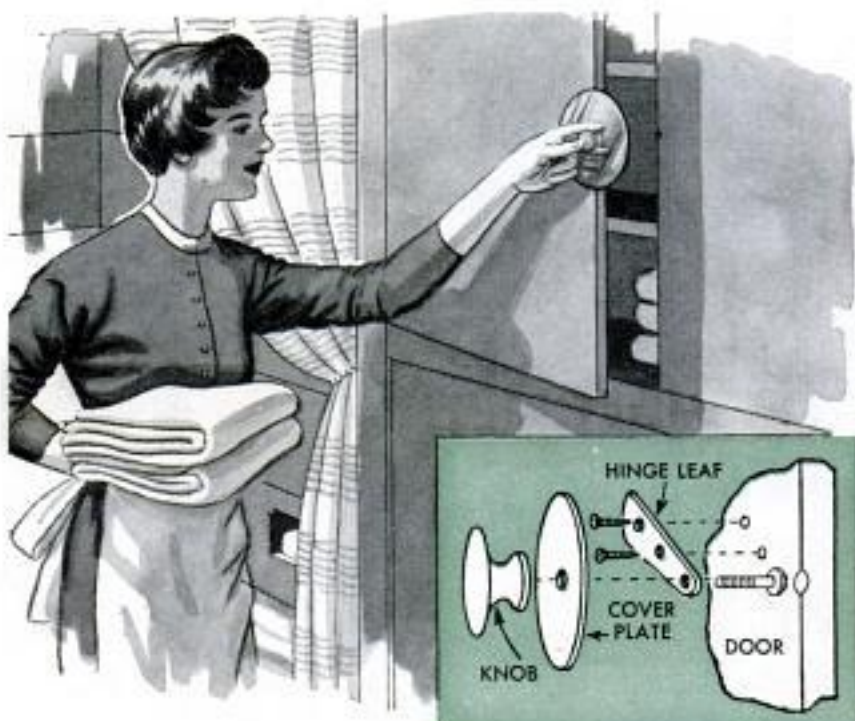
## Specialized Oil Applicator

An applicator made from a glass medicine dropper is as convenient as a hypodermic needle for oiling very fine mechanisms. Heat the glass tip of the dropper in a flame and draw it out to a needlelike point.

## Centered Door Pull Adds Symmetry

Wishing a more symmetrical appearance for some two-door cabinets he had built, one craftsman centered a single door pull on the center line between the doors. Either the leaf from a strap hinge, or a length of steel flat is used as an adapter to offset the pull. Mortise the surface of the door to accommodate the adapter, then screw it in place so the end hole is positioned between the doors. Use a door pull with a large escutcheon plate to conceal the adapter.

—R. E. Clark, Aurora, Illinois.



## Dowel Crossbar in Testing Tank Keeps Inner Tubes Submerged

It's much easier to keep an inflated inner tube submerged in a testing tank if a crossbar is fitted in the tank to hold the tube down while it is rotated. The crossbar is a wooden dowel, on the ends of which are fitted short lengths of serrated garden hose. The dowel should be just long enough to permit it to be held between the sides of the tank by the pieces of hose, yet readily removed.

☛ To renew playing cards that have become soiled and sticky from use, wipe them with a piece of cotton dipped in spirits of camphor. Use sparingly, then polish the cards with a soft cloth.

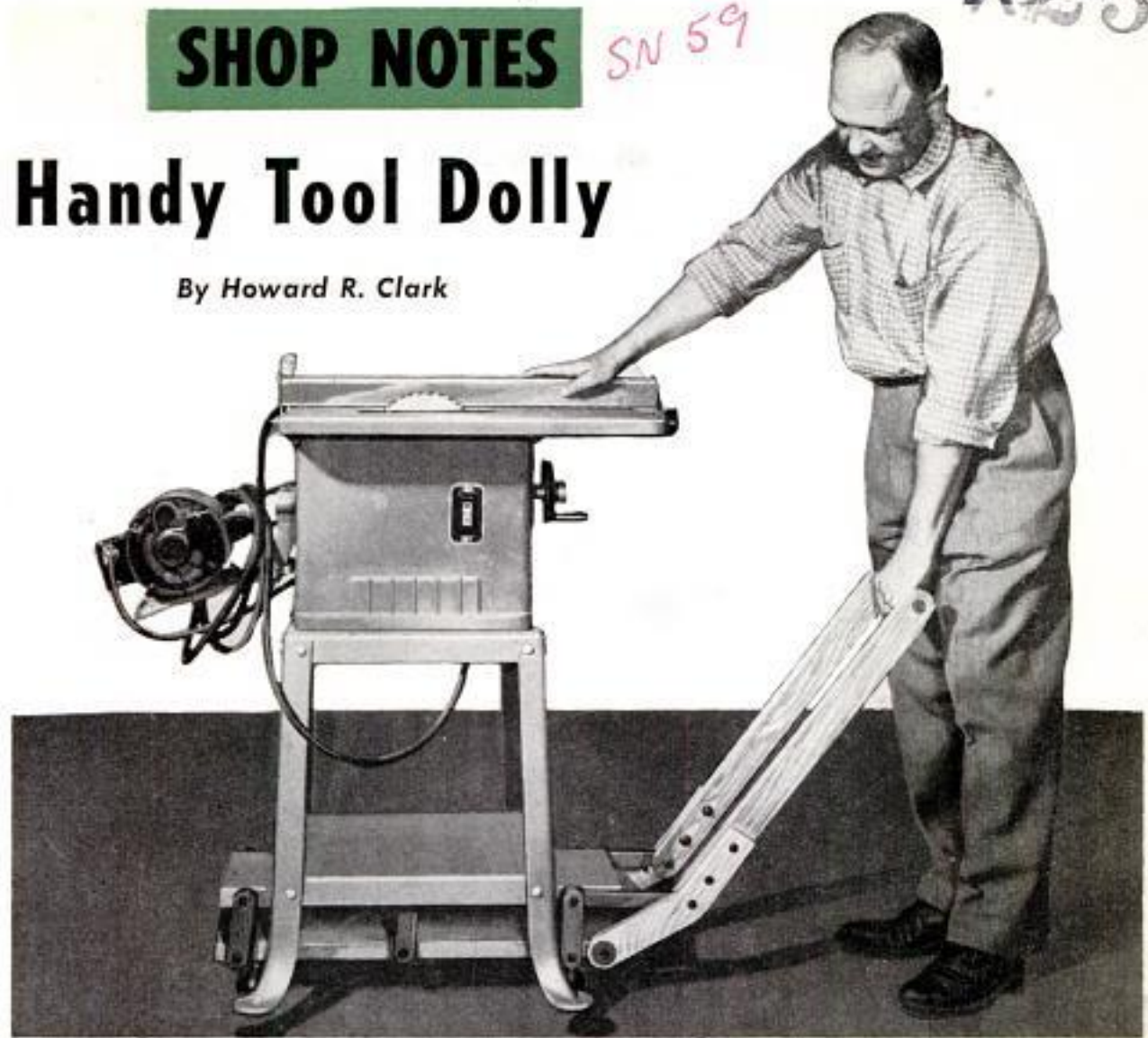
X237

# SHOP NOTES

SN 59

## Handy Tool Dolly

By Howard R. Clark

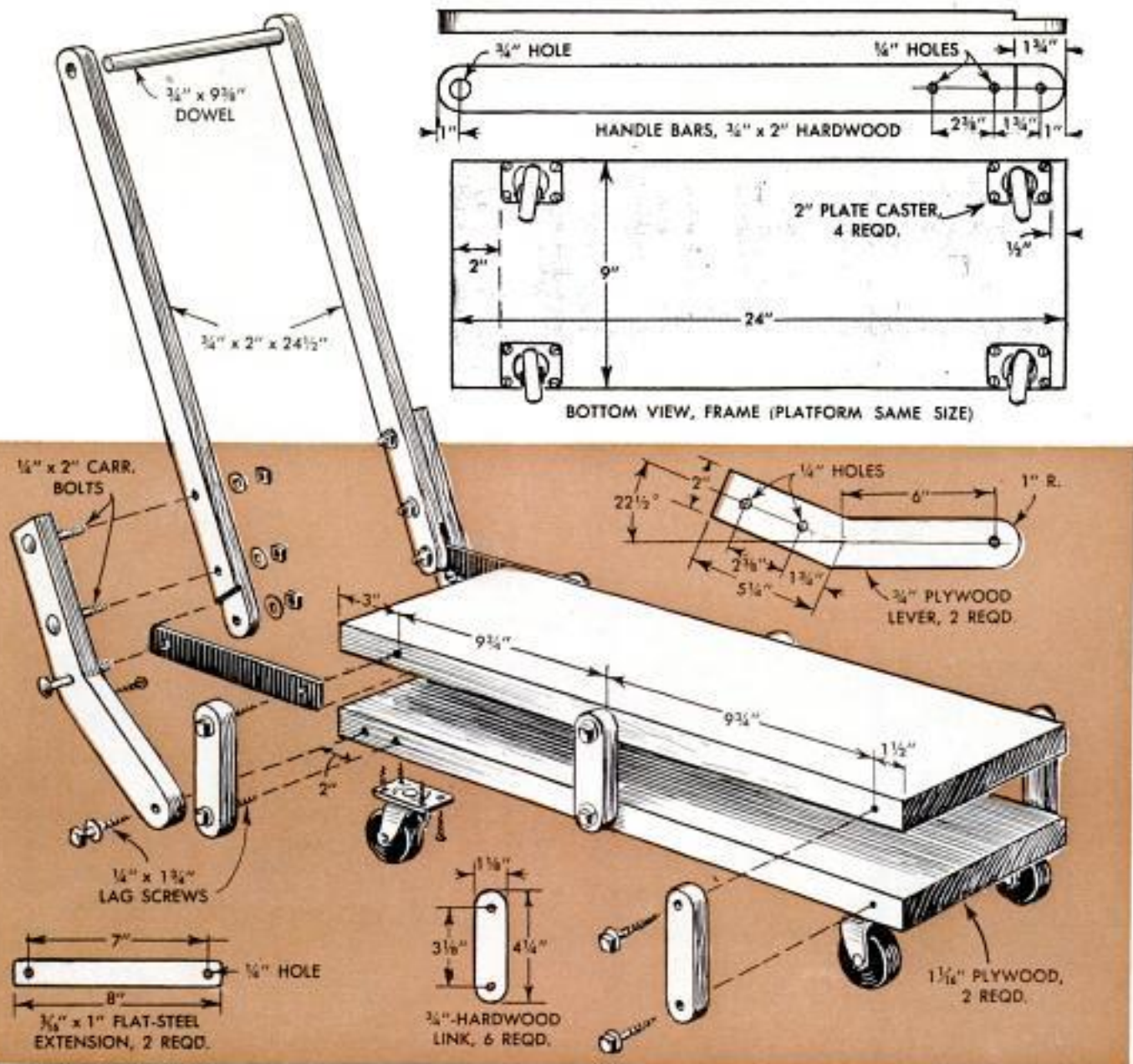


**P**OWER TOOLS ON STANDS are heavy, difficult to move about in the shop singlehanded unless you have this dolly. Then it's easy. Just roll the dolly under the stand as pictured at the right, lower the handle as shown above and away you go. Swiveling casters on the dolly make it easy to spot the machine just where you want it for ripping a long board, or moving it out of the central floor area of the shop for some other operation, such as laying out the lines full size for a boat hull.

The dolly can be made to suit almost any type of open tool stand and it also can be useful when moving other heavy units, such as workbenches. Before you cut stock from the dimensions on the following page, check your tool stands for height to the shelf or rails. You may have to shorten or lengthen the hardwood links or use larger or smaller casters. As dimensioned, the dolly is suited to the type of stand pictured, also other types having a lower shelf or rails at approximately the same height from the floor. The handle bars of the original dolly are minimum length. Where

Above, just lower the handle of the dolly to raise the machine clear of the floor. Below, raising the handle lowers the platform to clear machine table





there is more clearance under the machine table, the handle bars can be made somewhat longer. The frame and platform are the same size and are cut from  $1\frac{1}{8}$ -in. plywood. When plywood of this thickness is not readily obtainable, edge-glue strips of solid stock to give the required width. Use maple or oak for the links, as these parts are subjected to considerable stress. Be sure that they are the same length and that the holes are drilled the same distance apart on all six units, as otherwise the

links will tend to bind when raising and lowering the platform. Four swiveling plate casters are specified, but in some cases it will be an advantage to use two swiveling casters at the front (handle) end and two plain, nonswiveling casters at the rear of the frame. This arrangement of the casters makes the dolly easier to maneuver in close quarters, especially when moving a heavy unit. When you move a large unit such as a bench be sure that it is balanced on the narrow width of the dolly. ★ ★ ★

### Wax Paper Lubricates Clamp

Bar-clamp fixtures of the type which are assembled on black pipe sometimes stick and are difficult to move. Generally this is due to rust on the pipe. Clean off the rust and smooth the pipe with abrasive cloth, then rub vigorously with a piece of wax paper.—Ken Murray, Colon, Mich.



SN 59

## Holding Index Pin In "Out" Position

When working an indexing job requiring unusual care, machinists guard against a slip of the indexing pin by placing a special split ring under the knurled knob. The ring, or collar, holds the pin in the "out" position as the crank is turned. The ring also is useful when the head is being used as a rotary table. The ring is cut from a piece of brass tubing.—J. C. Magee, Schenectady, N. Y.

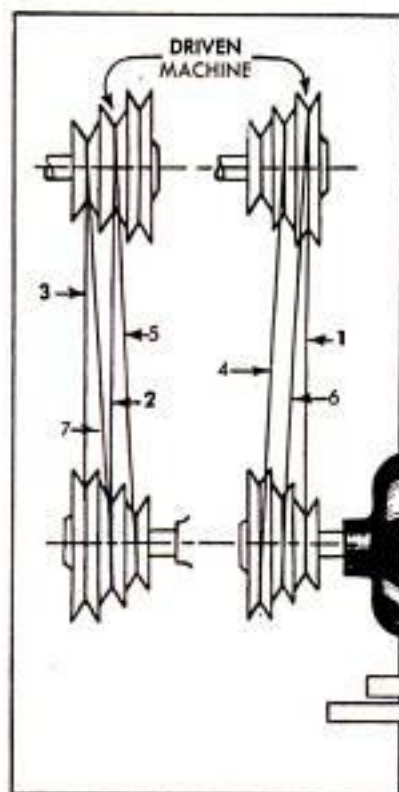
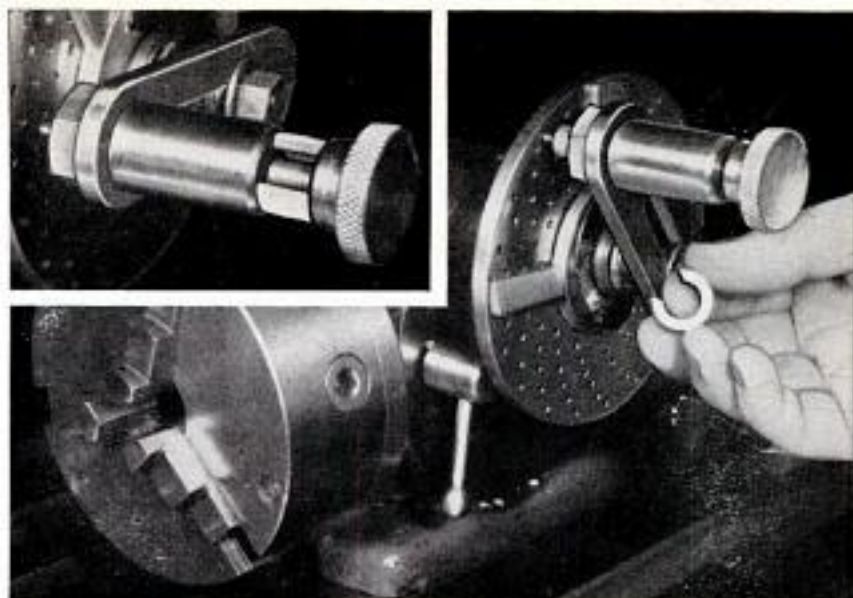
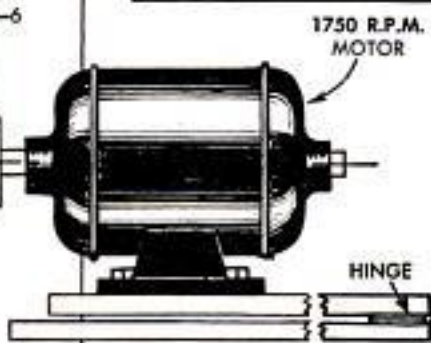


TABLE OF SPEED RATIOS

BELT POSITION	WORK SPEED USING 1750 R.P.M. MOTOR
1	875
2	1750
3	3500
4	2300
5	1150
6	1300
7	2600

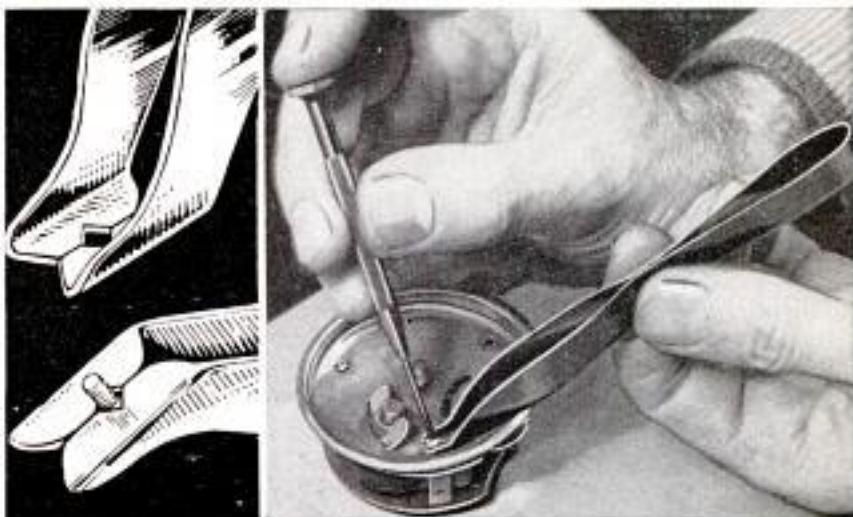
## Increasing Speed Range Of Three-Step Drives

Ordinarily, running a machine with misaligned V-belts is not considered good practice, but there are times when the gain in speed range makes the trick permissible on a drill press or lathe. Note the seven positions of the V-belt in the detail at the left. The table gives the various speeds available with the seven positions, using a 1750 r.p.m. motor. In order to make shifting of the belt easy and to compensate for the variations in the center-to-center distances between the pulleys, the motor must be placed on a hinged mount. Of course, this is unnecessary if the machine is already provided with this feature. If the speed of the driven machine is above 3000 r.p.m., this method is not recommended.—Russell Love, San Marino, Calif.

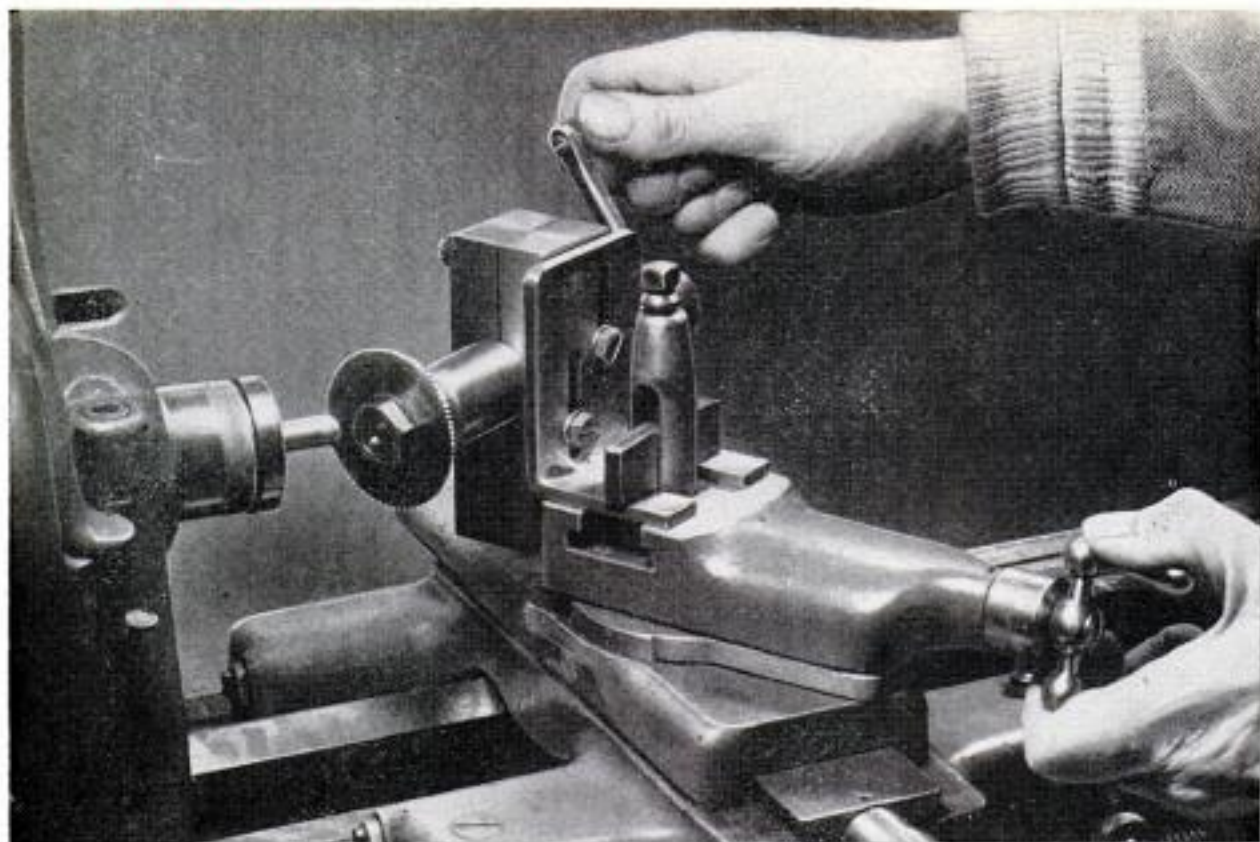


## Spring Tweezers Grip Tiny Screws

Normally closed tweezers made from a length of clock spring or box strapping are just the thing for placing tiny screws. The ends are bent at an angle and notched as in the detail to form jaws that grip the screw just below the head. A rivet at the center keeps the jaws of the tweezers in the closed position.—Walter E. Burton, Akron, Ohio.



