

How to Go After a Better Job

POPULAR MECHANICS

OCT. 1968
50 CENTS

What's
New in
Outboards
and
Snowmobiles

In Color! '69 Cars

Aboard the World's Last Battleship
Build Your Own Flight Simulator

First Report: TROOPER TV
Instant Replay for Tailgaters;
A Videotape for the Judge

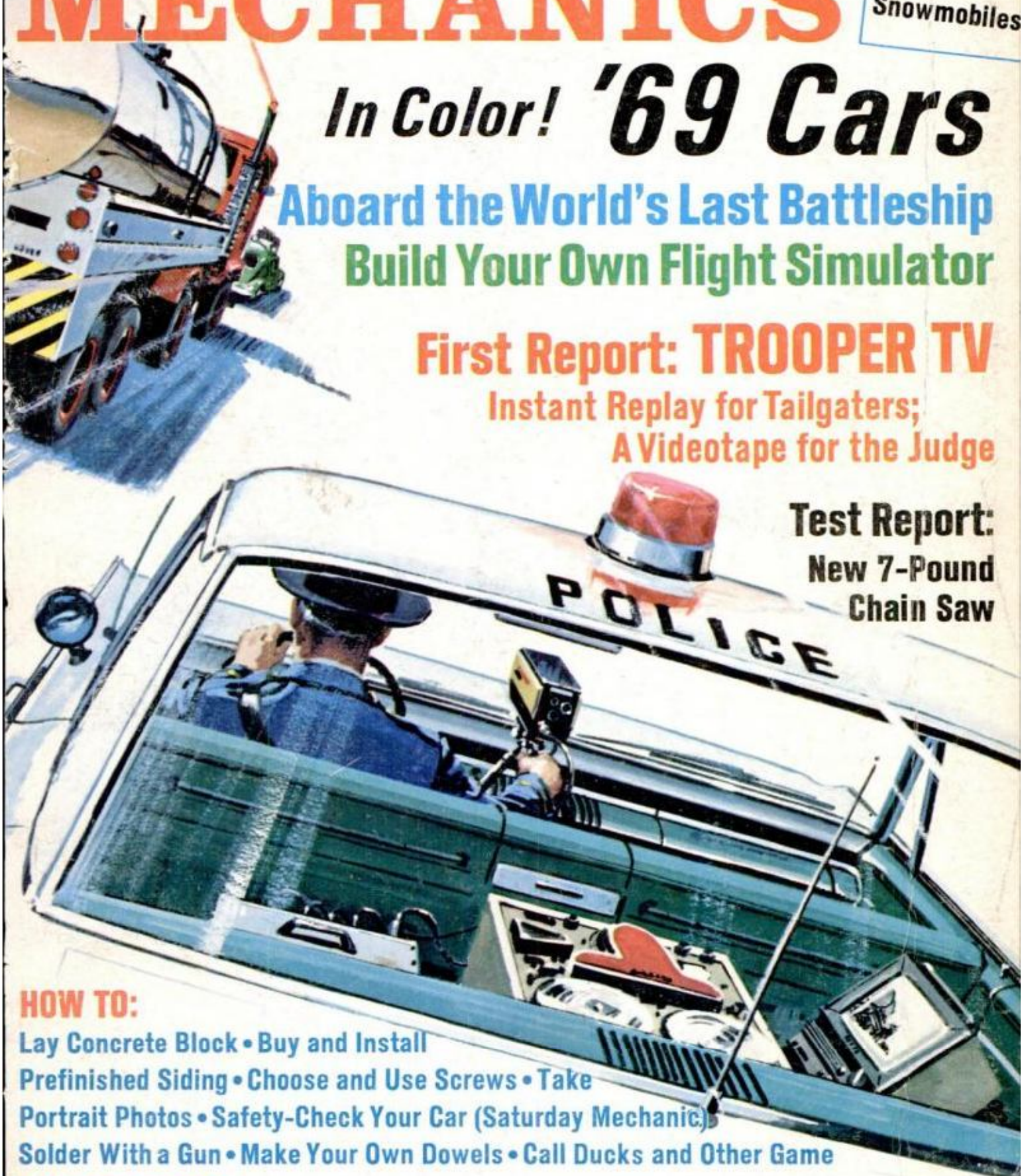
Test Report:
New 7-Pound
Chain Saw

HOW TO:

Lay Concrete Block • Buy and Install
Prefinished Siding • Choose and Use Screws • Take
Portrait Photos • Safety-Check Your Car (Saturday Mechanic)
Solder With a Gun • Make Your Own Dowels • Call Ducks and Other Game

WEEKEND PROJECTS: Remodeling Ideas

Automobile Clinic • Dan Gurney Answers Your Questions on Racing and Driving



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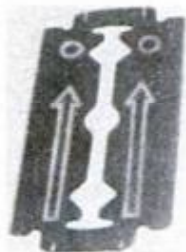
It has a pop-up sideburn trimmer. A handy, coiled cord.

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Not your face.



This One



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- Automobile Proving Grounds:** What do they really prove?
- 'I Lost My License.'** A driver learns that life's an ordeal without wheels.

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LETTERS

TO THE EDITOR

Speaking of goofs . . .

Your *Dear Mr. Automaker* (page 76, Aug. *PM*) is terrific. From my observations over the years, I doubt that any of the manufacturers' power structure will read it—I suspect they are illiterate as well as insensible.

PONTIAC, MICH. D. H. HOARD

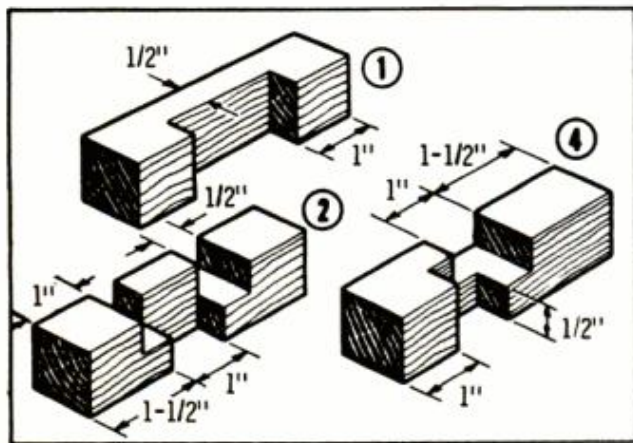
I enjoyed your holier-than-thou letter to the automotive companies. I wonder if any of those who actually are the poor workmen or who inspect poor workmanship or who hire inspectors and workmen ever say, "Hey, he means me!" I doubt it. They're too busy grousing about the poor workmanship on television sets and furniture. By the way, your August cover was not on straight.

GAINESVILLE, FLA. R. L. HADLEY

Ha! You missed that misspelled word, didn't you?

Easier Puzzle

The puzzle in *This Block Puzzle Is a Real Puzzler* (page 126, Aug. *PM*) can be made without the hand-cut, chiseled-out section of the No. 4 piece by changing pieces 1, 2 and 4—and leaving 3, 5 and 6 the same. I am enclosing the design (drawing below). It's not original; I think



it was published in *American Boy* in about 1906.

Back in those days, I had a scroll saw and made these puzzles by the dozen in half-inch stock instead of one-inch and sold them for five cents!

BERNARDSVILLE, N.J. JESSE F. WENTZ

When I was 10 years old, I cut a similar

puzzle from a piece of basswood with my father's pocketknife. I still have it—and I'm over 82.

KNOXVILLE, TENN.

F. W. DAVIDSON

It took me about two hours to cut, chisel and sand the pieces out of two-by-two pieces of stock.

WEST GOSHEN, CONN.

MARIO BRUNO

On guard

I have just read the excellent article, *How to Defend Yourself Against Dangerous Drivers* (page 59, July *PM*). I'm writing to request permission to have it published in our next Safety Newsletter for distribution to automobile drivers of this squadron.

2135th COMMUNICATIONS
SQUADRON
DEPT. OF THE AIR FORCE

F. D. TAPPIN,
LT. COL., USAF
COMMANDER

Permission granted.

Your article was informative and helpful. However, the author's suggestion that "one way to handle a foolhardy passer is to run up your own speed" is, I think, foolhardy in itself. If you have someone trying to pass you and he's driving 90 or 100 mph at night, once you speed up, the race is on—and the only thing that can happen is disaster.

LAS VEGAS, NEV.

JAMES C. BENNETT

The speed-up is suggested only as an emergency measure to keep the speeder behind you when you know there's a third car coming in the opposite lane. Once there's no danger of the passer hitting an oncoming car, let him go by.

Building-block sprinkling

Congratulations on your fine article, *You Can Afford Automatic Lawn Sprinkling* (page 152, July *PM*). It is indeed encouraging to finally see an article appear which not only points out the practicality of automatic lawn sprinkling, but also explains the value of the building-block approach whereby the homeowner can do a good job in easy stages instead of a bad job all at once.

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CHAPTER TWO: THE RENAULT 16 SEDAN-WAGON

Our story opened with the Renault 10. And that chapter is being written every day. At last count, there were over 35,000 Renault 10's on the road.

And so the stage is nicely set for our latest installment: The Renault 16 Sedan-Wagon.

The Sedan-Wagon. Besides being a new chapter for us, the Sedan-Wagon represents a new chapter in the industry.

Until now, even if you only needed a station wagon occasionally, you had to drive one around all the time. With the Renault 16, you drive around a sedan. And when you need a station wagon, it turns into a station wagon.

The front-wheel drive. Quite logical. The engine up front to get maximum hauling area in the rear. The drive wheels also up front to get maximum traction from the engine's weight.

The engine. Pressure cast aluminum block. 5 main bearings. And a sealed liquid cooling system that virtually eliminates the bother of having to

add anti-freeze. It can milk 28 miles out of a gallon of gas, and still manages a top speed of 93 mph. It is so well put together that you could roll up 30,000 continuous miles at 85, as we did, back and forth and back and forth between Rome and Milan.

The seats. They're every bit as comfortable as those in the

Renault 10. And the seats in the Renault 10 have been stacked up against the seats in the Rolls-Royce.

The road manners. The suspension is soft, without being mushy. Each wheel moves up and down independently, controlled by long torsion bars.

The price. The Sedan-Wagon sells for \$2,445.* The price of most sedan-sedans.



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*P. O. E. EAST COAST.

TOM McCAHILL SAYS:

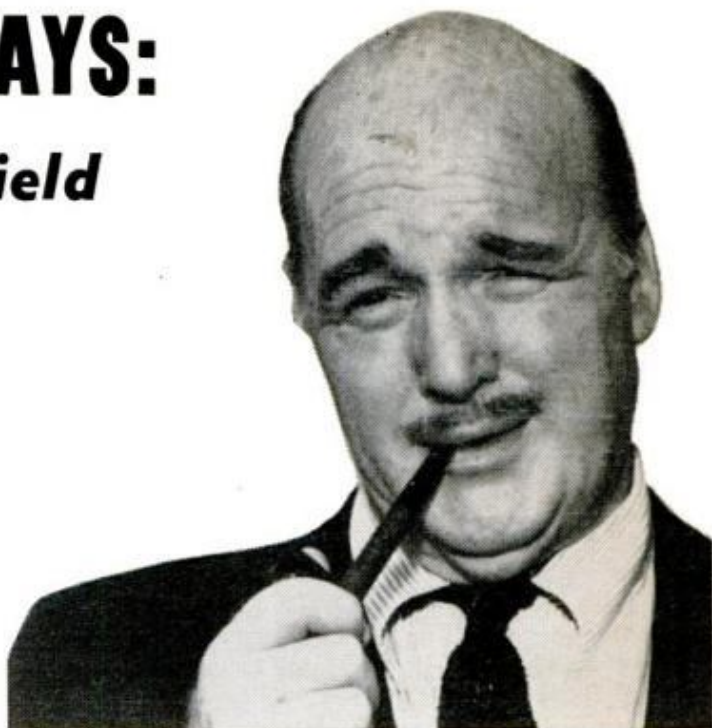
"The appliance repair field is so uncrowded it's almost lonely!"

Someone once said that if you build a better mousetrap, the world will beat a path to your door. In the home appliance business, a lot of enterprising companies have gotten rich peddling a list of handy electrical gadgets for the home longer than Wilt Chamberlain's arm. The trouble is, the dozen or more appliances in the average American home can go on the fritz, and men with the proper training to do repairs are as scarce as knee-length skirts on teen-agers.

Good Appliance Repairmen are a rare breed these days. Those with a little ambition are booked so solidly you can wait days to get somebody to fix a balky refrigerator or cantankerous toaster. Sometimes, you have to settle for a bum job from a guy who had no business calling himself an Appliance Repairman in the first place.

This brings me to my point. If you want to make money in a field that's begging for trained technicians, there's a fine, low-cost home-study plan available that teaches you how to handle every type of Appliance repair in detail—including refrigeration, air conditioners, and even small gas engines. The course was prepared by the instructors at National Radio Institute. This is the oldest and largest home-study school in the Electronics/Electrical fields with more than fifty years' experience training men like yourself for new careers or spare-time or full-time businesses of their own.

A few years ago, NRI recognized the increasing demand for trained Appliance Repairmen. They set about preparing well-illustrated, easy-to-understand lessons that teach you how to repair home, commercial and farm Appliances. NRI even added a professional Appliance Tester that's included in their low tuition. With the Tester and a few basic tools you probably already have,



you're equipped to service most Electrical Appliances. If you aren't making as much as \$4 to \$6 an hour in spare time fixing Appliances for friends and neighbors within a few months after enrolling, my name isn't McCahill.

The reason I'm no doubting Thomas, is because the staff at NRI is composed of experienced instructors who guide you through the course with more personal attention than you'd get in many classrooms. With the kind of help they give a student and the kind of course they have, you can be the man in demand in this field—even if you've never tried to rewire a plug, or got fed up with school at the 9th grade.

The best advice I can give you is to clip the coupon below and send for the NRI Appliance Training Catalog. It's free, and there's no obligation. NRI doesn't employ salesmen, so nobody will be knocking at your door. All it will cost you is a postage stamp. Take it from Uncle Tom, the Appliance Repair field needs good men. Now.

TOM McCAHILL

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DETROIT

LISTENING POST

BY BOB IRVIN

THE 1970 MODEL YEAR will be one of minor styling changes for the full-size cars which are all new for 1969. Rear-end styling changes are planned for the Chrysler and Imperial cars. Front-end changes are on tap for the Plymouths and Dodges. Word is that General Motors' standard cars as well as those from Ford will have revised grilles along with some changes in fenders and hoods. Look for complete restyling of some of the personal cars, including the Thunderbird, Toronado and Riviera.

USED-CAR SAFETY STANDARDS are ready to be issued. They are expected to cover such things as brakes, tires and steering. The National Highway Safety Bureau has been working on the standards for more than a year. Compliance will be another matter since only 31 of the 50 states have mandatory motor vehicle inspection and there are 100 million cars on the road.

SEE-THROUGH STOPLIGHTS almost made it to production on the 1969 Thunderbird. Ford had considered offering them as optional equipment until it found that they would violate some state lighting codes. The stoplights would have been mounted in the rear window and could have been seen by following cars several cars back, thus helping to prevent chain-reaction collisions on crowded urban freeways. State lighting codes are also slowing industry plans to eliminate the present system of superimposing tail and stoplights in favor of a safer system using separate lights.

USE OF SHOULDER BELTS is proving to be even less popular with American drivers than use of the lap type. One study indicates less than five percent of motorists with 1968 model cars are using them. Lap belt usage is 30-35 percent. Things may improve in 1970 when some cars introduce integrated systems in which the belts retract into the seats when not in use, and are mounted on inertia reels which allow people to move about while wearing the belts.

THE THREE-POINTED STAR HOOD EMBLEM is going to remain on the Mercedes cars sold in the United States despite a government move to outlaw all such ornaments. Mercedes has come up with a design to make the emblem disappear into the hood if it's struck. It'll be used if the U.S. government insists. Ornaments have been dropped from American-built cars in recent years following complaints they can injure pedestrians.

AN EXPERIMENTAL HYBRID BUS has been developed by Mercedes. It uses a diesel engine to recharge 3000 pounds of lead-acid batteries which provide the electricity to power the vehicle. The diesel runs at a constant speed to reduce air pollution.

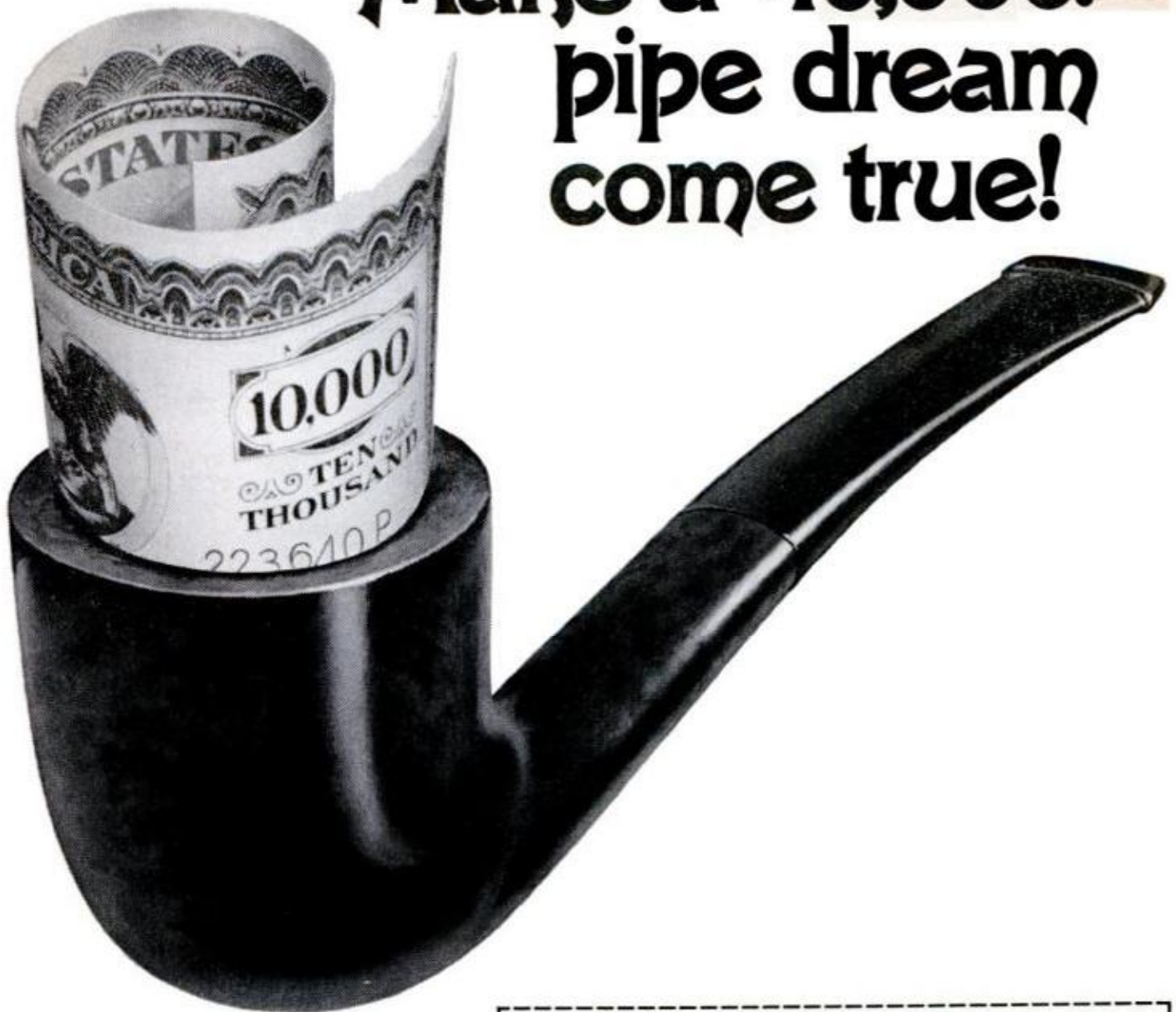
ELECTRONIC FUEL INJECTION will be on the next family of Mercedes engines. The company presently uses a mechanical system but in a few years it's expected to employ a computer-controlled system like that introduced on some 1968 Volkswagens.

AN END TO TAILGATING. Ford's testing two devices to take the driving away from the driver and eliminate rear-end pileups on freeways. Both use cars equipped with computers and an invisible electronic beam which is projected from the front of one vehicle to the rear of another.

The basic system, called "Automatic Highway Control," uses the radar-type beam and computer to control a car's accelerator and brake settings to maintain a safe following distance. The driver still has to steer, but even the steering is done automatically under the second system, called "Minigap." This links cars together electronically in

(Please turn to page 14)

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OCTOBER 1968

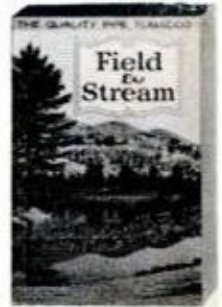
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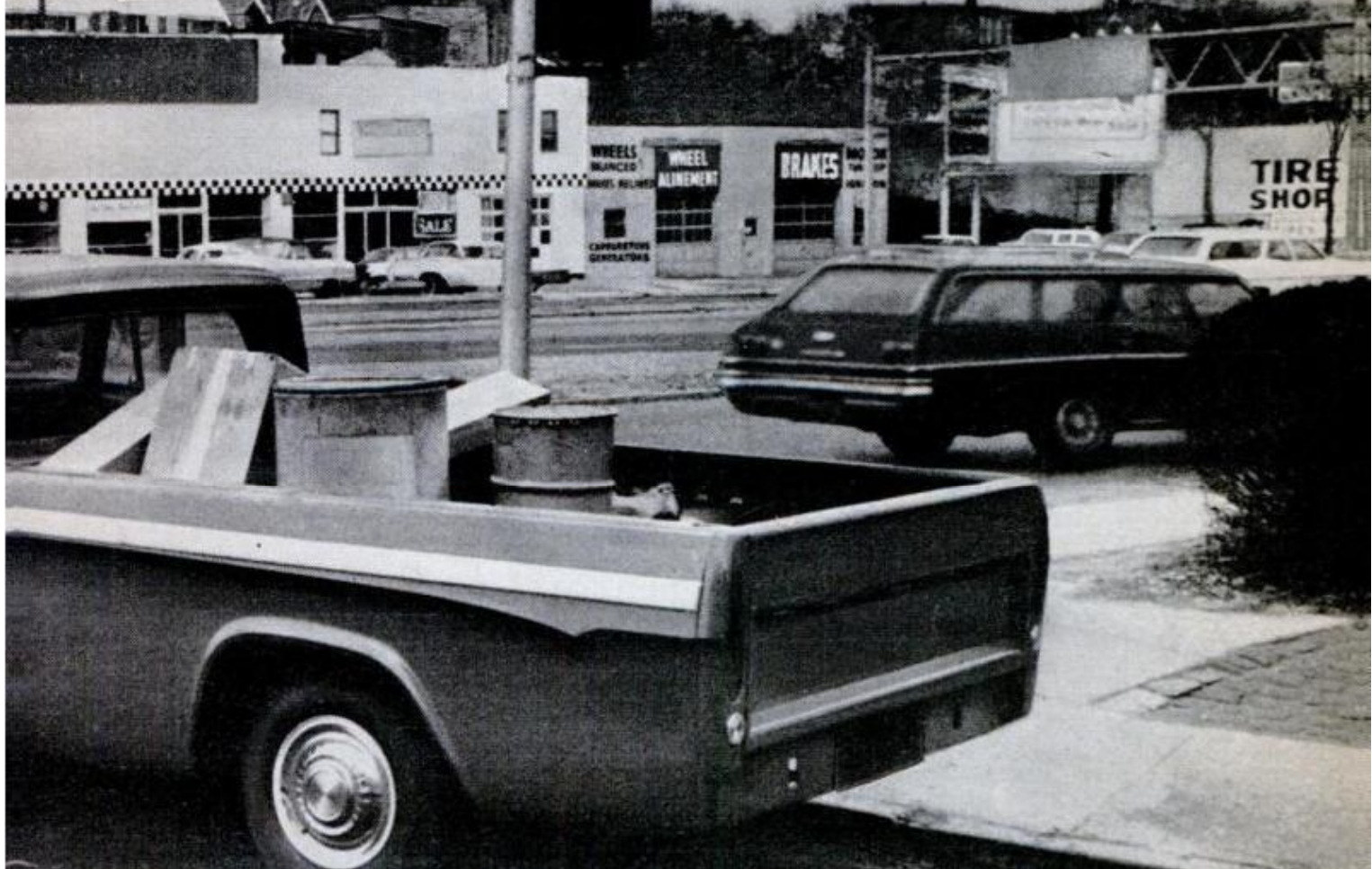
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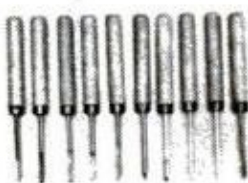
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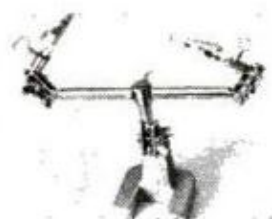
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DETROIT LISTENING POST