SN  
~~HM~~ 59



## Mill slots, flats, keyways and squares with this **HAND MILLING ATTACHMENT**

By *Walter E. Burton*

**I**T'S SHOP-MADE, hand-operated and designed to utilize the built-in accuracy of the lathe carriage. Handles light milling, reaming and drilling operations on any workpiece that can be chucked or mounted on a large faceplate. The chuck, which is simply a sleeve with two locking setscrews, takes any milling cutter, drill bit or reamer with  $\frac{1}{2}$ -in. straight shank.

Before you cut any stock, note the dimensions of parts A and B, opposite page, and then check your lathe. You may find it necessary to alter some of the dimensions given. Note also that the holder, or frame, which carries the spindle is slotted to take the bushing, F, which also is slotted. This construction permits adjustments which eliminate both lateral and end play and make it possible to adjust the spindle, part C, for a certain amount of drag, which is desirable when doing some types of work.

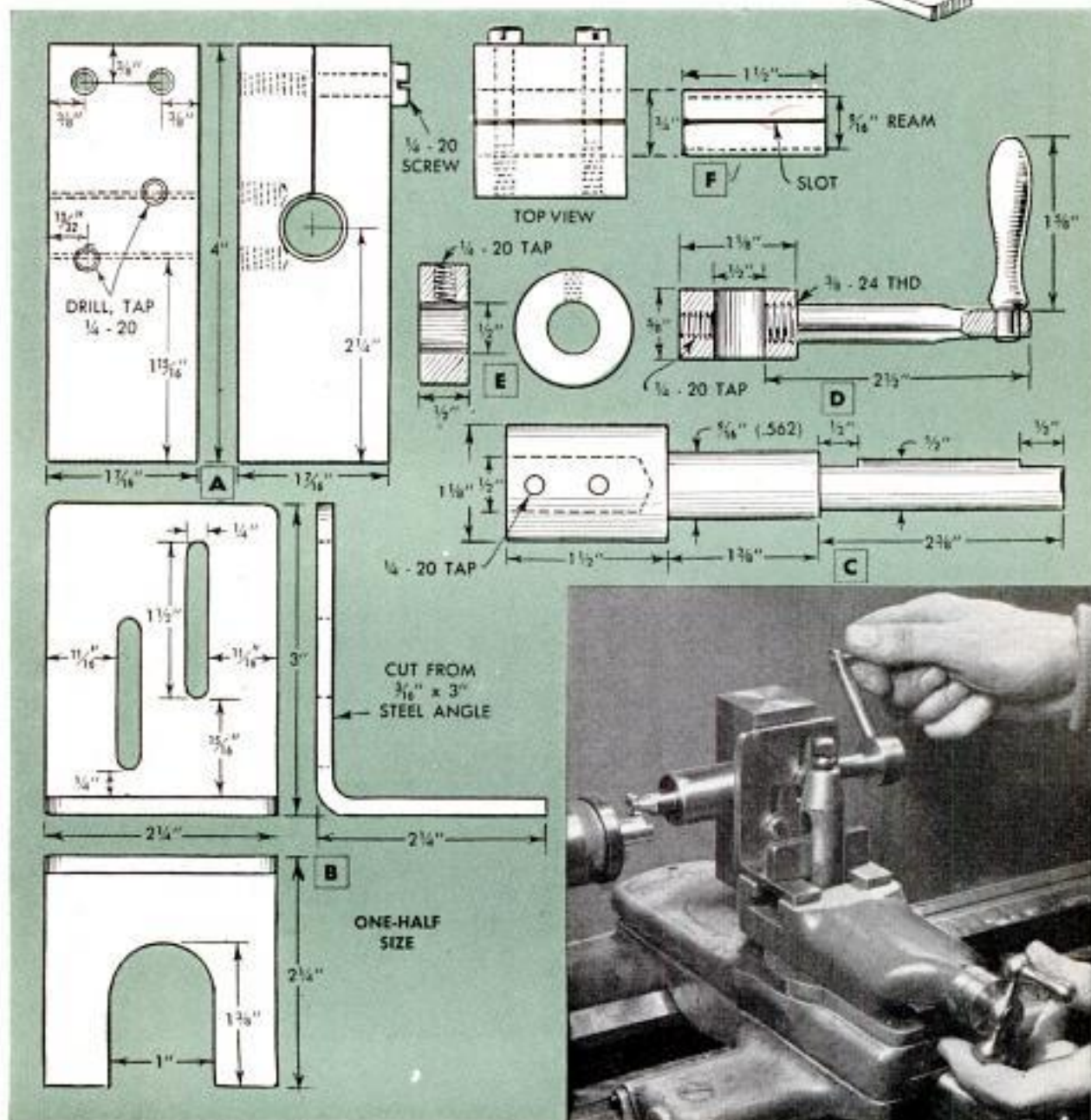
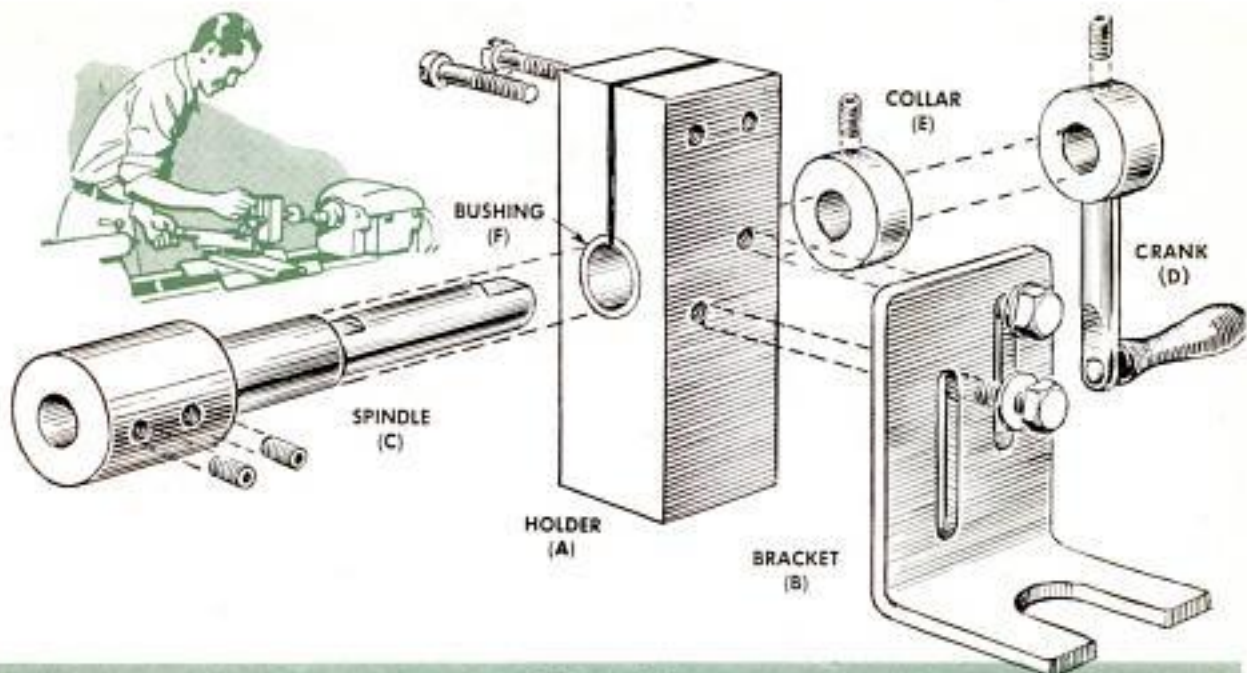
The angle bracket, part B, must be finished on the outside faces of the legs. Note that the length of the short leg of the angle is given as  $2\frac{1}{4}$  in. A 3 x 2-in. angle will do as well on a small lathe. Slot as indicated. When the unit is assembled the bracket is held on the tool-post pad by means of a short bar of flat stock as in the

photo above and also at the lower right, opposite page.

The spindle, part C, is shouldered down to two diameters from  $1\frac{1}{8}$  or  $1\frac{1}{4}$ -in. stock. The flats, one taking the setscrew of the collar E, the other the setscrew of the crank D, are filed to a width of  $\frac{1}{2}$  in. and a depth of about  $\frac{1}{16}$  in. The hole in the large end of the spindle is drilled  $\frac{3}{16}$  in. and then reamed to  $\frac{1}{2}$ -in. dia. Reaming should be done after the holes for the  $\frac{1}{4}$ -in. setscrews are drilled and tapped. The spindle collar can be made in the shop, or a ready-made collar can be used. A similar collar also carries the crank D. It is simply drilled and tapped to take the threaded end of the crank arm. The crank handle can be turned down from  $\frac{3}{8}$ -in. stock, or purchased ready-made.

The hole for the bushing should be drilled and reamed in the holder, part A, before slotting either with a hacksaw or on a milling machine. If you make the bushing in the lathe, drill  $\frac{1}{2}$  in. and ream to  $\frac{9}{16}$ -in. dia. before slotting. Use either brass or bronze for the bushing. Ordinary cold-rolled steel will do very well for the other parts, except the angle bracket which is cut from steel angle. ★ ★ ★





## Masking-Tape Tabs Easily Removed for Data Changes on Bins



When stock changes are made frequently in storage bins, time can be saved when changing tabs, or labels, by writing data on short strips of masking tape. When a change is made the old tape is stripped off and a new tape with new data applied. Writing should be done with a pen.

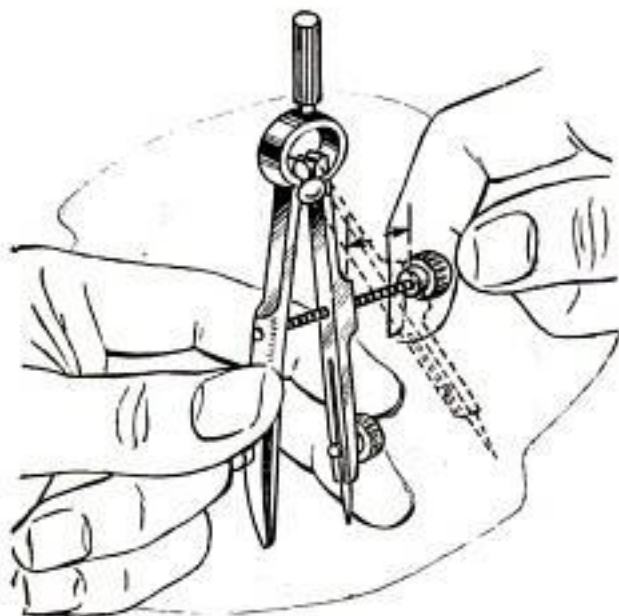
G. E. Hendrickson, Argyle, Wis.

## Solder Tightens Metal Screw

Self-tapping metal screws tend to loosen when subjected to excessive vibration over a period of time. This usually is due to slight enlargement of the registering holes in the sheet metal. A drop of solder flowed onto the threads near the head of the screw will renew the original grip of the threads.—J. McGinnis, Saddle Brook, N. J.

## Save Time When Adjusting Compass and Dividers

You'll save not only time but also excessive wear on the adjusting screw of the instrument by spinning the nut free on the threads. Grasp the legs of the instrument, either compasses or dividers of the screw-adjusting type, in the left hand as in the detail. Press the legs together until the distance between them is near that desired. Then spin the nut with the right hand to bear against the leg. Slight final adjustments for correct distance are made by turning the nut against the spring pressure. This method not only eliminates undue thread wear but also enables the user to make compass and divider adjustments through a wide range in a fraction of the time otherwise required.



## New Bite for Hammer Claws

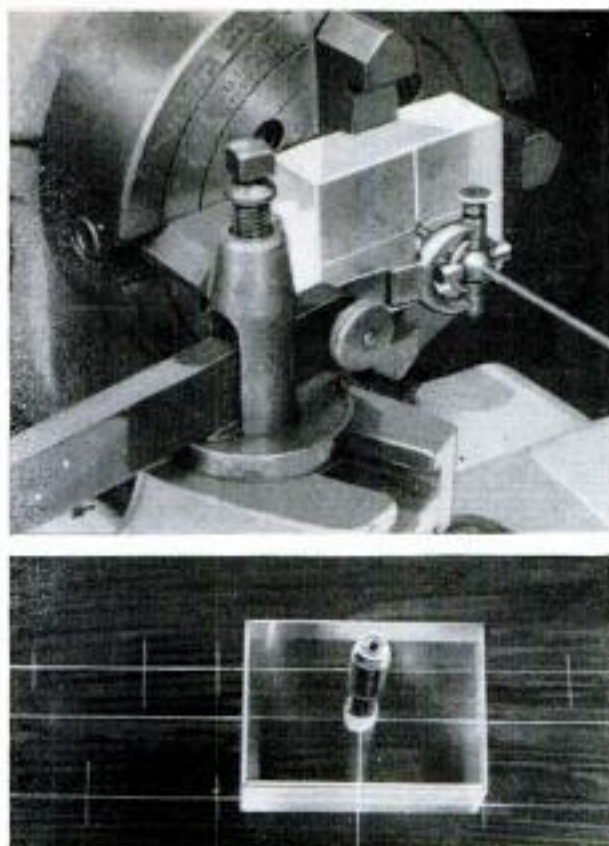
On old hammers the slot, or split, between the claws often become so badly worn that it will no longer grip and pull small nails. To give the claws a new and effective bite, place the hammer in a vise and deepen the split with a hacksaw.



## Razor-Sharp Hand Tools

After grinding and oilstoning the edges of chisels and plane irons, leather honing is the final step that produces a really sharp cutting edge. An old razor strop is just the thing. Use a few drops of oil and light pressure.—J. W. Rocke, Huron, S. D.





## Clear-Plastic Block Locates Center Punch

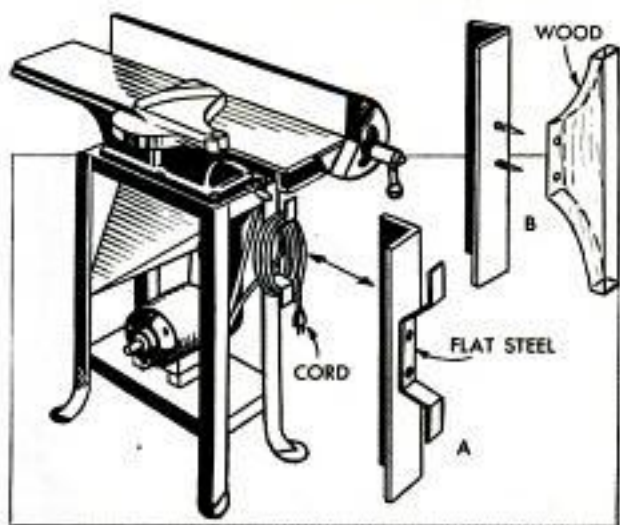
Coordinate layout lines scribed on metal can be quickly and accurately center-punched with this transparent-plastic locating block. The latter is cut from  $\frac{3}{4}$ -in. transparent plastic and can be any convenient over-all size. Scribe two sharp lines on the bottom face, the lines intersecting on the face at 90 deg. Center-punch the intersection of the lines and set up in the lathe as pictured, using a wiggler to center the block for drilling the hole for the punch. Drill and ream to  $\frac{7}{16}$ -in. diameter. Polish the cut edges of the block and round the corners slightly. Polish both top and bottom so that fine scribed lines on

the metal are easily seen through it. Make a punch similar to that pictured from  $\frac{3}{8}$ -in. drill rod, shouldering down and grinding from one end for a distance of about  $1\frac{1}{4}$  in. This shank portion of the punch should be an easy sliding fit in the center hole in the locating block. The body of the punch can be knurled if desired. Grind the shouldered end to a 60-deg. angle in the lathe. In use, the locating block is placed on the work as pictured, the guide lines on the bottom of the block being placed directly over those scribed on the work. A light tap on the punch marks the work.

H. J. Gerber, Stillwater, Okla.

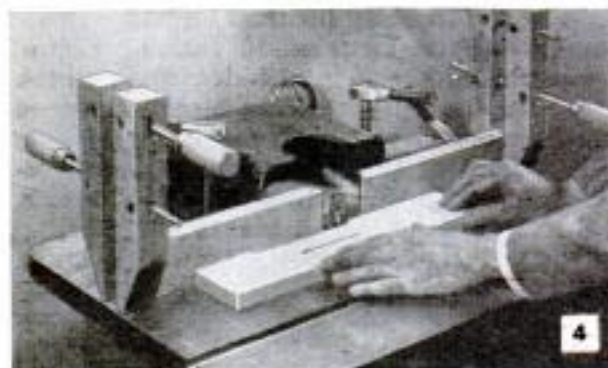
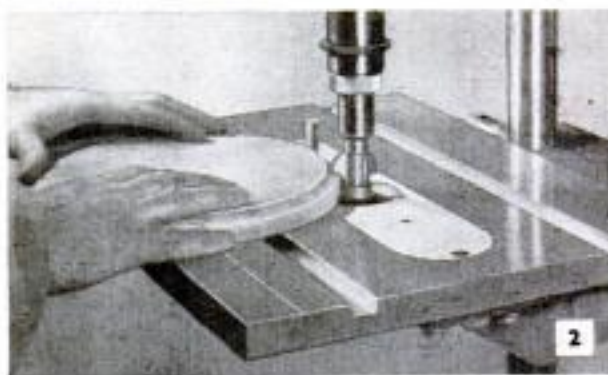
## Cord Reel on Power-Tool Stand Provides Safe Storage

Power cords looped loosely over individual machines, or wound into a kinked coil, are not only a potential hazard where shop space is limited. They also abrade quickly, sharp bends may result in insulation breaks and the plugs are likely to be broken if stepped on. The problem is easily solved by making a simple cord reel, or winder, for each machine. A length of  $\frac{1}{8}$  x 1-in. flat steel, bent as indicated at A in the detail, makes a good winder for attaching to the leg of a stand. If no flat steel of suitable size is at hand, make the winder from hardwood, detail B.



# HOW WOULD

By Chris Nelson



**1. Q—What is a starting pin, referred to in shaper work, and how is it used in practice?**

**A—**The starting pin, as its name implies, is used to support the work firmly at the start of a cut on a curved edge. As the first step, a depth collar, or rubbing collar, is placed on the spindle to limit the depth of cut. Then the pin is screwed into the tapped hole provided in the machine table. Next, the stock is laid on the table in contact with the pin, but clear of the rotating cutter. Then the stock is moved slowly into the cutter, using the starting pin as a fulcrum when making contact with cutter

**2. Q—Is the starting pin also used in shaping the edge of a disk? Do the methods differ?**

**A—**Note the similarity of the operations in Figs. 1 and 2. In Fig. 1 the pin is being used to support stock having a long-radius curve on one edge. In Fig. 2 the edge of a disk is being molded. In both operations the purpose of the pin is the same, to support the work at the start of the cut. Thereafter the depth of cut is controlled by the depth collar, which also supports the work. The critical point in both operations is that instant the cutter engages the stock. Be sure to hold material firmly

**3. Q—Is it possible to make a smooth cut with a shaper across the grain? What is the procedure?**

**A—**Sharp cutters mounted on high-speed spindles will make a smooth cut across the grain as well as with it. When the edges are straight, use a guide fence as pictured. If the table of the machine is grooved, use a miter gauge to guide the stock. When all four edges are to be molded, always run the end-grain cuts first. In both hard and soft woods you will generally do a better job if you make the molding cut in several passes, the finish cut being the lightest of all. This precaution assures smooth work

**4. Q—Is it possible to run a stopped cut, or chamfer, on a spindle shaper?**

**A—**Make the setup with the shaper fence and two clamps to limit the distance the stock can be moved past the cutter. Place one clamp on the fence and place the stock in position with one end against the clamp. Then measure from the free end of the stock a distance equal to the length of the cut desired and place the second clamp. Then swing the stock into the cutter and move it past the cutter until the end is stopped by the second clamp. If stock is longer than regular fence, you can easily make fence extensions to hold the clamps in position

# YOU DO IT?

**5. Q—Can a shaper be used to make a cut on the surface of the stock rather than the edge?**

A—Yes. If you have a machine of the type shown, you can run the cut with the work in the horizontal position. If your shaper is of the vertical-spindle type, then the work must be held in the vertical position against an auxiliary fence. A typical cut is the first half of a drawer joint such as that pictured. In the horizontal position the work is guided by a miter gauge with hold-down. For running this cut in the vertical position, screw a wide auxiliary fence to both members of the regular fence to guide stock



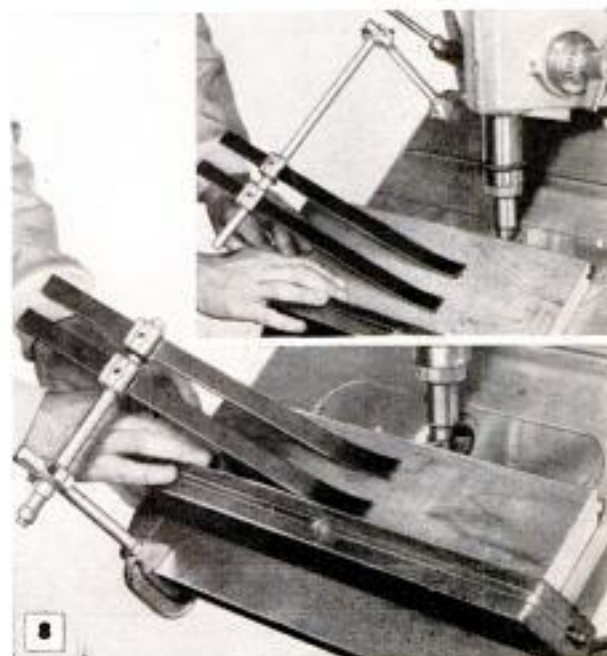
**6. Q—How are the edges of a number of disks shaped to assure a uniform diameter?**

A—Although the job can be done on a vertical-spindle shaper, the setup is pictured on a 9-in. radial saw. Clamp two strips to the table, each at 45 deg. to the spindle (in this case the radial-saw arbor). Test the setting on a waste disk until it gives the desired results. Be sure that the disks are turned or sanded to the same diameter so that the amount of material removed by the shaper cutter will be uniform. Guide strips should always be clamped or wedged securely in position so they cannot shift



**7. Q—How is a shaper set up to cut the glass rabbet in a circular or oval picture frame?**

A—Again you make use of the starting pin, Figs. 1 and 2, except that here you are making an inside instead of an outside cut. Again a depth collar is used on the spindle to limit the depth of cut. With the work in position and clear of the rotating cutter, move it inward so that it bears firmly against the pin. Then bring it slowly into the cutter until it bears against the depth collar. As you bring the work into cutter, start feeding simultaneously. This correlated movement prevents burning of wood



**8. Q—Is it possible to tongue-and-groove beveled edges on an ordinary shaper?**

A—Yes, by using the setup pictured in the two views in Fig. 8 and a pair of matched tongue-and-groove shaper cutters it is possible to make these cuts on beveled edges such as would be used in forming the joints of a hexagonal column. Table must be tilted as pictured, or you can make a fixture and clamp it to a stationary table to hold the stock at the required angle. Run test cuts on waste pieces to assure the proper setting. It is necessary to use hold-downs as there is some outward cutting pressure

**NOTE—In several photos the shaper guard has been omitted for clarity. Always use the guard.**

SN 59

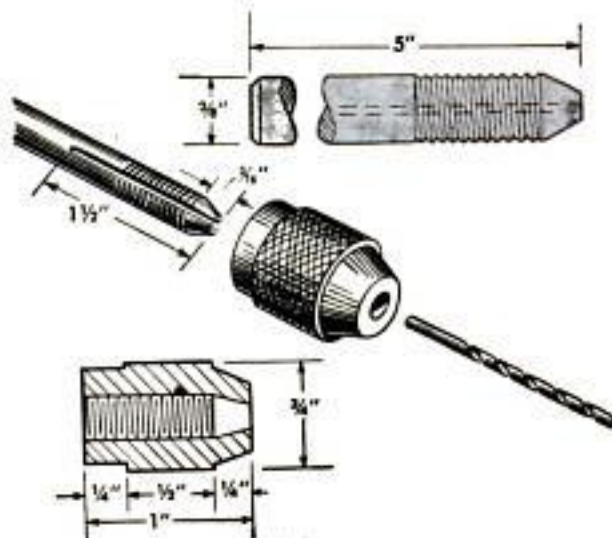
## V-Tool Cuts Wood Threads in a Metal Lathe



Cutting coarse threads on hardwood mounted in a metal lathe is easy to do with a special V-tool you make yourself from a length of sheet metal. First, grind one end to two bevels as in detail B. Then place in the vise and bend to a V-shape as in detail A, the included angle being about 60 deg. Hone to produce as sharp an edge as possible. Then mount in the tool post, using square stock cut to short lengths. The upper piece should be flattened slightly to provide a seat for the tool-post screw. The tool must be mounted so that it cuts well above the center line. Set the lathe to cut 6 threads per inch (8 per inch may fit some tapped holes in wood). Run the lathe at its lowest speed. Cut the thread in two or three passes. — Rex Bush, Columbus, Ohio.

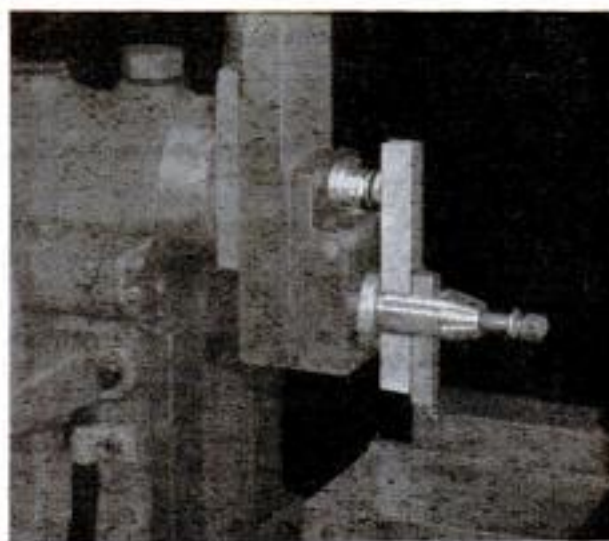
### Hand Chucks Take Tiny Drills

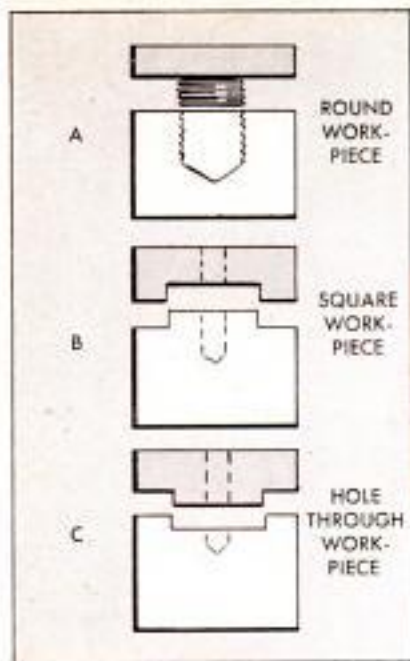
Hand chucks, or pin drills as they are sometimes called, are often used in the drill press when it is necessary to drive tiny twist drills  $\frac{1}{16}$ -in. and under in the fractional sizes, also in smaller letter sizes. The chucks are easily made as detailed, using drill rod for the shank which also forms the closer. Thread, drill and bevel the shank before slotting. Dimensions can be reduced from those given.



### Spring Loading a Shaper Tool

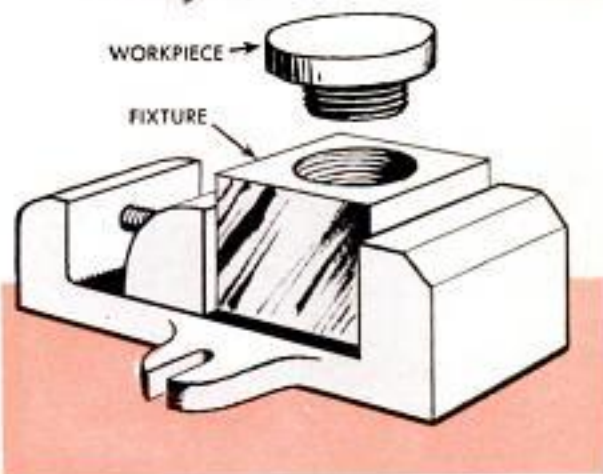
When taking light cuts with a shaper it sometimes happens that the tool will stick in the up position at the end of the back-stroke. This causes the tool to "miss" on the succeeding workstroke. To correct this tendency, mount a short length of square steel under the cutting tool and place a coil spring between the insert and the shaper head. Locate the end of the spring over the screw holding the swiveling pad.





## INDEXING FIXTURES For Milling Squares or Flats

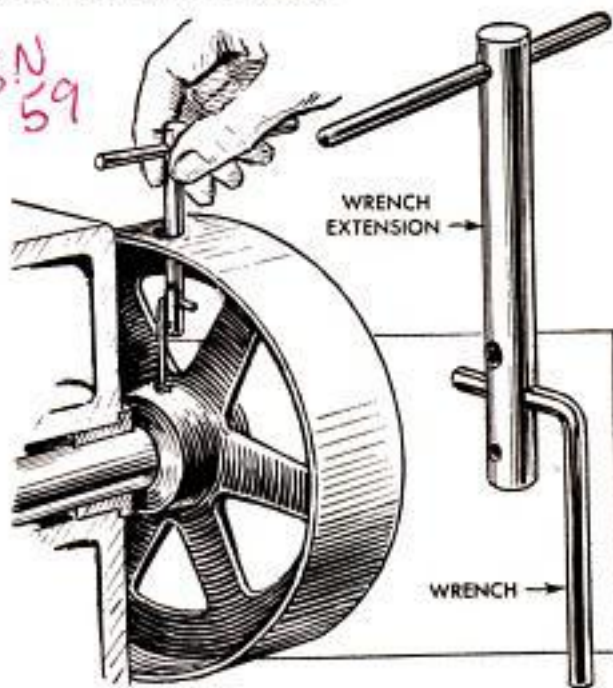
Special jobs that require accurate milling of squares or flats on various types of plugs or caps can be set up in a vise, using a square fixture instead of a dividing head or turntable. Workpieces A, B and C are typical. The indexing square can be shouldered or recessed as in details B and C, or drilled and tapped as in detail A. Where a center hole is permissible, the workpiece can be held with a capscrew for light milling as in details B and C.

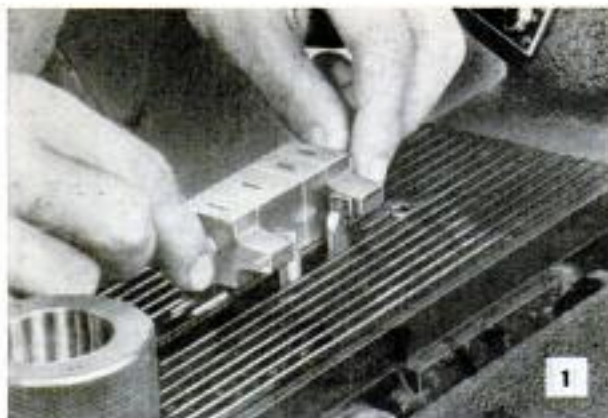


## Handle for Allen Wrench Reaches Hard-to-Get-at Places

When repairing or reconditioning older-type machines, replacement of small parts usually is necessary. When making these replacements, difficulty may be encountered in assembling. A typical example is detailed, the problem being the tightening of a socket setscrew in the hub of a flat-faced pulley. To accomplish the job, the repairmen made an offset handle for turning the Allen wrench in the manner detailed. The handle is drilled transversely with three holes, each of a different diameter to take three sizes of Allen wrenches. The handle made in this way has many other applications in addition to that pictured.—Loaden Godshall, Souderton, Pa.

When the rounded corners on a hex nut stopped an emergency repair job on a farm machine, due to the impossibility of loosening the nut with a wrench, the owner simply ran down a second nut over the first and welded the two together.





1

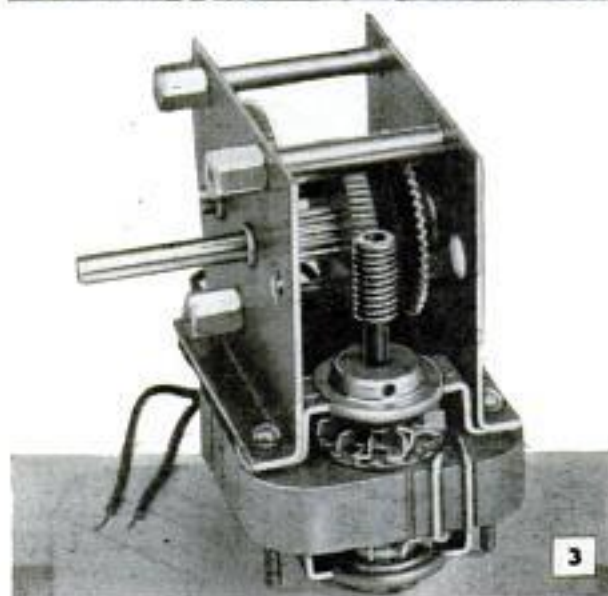


2

## SHOPPING

**1. PRECISION GAUGE BLOCKS** offer plus 8 millionths inch, minus nothing, for working accuracy, and plus 4 millionths, minus nothing, for inspection accuracy. The blocks are classified as standard and have been made available with all deviations unconditionally guaranteed to be on the plus side of the nominal block size. The minus-nothing tolerances provide finer accuracy and a minimum-wear factor

Ellstrom Standards Div., Dearborn Gage Co., Dearborn, Mich.



3

**2. BENCH-TOP ULTRASONIC CLEANER** consists of a separate power generator, about the size of a small portable TV set, and two tanks with transducers hermetically sealed in the bases. Alternate use of two or four tanks permits several cleaning stages or the use of different solvents. Cleaning is accomplished by ultrasonic activation of solvents in tanks. Designed for cleaning watch movements, ball bearings, jewelry

Branson Ultrasonic Corp., 37 Brown House Rd., Stamford, Conn.



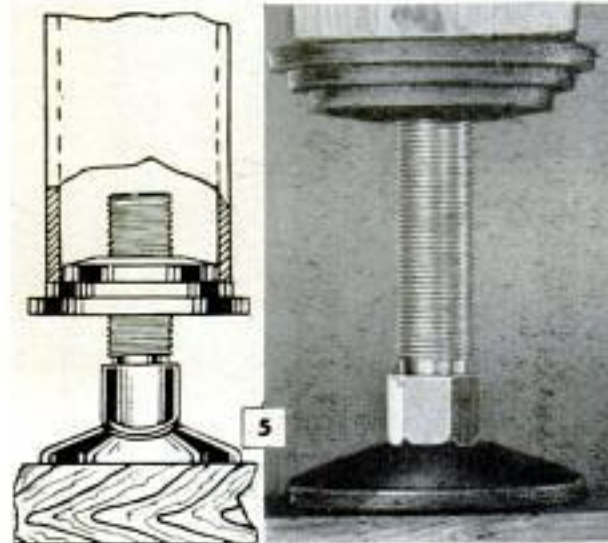
4

**3. TINY MOTOR WITH BUILT-IN REDUCTION GEAR** has output-shaft speeds ranging from 3 r.p.m. up. Torque is 12-in.-lb. at 3 r.p.m. for continuous-duty applications. Higher output torque can be provided for intermittent duty. One output shaft is furnished on standard motor, but double-shaft extensions and two shafts operating at different speeds are available. Designed to power displays, models

Brevet Products Corp., 601 W. 26th St., New York City 1

**4. VISE-GRIP WRENCH**, or toggle wrench, now has a special release built into the movable lever. This permits the operator to release the jaw, and the work, by light pressure of the thumb or finger. This new feature permits one-hand operation of wrench when tightening or loosening nuts and threaded rods, or when working where space is limited to a short swing of wrench handle. Available in 7, 10-in. sizes

Peterson Mfg. Co., DeWitt, Neb.

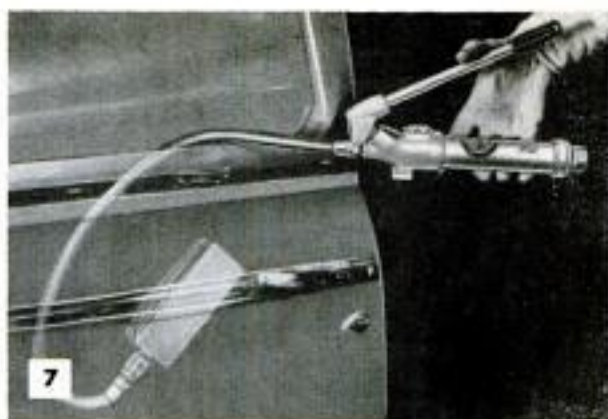


5

**5. SHORT-LIFT JACK** can be used on the top or bottom ends of posts for supporting beams under floors, roofs and porches, also for leveling floors and trailers in parks. Can be placed under lower end of a wooden post as in photo, or, base plate can be reversed and fitted into a pipe as in detail. Fits 3 or 3½-in. pipe. Jack is raised and lowered with a wrench placed on hex section. Maximum lift is 3 in.

Nelson Screw Products, Inc., Logansport, Ind.





# FOR TOOLS

**6. GREASE GUN** is loaded with a cartridge which is placed in a cylinder in the manner pictured. When the cap is removed from the cartridge and the nozzle screwed in place it takes only one stroke of handle to fill gun ready for use. One cartridge gives about 300 shots of clean lubricant. Pressure developed is sufficient to force grease into any fitting

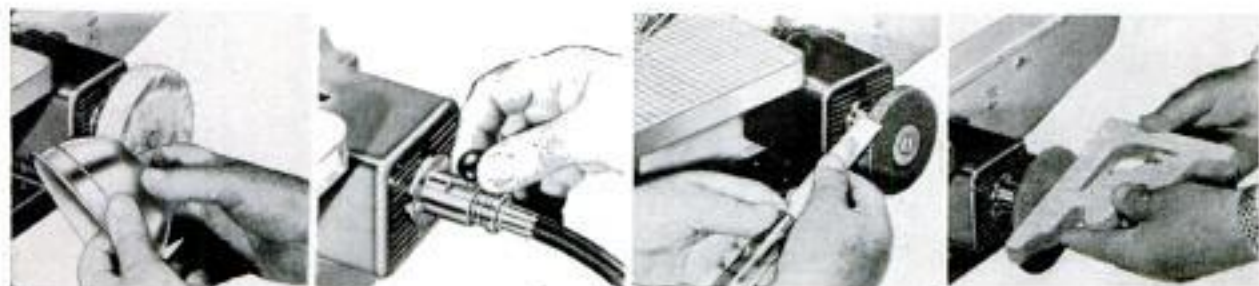
C. J. Neuman, Ltd., 445 Brighton Rd.,  
South Croydon, Surrey, England

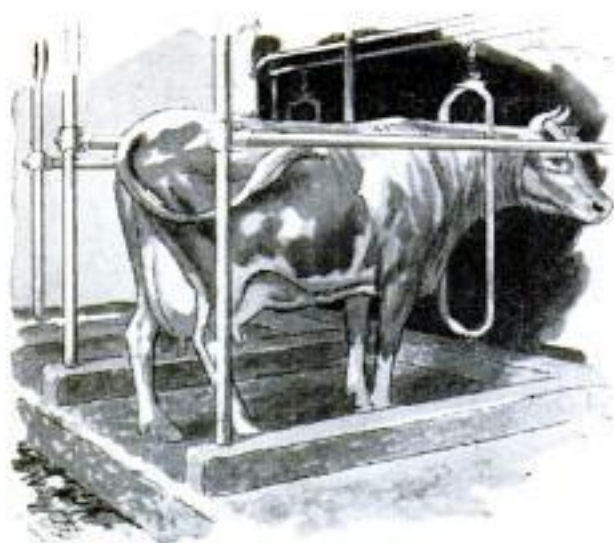
**7. HYDRAULICALLY OPERATED DOLLY** has expanding jaws, or pads, which can be inserted in auto-door panels for ironing out dents. Also can be used effectively at other points in the car body which are inaccessible with regular body-bumping tools. Pads are available in various shapes and face contours. Develops sufficient pressure to straighten any body metal

Blackhawk Mfg. Co., Milwaukee, Wis.