(Continued from page 10)

convoys. A special lead vehicle directs the train of cars. Each car operates under its own power but it's all automatic. A key feature of each system is that it can use existing highways and the specially equipped cars can be mixed with vehicles not having the devices.

ANTISKID BRAKING still hasn't found full favor with officials of General Motors and Mercedes. Both say there are still some problems to be solved even though Ford introduced a two-wheel skid-control system on some 1969 cars and claims it's fail-safe. But competitors say it takes longer to stop on ice and gravel roads.

GROUP AUTO INSURANCE, long discussed as a means of reducing rates, is now a reality. The Farm Bureau Insurance Corp. granted such a policy to 300 members of the Michigan Credit Union League. The workers pay \$60 per year, the League \$52, or about \$20 less than before. It's expected the results will be watched closely by other companies before they decide on similar plans.

DISTRESS SIGN BALLOONS are being used on New York expressways. State officials have asked motorists to buy balloons and display them outside the car if they get into trouble. A red balloon signifies a medical emergency, blue is for mechanical help, while green is for police help.

PRIVATE INVESTIGATORS: About 3500 accidents have been investigated by General Motors researchers in the past year. It's the only program of its kind in the industry. Most of the leg work is done by investigators for Motors Insurance Corp., a GM subsidiary, who send reports they process to safety people here. The material is fed into a computer for analysis. The approach is unique because up to now such research has been primarily in the hands of government and university researchers. Other companies have considered the idea but presumably budgetary problems stood in the way.

NEW JERSEY LAW to protect motorists against arbitrary cancellation of their car insurance went into effect recently. The law will prevent indiscriminate cancellations by insurance companies for unspecified reasons. Under the law, policies can only be terminated when the insured fails to pay the premium or he has his driver's license suspended or revoked. ★★



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Some people get sick from Chinese food. They suffer from headaches, dizziness, numbness and burning sensations—symptoms called the Chinese Restaurant Syndrome, or CRS. Researchers at New York's Albert Einstein College of Medicine and at New York University recently isolated the probable cause—monosodium glutamate, a salt used for flavoring in Chinese cookery. People who get CRS apparently are allergic to monosodium glutamate or some contaminant in it, say researchers.

As constant as a clock that is off only one second in 30 million years—that's the rate of accuracy Caltech scientists ascribe to those "clocks in the sky" called pulsars, mysterious objects that send out bursts of radio energy according to a rhythmic pattern. The Caltech researchers used an atomic clock of great precision in making their determinations. Scientists can offer no explanation for pulsars, though they tend to rule out the possibility that the signals are from sources under intelligent control. The signals are concentrated at frequencies that are unsuited to space communication.

A breakthrough in surveying methods has been achieved with the laser, that versatile scientific tool that had no known use when invented. According to the Department of Commerce's Environmental Science Services Administration, lasers used with a geodimeter (a surveying instrument that utilizes the known speed of light to measure linear distances) have enabled survey teams to cover larger pieces of terrain than before and to increase their accuracy. (Geodimeters were previously equipped with mercury lights.) Laser beams are bounced from portable towers to reflectors on other towers some 12 to 20 miles away to get measurements.

Nearsightedness, farsightedness and astigmatism can now be accurately diagnosed through the use of a computer that records brainwaves. The method was developed by two researchers at the Naval Electronics Laboratory Center, San Diego, who explain that there is a change in electrical energy, in the range of two to three-millionths of a volt, created by the brain when the subject being tested sees an object sharply or in a blurred manner. The brainwave recordings show these electrical differences, thus providing a chart of a subject's visual problems. Big advantage of the method is that it is not dependent on a subject's use of judgment and verbal responses, as are present eye-testing procedures, making it ideal for the testing of babies.

An antidote for nerve gas can be self-injected by a soldier during combat if he is equipped with a new type of hypodermic syringe developed by a Swedish pharmaceutical company. The syringe is said to be armed with a spring and a trigger mechanism. When the soldier presses the syringe against his body, the spring forces the needle through the uniform and into his muscle. An ampule, punctured in the process, provides the antidote.

A "Central Premonitions Registry" has been established in New York. Its purpose: to collect and evaluate premonitions involving state, national and international events. The agency is modeled after another bureau established in London over a year ago. In its first year of operation, the English agency collected 469 premonitions, 18 of which proved accurate. Two people, responsible for 12 of the 18 validated premonitions, are now under intensive study.

If you're left-handed, it's not because you inherited this hand preference from your parents, according to geneticist Robert L. Collins of the Jackson Laboratory at Bar Harbor, Me. His studies of paw preference among genetically identical mice indicate that environment, not heredity, is responsible. Dr. Collins suspects that among humans hand preference is determined by something—just what, he can't say—that happens in a child's environment before or after birth.

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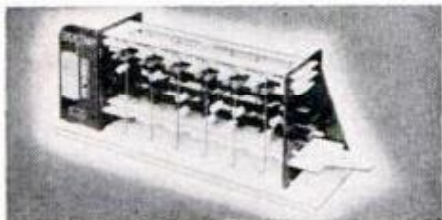
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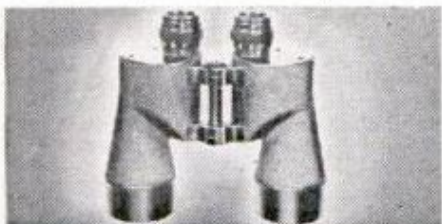
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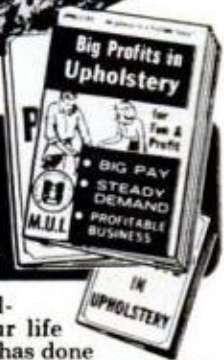
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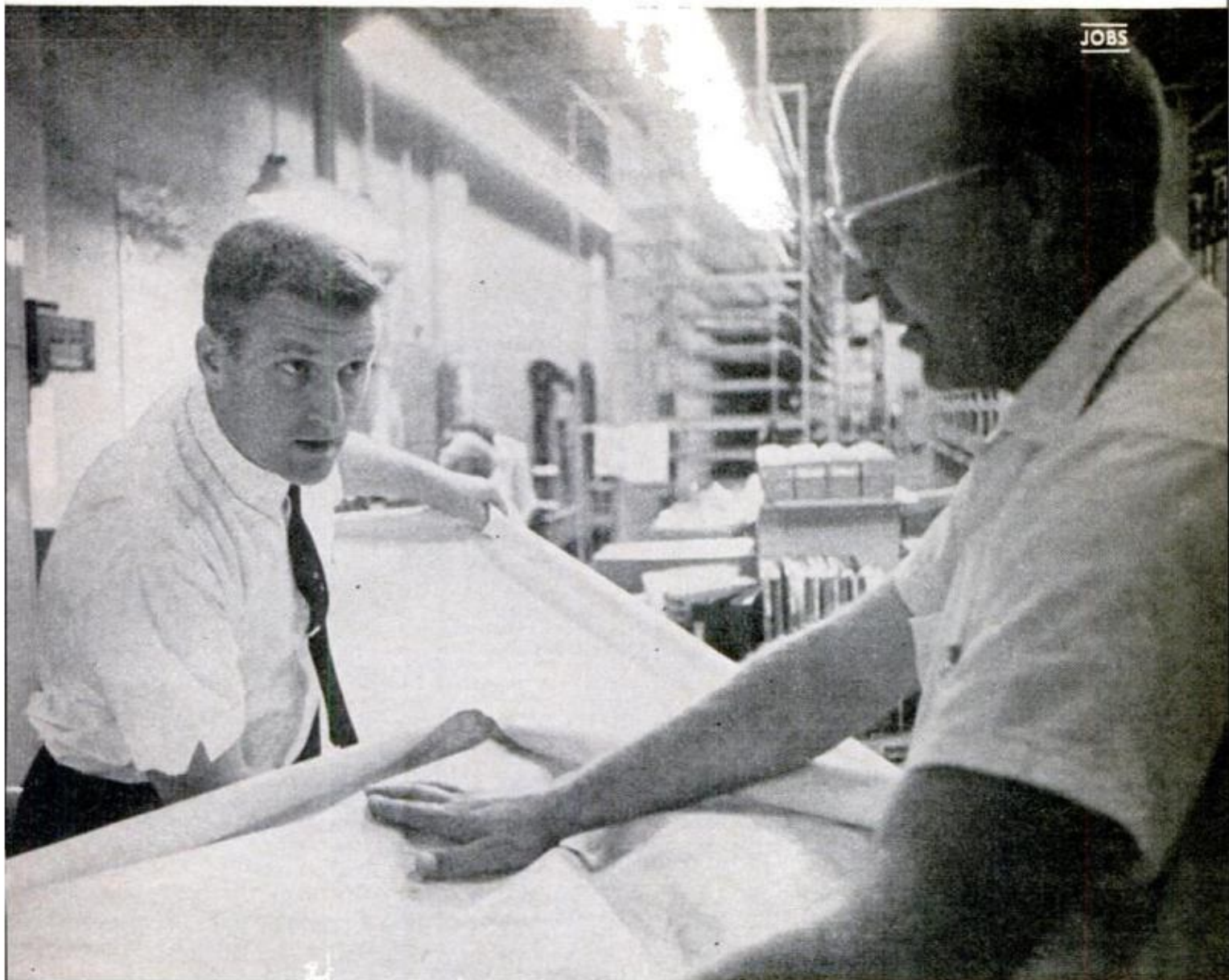
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How to Be The Man They're Looking For

Industry urgently needs skilled engineers and technicians. Many companies will even help to train you free. Here's how to cash in on the opportunities by making sure you have what they want

By JAMES R. BERRY

INCREDULOUS, Ullman Rosenfield stared across the desk at me and almost shouted:

"You must be kidding!"

Rosenfield is vice-president of Ideal Corp., a maker of auto parts in New York. I had just thrown him with what I thought was a reasonable question: "Is it true that

industry is really desperate for engineers and technical graduates from colleges, junior colleges, technical schools and high schools?"

Rosenfield calmed down. "The demand for technical help is tremendous. We often have to take expensive short cuts or not meet deadlines because we don't



SITTING AT A GIANT CONSOLE, telephone troubleshooter Bob Dietl monitors calls and makes on-the-spot diagnoses of difficulties in phone lines and switches. To help deskmen like Dietl, American Telephone & Telegraph sponsors on-the-job training courses in electronic circuits. Deskmen typically earn \$150 a week

have enough qualified men. And it's the same all over."