**8. MULTIPURPOSE WORKSHOP TOOL** is built up around a jigsaw having a built-in motor and power takeoff for driving a disk sander, grinding wheel, buffer and a 30-in. flexible shaft. The various attachments are driven direct from the motor through the power takeoff as pictured in the four photos at the bottom of page. Jigsaw has 3-way blade holder, tilting table, spring-type blade guard and hold-down blade locking lever which permits changing blade without wrench or other tools. Machine is mounted on rubber suction feet which hold it in place on bench, reducing vibration to minimum. Cuts to center of 30-in. circle. Table can be raised to utilize full length of blade. Cuts 1 3/4-in. stock, hard or soft wood, plastics, soft metals and steel to 1/16-in. thickness

Dremel Mfg. Co., Racine, Wis.





### Separate Stalls in Dairy Barn

Individual stalls in a dairy barn are good insurance against crowding and possible injury when the cows enter and leave the barn. The separate stalls are formed by concrete curbs in which are embedded vertical and horizontal lengths of pipe to form partitions.

### Drill Clean Holes in Plywood



When drilling holes in plywood with an auger bit there is a tendency of the wood to splinter at the edges of the hole. This can be prevented by first pressing a square of cellulose tape on the wood and drilling through it.

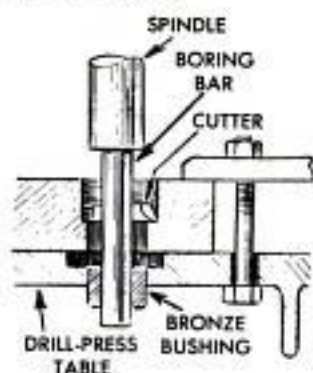
### Feed Stored in Truck Body

A discarded truck body of the closed type solves the problem of safe, dry storage of feeds and feed supplements for one farmer. The body is mounted on skids so that it can be moved by tractor from one pasture to another.—K. Imig, Watseka, Ill.



### Vertical Boring in Drill Press

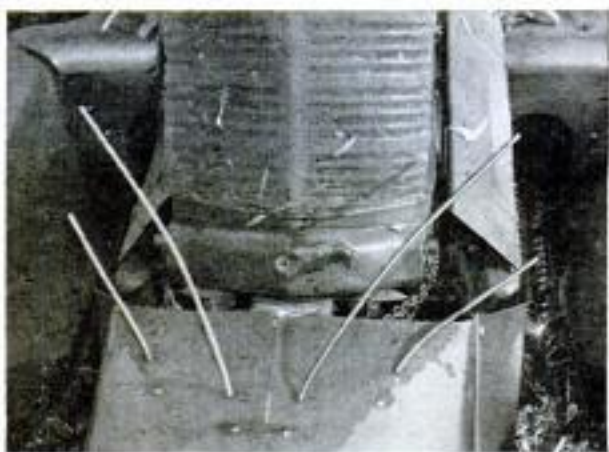
Where accuracy and smooth work are required on light boring jobs, machinists sometimes use a drill press as a boring machine. The drill-press table is counterbored to take a bushing carrying the free end of the boring bar. The counterbore also provides chip and tool clearance. The bushing is machined to a press fit in the counterbored hole. The work setup shown in the detail is typical of several that can be made on a drill-press table of average size, using two clamps. In some instances, three clamps will be necessary. Feed of the drill spindle should be uniformly slow to produce a smooth bore.



Frank L. Rush, Columbus, Ohio.

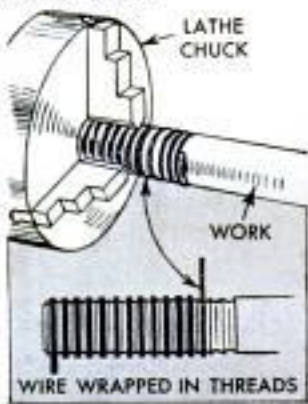
### Lifters Guide Stalks to Rolls

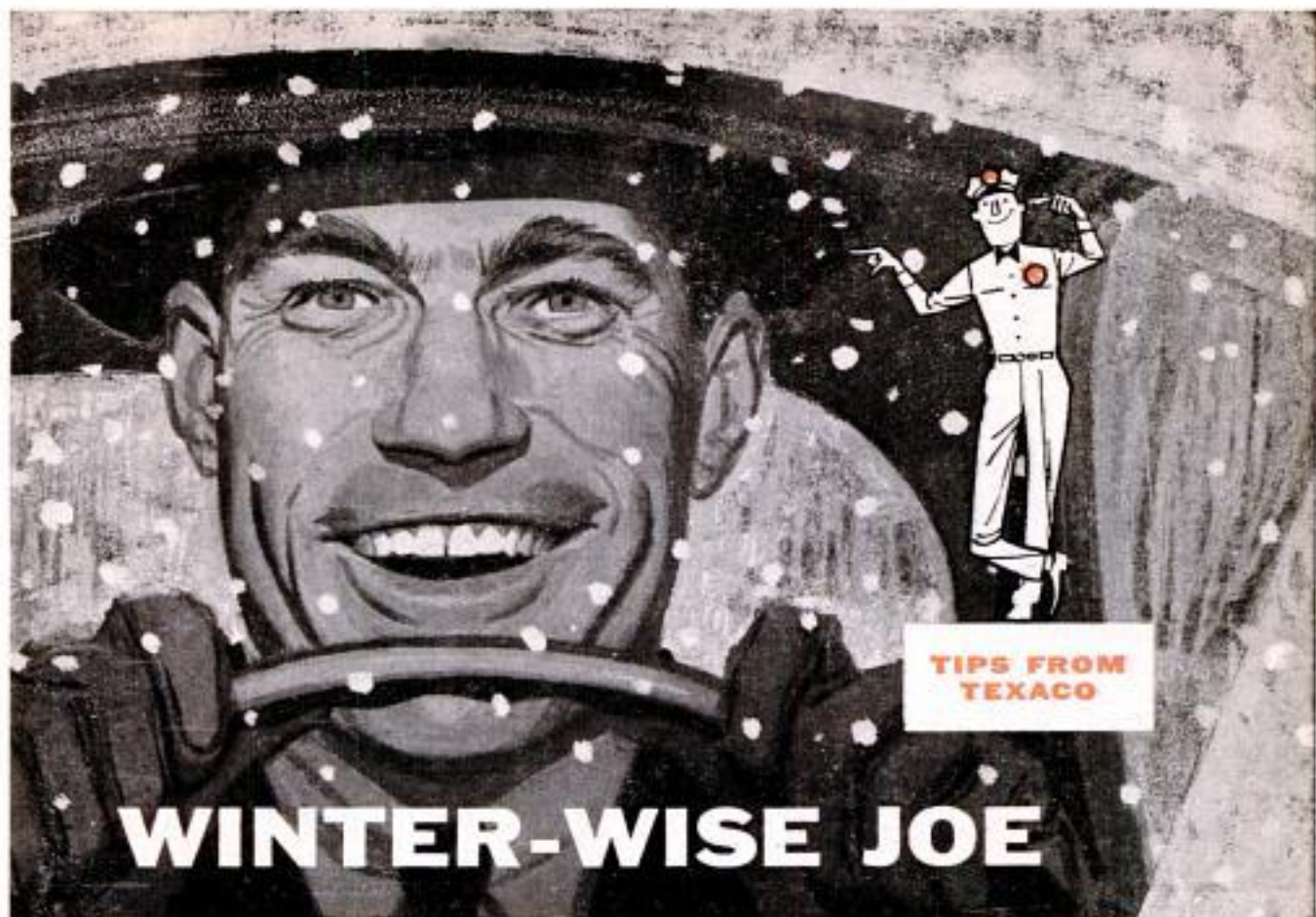
A pair of steel rods welded to the upper end of the center divider on a tractor-mounted cornpicker straightens leaning stalks, preventing loss of the ears as the stalks pass into the snapping rolls.



### Chucking a Threaded Rod

When chucking the threaded end of a rod you can avoid damage to the threads simply by wrapping a length of wire into them before tightening the chuck jaws. Use correct-size wire.—Hugh Lineback, Stillwater, Okla.





Winter driving problems that bother other drivers don't seem to bother Joe.

If Joe's car door lock freezes up, he heats the key with a match and inserts it. The lock thaws out.

Joe slides pieces of cardboard under the windshield wipers to prevent windshield frosting while his car is parked.

When Joe parks in the snow he always

backs up a little so there'll be space for a running start if the snow freezes or more snow falls.

Joe's Texaco Dealer checks his battery frequently to make sure there'll be plenty of power for starting . . . checks his anti-freeze to be sure of his temperature protection. Joe always favors Texaco products and the careful service Texaco Dealers give his car.

### Start fast and save gasoline

When cold weather congeals ordinary motor oil, starting is slow and you waste gasoline. It pays you to use Havoline Special 10W-30 that flows freely in sub-zero cold, makes starting easier and saves on fuel. And, under high temperature conditions, it doesn't thin out like ordinary oil. You get full lubrication, a cleaner engine and more gasoline saved. Get this finer oil from your Texaco Dealer — *the best friend your car has ever had.*



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## New! Kodak Pony II Camera

*Makes 35mm color slides faster,  
easier than ever. Only \$26.75*

With the new Kodak Pony II Camera you'll take gorgeous color slides, crisp black-and-whites, *right from the start . . .* and do it easier than you ever thought possible.

Here's why: You make only *one setting* for correct exposure—and a guide on the camera tells you how. Focusing is just as easy. You dial the kind of picture you want to take—"Close-up," "Group," or "Scene." Then you frame the picture the way you like it in the big viewfinder—and press the button.

Even if you've never taken a picture before, you can learn everything you need to know about the Kodak Pony II Camera in a matter of minutes. It loads without threading, cocks the

shutter automatically, counts each exposure made, keeps you from making "double exposures." In short, it handles so smoothly that all you have to think about is the fun of taking pictures!

Ask your photo dealer about the Pony II's fast *f/3.9* lens and remarkable operating ease. And remember, you can own a Kodak Pony II Camera for as little as \$2.70 down.

### **New Exposure Value Settings**

All four new Kodak cameras described here are calibrated with exposure value numbers which make picture-taking faster . . . easier than ever. A guide on the camera tells you which number to use to *set everything* for the right exposure.

**EASTMAN KODAK COMPANY, Rochester 4, N. Y.**

**New!**

## KODAK PONY IV CAMERA

*has the deluxe features  
35mm fans asked for!*



Here are some of the *plus* features that make this the finest Pony ever built . . .

Exposure settings are ultrafast. For each picture situation, a guide on the camera tells you which *exposure value number* to use. Simply match this number with the camera settings—and shoot! (Kodak Pony IV Camera has new *exposure value scale* markings as well as conventional shutter-speed and lens-opening settings.)

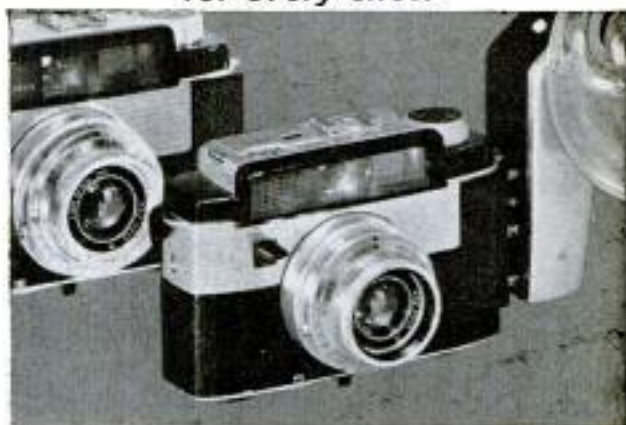
Focusing is equally fast. You can dial for "Close-ups," "Groups," "Scenes,"—or focus by scale from 2½ feet to infinity. Other Pony IV features: automatic double exposure prevention *plus* a release for intentional multiple exposures; direct body-contact flashholder fittings *plus* a handy accessory clip on top of the camera. And to give you really sharp pictures, the Pony IV has a fast, Lumenized *f/3.5* Kodak Anastar Lens.

New Kodak Pony IV Camera, \$39.95, or as little as \$4 down.

**New!**

## KODAK SIGNET 50 CAMERA

*measures the light  
for every shot!*



Precision photography has never been simpler! With the Kodak Signet 50 Camera (right) a photoelectric meter tells you the right exposure for a subject. All you do is read the number on the meter, set the same number on the camera—and shoot! An exceptionally fine *f/2.8* lens and an 8-speed Kodak Synchro Shutter let you take top-quality pictures anywhere, any time.

Your photo dealer will gladly show you the new and automatic features that make Signet 50 the fastest, surest operating 35mm camera Kodak has ever built. You can own a beautifully styled Kodak Signet 50 Camera complete with flashholder and two reflectors for \$82.50, or as little as \$8.25 down.

**Kodak Signet 30 Camera** (left) is identical with the Kodak Signet 50 Camera except that it has no built-in light meter, and does not come equipped with flashholder. \$55 or as little as \$5.50 down.

**Ask your photo dealer about these other fine Kodak 35mm Cameras**



**Kodak Signet 40 Camera.** Precision camera with rangefinder and handy dual-reflector flash system, \$74



**Kodak Retina IIIc Camera.** Has coupled rangefinder, ultrafast *f/2* lens, built-in photoelectric meter. \$175



**Kodak Retina IIc Camera.** Has *f/2.8* lens, no exposure meter. \$132

*Prices are list, include Federal Tax,  
and are subject to change without notice.*

**Kodak**  
TRADE MARK

# Need oil control?



## Sealed Power's got it!

**KromeX ring set with new Stainless Steel Oil Ring permits performance never before possible.**

Even under high vacuum condition such as deceleration, Sealed Power's Stainless Steel\* Oil Ring controls oil, eliminates smoking. This ring will not sludge or corrode because of the characteristics of stainless steel. And it has chrome-plated steel side rails for more than double normal ring life. They seat instantly.

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\*U. S. Patent No. 2,789,872

# Sealed Power

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# Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.

### Winter Protection For Climbing Rose

*Q—I have a climbing rose which has nearly covered a large wooden trellis. During the last year much of the growth died out. The trellis is located at the northwest corner of the house and is exposed to severe winter winds. Is the exposure the cause of the canes dying, or is it due to disease?*



*B. W.—Minneapolis, Minn.*

*A—*Ordinarily, the climbers are quite hardy, especially those with small blooms in clusters such as the ramblers. In very severe winters they may be damaged somewhat but if the plant is not diseased it will renew itself in a season or two. The large-flowered climbers generally are less hardy. It is possible that the rose disease known as "black spot" has so weakened the plant that it is unusually susceptible to winter injury. The disease can be controlled by spraying with a prepared rose spray during the growing season. In localities where the winters are severe, many gardeners remove the canes from the trellis late in the fall and tie them in a loose bundle. This is laid on the ground and covered with a layer of small twigs. Finally, leaves or coarse straw is used to cover the bundle. Ordinarily, this is sufficient protection.



### Renewing Finish On Old Piano

*Q—I have an old upright piano on which the original finish is checked. The checks are fine and run irregularly over all the finished surfaces. I believe the wood is mahogany. Is there any method of renewing the old finish?*

*J. M.—Lima, Ohio.*

*A—*If you are sure the wood is mahogany and that the finish is not a grained finish over some other wood, then it is possible to do a fairly good job of renewing the original finish provided the checks are merely surface checks and do not go clear through to the wood. One way is to mix fine pumice stone and rubbing oil to a thick paste, place a small quantity in the center of a square of soft cloth and then fold the corners of the cloth over to form a pad. Rub the checked surfaces, first

(Continued to page 226)



## FREE MASONITE PLANS...Easy cut-outs to brighten your home for Christmas!

Big, bright, beautiful cut-outs! Santa and his reindeer to prance across your yard...a Peg-Board® Greeting Card tree...a Nativity scene...snowmen and carolers, angels and choirboys. They're all here, all laid out on a grid pattern. You and the family will have a world of fun tracing these scale patterns on economical, durable Masonite® Primecote® Panels!

### JUST ASK YOUR NEIGHBORHOOD LUMBER DEALER

—He has your plans waiting for you now, *free* plans for all Masonite's Christmas figures. And he has just what you need to bring them to life: Masonite exterior panels. These panels are super-smooth and splinter-free. They cut cleanly, stand firmly. What's more, they're all prime-coated, ready to take on their gay Christmas colors...ready for years of holiday service.

How they'll add to your Christmas spirit —this year and many years to come. These durable Masonite panels take to wintry weather like Santa himself! So act now! Get down to your lumber dealer's...ask him about the full-size tracing patterns for *your* displays...he'll help you with your plans and materials. Or send the coupon below for complete information.



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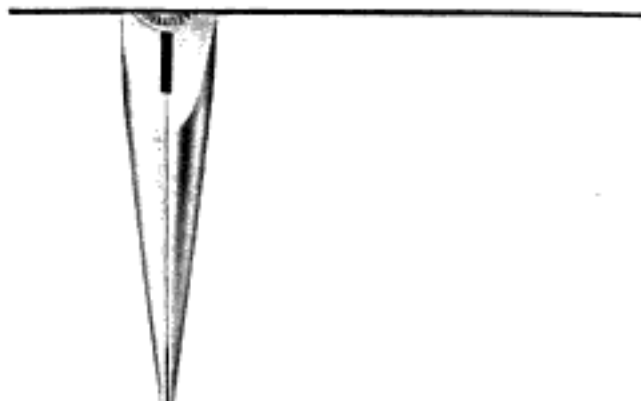
Insist on Masonite 3/4" Primecote Panels for your Christmas cut-outs. They're so easy to paint...so weather-resistant...so inexpensive.

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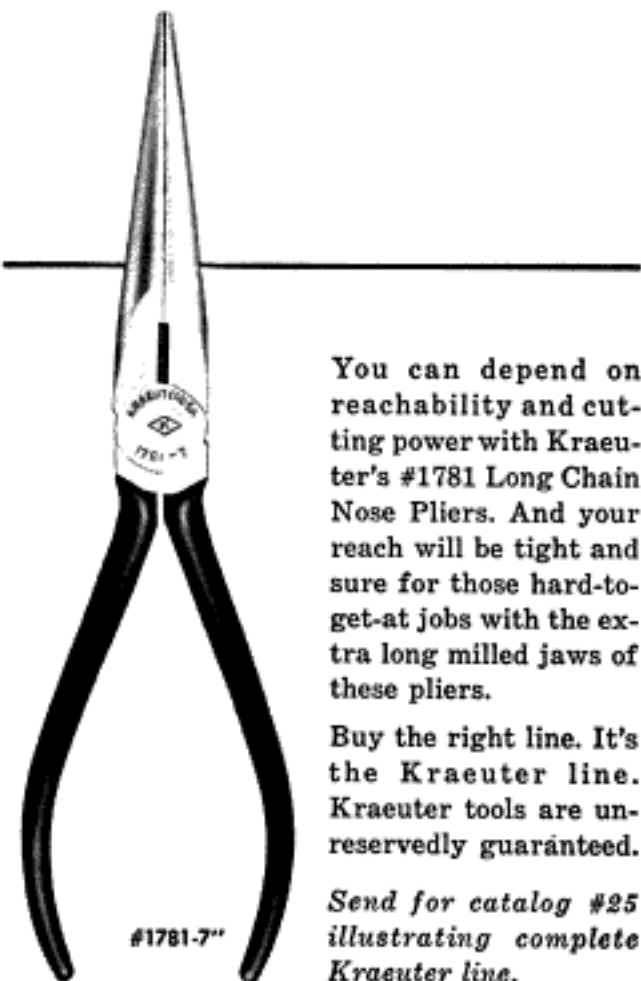
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(Continued from page 224)

with a circular motion then with a straight back-and-forth stroke. Continue this procedure until the checks are removed, then polish with rottenstone and oil on a pad in the same manner. Use a high-quality rubbing oil which is especially made for the purpose. Do not apply undue pressure in either the circular or straight strokes as the heat generated, although very little comparatively, may tend to soften the finish.

#### **Chain Loosens Soot In Chimney**

**Q**—My three chimneys are old, unlined and, I suspect, badly coated with soot. One chimney is about 30 ft. high; the other two 18 or 20 ft. high. Only the tallest one has a cleanout door. Is there any easy way of removing the soot from these chimneys?  
*G. H.—Rome, N. Y.*



**A**—One way of loosening the soot in a tall chimney is to lower a chain into the flue from the top. The chain should be long enough to reach nearly to the bottom of the chimney. A light wire chain is best, although any chain will do. After lowering the chain into the flue, swing it with a quick circular movement to give a whipping motion. This will cause the chain to strike the sides of the flue all along its length. The action of the chain will loosen the soot very effectively. Cleanouts should, of course, be installed in the two shorter chimneys. Remove all the loosened soot from the chimneys as it can cause a serious fire should it be ignited by sparks.