I got the same answer everywhere I went.

"We could hire 10,000 new technicians right now," states Warren Rhodes, educational consultant for General Electric.

"The situation is critical. We hire 4000 engineers a year, but we need 25 percent more than that," adds Tracy Brooks, personnel manager at General Dynamics Corp.

"There just aren't enough high school grads, even when we're willing to train them," says Lenz Meylan, general employment manager for American Telephone and Telegraph.

And the situation is growing worse. Between 1900 and 1950, the demand for technical help doubled once. Now it doubles every *five* years. Just in the next three to five years, industry will soak up half a million additional technicians and still scramble for more.

It all adds up to a healthy flock of technical jobs. Given basic training, your getting one isn't a problem. But you—like thousands of other tech grads—may be heading for a job slot that won't satisfy your ambitions, fulfill your need for challenge, or pay what you had hoped. If you find yourself in such a situation, chances are it will be your own fault. Turning native ability into a career—a lifetime

satisfaction of applying skills to the jobs *you* select—takes more than professional competence. It means perfecting a pyramid of characteristics that employers value highest and reward the most.

This pyramid's foundation is formal schooling. Once, high school grads got the dregs of technical jobs. But with today's shortage of help, they're sought after by scores of firms willing to train them as everything from pipefitters to computer repairmen. But the more time you spend in school, the wider the selection of choice jobs becomes. A diploma from a two-year technical school or junior college automatically qualifies you for responsible and challenging positions that are closed to graduates of high school alone. If it isn't possible to go to school full time, there are also home-study courses available in almost every technical field.

"We're trying to raise the quality of our work force and we just don't hire high school graduates," says Douglas Stevenson, recruiting officer at Ford Motor Co. "We're scratching for two-year technical school grads all the time. A technical school diploma jumps a guy from nonconsideration into a good recruiting position."

It also jumps starting salary. Typically a high school trainee makes around \$1.50 an hour to start. Two years in a technical school jumps this starting salary to \$2 an hour. "And if the guy is any good, he'll



APPRENTICE TRAINING PROGRAMS at Ford mean better jobs for thousands of employees every year. Lynwood Whyte (left above) joined as a sand shoveler in Dearborn, is now a journeyman pipefitter. Roy Clarke (right) started out as an assembler, has worked up to skilled welder after two years of training

jump to \$3 an hour or more darned fast," says Tracy Brooks.

As for college engineering grads, they're fought over like free beers in an Army barracks. According to the College Placement Council, a private survey organization, engineering recruitment is at a record level with salaries ranging from \$783 a month for a freshly graduated chemical engineer to \$760 a month for mechanical engineers.

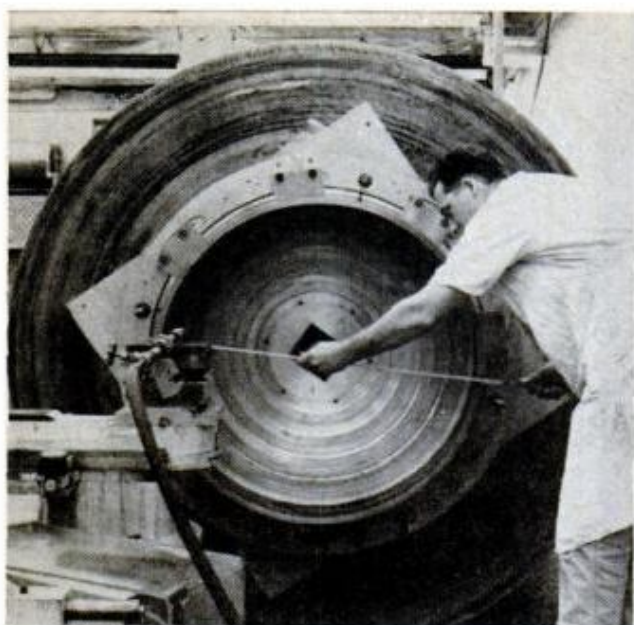
Whatever educational level you start with, getting a job is a perfect way to raise it. Practically every firm hiring technical help offers free job-related courses at its plants, or it may encourage employees to get further technical schooling outside by refunding part of their tuition. "These tuition refund programs aren't altruism," states Ed Stafford, a manager at the nationwide employment agency of Dunhill, Inc. "Qualified help is so scarce that firms pay for further education in self defense."

Training is important. But almost equally prized by employers are verbal skills.

Sure, students should learn to speak and write clearly and accurately in school. But often they don't. According to New Jersey business consultant Peter Drucker, the ability of engineers and other employees to make people understand their work is frequently as important as the work itself. In a pamphlet outlining technical job



UNION CARBIDE TECHNICIAN Bill Runkle experiments with superfrigid liquid helium. Only 30, he attended General Motors Institutes for three years, has been involved in many exciting research jobs



SUCCESS IN A BIG WAY has come to Vernon P. Tutterow, a North American Rockwell employee who joined company in 1953 as an apprentice. After a two-month training course, he was made a lathe operator. By 1959 he had achieved classification of senior turret lathe operator. Now he's a machinist working on construction of giant industrial lathes

opportunities, GE states: "No matter what your career, a command of the English language is the most important skill you can acquire. We put the need to study English first, over science or mathematics."

Acquiring verbal skills—while in school or afterward—quickly improves promotion possibilities. At New York's Ideal Corp., a 40-year-old press operator, and a high school drop-out, showed so much native ability that the firm asked him to go to school. "He finished his high school equivalency at our expense, then went on to a management trainee course where he learned, among other things, how to communicate effectively," explains Ideal executive Rosenfield. Just a few months after finishing his courses, the man was promoted to foreman, with a dozen or so people working under him. "Without being able to explain job specs to men under him, or report his problems to executives, he couldn't have gotten that job," adds Rosenfield.

Another important characteristic that helps further a career—and one steadily becoming more appreciated by employers—is perspective. Once, employers looked only for technical skills and dismissed an employee's other interests as irrelevant. No longer. "More and more, engineers and technicians are asked to provide technological solutions to social problems," states GE's Warren Rhodes. "Courses like civics, geography, sociology, economics, and especially history establish a framework in which to place the technology learned."

Far-ranging personal interests—from hobbies to community activities—create perspective, too. "The man who makes the greatest contribution to his company is the mature person, and you cannot have maturity without an interest outside of the job," writes Peter Drucker in a national business magazine.

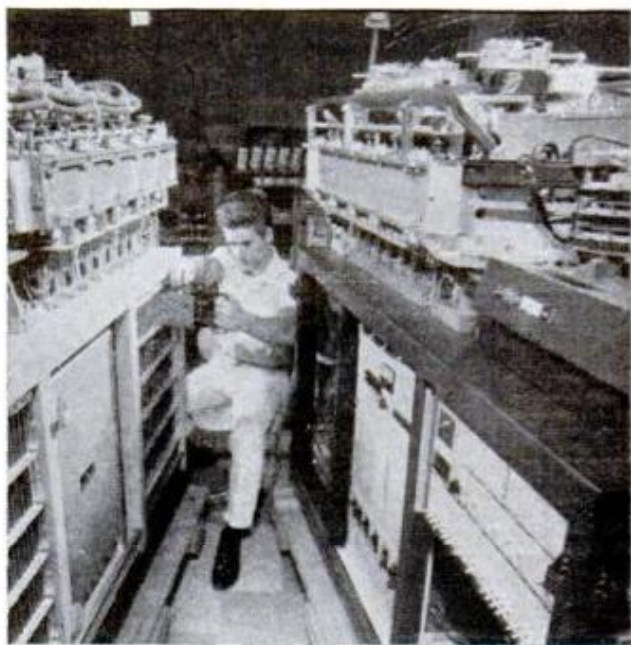
Often, an elementary but difficult step in launching a career is deciding what skills to perfect. A concrete decision is important. "Guys walk in here and actually say they'll take any job around," says AT&T's Lenz Meylan. "They haven't the foggiest notion of what they want to do."

In one case, Douglas Stevenson of Ford had a campus interview with a mechanical engineer in the top 10th of his class. The student, though brilliant, had only a vague idea of the kind of work he was interested in. "I washed him out," states Stevenson. "He didn't know anything about Ford and, worse, he didn't even know the area of work that interested him. We want to see guys who can at least indicate a specific job area, say design work as opposed to research and development."

If deciding what skills you possess and should develop is a problem, Dr. Harry Levinson, formerly of the Industrial Health Div. of Kansas' Menninger Foundation, offers these two tips:

First, seek out vocational guidance. "Such guidance can keep a man from wasting time in an area that really doesn't suit him," states Levinson.

Second, find a successful man in the
(Please turn to page 26)



KEEPING TABS ON A COMPUTER is typical of many challenging jobs open to trained technicians. Here, Harry Plunkett checks out complicated memory bank on RCA computer manufactured at Van Nuys, Calif.



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MAN THEY'RE LOOKING FOR

(Continued from page 24)

field you think you're interested in. Ask him about the satisfaction he's found in his work and any drawbacks he's encountered. If his ideals and career match what you want, chances are he can help you to achieve similar success and avoid problems you can't anticipate.

It's not hard to find out what skills or aptitudes you possess. Many organizations give aptitude tests, including some YMCAs, college and high school vocational offices, and federal and state employment agencies. Your school guidance counselor might know where you can take such tests. You can also write to the American Personnel and Guidance Assn., 1607 New Hampshire Ave., NW., Washington, D.C., for a list of organizations in your area that sponsor aptitude testing.

Once you've picked out or studied a skill, landing a job that best suits you starts at a firm's recruitment desk.

Attitude vital to your job

Surprisingly, training isn't always the quality firms value most. "We're mainly interested in a candidate's attitude. It's the key factor," says Warren Rhodes of GE. "A man with less training than we want, yet who is willing to take courses and convince us that he's going to make a lot of effort, is a lot better off than the guy with good training and a poor attitude."

Besides attitudes, recruiters look for career hunters, not just job seekers. "If a fellow asks questions that show he's measuring a job by slight pay differences, he's not looking for a career. He's out for some place to hang his hat," states Ed Stafford of Dunhill, Inc. "And interviewers spot the difference immediately. Men, especially younger men, should choose a job by measuring how much experience and training it will give them."

An important step in making sure a company's offer suits you is getting some background information about the firm. "It's incredible how little time men spend on exploring a company where they'll be working a good part of their coming years," says Dudley Darling, vice-president of Ward Howell Associates, a managerial recruitment agency. "Doing a little homework about the firm pays big dividends and indicates what life with a given company will be like."

"Interviewers can tell when someone has done background research about a firm by the questions asked," says Donald Liebers, a personnel manager at AT&T. "This kind of digging shows that a man is

interested in being satisfied with his work, something that interests us just as much."

For high school grads, getting an interview is simply a matter of applying for a job at the personnel office of a firm. College and technical school grads often meet recruiters on campus. Otherwise, they should forward a resume with a covering letter to the personnel officer of the firm they would like to work for. Many firms that become interested in a candidate need help so badly they'll pay all expenses to and from the nearest personnel office.

"A resume needn't be over one page long and should include the applicant's vital data, such as schooling, previous jobs, and accomplishments," explains Tracy Brooks of General Dynamics. "But the resume should be accompanied by a freshly typed letter telling why the person wants to work for the firm. This letter should be short. Three or four paragraphs is all you're going to get a personnel manager to read these days.

"What we look for in interviews and resumes is a record of accomplishment. What a man has done is a pretty good indicator of what he will do. So a guy should tell us what he's proud of, what he's accomplished. This includes extracurricular activities and personal interests as well as academic record."

During the 30 minutes typically allotted to an interview, a candidate should stick to pertinent facts. "Some guys come in and talk about grossly irrelevant things and just waste time. Others are so meek you have to draw information out of them," says Lenz Meylan of AT&T. "Remember this, too. We want to give guys jobs, so don't offer an interviewer a reason to reject you for such things as sloppy dress or indifference."

Use the right reference

References are a help in clinching the job you're shooting for. But use references who are most pertinent to the job in view. Asking a gym teacher to vouch for you when you're hoping for a position as an electronics technician won't aid you as much as the support of an electronics or mathematics instructor. And make sure you've asked if you can use a person's name as a reference.

A final tip: The U.S. Department of Labor publishes a book that describes in detail the current outlook for thousands of job titles, from auto mechanic to physicist. The book, entitled *Occupational Outlook Handbook, Bulletin No. 1550*, sells for \$4.25 and can be obtained by writing to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. ★★★

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I'd like to give this to my fellow men... while I am still able to help!

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 "leg 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.

This business has another peculiarity. It can be started at home in spare time. No risk to present job. No risk to present income. And no need to let anyone else know you are "on your own." It can be run as a spare time business for extra money. Or, as it grows to the point where it is paying more than your present salary, it can be expanded into a full time business—overnight. It can give you a sense of personal independence that will free you forever from the fear of lay-off, loss of job, depressions, or economic reverses.

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 turning 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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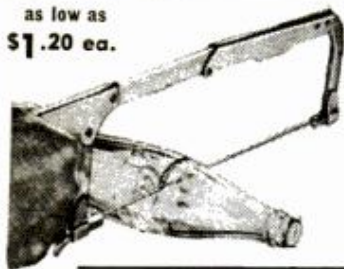


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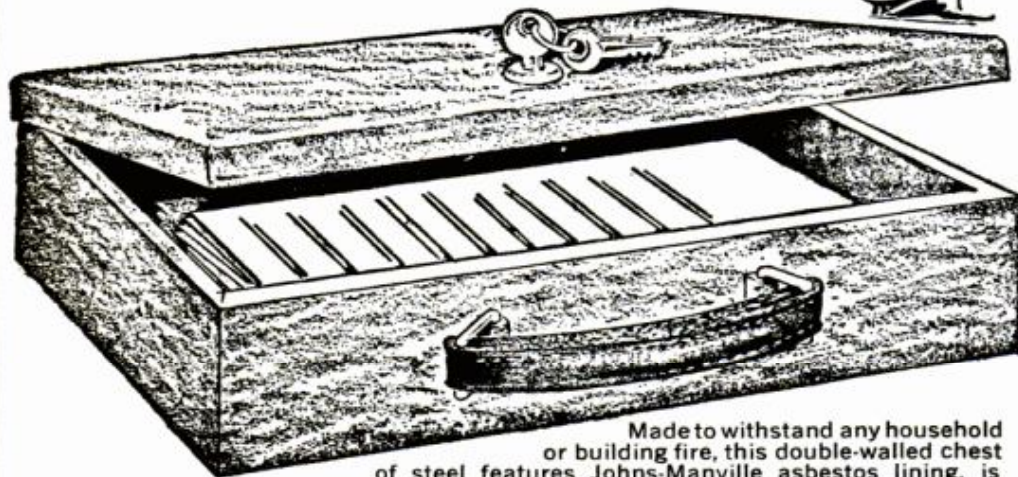
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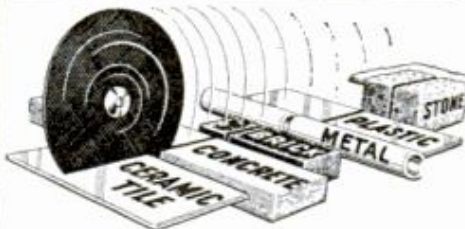
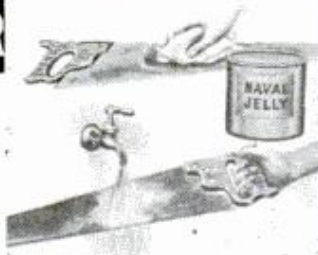
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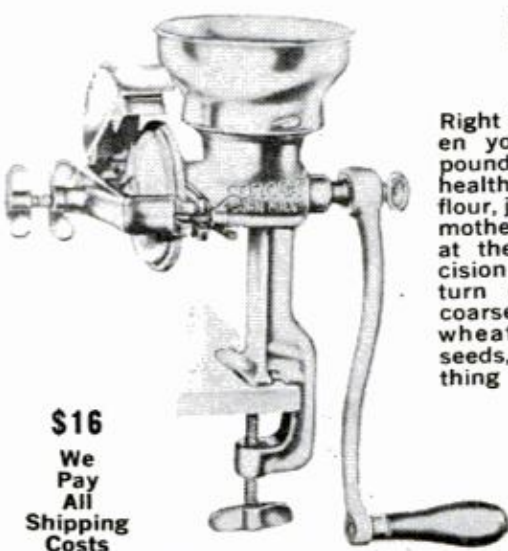
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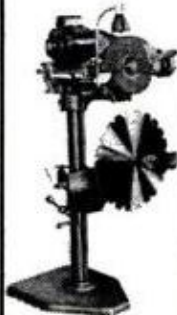
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Drivin' with Dan

Can professional race drivers carry life insurance? What's the big difference between a turbocharged and turbine engine? Can a gal get started in racing? Dan Gurney answers these and other provocative questions



DAN DONS his driving helmet just before start of the 1968 Indy 500. His Eagle, with stock block Ford power, finished second. Note the exclamation point!

Q. Are Formula 1 race drivers a very close-knit group? How close were you to Jim Clark?—Robert Swenson, Detroit, Mich.

A. I think we are as close as any other group of professional competitors. Respect for a competitor's ability can often be very strong without a feeling of friendship. Jim had my utmost respect. I always enjoyed talking with him and racing against him. I'm an American, he was a Scot. Our paths seldom crossed outside of racing, so I'd say we were close only at the races. I miss him very much both as a friend and competitor.

Q. Do professional race drivers carry life insurance, and if so, what does it cost annually?—Alan Enstrom, Kokomo, Ind.

A. Yes. The cost depends on the type of racing a driver is doing—or rather, the extent of his exposure on the racing circuit. It's from \$5 up to \$20 per year per \$1000 for term insurance, and from \$25 up to \$40 per \$1000 for whole life. Insurance for race drivers is available from about 50 out of the 1800 companies in the U.S. Most racing organizations (such as NASCAR, USAC, SCCA) provide a \$10,000 policy with a driver's racing license.

Q. Would you give the kids of the United States your view on drinking and driving?—Jim Brown, Englewood, Tenn.

A. Good driving requires concentration. A person's senses make him aware of potentially dangerous situations and enable him to exercise good judgment in operating a vehicle. One drink impairs this balance perceptibly, requiring a reduction in speed and further planning ahead to maintain a good safety level. Excessive drinking followed by driving is like playing Russian roulette—with your own head, and the heads of other, innocent people as well.

Q. Do you have any suggestions or hints for getting started in racing that could help a female would-be driver? I know that it's a man's world, but we girls like the thrills and excitement of competition racing just as much as you guys.—Mrs. Darla Moodispaugh, St. Charles, Mo.

A. How about a disguise? Seriously, SCCA sports car racing has many active female drivers. Some are very good.

Q. How is it decided who gets a chance to qualify for the pole on the first day of Indy 500 trials, (Please turn to page 42)

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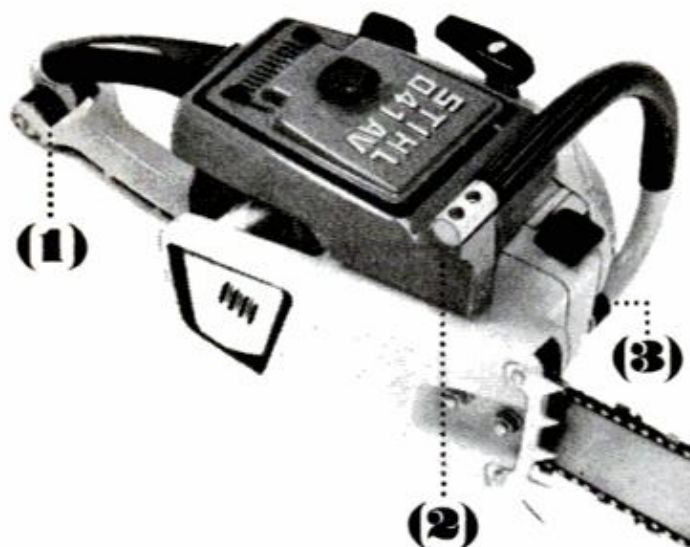
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DRIVIN' WITH DAN

(Continued from page 40)

and what if more drivers are ready to go than time permits, or weather interferes?—Don Aukamp, New Castle, Del.

A. This year we drew capsules out of a covered box. Each capsule had a number inside it up to 60. On the first day, if everyone was ready, then some would not get a chance. Rain could ruin it, as it did on the second day this year when only one car qualified.

Q. In watching a cross-country motorcycle race on TV, I noticed that European riders seemed to be doing very well—they won every race! I don't think their bikes are better than ours. What do you think they have on their side?—Randy Bovell, Chattanooga, Tenn.

A. They have more experience in a tougher league. Motorcycle racing in Europe is professional and international. It even crosses back and forth over the Iron Curtain.

Q. To design cars (not racing or drag-race cars), what kind of courses would one have to take, and how could one get a good job with a company like Ford?—M. Harding, Quebec, Canada

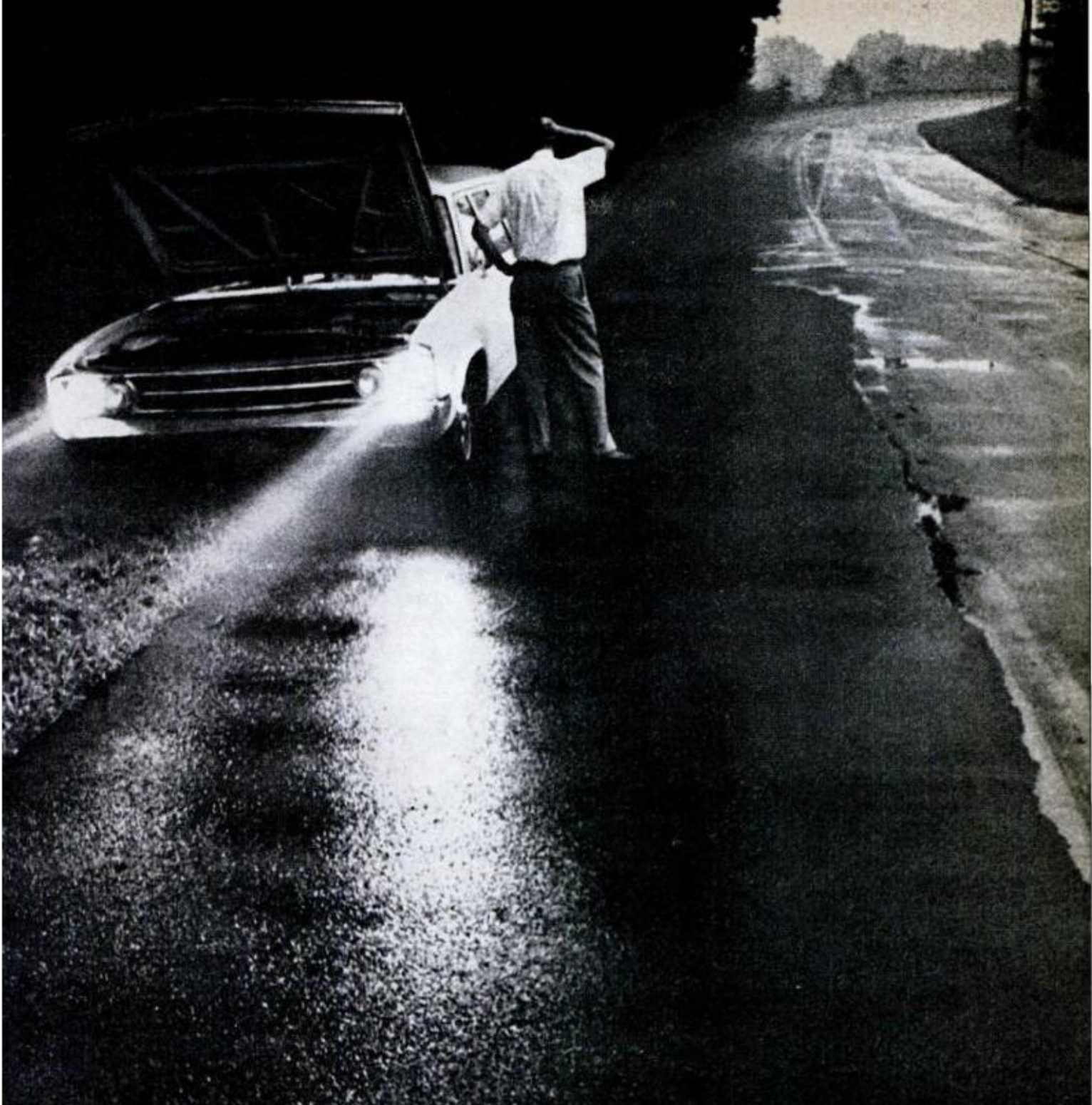
A. I would write Ford or GM or Chrysler or American Motors and ask them. Engineering courses cover a lot of ground—mechanical drawing, higher mathematics, stress metalurgy, electricity, plastics, liquid and gas flows. You'd better ask them.