#### **Attaching Wooden Strips to Concrete**

**Q**—I'm planning a recreation room in my basement and want to use knotty pine on the wall at one end of the room. My problem is how to fasten the pine boards to the wall, which is concrete. Can you help me?  
*F. M.—Manchester, N. H.*

**A**—First you will have to attach furring strips to the wall to get a nailing base, and to provide space back of the boards for circulation of air. If the wall is the common height of 6½ or 7 ft. from the basement floor to the bottom of the joists, you will need at least three horizontal strips spaced evenly, the first strip placed about 8 in. above the floor. These strips are attached to the concrete wall with lead or fiber screw anchors. To install the anchors, first drill holes to the required depth with a star drill of the correct size. Tap the anchors in place in the holes with light blows of a hammer so as not to upset the ends. Then simply drive ordinary wood screws through the furring strips into the screw anchors just as you would drive the screws into wood.

#### **Metal Weather Strip for Storm Sash**

**Q**—I recently purchased an old house and want to fit storm sash all around to conserve heat. Some of the window frames seem to be warped or pulled out of square. On several, the sills are curved upward at the center, making it almost impossible to get a tight fit of the storm sash. Can you suggest a remedy?  
*B. R.—Waterloo, Iowa.*

**A**—Use metal weather strip of the spring-contact type. This will add to the cost of installation but the fuel savings will more than offset the extra initial cost. Measure the window frames carefully and cut the storm sash to fit with an allowance of about ⅜ to ¼ in. all around. Then nail the metal strip to the edges of the storm-sash frame with the nailing flange flush with the inside corner of both rails and stiles. Apply the weather strip in this manner to the top and bottom rails and to the stiles. When installing the storm sash, use turn buttons rather than hangers for fastening.



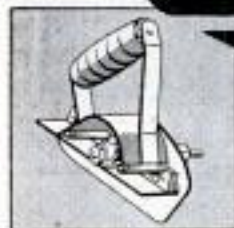
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Model 149B— $\frac{3}{4}$ -inch electric drill, AC-DC; 25 to 60 cycle; 115 volts; 2,500 rpm. At \$29.50—more power per dollar—attachments not included.\*



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METAL NIBBLER



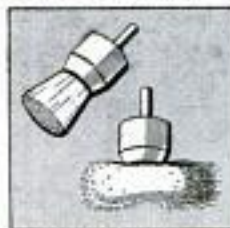
HEDGE TRIMMER



SCREW DRIVER



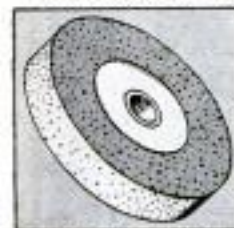
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Here's an electric drill with power to spare! Now you can assemble a complete, low-cost home workshop around just one powerful tool—the Remington 149B drill by Mall. It's precision-built to handle most any job ... to give a lifetime of rugged service. Fits planer, sander, saw and dozens of other attachments. Does many jobs out of the workshop, too, from hedge trimming to car polishing.

\*Specifications and recommended price subject to change without notice.

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Be a real home "do-it-yourselfer." Build this fold-away work bench easily from Easi-Bild pattern #576 with Elmer's Glue-All. It's easy to apply, fast drying. Glue-All is also ideal for dozens of other uses around the home. Bonds any porous material such as wood, pottery, paper or cloth.

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No clamps, nails or presses needed to do professional job quickly. Highly resistant to heat and water. Available in regular or non-flammable type to meet every need.



IF IT'S **Borden's** IT'S GOT TO BE GOOD!  
The Borden Company, Chemical Division  
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Framing trick mirrors is one of the jobs taken on by Logan. Assistant, Dolores Astling, demonstrates

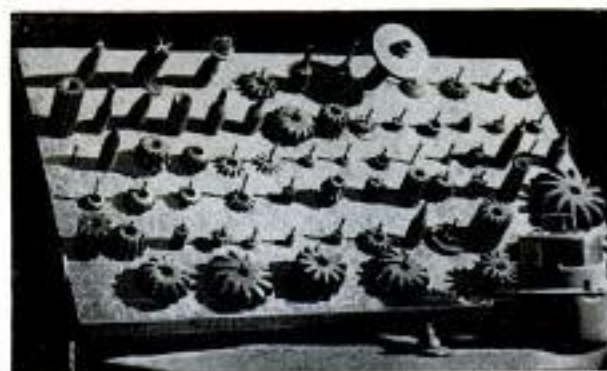
## Trouble Shooter for Carnivals

*(Continued from page 135)*

made in Spain, and a knee organ that the player holds in his lap and operates from a bellows.

When he needs a special device, he makes it. He has built a left-handed band-saw and a vise that holds merry-go-round horses as he carves on them with chisel and file. He makes the storage batteries he uses in his own car and has built one of the area's first swamp buggies—those strange vehicles used in Everglades travel. In 1926 he made an aircraft which was licensed. He even prints his own letter-heads and business cards. Retirement means anything but that to Pete Logan, trouble shooter deluxe. ★ ★ ★

Logan has this set of high-speed spindles for freehand work on merry-go-round horses. Carving gear is rare



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uniform of choice — **MODERN ARMY GREEN**



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*Victor R. Jones*

• Pvt. Victor R. Jones, Miller, Ohio.



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*Charles R. Carrico*

• Pvt. Charles R. Carrico, Springfield, Ky.



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*John D. Finley*

• Pvt. John D. Finley, Colebrook, N. H.

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Engineer of Casey Junior Circus Train sits in front unit but the engine actually is in the second car

## Disney's Mechanical Wonderland

(Continued from page 143)

strains. Another big problem was the method of getting power from the rear-mounted engine to the rear wheels. The small space available left no room for a differential or drive shaft. Bob tried several transmissions, including one that broke down in only one day. He finally selected a heavy gearbox with a pair of V-belts driving from a centrifugal clutch on the engine.

One pedal controls both accelerating and stopping. Gentle pressure on the pedal speeds up the car. Releasing the pedal

Power unit of Casey Junior is a Plymouth auto engine with an automatic transmission. It is linked to the front set of wheels by a chain drive



closes the throttle and engages the power brakes. The car stops within one length at its maximum speed of  $9\frac{1}{2}$  miles per hour.

And this maximum speed is a critical matter. One half mile over this speed just won't do.

At exactly  $9\frac{1}{2}$  miles the car can crash into a brick wall and do no injury to car or occupants. Anything over that speed may produce banged knees. The governor on the cars maintains an exact  $9\frac{1}{2}$  miles uphill or downhill.

### Disney Plans for Future

The imagination that first thought of Disneyland continues to grind away.

For the future, Walt is thinking of ideas for Sleeping Beauty Castle. He plans to tell this story in three-dimensional, animated views. He wants fairies flying through the scenes sprinkling pixie dust. And he wants a life-sized spinning wheel like the princess had when she pricked her finger on the spindle and fell asleep for 100 years.

Walt once complained that when he finished a feature film he couldn't do anything more to it. He has now found the answer to this problem in his new park, a giant hobby which he continually tinkers with and enlarges. ★ ★ ★



*New  
Advanced  
Design*

## **DELTA'SHOP** BIG IDEA FOR SMALL SPACE

**Combination of 4 full size tools  
does 95% of all workshop jobs  
—yet takes space only 3 feet square!**

If you want a *real* workshop, but simply don't have a lot of space, then the New Advanced Design DELTA-SHOP is for you. It's the most *practical* all-purpose combination tool ever built!

Here's why: In a space just 3 feet square it puts at your finger tips a powerful 9" circular saw, a 4" jointer,

an 11" drill press, and an 8½" disk sander—all mounted on one stand and powered by one motor. And because the DeltaShop is a combination of *full-size* tools (not attachments) you can buy it all at once (as little as 10% down), or the easy Tool-At-A-Time way.

**BUILD THIS SPACE-SAVER SHOP!** Delta experts designed the efficient under-the-stairs shop shown above so that you can build it. Plans are yours free—just send the coupon on the other side of this page. Do it *now*—and then see the New Advanced Design DeltaShop!

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enjoying them now!)



## DELTA "900" RADIAL SAW

1. Powered by true  $\frac{3}{4}$  HP motor. Saw, drill, rout, sand, grind, shape, cut mouldings and do many other jobs. As shown, equipped with Retractable Leaf Guard, Stand, and Retractable Casters.

## DELTA DUST COLLECTOR

2. The only industrial type dust collector priced for the home workshop! As shown, with  $\frac{7}{8}$  HP Motor, Switch and Cord, Drum, Hose, Casters, and Filter Bags, and equipped with Adapter for Delta "900" Radial Saw.

## DELTA'SHOP

The most practical combination of full-size tools ever built. Consists of 9" Tilting Arbor Circular Saw, 4" Jointer, 11" Drill Press, 8 $\frac{1}{2}$ " Disk Sander,  $\frac{3}{4}$  HP Motor, Motor Pulleys, V-Belts, and Stand. As shown, equipped with Retractable Casters.



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### DELTA-GRAM

Known home workshop popular DELTA-GRAM with helpful ideas, complete with detailed step-by-step instructions and lists of materials. Giving short cuts and included in every year.



## MONEY-SAVING ACCESSORIES

### Make every Delta Tool an even better investment

Your circular saw becomes a tenoner, cuts mouldings or dados . . . your drill press becomes a grinder, shaper or router . . . your lathe becomes a sander, drill, or does buffing and polishing—in fact, every Delta tool is more versatile, more valuable, when you add the right low-cost Delta accessories.

Delta makes more than 1300 different accessories, each one engineered to increase the range of jobs you can do. For very little money, Delta accessories add a lot of value to your shop, and to your own skill and satisfaction as a craftsman.

SEE NEW  
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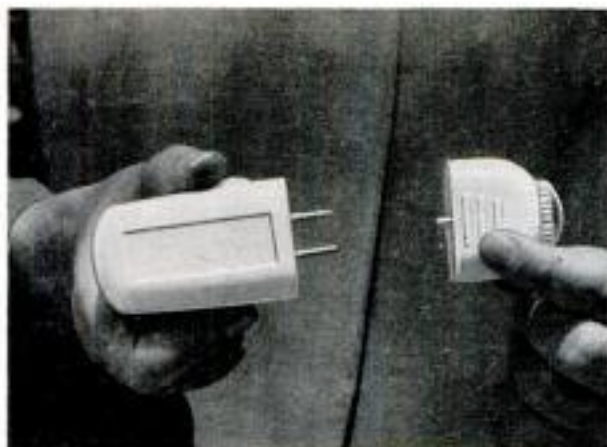
# DELTA

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Because Delta makes the world's most complete line of individual, all-purpose and combination tools, you can count on the man who sells Delta for impartial help in selecting the best type of tool for you. See him today—let him show you the exciting New Advanced Design Delta Homecraft Power Tools. Compare, and make up your own mind.



Competition Chemicals, 704 Washington Ave.,  
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### Recharge Flashlight Battery By Plugging Into Wall Outlet

Operating on dry cells, a flashlight can be recharged overnight by removing the battery unit and plugging it into a 110-volt alternating-current outlet. The steel-cased unit contains a charger and a limiting device to prevent overcharging. The recharged battery will operate the light for two hours.

### Bavarian Mushroom Slows Tumor Growth

Michigan State University scientists are trying to isolate a substance in a Bavarian mushroom which checks tumor growth in mice and rats. According to folklore, people who ate a certain species of mushroom that grows in the Bavarian-Bohemian Forest did not develop cancer. Cancer research workers decided to test the legend by injecting mice and rats with an extract of the mushroom. They discovered that it slowed the growth of tumors.

### Spray Coating Ends Snow Sticking



Shoveling snow usually is less work if the snow doesn't stick to the blade of your plow or shovel. An aerosol spray now on the market reportedly ends the sticky snow problem with an invisible coating that causes the snow to slide off treated surfaces. It

also can be used on power-driven throwers to prevent snow from clogging the chute. As an added benefit, the spray coating protects the metal parts from rust formation.

Speco, Inc., Cleveland 9, Ohio

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- Grips better on slippery surfaces
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**MORE GRIPPING EDGES!** Siped traction units provide thousands of gripping edges, minimize danger of skidding—give faster, surer stops and starts on slippery surfaces!

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Distributed in Canada by Gordon Mackay & Co., Ltd., Toronto, Ontario  
In trim longies-n-T-shirts and union-suits for men; sports styles in Sun Valley Red\* for the entire family; Peppermint Candy Stripe\* for girls and ladies. NEW Powder-Snow Blue\* for ladies... all shrink-resistant.

\*Trademarks

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## School for Courteous Traffic Cops

(Continued from page 148)

A cadet can be giggered for all sorts of other seemingly minor infractions — if he fails to rise when reciting in class, for example; if his handkerchief isn't tucked into his trouser pocket, or if he doesn't push his chair in under his desk at the end of the class period. Drinking in the barracks, leaving the academy without permission or shirking work details are all grounds for immediate dismissal.

Recruits are bombarded with courses covering the whole gamut of police work; subjects include everything from driver's license law to emergency childbirth, from general semantics to "pursuit and apprehension of traffic violators."

During the accident-investigation course, each cadet is turned loose at the scene of a mock accident and told to find out as much as he can. An old car has been covered with tape at various points to simulate collision damage, and various automobile parts — obtained from junk yards — have been left lying on the ground nearby. The accident scene is complete with a cast of "drivers," "passengers" and "witnesses," played by instructors and students, who answer the cadet's questions with specially prepared statements designed to mislead and confuse him. Here is the sort of thing the cadet has to contend with:

A witness hints vaguely that an old man might have been present when the accident occurred. If the recruit ignores this tip, he flunks the exercise. Many real accidents are solved by pursuing just such tenuous leads.

Another mock accident involves a "cab driver," who freely admits being at fault, and a "banker." Unless the recruit checks thoroughly, he doesn't discover that the banker is really the guilty one. The cabby is trying to cover up because he owes the banker a lot of money.

### Fists Help to Pass Test

The cadet runs into a host of other troubles he can expect to encounter on the job. If a driver has to be taken into custody, for example, his "family" puts up an awful squawk. At other times, the driver plays the role of a drunk, a psychoneurotic or a criminal, in which case the cadet has to employ special arts of persuasion, including his fists, to get his man.

After each mock accident, the cadet must present his findings at a mock trial. A former judge presides at these sessions, and an experienced attorney plays the role of defense counsel. To give students

(Continued to page 256)





IN TOWN TRAFFIC . . . some spark plugs, designed for high speeds, become fouled and cause misfiring and loss of power.



ON THE HIGHWAY . . . some spark plugs, designed for low speeds, invite destructive pre-ignition or misfire causing power loss. Why gamble when . . .

## Auto-Lite Spark Plugs with **POWER TIP** "Fire Up" your engine\* at all speeds!



If you drive both at town-traffic and at highway speeds, here's why you should use Power Tip . . . the first spark plug ignition-engineered for today's engines and today's driving

YOU CAN SEE  
THE BIG NEW  
DIFFERENCE IN  
SPARK PLUGS!



Ordinary Tip    Power Tip

At low speeds, the projecting Power Tip is in the thick of combustion where it gets hot quicker and stays hot to burn fouling deposits away *clean*. At higher speeds, the projecting tip is in the path of the incoming air-fuel mixture where it operates cooler to effectively *check* power-robbing pre-ignition.

Ask your garage or service station to install Auto-Lite Spark Plugs . . . the *only* spark plugs with Power Tip . . . and start enjoying top performance and economy from your car at *all speeds*.

\*Power Tip, with or without Resistor, is ignition-engineered for overhead-valve V-8 engines and for most overhead-valve 6-cylinder engines in all these cars—Buick, Cadillac, Chevrolet, Chrysler, De Soto, Dodge, Plymouth, Ford, Hudson, Imperial, Lincoln, Mercury, Nash, Oldsmobile, Packard, Pontiac, Rambler, Studebaker.

Power Tip protrudes farther into the combustion chamber for better ignition. Fuel burns more evenly and completely to give top performance and economy at all speeds.

# AUTO-LITE® SPARK PLUGS WITH **POWER TIP**

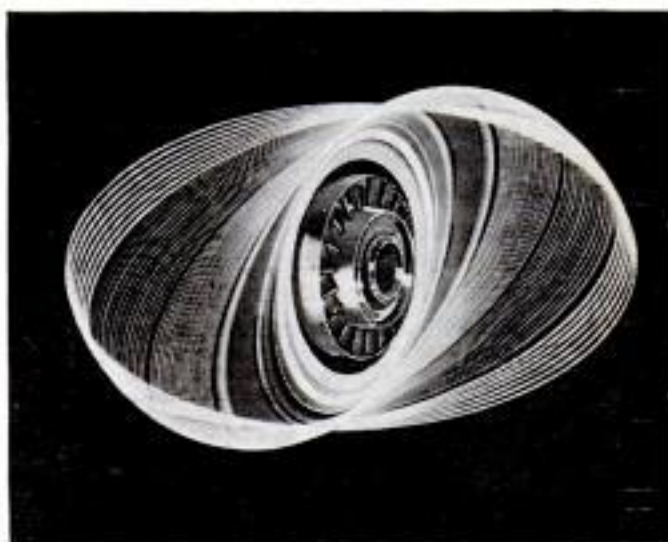
Auto-Lite makes a complete line of spark plugs, including Standard, Resistor, Small-Engine, Transport, Aircraft, and Diesel-Starting.

# The Bombshell News Behind This Fresh, Bold Look



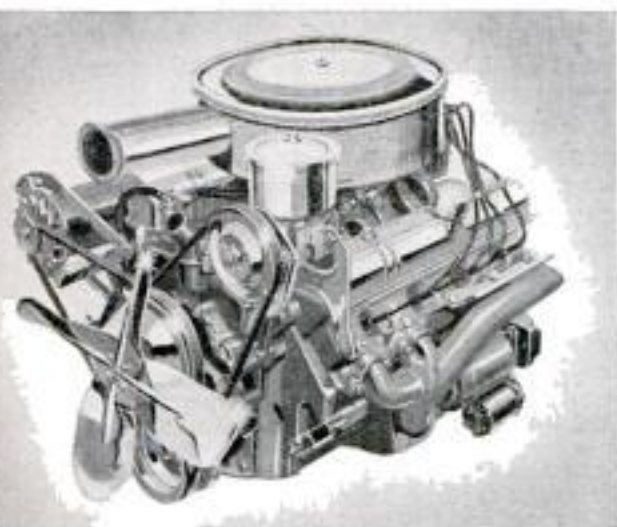
When better automobiles are built Buick will build them

**1. Flight Pitch Dynaflow\***—Those Buick engineers make transmission headlines again. In the eagerly awaited '58 Buick, they've developed a true *infinitely variable* stator for their triple-turbine Flight Pitch Dynaflow. Now those stator blades in the unit swing not to just two or three fixed positions, but literally to a million or more. That means maximum-power angle for starting, if you want it; gradually decreasing angle as your pace increases; and instant response at *any* pace in perfect ratio for the need at hand. The stator's 20 blades throw oil at the pump at 30 gallons per second at high angle. And this oil, moving at a velocity of 180 miles-per-



hour, impinges on the turbine blades with a *constant force of 1,140 pounds*. The performance is spectacular.

**2. The B-12000 Engine**—When you talk about engine efficiency, this is the one—the most modern engine it is possible to build for today's fuels. Vertical-valved for extra compactness (world's only vertical-valve V8), this great engine works at a neat 10 to 1 compression, develops a thrust of 12,000 pounds behind every piston's power stroke. That translates into superbly brilliant



response. A unique center-of-percussion theory is used with "tuned" nodal-point mounting for more controlled rotational motion of the engine, and for increased lateral stability. With the response of this powerful engine, and the instant flexibility of Flight Pitch Dynaflo, you get in this '58 Buick the first big car that's really light on its feet — most nimble Buick ever.

**3. The Miracle Ride** plus Buick Air-Poise Suspension.\* Long years of constantly progressive ride-engineering have brought to a peak today the advantages of Buick's ride basics: X-member frame, full-length torque tube, and coil springs at all four wheels. In the '58 Buick chassis, you get a total of 46 feet of spring steel for torsional absorbence of road shock, which cuts vibrational frequency

to a low of 65 cycles per minute at the front, and to only 58 cycles at the rear. As an option, Buick Air-Poise Suspension replaces the coil springs, works new wonders for the Miracle Ride. To the basic solidity and stability of the Buick chassis—and without any major changes in its design — it adds 4 columns of compressed air with a *variable spring rate*. This keeps the car at one level, automatically, regardless of load or road condition. There's no other ride like it.