Q. What put the turbines out of the Indy 500? How many seconds were you behind Bobby Unser? What speed did you average during the race?—Lary Polhamua, Piqua, Ohio

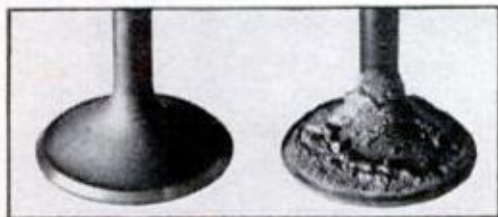
A. I believe that partial seizure of the fuel pump due to overheating during slow running (the fuel flow cools the pump) caused fuel-pump driveshafts to shear. Graham Hill's turbine went out with suspension failure. I was about 53 seconds behind and averaged 152.18 mph approximately.

Q. My parents don't want me to become a race driver. Did yours?—Jim Samuel, Cherry Hill, N.J.

A. No, they didn't. I didn't start in earnest until I was about 24 years old. By then I had
(Please turn to page 44)



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DRIVIN' WITH DAN

(Continued from page 42)

been exposed to quite a bit of education, and I wasn't quite so harebrained or fearless as I was when I was younger. I recommend this approach.

Q. *What is the difference between a turbocharger on a Meyer-Drake, and a turbine engine? What does "liter" mean in racing?—Jerry Chamberlin, Brookville, Pa.*

A. A turbocharger on a Meyer-Drake refers to an exhaust-driven centrifugal supercharger that forces air and fuel into a reciprocating four-cylinder piston engine. A turbine engine is not a reciprocating engine; it's a "jet" engine of the type used most successfully in aircraft. A liter is a volume measure. It's a little more than a quart, equal to 1000 cubic centimeters, or 61 cubic inches.

Q. *Where and when is the Grand Prix of the U.S. held? Where does one write for tickets?—N. Porter, Vineland, N.J.*

A. Watkins Glen, New York, Oct. 6. Try writing to Watkins Glen Grand Prix, P.O. Box 187, Watkins Glen, New York (14891). To get a good fill-in on the race read "The Wildest Show on the Road" in last month's *PM*.

Q. *What is your opinion on Jet Fire Fuel Igniter Plugs, and the G.T. Energy Chamber gas saver?—Anthony Kotchi, Oak Creek, Wis.*

A. I have no first-hand knowledge of either, but I am skeptical of their merit when applied to modern, well-tuned auto engines.

Q. *A classmate and I have been having an argument. He says that a '68 Firebird will wipe out a '68 Corvette Stingray. I strongly disagree. Who's right?—Stephen Boutilier, Rangeley, Me.*

A. I think you ought to go to the nearest drag strip and settle it. I'd pick the Corvette offhand, other things being equal, but I'm sure there are many Firebirds around that can "wipe out" many Corvettes. ★★★

If you have questions on racing, high-performance and everyday driving techniques, send them to "Drivin' with Dan," c/o Popular Mechanics, 575 Lexington Ave., New York, N.Y. 10022. Questions cannot be answered by individual letters. Questions on maintenance and repair should be addressed to the Auto Clinic (see page 84).

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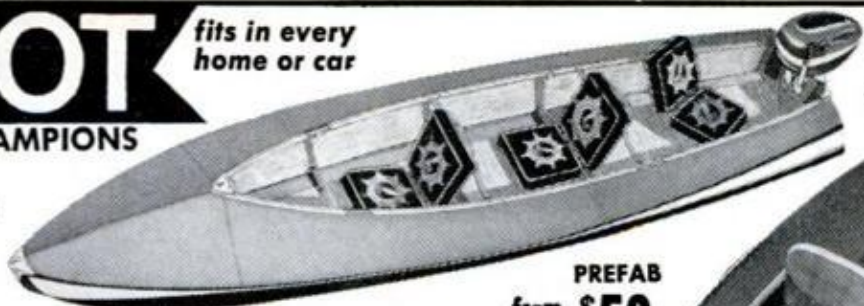
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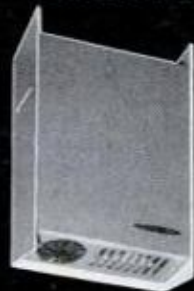
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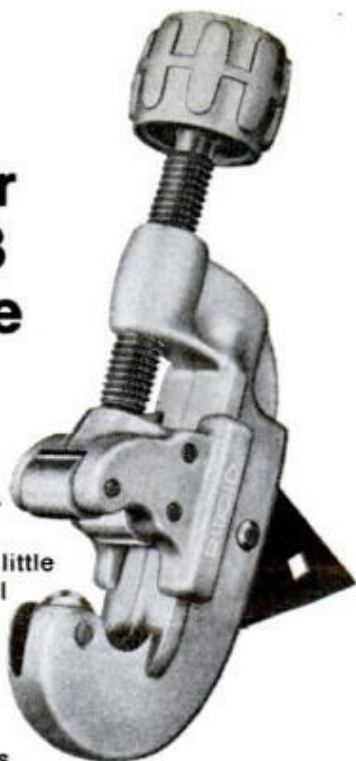
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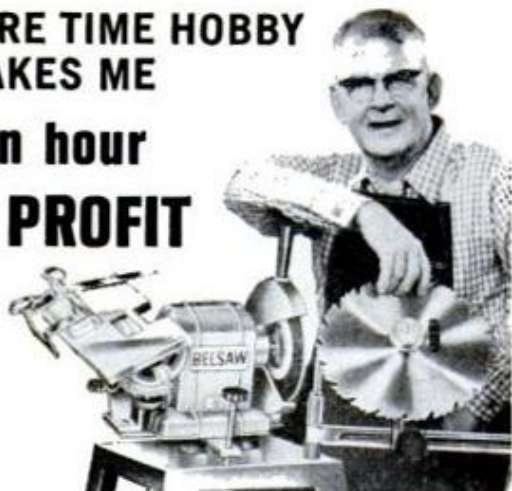
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By SHELDON M. GALLAGER



FIVE NEW INSTAMATIC CAMERAS from Kodak are designed to cover the needs of most snapshooters. Included in the group is the lowest-priced model ever to incorporate an electric-eye diaphragm, the Instamatic 134 shown above. The electric eye automatically adjusts the lens opening to varying light conditions. The camera has a shutter speed of $1/50$ th of a second and sells for about \$28. A similar model without the electric eye, the Instamatic 124, sells for under \$20. Two other new models offer a handy spring-motor drive that advances the film each time you press the shutter release. One winding of the spring knob, shown on top of the camera below, handles a full roll of film and lets you fire off shots at the rate of one a second. The motorized models are the Instamatic 414 with electric-eye diaphragm and close-up lens for about \$50 and the Instamatic 174 without the extra features for under \$30. There's also the Instamatic 314, similar to the 414 but without the spring drive for under \$40. All models take flash cubes and drop-in Instamatic film cartridges. On electric-eye models, a red warning light shows in the viewfinder when you need to use flash. (Please turn to page 46H)



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By Tom Harding

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It all began when Dail was working as a night clerk in a hotel in Barstow, Cal. It was a dull, low-pay job. There obviously wasn't much of a future. But Dail wasn't about to give up.

The Big Break

He enrolled with Universal Schools of Dallas for correspondence training in Accident Investigation. He started reading lessons-by-mail in his spare time.

Then came the big break. A large furniture store burned in Long Beach. Dail quickly reviewed one of his Universal lessons then hurried out to see the owner of the store. He offered to represent the owner in obtaining an insurance settlement.

In just 5 days, working entirely from directions in his Universal lessons, Dail obtained a settlement for \$90,000. His fee—\$4,474.00!

Almost without knowing it, Harold Dail had become what is known as a Public Adjuster. The Public Adjuster works as an independent operator. He helps people settle insurance claims. It is only one of the many money-making careers open today in the booming field of Accident Investigation.

A New Career Opens

But this was only the beginning for Harold Dail. His new career opened up like the door to a bank vault.

When a large area of Los Angeles was swept by fire, Dail went to work in earnest. His Universal training turned into a jackpot. He helped 21 businessmen handle their insurance claims and made \$7,975.00 in 59 days. That's an average pay of \$135.00 a day!

Today Harold Dail has made so much money in Accident Investigation that he spends his summers on his ranch

Amazing Things Can Happen To You In This Big-Money Industry



near Kingman, Arizona. He's also building a sub-division in Barstow—the same city where he was once merely a night clerk in a local hotel.

"If it hadn't been for my income from Public Adjusting I wouldn't be financially able to carry on this project," Dail writes. "If it hadn't been for the training of Universal Schools I wouldn't have been in the 'know' about Accident Investigation in the first place. I owe a lot to Universal Schools."

You Can Train, Too

The story of Harold Dail is unusual. His income is far above average for the field. But it shows what a man can do in Accident Investigation when he is trained to take advantage of the opportunities around him.

Now you can take exactly the same training Harold Dail had. You can do it easily in your own home, in your spare time, and at low cost.

You need no experience, no college education. There's no equipment to buy. No classes to attend. Keep right on with your present job until ready to switch.