**4. Many Significant Changes** are found throughout the new B-58 Buick, since a great many projects long under development suddenly came to full flower this year, in this car: the Dynastar Grille, the clean, fresh styling, the "velvet wall" sound silencing, the new Quadrajets Carburetor, the Air-Cooled Aluminum Brakes,\* and many others. Best thing any knowing car buyer can do is drop in on



his Buick dealer at the first opportunity to take a good long look at these B-58's, then drive one and let it speak for itself.

BUICK Division of GENERAL MOTORS

\*Flight Pitch Dynaflo standard on Limited and Roadmaster 75, optional at extra cost on other Series. Air-Poise Suspension optional at extra cost on all Series. Aluminum Brakes standard on all Series except Special.

See TALES OF WELLS FARGO, Monday Nights, NBC-TV and THE PATRICE MUNSEL SHOW, Friday Nights, ABC-TV



**The Air Born**  **B-58 Buick**

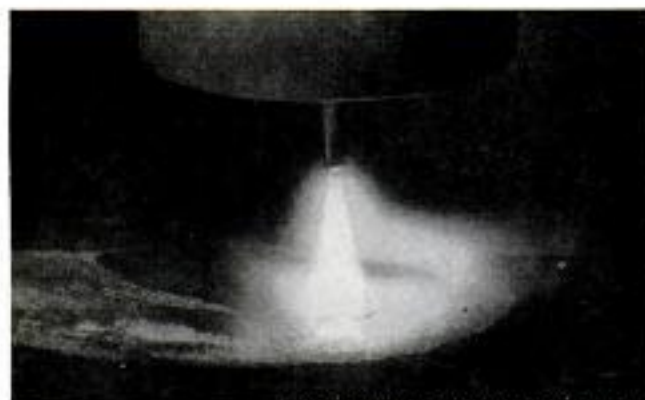


PHOTO COURTESY AIR REDUCTION COMPANY, INC.

## WELDING ARC IN ACTION

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*Pacemaker* **GRAPHIC\***!

There's almost no limit to the versatility of the Pacemaker Speed Graphic\* camera. Whether used by the industrial photographer to show a close-up of a welding arc and the flow of molten metal as in the photo above, or by the serious amateur as a natural complement to his own abilities, no other camera gives the user such tremendous photographic range. That's why better than 90% of all professional and press photographers use it.

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*Price-Winning Cameras*

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\*Trademark

## Make Your TV Set Safe!

(Continued from page 163)

chassis are completely enclosed or otherwise inaccessible. For metal-cased receivers, the chassis is insulated from the case by means of insulating bushings and washers so that no direct contact between case and chassis is possible. But, because of the proximity of an electrically "floating" metal case, the performance of the receiver might be impaired and it is common practice to connect a low-value isolating capacitor between case and chassis. For the high television frequencies this capacitor is, in effect, a short circuit so that the case is actually connected to the chassis. But for the 60-cycle line voltage the capacitor represents almost an open circuit and, therefore, provides sufficient isolation to eliminate the shock hazard.

In view of these precautions, it takes the following unusual, though entirely possible, combination of circumstances to make a TV receiver too hot to handle:

The set would have to be of the transformerless variety.

The set would have to be defective in such a way as to make a hot metal part exposed to the touch. (In metal cabinets, this can occur if the isolation capacitor or a chassis insulator becomes shorted. In wooden cabinets, tampering with the installation may expose a mounting screw. With either type, the removal of control knobs to foil the natural knob-twiddling instinct of the younger set is an invitation for trouble.)

The set would have to be located within reach of an externally grounded metal object. (Kitchens, basements, bathrooms and utility rooms are particularly dangerous locations.)

The line cord would have to be inserted in the outlet so that the chassis is connected to the hot side of the line.

Simultaneous contact would have to be made with the receiver and an externally grounded object. (With the previous conditions satisfied, touching the receiver while standing on a damp cement floor may be dangerous.)

### Reducing the Shock Hazard

One recommended method for eliminating the hot-chassis danger is the installation of polarized wall outlets in all locations where the set is likely to be plugged in, and the use of a correspondingly polarized plug on the end of the receiver line cord. With this method, the plug can be inserted in the outlet only in such a way that the chassis is connected to the grounded side of the line, and all danger is eliminated. However, any wall outlet so modified can not be used for any appliance fitted with the standard type of plug.

A similar modification, one which overcomes the latter disadvantage but affords protection only against hot metal cabinets, is the use of a three-prong plug adapter

(Continued to page 246)

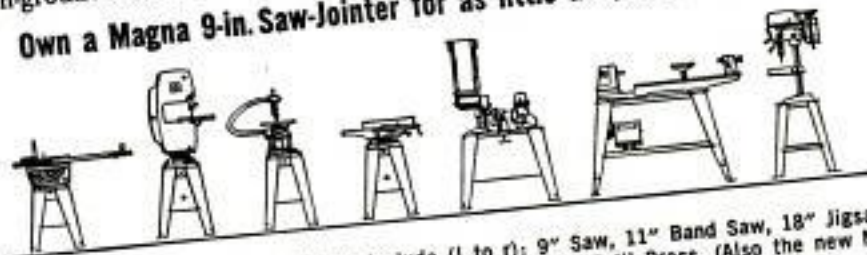


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Own a Magna 9-in. Saw-Jointer for as little as \$2.30 a week!



MAGNA-LINE tools for home and industry include (l to r): 9" Saw, 11" Band Saw, 18" Jigsaw, 4" Jointer, 6" Belt Sander, Compressor-Sprayer, 30" Lathe, 12½" Drill Press. (Also the new MAGNA Thrifty-Three: 8" T/A Saw, 12½" Jigsaw, 4" Belt Sander).



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*image  
not  
available*

# How to fit two boys into one room ...and keep 'em quiet, too!



Put two boys together and they're bound to have fun . . . and bound to make noise, too. But here's a dandy sound-conditioned room that lets 'em roughhouse all they want - yet hushes the noise they make. You can build a room like this yourself . . . even if you're no expert with a hammer and saw. It's easy to do, and costs less than you think. Here's how.

**For the ceiling,** use Gold Bond Decor Tiles - in the handsome new Jackstraw pattern (shown above). They're attractive, inexpensive, and make rooms pleasantly quiet - tiny spaces between the wood fibers actually soak up disturbing noises. Just nail or staple tiles to wood strips applied right over your present ceiling.

**For the walls,** use Gold Bond® Gypsum Grain-board Decorator Panels and Insulation Tiles. Decorator Panels come in four exciting wood-grain finishes, plus Knotty Pine. Go up in a jiffy, too. Saw panels like wood, or score with

a knife and snap. To clean, just wipe with a damp cloth. Insulation Tiles come in rich ivory white, and can be painted if you like. Their interlocking edges hide nails or staples.

**Want plans so you can start building?** Write for free illustrated folder, "How to Remodel Your Attic," to National Gypsum Company, Dept. PM 117, Box 73, Buffalo 13, N. Y. Then see your local Gold Bond dealer. He'll supply everything you need - including helpful advice.



NATIONAL GYPSUM COMPANY

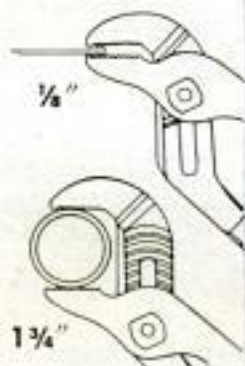


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BE SURE IT'S A GENUINE CHANNELLOCK



CHAMPION DEARMENT TOOL Co. MEADVILLE, PA.

## Transistorized Instrument Amplifier

(Continued from page 162)

battery. A kitchen-cabinet drawer pull serves as a carrying handle. Four rubber feet are attached to the bottom of the cabinet to prevent scratching of table tops. As a finishing touch, a piece of perforated aluminum may be cut to provide a back cover for the amplifier.

After the amplifier has been wired, it should be carefully checked against both the pictorial and the schematic diagrams to insure against wiring errors or improperly soldered connections. Particular attention should be paid to the polarity

### LIST OF MATERIALS

**RESISTORS:** R1, R3=270K, 1/2-watt; R2, R8=5K potentiometer (one with s.p.s.t. switch, SW1); R4=100 ohms, 1/2-watt; R5=4.7K, 1/2-watt; R6=100K, 1/2-watt; R7=47 ohms, 1/2-watt; R9=2.7K, 1-watt (see text).

**CAPACITORS:** (all miniature or subminiature) C1=5-mfd., 200-volt tubular; C2=100-mfd., 6-volt electrolytic; C3, C4=6-mfd. 15-volt electrolytic; C5=2-mfd., 6-volt electrolytic (see text); C6=30-mfd., 15-volt electrolytic.

**TRANSISTORS:** TR1, TR2, TR3 = Raytheon CK722; TR4=CBS-Hytron 2N255.

**MISCELLANEOUS:** T1=driver transformer, 500 ohms CT to 8 ohms, Argonne AR-164; T2=output transformer, 48 ohms CT to 3.2 ohms, Argonne AR-503; 8" PM speaker with 3 to 4-ohm voice coil; phono input jack (J1) with matching plug; small two-terminal jack (J2) with matching plug (PL2); 6-volt battery, RCA VS009 and matching connector (see text); main chassis, ICA No. 29077; heat-sink chassis, L.M.B. No. 424-C; baffle for 8" speaker, Lafayette No. SB-11 or equiv. (see text).

**HARDWARE:** Transistor sockets with clips (3), handle, rubber-tack feet (4), knobs (2), terminal strip, ground lugs, screws, nuts, wire, rosin-core solder.

Complete kit of parts available from Lafayette Radio, 165-08 Liberty Ave., Jamaica 33, N. Y.

(+ and - leads) of the electrolytic capacitors and to the connection to the polarized battery plug, PL1. These must be connected as shown in the diagrams to prevent damage to the amplifier when power is applied.

When the wiring has been checked, the three CK722 transistors may be inserted in their sockets. The small insert in Fig. 4 identifies the three equally spaced leads of the CK722s. These leads should be cut off to about 3/8 in. and special care should be used to make sure that the transistor leads coincide with the proper socket pins as labeled in Fig. 3.

### Possible Circuit Modifications

Tone-control action may be modified merely by changing the value of the tone-control capacitor, C5. With the 2-mfd. unit used in the original model, a considerable cut in high frequencies is obtained at maximum tone-control setting. If a lesser degree of treble cut is desired, the capacitor value can be lowered. Or, the tone-control

(Continued to page 250)



# How to get your money's worth from the next battery you buy

Although most batteries look alike, there is a vast difference in the way they perform. So, it will pay you to choose your next battery carefully rather than just "buy a battery." There are good reasons why it will pay you to choose an Exide.



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**FREE!** This 32-page manual tells all about batteries. How to test, install, recharge, etc. Write to Dept. 36, Exide Automotive Division, P.O. Box 6266, Cleveland, Ohio.

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Choose the 336 Carbine that's right for your type of hunting, from five models and four calibers. Ask your dealer about the Marlin Pay-Later Plan.

**ILLUSTRATED:** Model 336-C, Regular Carbine. Calibers 30/30, .32 Sp., .35 Rem. • 20" barrel • Tube holds 6 shots.

**THE NAME FOR GAME**

**\$76<sup>95</sup>\*\***

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\*Patent applied for.

\*\*Slightly higher west of the Rockies. Subject to change without notice.

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circuit may be omitted entirely, saving the cost of C5 and R9. If this is done, a separate switch, SW1, must be provided for the power-supply circuit.

The undistorted power output of the amplifier may be increased by reducing the value of resistor R9. With the value specified, adequate room volume is obtained before signal overload (and distortion) occurs. The battery life, under typical intermittent operating conditions, should be between 50 and 100 hours. For greater undistorted power, the value of R9 may be dropped to 1500, 1000 or even 820 ohms, but battery life is reduced accordingly.

In addition to the circuit changes, a number of parts substitutions may be made to fit the requirements—and stock—of the individual builder: A smaller or larger loudspeaker may be employed provided it has a 3 to 4-ohm voice-coil impedance; specified battery may be replaced with a longer-lasting Burgess-type 2F4 or with four series-connected flashlight cells; other general-purpose audio transistors may be substituted for the CK722 units (this may require a change in the values of the bias resistors R1, R3 and R6 in order to obtain optimum performance) and, of course, the cabinet and chassis may be changed to meet individual requirements.

Two typical contact microphones are shown in the title illustration. Units such as these are available from most large radio-parts distributors and music stores. A high-impedance, high-output type of pickup is recommended. The 6-ft. shielded cable usually supplied with such pickups must be terminated with a pin plug to fit the amplifier input jack. ★ ★ ★



### "Caddy" for Your Rifle

Rifles may be hung anywhere or carried with a new sling, or "caddy," that hooks through the trigger guard and loops around the end of the barrel. It is made of braided Saran plastic. When used as a sling, a hunter's hands are freed for other activity. It also can be used as a leash for a dog, if you desire.

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As illustrated, the basic Router costs only \$42.50. And as shown below, you save as much as \$20.00 (including a \$4.00 saving on accessory Dovetail Templet) on Routo-Jig attachments! See the Yellow Pages for nearest Porter-Cable dealer—or write for free 48-page Routo-Jig manual.



**JIG SAW!** Routo-Jig is a new kind of portable jig saw with rotary action — for intricate contours or straight cut-off work in wood up to 1" thick. Combination Router and Jig Saw.....\$49.95



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10 in.	10L	3.55	10BL	3.00
12 in.	12L	5.18	12BL	4.40
15 in.	15L	7.88	15BL	6.95

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## Now Electronic Brains are Talking

(Continued from page 121)

BEEP-BEEP — red LEADER — VECTOR  
one nine zero—ANGELS two zero—OVER.

If a radio transmitter were hooked up to the voice, the leader of an intercept group climbing into the wild blue yonder would know instantly that he must fly a course of 190 degrees at 20,000-foot altitude in order to find the object that the search radar far below him had picked up in the sky.

Nearly any kind of vocabulary—up to 100 words—can be recorded on a single drum, and in any language. "In areas where NATO forces are stationed," says Poppe, "the complaints against the Frenchman's English and the American's French could be eliminated, if the proper Voice Data Link were hooked to computers engaged in air-traffic control work."

The system can be tied into all kinds of air-traffic control. With such a talking calculator, Frye and Poppe point out that air crashes like the one over the Grand Canyon might be foreseen and prevented. Here's how it would work:

Imagine two planes approaching each other in fog at the same altitude—one flying from New York to Boston; the other heading for Nantucket Island from New York.

CAA radar in Providence picks up both planes and begins tracking them automatically, sending the course, speed and position data on each to an electronic computer. The brain, promptly calculating a collision course for each, would compute a new heading and altitude for one plane, transmitting these in digital or binary code to the Voice Data Link, where the impulses would trigger certain playback heads over the revolving vocabulary.

Instead of code calls, like the red, green and blue used in intercept work, this vocabulary would include the names of airlines. The computer's voice would go out instantly on commercial-airline radio channels with a message such as this: "Northern 307—new heading one eight five—altitude zero eight—over."

From the instant both planes came into radar range, all this would have consumed a matter of seconds.

Poppe envisions dozens of other uses for the unique voice. It could be a voice link between a computer and the radar operator—spilling off data to him while he watches the scope. "It would provide the radar shack with ears as well as eyes," says Poppe.

"In operations where several huge computers are used, one man usually runs his

(Continued to page 254)

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TO ANY LENGTH**

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1/4" 3/16" 1/8" 7/16"  
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**NEW KIND  
OF SEAL**



*Protects garage doors . . .  
seals out rain, snow, drafts*

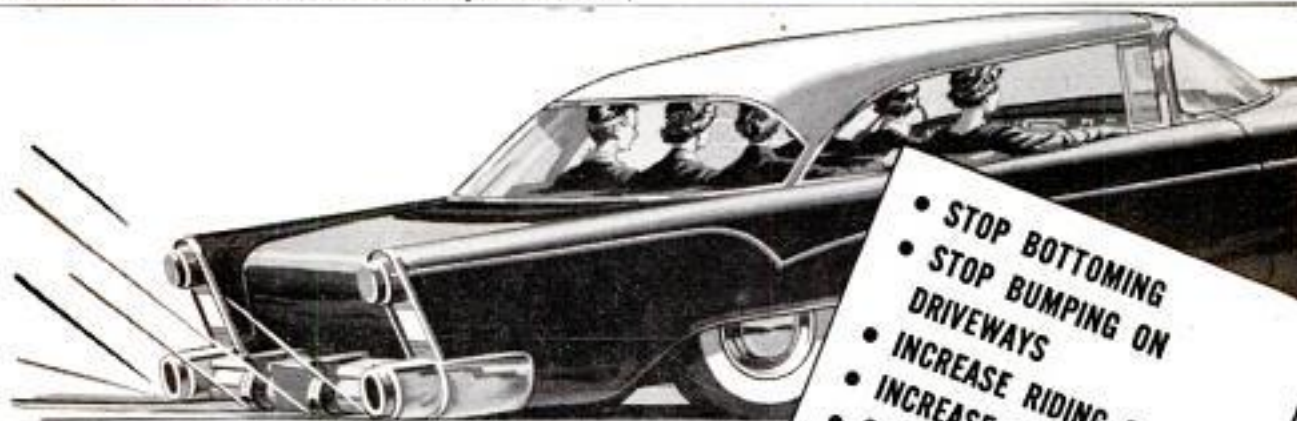


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StanStrip is molded from specially developed synthetic rubber. You can install it in only a few minutes. It's tough, stays soft and flexible, never sets or deforms. Follows the roughest floor contours. Protect your investment in garage doors with StanStrip. Eight-foot strip costs only \$2.95, 16-foot strip costs \$5.90. At your hardware dealer's now. Install it this week end.

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keep loaded cars level . . .

If you load your car with samples, equipment, etc., if you drive a station wagon or haul a trailer, if you load family and luggage into your car for weekend or vacation trips, you need:

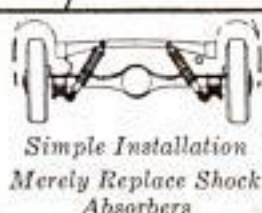
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Automatically compensate for lightened load to give a comfortable ride when car is normally loaded.



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legs off watching for red lights on a panel a block long," Poppe reveals. "With a trouble-shooting Voice Data Link, instead of lights, the man might be a block away and the voice, hooked to a PA system, would shout to him about any emergency, telling him where and what it was."

Poppe and his associates are looking into the possibility of using the voice in conjunction with big computers that would store ticker-tape data for Wall Street. "The link could be hooked up to telephone lines," says Poppe. "In a brokerage house, anyone could lift up a telephone and dial a special number. The latest quotation on any stock, stored in the brain, would be promptly given over the phone by Voice Data Link."

As Fairchild envisions it, their unique "mouthpiece" may some day enable automatic weather stations to shout their reports via radio to all points of the globe, in a dozen different languages. Inventory memory computers may be talking to accountants in vast industrial organizations, giving verbal accounts of any stock on hand. Oil-company engineers, to find the level of any tank in their vast tank farms spread across the country, will need only dial a phone number. Huge electronic brains, collecting tank-level data from the

entire system continually, will feed the necessary impulses to a Voice Data Link, which will, in plain English, tell the engineer the level of any tank in the entire system at any time.

So far, neither Poppe, nor any of his cohorts has figured what will happen if somebody asks an electronic brain a silly question. Possibly a sarcastic word or two will be programmed into the revolving vocabulary to take care of clowns. ★ ★ ★

---

### **Air Force Planes "Home" On Flying Tankers**

Radar "homing" beacons built by Sperry Gyroscope Co. are used by U. S. Air Force planes to find flying tankers for inflight refueling. A pilot wishing to refuel sends out radar pulses hundreds of miles to trigger a tanker's beacon, which returns a coded reply and location information.

### **Diamonds From Peanut Butter**

Using the carbon in peanut butter as the raw material, scientists at the General Electric Company laboratory have manufactured synthetic diamonds. The carbon was subjected to great heat and pressure to transform it into gems.



## **Two good names are always better than one**

When you buy a portable electric drill look for the name JACOBS on the chuck. It is your extra assurance of top tool performance.

An electric drill is no better than its chuck...the point where the drill's power is put to work. Many heavy duty operations are performed with attachments which are held in the chuck, so a tight, accurate grip — a JACOBS grip — means better work done easier.

All leading manufacturers of portable electric tools equip their drills with Jacobs Chucks. Look for the name JACOBS on the chuck when you buy. Two good names are always better than one.

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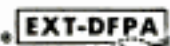







**1 - LOOK FOR THE DFPA QUALITY TRADEMARK**



When you see the letters DFPA on panel you know you're getting plywood quality-tested to meet rigid industry standards. DFPA trademarks attest quality, performance and value.

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<p><b>EXT-DFPA</b></p> <p>Exterior plywood for outdoor &amp; marine use</p>	 
<p><b>PlyPanel®</b> for paneling, most indoor uses</p>	 
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Choose Exterior-type (waterproof glue) for outdoor and marine uses; Interior-type for inside jobs. Within each type are several appearance grades (panels with one good side, two good sides, etc.). See your lumber dealer. He'll help you choose the right grade, help with ideas and plans.