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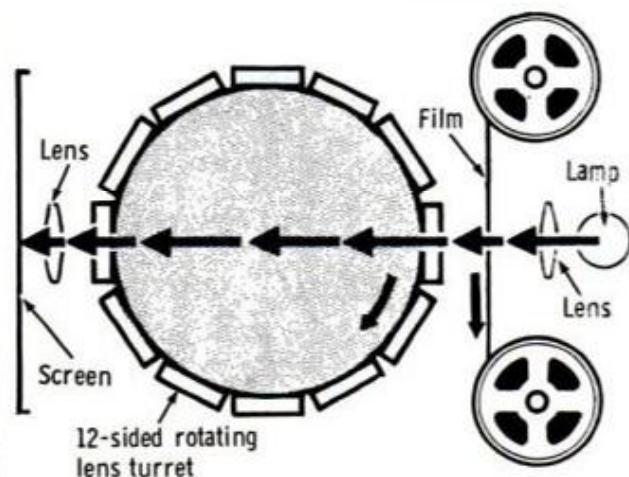
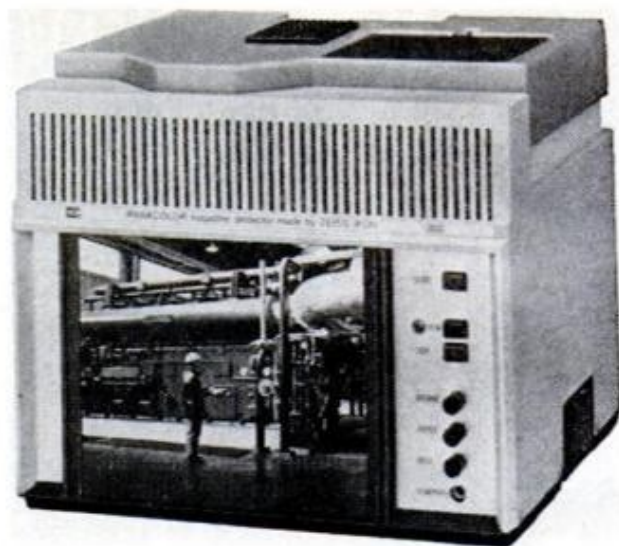
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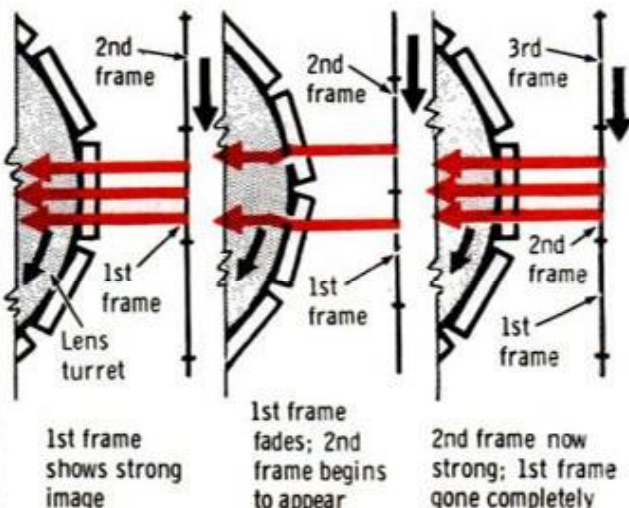
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PICTURE THIS

(Continued from page 46F)



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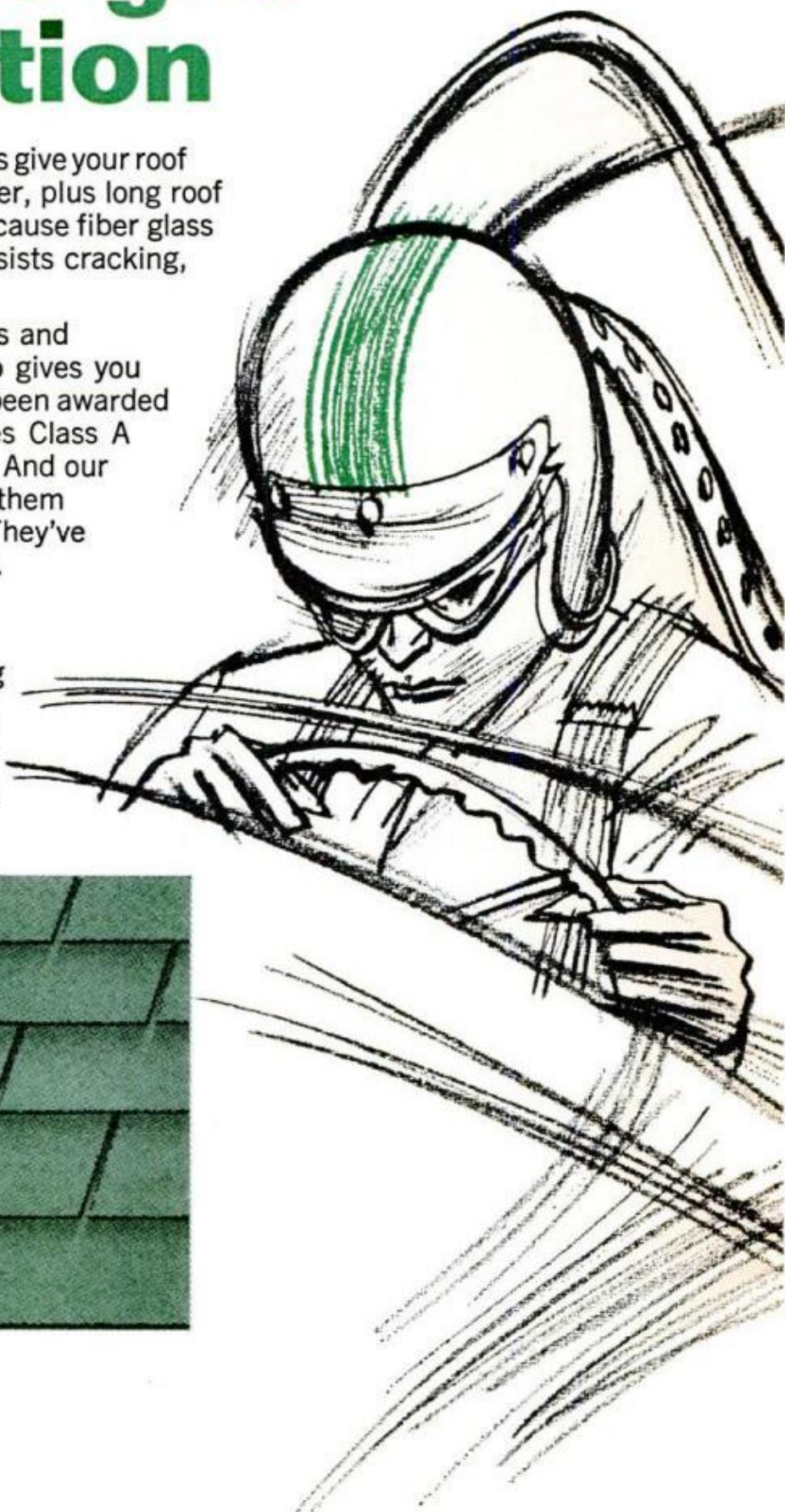
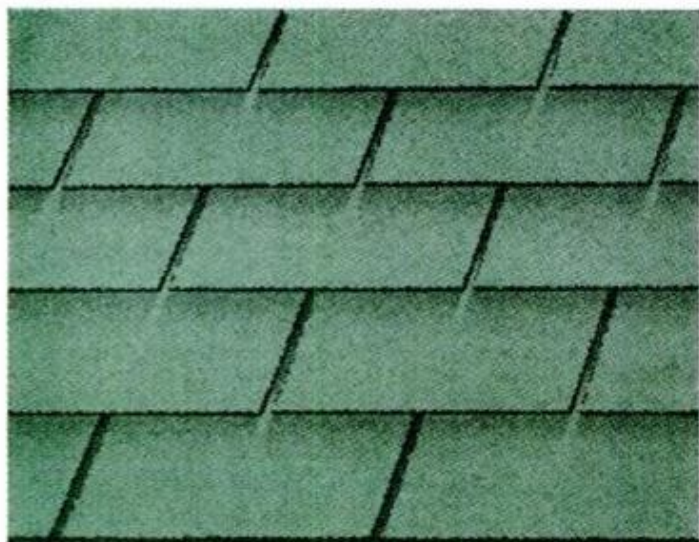
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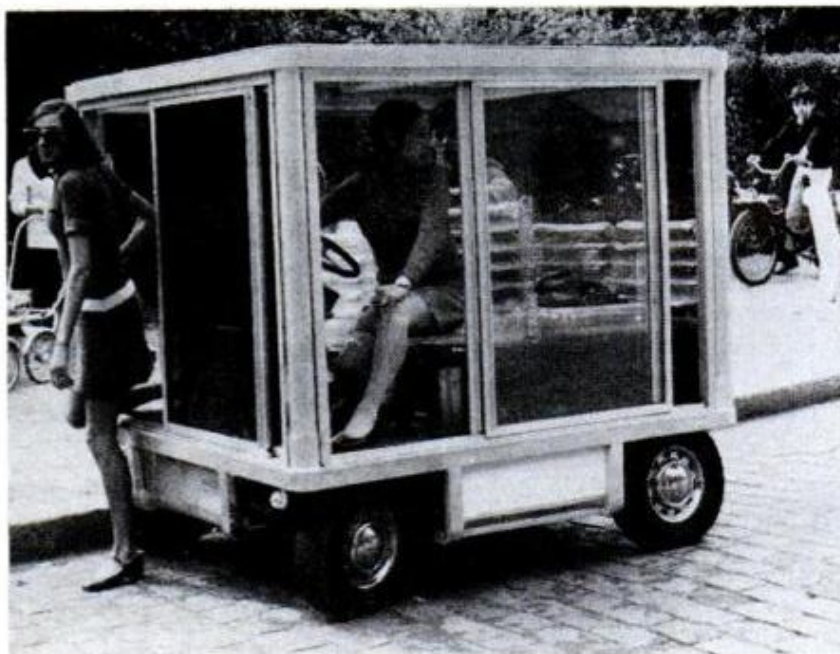
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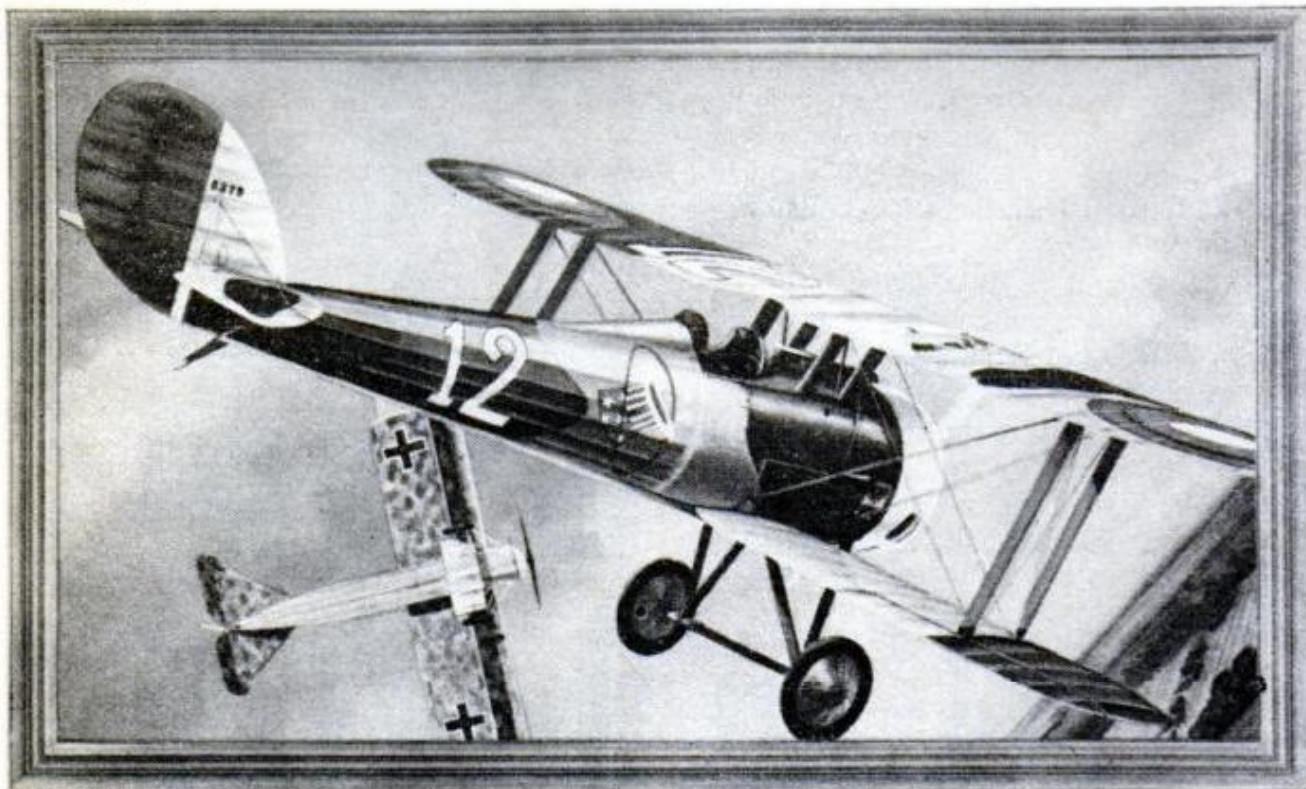
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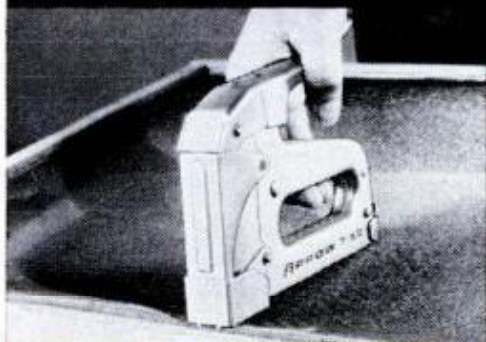
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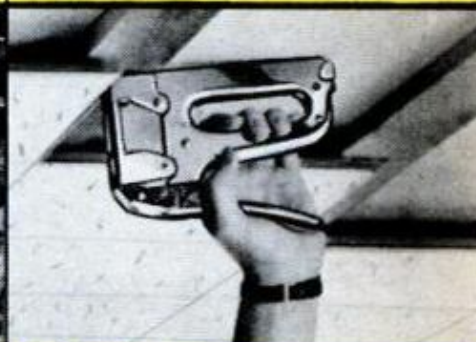
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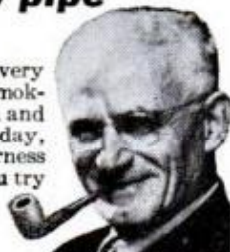
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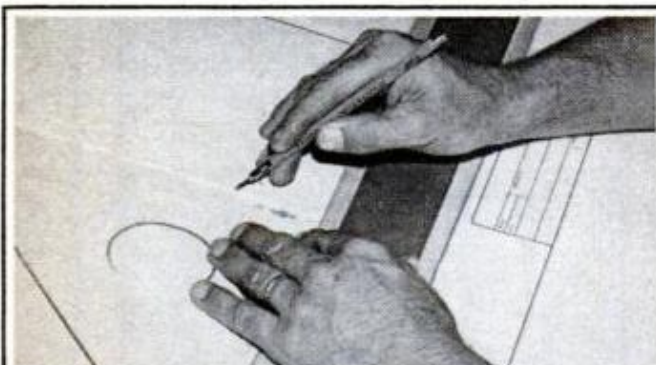
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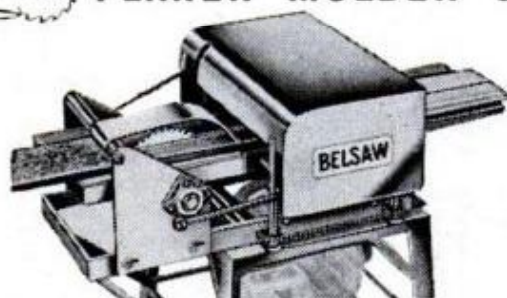