**SPECIALTY PANELS** include 1. textured plywood with smart grooved, striated or brushed surfaces for special decorative effects; 2. overlaid plywood (smooth, durable resin-fiber surfaces) for extra quality work.



**FREE:** Helpful booklets that show how to buy, use and finish plywood. Also, list of available homecraft plans. Write (USA only) Douglas Fir Plywood Assoc., Tacoma 2, Wash., Dept. 9.

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There is a type and size of Klein Plier for every job—all famous for Klein quality "since 1857."



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.



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a taste of the treatment they may be subjected to after graduation, the attorney does his best to badger and browbeat them on the stand.

Near the end of a recent 13-week session, officials obtained rather convincing proof that the course was a success. A cook employed at the academy dining hall tripped on a doorstep and sprained her ankle. Two recruits who happened to be nearby put their first-aid training to use and quickly applied a bandage. Later, a doctor who examined their handiwork told the Director of Training, Sergeant Karns: "Your men really did a good job. I was able to send the cook home without any further treatment."

### Training Pays off

A few weeks after this incident, a student was granted leave because his wife was expecting a baby. Unable to get her to the hospital in time, he used his academy training in emergency childbirth to perform the delivery himself.

"When a cadet graduates," explains Sergeant Karns, "he is an expert police officer, equipped to cope with just about any kind of emergency, and just as important, to administer the law fairly and honestly. The course demands a lot from each student, and represents a heavy drain on our taxpayers. But we feel that in the near future, this expenditure of time, effort and money will produce a substantial reduction in accidents and an increased respect for the law among the motorists who use our highways." ★ ★ ★

### Fertilizer Subs for Dynamite

Ammonium-nitrate fertilizer is gaining acceptance as a substitute for dynamite and other blasting materials, according to the Monsanto Chemical Company. It is reported to be extremely safe, cheaper and as effective as most explosives.

### Life of Satellite Predicted

Man-launched earth satellites, reaching heights up to 800 miles from the earth, will last only about nine years due to the drag of atmospheric particles. Density of particles at this height has been estimated at 250 grams per thousand billion billion cubic centimeters by Dr. Theodore E. Sterne of the Smithsonian Astrophysical and the Harvard College observatories. This is a long way from the nonfrictional vacuum of space which Doctor Sterne evaluates at one gram per million billion billion cubic centimeters. In a perfect vacuum the satellite presumably could continue forever.





Something **NEW**  
for your Christmas List!

# 5 POWER TOOLS IN ONE

## NEW Dremel Deluxe MOTO-SHOP

- 1 JIG SAW
- 2 DISC SANDER
- 3 BUFFING WHEEL
- 4 BENCH GRINDER
- 5 FLEXIBLE SHAFT

### Complete Power Workshop In One Compact, Portable Unit

The amazing new Dremel Moto-Shop is the most versatile multi-purpose tool ever invented. Has 1,001 home and shop uses. Basically, it's a 15" Jig Saw with a unique power take-off to which you simply connect other attachments. It then converts to a disc sander, bench grinder, buffing wheel, and a flexible-shaft machine . . . all powered by a BALL-BEARING ROTARY MOTOR.

And this professional-quality, portable power shop can be set up practically anywhere — basement workshop, kitchen counter or card table. Weighs only 12 lbs. As a Jig Saw, it will cut 1 3/4" wood, 18 gauge copper, 1/16" steel — all with same blade. Foolproof blade guard makes it absolutely

safe — even for children. Handles everything from bird-houses to full-size furniture.

The flexible shaft is a complete machine shop in itself. Use it for sharpening, grinding, polishing, drilling, carving. Collet capacity 1/64" to 1/8". Other attachments have hundreds of home and shop uses.

Moto-Shop is the perfect "ALL FAMILY" workshop — safe for even mom and the children. Helps build a close father-son relationship.

**See Your Power Tool Dealer for a Demonstration Today!**

**Model 57 Moto-Shop.** Includes Jig Saw with disc sander attachment only. Other attachments can be added later - - - **\$33.95**

**Deluxe Model 57 Moto-Shop** with all attachments shown - **\$49.95**

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D-33

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A new Indicator Holder with a rigid post centered over point of greatest magnetic pull . . . holds even heavy lug-back type indicators securely in position. Newly designed base contains a permanent magnet with an unbreakable plastic outer shell. Base attaches instantly to curved or flat ferrous surfaces. Has a fine adjustment feature. Ideal for all set-ups requiring the use of an indicator.

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A new heavy duty surface gage and indicator holder that has greater range and capacity. Permanent magnet can be turned on or off for easy positioning. Fully adjustable spindle and fine adjustment screw. New-designed scribe has a removable, long wearing carbide tip.



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For securely holding precision work without use of blocks, shims, parallels, etc. Swivel mounted in polished aluminum plates containing two permanent magnets.



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Portable, high intensity lighting coupled with a magnifier. Lamps light instantly, operate at body temperature, are protected by chip shield. Adjustable goose neck with full swivel. Strong permanent magnets in base with fingertip release for quick relocating.



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AT YOUR HARDWARE OR TOOL STORE

THE LUFKIN RULE COMPANY, DEPT. PM, SAGINAW, MICHIGAN

## Landing Fields for Jetliners

(Continued from page 129)

fly and maneuver safely in the same traffic pattern with today's conventional transports. The jets will carry fuel reserves just as do present aircraft. The basic requirement is 260 miles to an alternate airport plus one hour of holding. Many long-distance operators carry far greater reserves.

**Q:** From the traffic standpoint, the prop-jets will be flying at conventional altitudes and the pure jets will be flying above the rest of the traffic. Is that right?

**HORNING:** That is right. In April we took over control of all instrument flight in the airspace above 24,000 feet. Previously the CAA exercised such control of the airways only. The 24,000-foot level is a floor below which the present very high frequency and ultra-high-frequency line-of-sight radio is not too good. To control traffic you have to communicate with it. Within a year we hope to control traffic down to 15,000 feet by adding more ground-radio communication facilities.

**Q:** With the airways busier than ever, what is being done to prevent mid-air collisions such as the two transports that collided over Grand Canyon?

**HORNING:** This control of all instrument flying is the number one thing. The next logical step is to extend our present terminal-radar coverage by adding long-range radar that will cover en-route traffic. There is another development, the airborne transponder beacon. It is carried on the plane. In effect it reinforces the radar signals so you can see the plane farther away and through snow or rain. Also, it identifies the plane. This feature is vital when using radar for traffic control.

**Q:** Is there any chance that our jet transports will blow up, as did two British Comets several years ago? They suffered explosive decompression at high altitude.

**EDWARDS:** We are all acquainted with the structural problem that existed in the Comet. Our new jets will be pressurized to give 6500-foot cabin altitude at 40,000-foot flight altitude. They will carry an internal pressure of  $8\frac{2}{3}$  pounds per square inch. There are several things that are mandatory for a safe pressure cabin. One is a heavier fuselage skin. Two, very conservative riveting practices. Three, all doors are of the so-called plug type that can't blow out. Another thing, each window has three panes. The middle and outer panes are each good for eight times the cabin pressure. The inner pane is good for three times the cabin pressure. Any window material can be weakened by what is

(Continued to page 260)

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COMPACT—  
Fits in the trunk of your car  
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**ENGINE:** BRIGGS-STRATTON 2 3/4 H.P.—Equipped with recoil Starter.  
**GENERATOR:** Ball bearing construction 1000 Watts. 115 Volts A.C. 60 cycles. Automatic self-regulating. SAME AS HOUSEHOLD CURRENT  
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**Shipping Weight** 100 lbs. boxed  
**PRICE:** Save \$100.00 from \$259.50 list price. Now! F.O.B. Chicago.....NET **159.50**

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For Jeep—Truck—Car—Tractor

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INCLUDES — AUTOLITE Motor Driven Pump, Oil Tank, and Pair of Solenoids.

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**HYDRAULIC HOSE — 4 Ft. x 1/4" with Fittings..... 2.50 ea.**

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Silent, high efficiency, Helical Gear Type Ball Bearing, Hydraulic Pump or Motor. Rated 8 Gal. Per Min. At 1500 R.P.M.—Delivers 1000 P.S.I. Using 6 H.P.—Reversible Rotation—3/4" Pipe Thread Inlet and Outlet Ports—1/4" Drain Port—3/4" shaft with keyway and flat for either direct or pulley drive. Dimensions—3 3/4" x 7 1/4" long, 3 1/4" wide. Shipping weight 18 lbs. F.O.B. Chicago.... **52.50**

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STAMPS NAMES, NUMBERS, ON WOOD OR METAL

ITEM # 390-B — FULL ALPHABET, A-Z, NUMBERS 1-9, "&" AND PERIOD. PRECISION HAND TRIMMED, deep cut, hardened TOOL STEEL STAMPS—IN FITTED EASY ACCESS CARTON. Made to rigid U. S. Army specifications.



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Item # 415—Designed for remote operation of controls on engines, boats, special machinery, etc. Eliminates complicated mechanical linkages, cables, pulleys, etc. The master unit connects to the slave unit with a single 1/4" tube.

When master control lever is moved, slave lever follows exactly. Light, compact, aluminum alloy construction. Dim. of both units: 5 1/4" W. 9" H. 1 3/4" D. (exclusive of handle) Ship. Wt. 8 lbs. F.O.B. Chicago..... **27.50** per pair (Note—tubing not supplied)

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- FOR — • Insecticide Spraying  
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MOOG PH Overload Helper Springs add 1200 lbs. extra capacity, correct the cause of "rear-end sag!"

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By restoring proper height to weak rear springs, MOOG PH Overloads prevent bottoming!

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MOOG PH Overloads stabilize the ride, improve roadability whether car is loaded or not!



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called the notch effect. That is, there are sometimes small boys or people of less than average mentality who like to put their initials on the windows of airplanes. This notching weakens the pane. Having a protected pane between the two exposed panes is a very important safety factor. The cockpit windows are of optical glass and have an over-all thickness of about three inches.

**Q: Does the Electra have the same pressure problems as have the pure jets?**

McDONALD: In a certain sense it does, though our operating altitude is not as great and our requirements for cabin pressures are not as severe. We are doing the same sort of thing that Mr. Edwards has described. We are using materials that have a long life expectancy with low risk of fatigue trouble. We are using a rip-stop type of construction that confines any tearing of the skin to local areas.

**Q: Then explosive decompression could not occur?**

McDONALD: Not in the normal sense. However, we have made studies to determine just what a loss of pressure means to an average load of passengers. All the new transports will have provisions for supplying oxygen to each passenger.

**Q: An emergency oxygen mask for each passenger?**

McDONALD: Different designs are being considered. I want to make it particularly clear that the airplane is designed expressly to avoid any loss of pressure. Oxygen becomes a last emergency device.

BONE: We might go back to the traffic problem for a minute. We are investing many millions of dollars in new airplanes and we can't afford to have them standing idle. Unless we have good traffic-control facilities at major airports the advantages of the new aircraft will be nullified.

HORNING: Two things are coming along that will help. One of these is the high-speed turn-off from the landing runway, a turn-off at a 30-degree angle that will permit the airplane to leave the active runway at speeds of up to 90 miles per hour. This is an improvement over the sharp-angle taxiways used today, for which a plane must slow down to 20 miles per hour or so before turning off. The other thing that is going to help is a short-range ground radar with which the tower operators can see the airplanes moving on the ground. For example, when the Los Angeles expansion program is complete the control tower will be between two 10,000-foot runways, one extending to the east and the other to the west. Under adverse weather conditions the tower won't be able to see planes on the

(Continued to page 262)

# WEN

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PROVED BEST FOR THE MONEY BY FAR

### POWER SAW 8 SAWS IN 1



No equal. Cuts anything—2x4's in seconds— $\frac{1}{2}$ " steel—scrolls, circles, dovetails, straights, angles. 3 blades—coarse, medium, fine.

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### 2 SPEED POWER DRILL



$\frac{3}{8}$ " drill. 1000-3000 RPM. Speed change simple, positive. Provides right speed for different jobs. With attachments, it's a whole work shop.

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Superbly made. U.L. approved. Fully guaranteed. Here's top quality at lower cost.



### NEW FEATHER-LIGHT 100-WATT ELECTRONIC SOLDERING GUN



Weights only 19 oz. Heats in 3 seconds. Spotlight. Long reach, long life tips. Ideal for home, shop.

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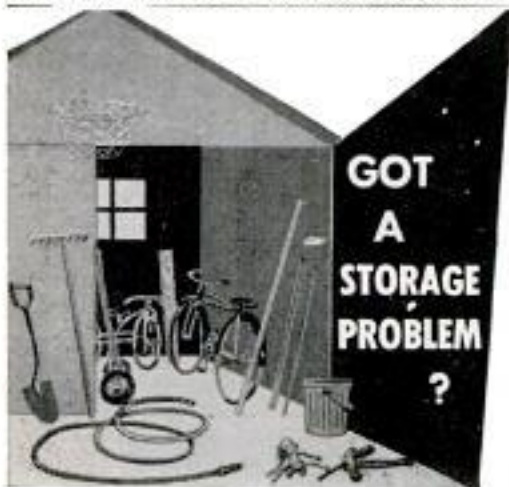
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57B-2

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SHAW-BOX CRANE & HOIST DIVISION  
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runways. We are providing radar for that. In one of the evaluation tests on this radar the boys saw something on the scope out on the main runway and dispatched an airport jeep to learn what it was. It was an 18-inch landing-gear pin with a rag on it. That shows the good resolution of this new equipment.

**Q:** Without this radar control from the tower, can a pilot get lost in a heavy fog after he lands?

**HORNING:** Put it this way—I have.

**Q:** Mr. Bone, what will be the effect of the jets and propjets on passenger volume?

**BONE:** We estimate the airlines will sell 34½ billion passenger miles of transportation in 1961. This is almost double 1955. And this is just domestic traffic.

**Q:** Is there any indication fares will come down?

**BONE:** We are running into increased costs without any increase in fares. We think that fares are too low now. I don't believe any of us know what the situation will be when the jets are in operation.

**Q:** Would anyone care to predict when passengers will be flying at supersonic speeds?

**McDONALD:** I am sure that all the manufacturers are considering preliminary designs of supersonic transports now. Perhaps this same group should get together 10 years from now to discuss the method of their introduction into airline service. ★★★

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Question 2 \_\_\_\_\_

What's the **EASIEST** way to remove wood screws?

Question 3 \_\_\_\_\_

What's the **EASIEST** way to run nuts or bolts on or off?

Question 4 \_\_\_\_\_

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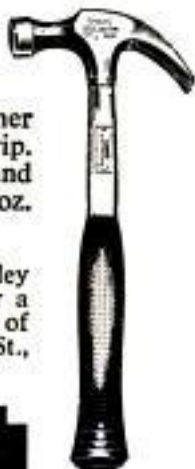


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The FR Corporation, 851 Brook Ave., New York 51, N. Y.







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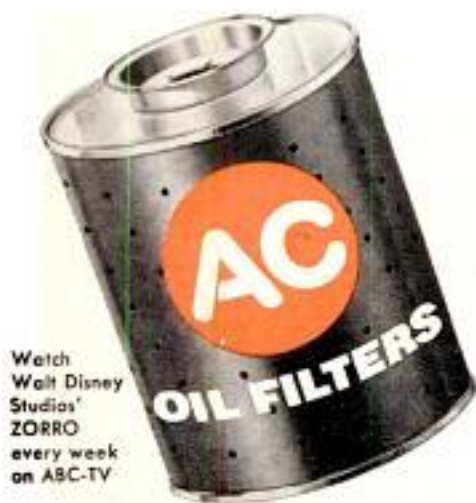
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## San Francisco's Acre of Concrete

(Continued from page 111)

It takes 100,000 gallons of water to fill the model. As the tides ebb and flow, their rate of movement is controlled in the various channels of the bay by 5000 vertical copper strips set in the concrete. Engineers know how fast the tide should flow in each foot of these channels and to bring it to that exactness they bend the strips to desired position to either impede or speed up the flow.

Precise tide gauges, 24 of them to represent the same number that operate in San Francisco Bay, measure elevations of tides. Velocity meters determine water velocity. The model is adjusted so that these and other measurements agree with like measurements in the actual bay, causing the model to act the same as in nature.

San Francisco Bay has never lacked conservation plans, but the integration of those factors which best serve the community into a realistic construction program has been only in the offing over the past several decades. There are six plans that call for controlling the bay's waters. Each of them will be tested to determine what effect it will have on the underfloor surfaces of the waterways.

The plan that holds the most favor with engineers and government officials is the Reber Plan. Its originator is John Reber of San Francisco. His plan envisions two broad earth-fill dams across the narrow necks of the upper and lower sections of the bay. This would control the river runoff water that comes down from the snows of the Sierra Nevada Mountains and would create the world's two largest manmade lakes. He would connect the lakes by a ship canal along the east shore of the bay, and the channel would be reached through a lock.

If the Reber plan were successful, these lakes would end California's water shortage forever and, in addition, would provide unlimited road and rail facilities, furnishing transportation across the bay, new land for factories, military bases and miles of scenic shoreline featuring warm-water beaches.

To determine the effects of such a salt-water barrier on the bay area outside the Golden Gate, and the freshwater lakes, a miniature barrier of exact design is mounted into the model bay and set to operating as planned. By comparison of measurements from the model of water-surface elevations, current velocities and directions, silt deposits and mixing of fresh and salt water, with and without the barrier,

(Continued to page 268)

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engineers can forecast what would happen if the barrier were to be constructed.

One thing of importance is to know what will happen to the Golden Gate bar, an undersea mound of sediment extending in a half circle on a six-mile radius beyond the Golden Gate, with its crest submerged to a fairly uniform depth of 30 feet. This bar is heavily influenced by ebbing current velocities developed in the Golden Gate narrows. The currents are the result of a huge tidal prism existing in the bay system which stores and discharges its tidal volume through the Gate during each tidal cycle. Such a barrier as that proposed by Reber might reduce the tidal prism by half and cause the bar to become larger, making the entrance to San Francisco Bay more shallow, and a threat to navigation.

This remarkable acre of concrete is said to hold the answers to the growth and economic future of the West. Engineers insist that around the proper knowledge of how to handle San Francisco Bay will evolve events of national, as well as of Western importance.

Engineers feel that the answers the bay model will provide should prove it to be the most valuable piece of concrete in all the world. ★ ★ ★

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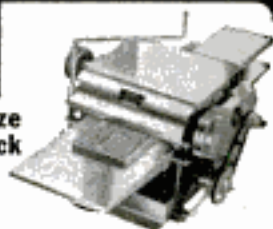
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### **Gets rid of sludge and gum**

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### **Results guaranteed, or double-your-money-back!**

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**HASTINGS MFG. CO., HASTINGS, MICH.**

Piston Rings, Oil Filters, Spark Plugs

## **An Appraisal of the New Models**

(Continued from page 89)

Bendix electronic system which uses transistors to “sense” the engine’s need for more or less fuel is the one Chrysler selected. General Motors offers injection in Chevrolet, but minus the electronics. Ford, American Motors (which first announced the Bendix system in 1957) and Studebaker-Packard (which still has the supercharger) do not offer injection.

Buick mounts aluminum brake drums on the front wheels of its three top lines. The actual braking surface is cast iron, but the drum and cooling fins that surround it are aluminum. Holes in the cast-iron liner fill with aluminum as the drums are cast and act as heat-transfer corridors as well as bonds to hold the two metals together. The bimetal drum is used on the front brakes only because it is there that the major braking effort is made.

Buick also has a full variable-pitch stator in its new triple-turbine transmission. This stator is linked to the throttle so it assumes an infinite number of angles, depending on throttle position. Thus, better torque multiplication is provided when it is needed, better economy when needed. The previous design had only two positions. It switched from one extreme to the other when the throttle was floorboarded.

You’ll see a new symbol on some transmission quadrants this year. It’s a “G” or “Gr” standing for Grade. In descending steep grades, the transmission is put into this retard position and the hydraulic oil of the unit absorbs the car’s energy, slowing it down and helping the brakes. Other automatic transmissions do the same job when in Low or Intermediate.

Push-button transmission made a new convert this year: American Motors offers it in a design very similar to that introduced by Mercury last year. General Motors, Studebaker-Packard, Lincoln and probably Ford (coming out later) still retain the right-hand-operated shift lever.

Oldsmobile has a neat trick for its radio. Designed as a two-way unit, the all-transistor radio can be removed from the dashboard and used as a portable. When you push it back into the dashboard, self-aligning sockets plug it into the car’s battery, antenna and loudspeaker systems. When used separately, it has a small built-in speaker, loop antenna and batteries good for 160 hours’ operation.

It may be that Olds has come up with the most significant news of the year. For the first time in many, many years, a new model has less horsepower and less weight

(Continued to page 272)



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NOVEMBER 1957

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than its previous model. The Oldsmobile 88 has only 265 horsepower compared with 277 horsepower in 1957. Its shipping weight is 3984 pounds compared with 4000 pounds for 1957. It is designed for economy. This may mark a turning point for the industry. If so, remember it was Olds that made the turn first!

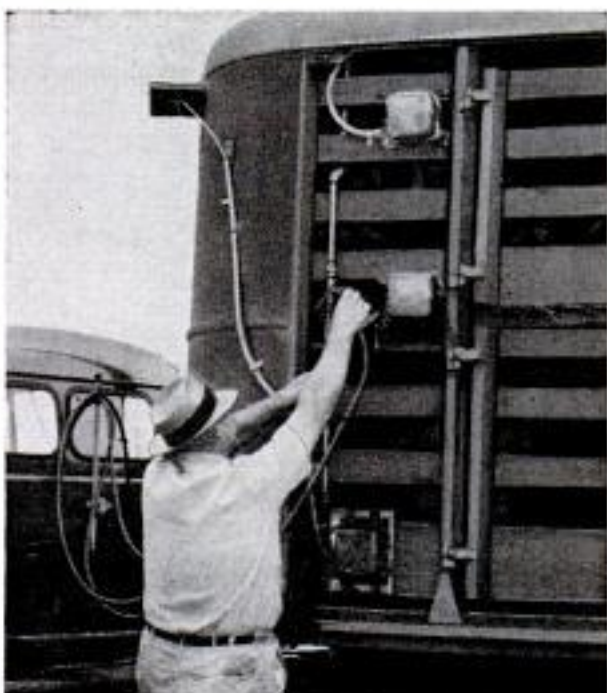
Perhaps the most important news (or at least the news that will be most remembered by history) is the death of two distinguished names: Hudson and Nash.

For the first time in 50 years, there is no new Hudson, for the first time in 41 years, no new Nash. Instead there is an Ambassador in the Rambler series, which means a bigger car built on the Rambler shell. Thus the attrition continues. How long it will continue is a question for history.

As the number of American makes diminishes, the number of European imports increases: Vauxhall, Opel, British Ford, and scores more without American sponsorship. Perhaps this is significant—the industry is watching. ★★★

## Cool Shower for Pigs Pays Off at Market

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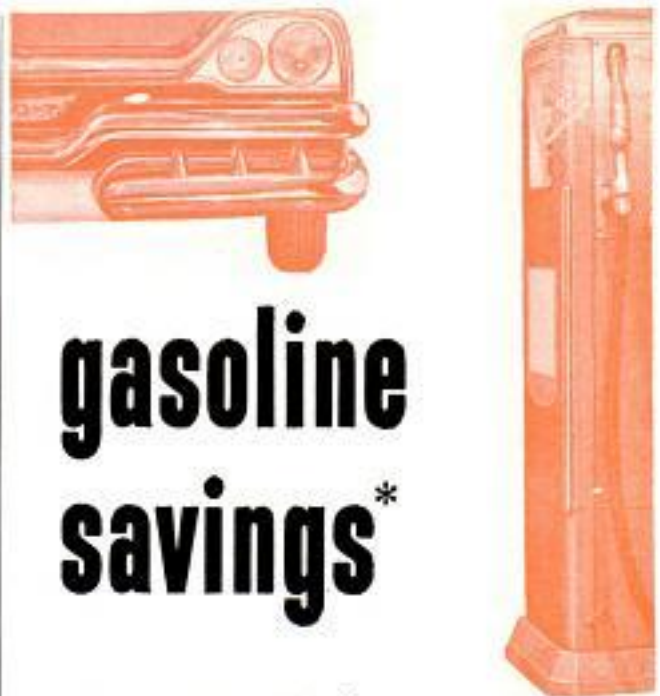
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Children pose proudly on a signpost that marks one of the most important points of the war in Asia—the junction of the Stilwell Road and Burma Road

## Adventure on the Stilwell Road

(Continued from page 85)

crossed the river at Tanai, where we met our first representative of the Burmese government, a local district official in a *lungyi* (sarong). He concealed his surprise and refused to do anything so rude as to ask for our passports. "Would you like a game of badminton?" was all he said. We later learned from him that there was practically no traffic on the higher part of the road, though six trucks a year moved short distances between villages. He was surprised that it was possible to come from India.

We drove on next day through a forest valley, then passed Walawbum, Shaduzup and Kamaing—names attached to nothing but a dozen huts in a jungle clearing and a memory of heavily fought battles. Then the valley disappeared and we entered Myitkyina, past the great airstrip which had been seized by Merrill's Marauders in one of the most successful jungle surprises of the war.

"Boy, oh boy! I sure am glad to see you!" were the first words we heard as we climbed out of the cars. A tall, smiling man came forward to pump our hands. "I sort of got left by the war," he said, and pointed at his "business," a wooden hut with

mechanic's tools outside and, at a guess, a Burmese wife inside.

### Huts Made of Trucks

In fact, most things in that part of Burma have been leftover by the war. Huts were made of upturned trucks, knives ground from car springs, and money earned by banditry with a wartime rifle. Transport was almost entirely by one of the 15,000 Jeeps and trucks the American army is said to have left behind, and I once saw a woman wearing Japanese epaulets hanging like rings from her ears.

We left Myitkyina by a ferry constructed of two Bailey pontoons lashed together and powered by a homemade adaptation of a car engine. On the pontoon ferry was a lorry, in the lorry the band of some Kachin troops who refused to cross until they had played for us. Nine men with bamboo pipes, a drummer and a wild-eyed character who rhythmically beat a jungle knife against the lorry's metal side produced a weird, whimsical melody; all the more whimsical when we realized the tunes were Orientalized renderings of "Swanee River" and "Home Sweet Home," obviously picked up from U.S. troops. They smiled at our camera. They grinned bashfully at our tape recorder. They roared at their sergeant when he ordered them to move. They laughed at everything.

From there we began the mountain climb toward the junction with the Burma Road. It was a dramatic journey. The road climbed and turned like an Alpine race-course, but instead of macadam there were dust and cobbles. We saw a few Jeeps and lorries on the road, the only vehicles that could manage it.

One morning we stopped at a village market while a couple of our men worked on the Landrovers. All manner of natives dressed in all kinds of costumes gaped at us. "Strange-looking Charlies," remarked one of our mechanics as he wiped a black hand across a dusty face, filthy shirt dangling over shaggy shorts, unbathed for a fortnight, the whole apparition crowned by a tufted beard and a disintegrating straw hat. I wonder what the natives were saying.

### Mistaken for Missionaries

As we journeyed we found that, because of our black beards, we were frequently taken for Italian missionaries. We quickly corrected the mistake. A missionary had been shot by bandits only a month before.

One night our camp was a quarter mile from the Chinese border and we could see on the other side what we later learned

(Continued to page 276)



The beautiful Edsel Citation two-door hardtop. All 18 models in the new Edsel line are equipped with Champion spark plugs.

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was the "Flying Tigers" last airbase. Two of our men poled across the frontier river in a bamboo raft to have a look, landed in China, exchanged a few words with a passing peasant and returned to be "brain-washed" by the rest of us.

Finally one morning our dirt track came to a crossing, and the other road was made of macadam. We had come to the Burma Road, and the end of Stilwell's impossible engineering feat. On a signpost: Kunming 606 miles.

We had started our journey on the Stilwell Road partially to rediscover a war-time campaign. Instead, we had found a smiling, delightful people. The tragedy we had expected lay not in the decay of the road, but in the impact of the war on a primitive people.

In a way, we were glad the highway had become a forgotten one. ★ ★ ★

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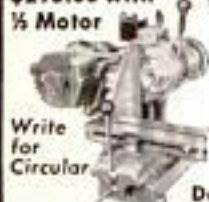
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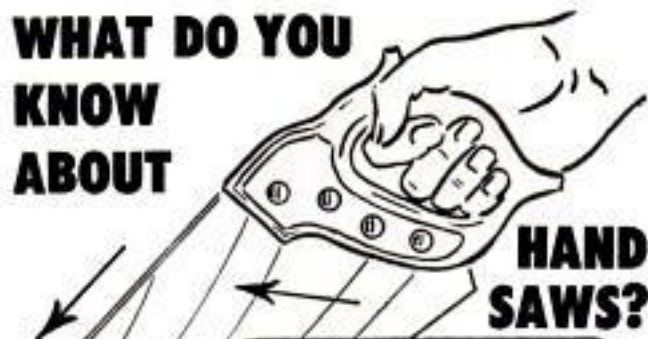
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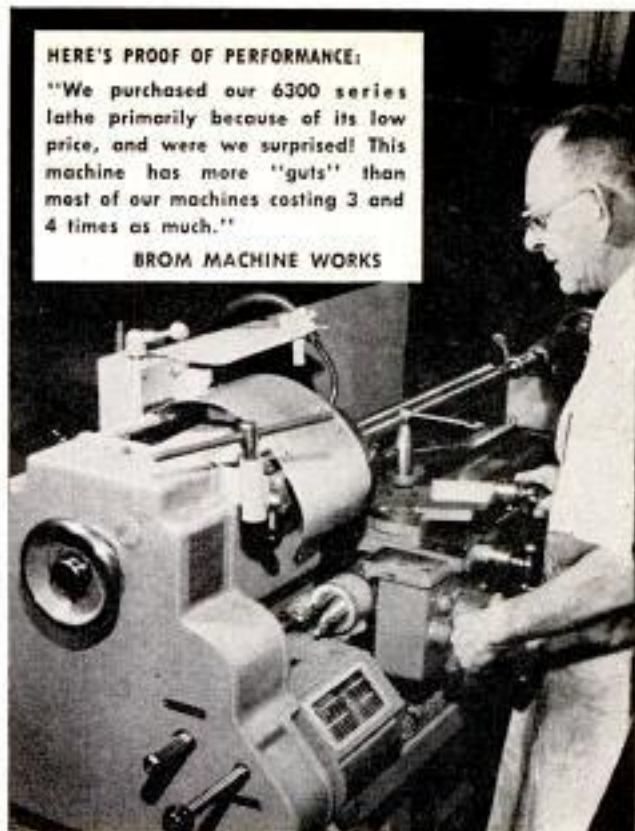
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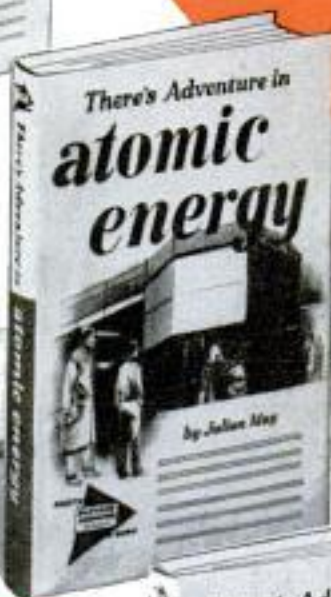
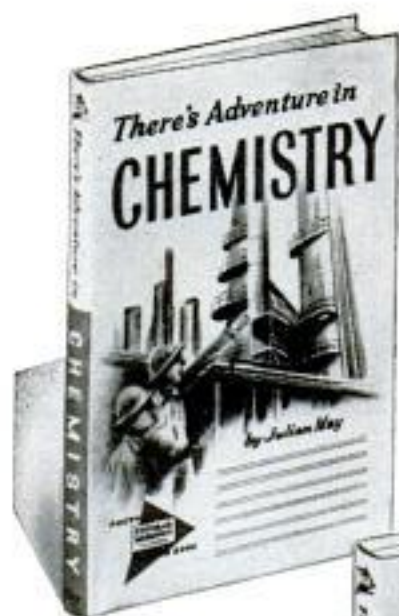
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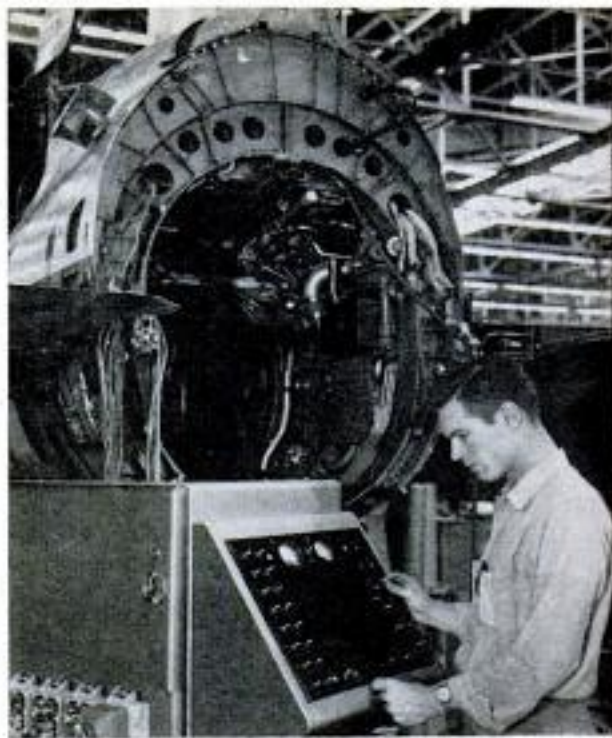
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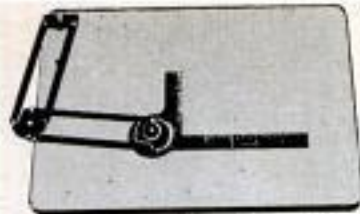
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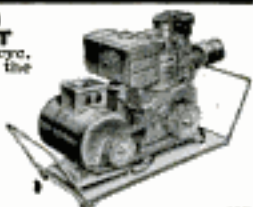
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110-120 v. 60 cyc. AC, absolutely the best made exclusive dynamically balanced armature; heavy windings develop up to 3000 watt overload for motor starting. Rigid mounted - portable. Powered by an easy starting Briggs or Wisconsin 6 HP engine—complete with all accessories; engine easily disconnected for other uses. Big outlet box, voltmeter, no wiring necessary. Ample current for all purposes. Factory warranty. (Item 31) Wt. 210 lb. Reg. price \$585. Special at... **\$299.50**

Same plant with electric self starter (Item 31a)... **\$359.50**

Generator only and control box... **\$169.50**

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**POWER-FLO 2500 WATT** 115-230 v. 60 cyc. AC. A rugged power plant for heavy duty use. Duplex power distribution provides both 115 v. and 230 v. output at the same time if desired. Powered by a big 8 HP Wisconsin engine with triple V belt drive. Has built-in overload protection. A dependable plant for either standby or regular service. Equipped with electric self-starter. (Can also be started by rope) and plug-in outlet box. (Item 198) Wt. 310 lbs. Factory price... **\$439.50**

**GENERATOR ONLY** belt driven... **\$239.50**



(Item 198)

### HEATING & VENTILATING FAN

(Item 10) Easily installed in furnace pipes. Forces even heat to all rooms. Over range removes kitchen smoke and odors. Powerful, continuous duty motor, 110-120v. AC. Mount in wall or ceiling to ventilate any area. Quiet, super-efficient fan moves huge volume of air. (400 to 600 CFM.)

8" Pipe, wt. 5 lb. .... **\$6.85**  
 9" Pipe, wt. 6 lb. .... **\$7.85**  
 10" Pipe, wt. 7 lb. .... **\$8.85**  
 12" Pipe, wt. 8 lb. .... **\$9.85**

**HEAVY DUTY FAN.** Semi-enclosed motor, suitable for spray booths, restaurant exhausts, poultry houses, etc. 10" Fan, wt. 8 lbs. (Item 10E) ... **\$11.95**

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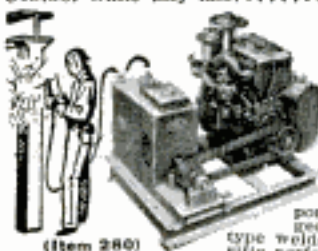
**HIGH SPEED BARN FAN** similar to above, but larger, high speed motor moves huge volume of air.

12" Fan (Item 10G) ... **\$14.95**  
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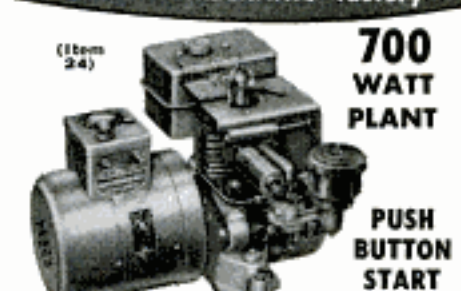
**WELDER ONLY—DUAL CONTROL MODEL.** Same as above, but drive with your tractor, jeep or gas engine of 14 HP or more. (Item 28a.) Wt. 210 lbs. \$450 value... **\$119.50**

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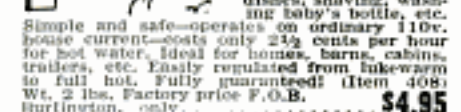
### BATTERY CHARGING GENERATOR

**Push Button Start** A husky, 700 watt plant (designed for battery charging only) that will charge 8 or 12 volt batteries in just minutes! When mounted with two 6 volt batteries it provides a terrific cold weather motor starting unit, as well as a fast charger! Charges all batteries anywhere —no tilting current needed. Ideal for service stations, garages and farms. Comes complete with ammeter and cutout. (Item 821) Wt. 120 lbs. Regularly \$295. Our special, only... **\$119.50**



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**3800 Watt Plant** Push Button Start (Item 23) 115 v. 60 cyc. AC. Similar to above, but larger and 30% more capacity. Wt. 270 lbs. Reg. \$760. Factory Price... **\$379.50**

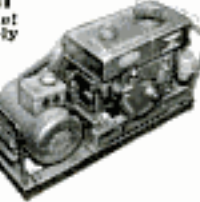
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A powerful cylinder mfr'd. by Massey Harris which develops both a pushing and a pulling action. Will push 8,100 lbs., with a 1000 PSI pump pressure. Cylinder is 3 1/2" O.D. with 1 1/2" stroke—standard heavy duty clevises on both ends. Has standard 3/4" pipe thread openings. Can be used for tilting buckets or blades, raising or lowering implements, hydraulic presses, etc. Can also be used as an air cylinder. (Item 802) Wt. 17 lbs. Reg. \$68 value, Special... **\$14.95**

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Pump only (Item 836a) only... **\$23.50**

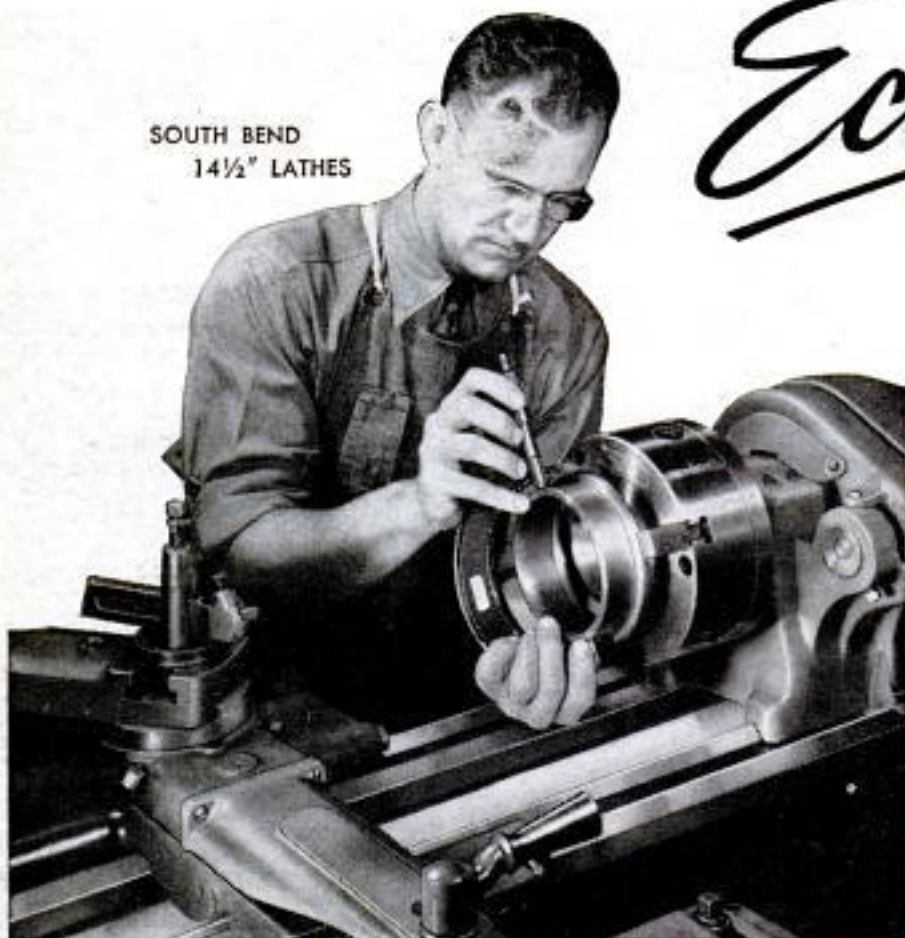


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