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CL-339

BY KEVIN V. BROWN
AVIATION
JETSTREAM

RUNWAY GROOVING—cutting shallow grooves crossways in runways to prevent hydroplaning and to improve braking and stopping distances on wet surfaces—seems to be working out.

After a year-long evaluation at three different airports, pilot reports showed that stopping distances were reduced as much as 1000 feet, and the airport operators themselves reported that no noticeable increase in deterioration of the runways took place.

Other experiments underway to make runways safer in all weather include use of commercial fertilizer to remove or prevent ice formation during snow or freezing rain and tests for runway friction to predict braking before the plane lands.

SEEN ANY lost flying boats?

The Boeing Co., just for nostalgic reasons, is trying to locate the whereabouts of any of its old Model 314 Clippers. These huge aircraft plied both the Atlantic and Pacific Oceans during the late '30s and

'40s. Some were sighted as late as 1950.

Boeing built 12 of them, mostly for Pan American Airways, and some are known to have crashed (singer Jane Froman survived one of the crashes near Portugal) or to have been scrapped for parts, but the others just disappeared, and no one knows where.

If you've seen any, contact Boeing.

AND SPEAKING OF FLYING BOATS, they may not be all that dead.

The Navy is thinking seriously of converting the venerable C-130 Hercules into a seaplane. Lockheed, the builder, has been awarded a feasibility contract to put the Hercules on water.

The Hercules is considered by some to be the logical successor to the old DC-3, being all things to all men.

THE GUN-LAW CONTROVERSY has seeped over into aviation.

Scheduled airlines have announced new regulations requiring shippers of firearms to mark each piece or package prominently with the word "firearms," and to notify proper law-enforcement officials. The notification will list the contents of the shipment, the receiver's name and address, the date of shipment and the method of shipment. ★★★

Our oil was good enough for everybody. Except us.

People thought Dino Supreme was about the best oil you could buy.

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So we set up some new standards. Even above those of the car makers. And developed a new 10W-40 oil.

Then we tested this newly formulated oil against four top multi-graded motor oils.

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It proved we were good enough. For ourselves.

And better than good enough for your car.

In fact, if your car had a mind of its own, it wouldn't run without us.

 **Sinclair**
SINCLAIR REFINING COMPANY

Up, up and away on your playful, powerful '69 Polaris



So maybe you don't need to leap streams...or fly across gullies. But it's nice to know you can on a Polaris. That's because only Polaris has Powertrain. Powertrain puts the fun into snowmobiling. Power with a purpose.

It starts with the new Polaris Star, the finest snowmobile engine ever built. It flows smoothly and efficiently through the famous Polaris Torque-O-Matic drive. It ends with the Polaris power tracks that propel you over powder or hardpack with sure-footed dependability.

The Polaris Powertrain is the heart of true snowmobile performance. Without it, a snowmobile is something less than what it could be. With it, your Polaris becomes the most spirited over-the-snow funmobile ever built. Powerful reasons for you to test drive a '69 Polaris.

*Step up... Step out...
on a playful,
powerful Polaris!*



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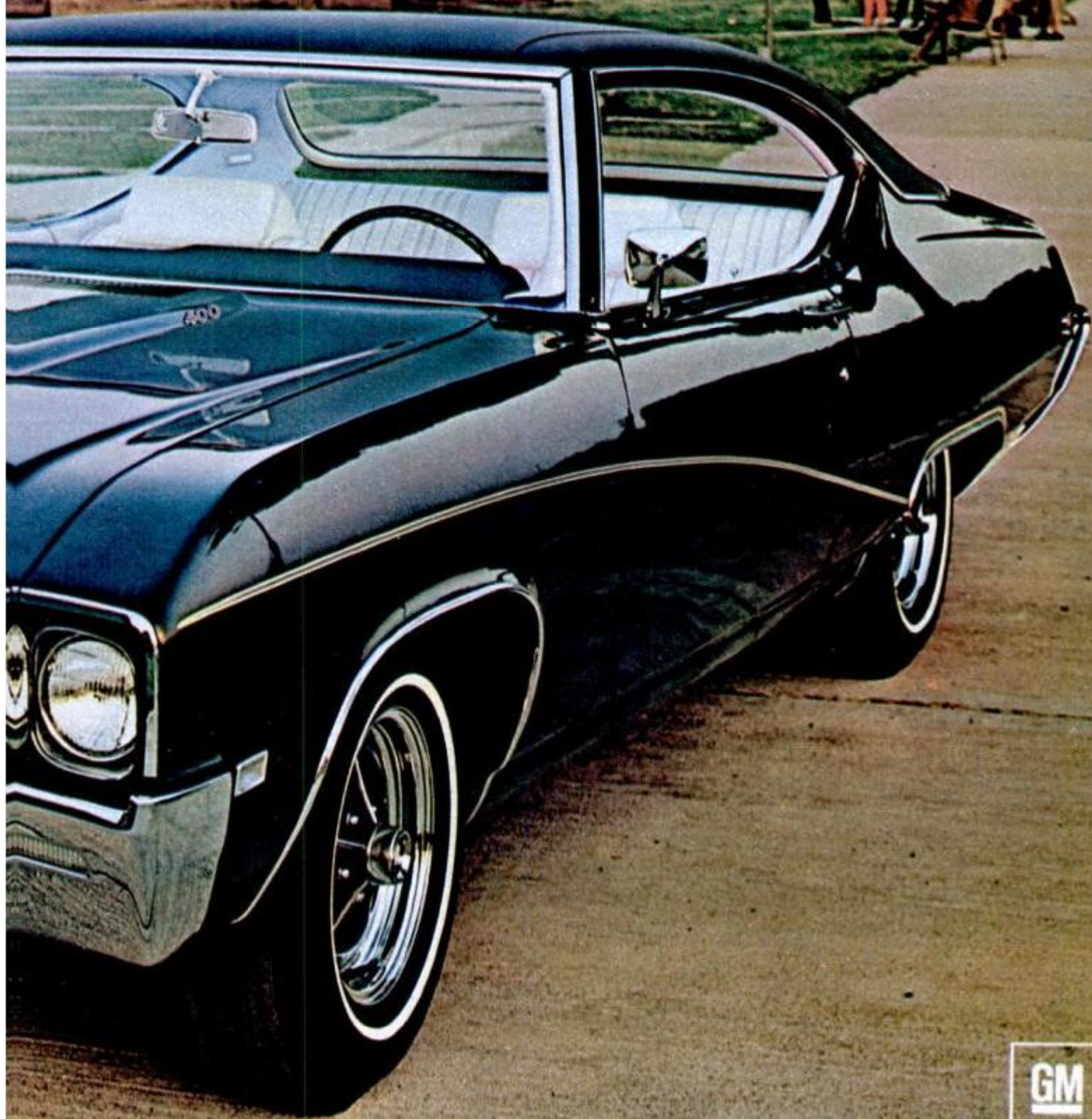
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1969 Buick



No wonder Buick owners

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keep selling Buicks for us.
Wouldn't you really rather have a Buick?

**A handful of
compact power
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NEW!
DREMEL MOTO-TOOL
with constant-torque
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Now all Dremel Moto-Tools belt out twice the torque of previous models! They're virtually stall-proof, even when you're really bearing down. Compact — lightweight — and now super-powered for grinding, drilling, polishing, carving, deburring, and sanding. Shock-proof Lexan housing. See your dealer for a demonstration.

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Complete with Moto-Tool
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New 160-page "Dremel Handbook of Hobbies, Crafts, and Projects", only \$1.45.

- Please send book. I enclose \$1.45.
- Send free power tool literature.



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WHAT'S NEW
OUTDOORS
BY DAN FALES

HERE'S YOUR CHANCE to tell the Coast Guard your gripes about, and suggestions for, modernizing the navigational aid system. The CG is studying the present system and wants comments from the maritime community, including small pleasure-craft skippers like you who use both inland and coastal waters. It's considering the "system" of navigational aids in general. The specific question asked is: "If the existing navigation system is inadequate, what is needed, and where to make it (the system) more effective for mariners' needs?"

My suggestion is to increase the lumen rating of flashing white channel markers. All too often, I've approached an unfamiliar harbor or channel at night and been unable to locate a critical flashing marker because of highway or town lights in the background. It's probably not a problem for those looking down from the bridge of a big ship. But I look straight away from my "bridge" which is only two feet off the water. Should you have suggestions, write the National Navigational Planning Staff, U.S. Coast Guard, 1300 E St. N.W., Washington, D.C. 20591.

FOR A BUCK you can get a Bear. It's not as crazy as it sounds. Famed archer Fred Bear has made a recording called *Fred Bear's Secrets of Hunting*. It's a collection of fascinating hunting yarns and solid tips — not only on bowhunting, but on outdoorsmanship in general. This LP record is selling for \$1 at sporting-goods stores.

BEWARE OF WORMS THAT BITE is the advice of Winchester-Western's conservation department. As the story goes, a game warden in Lubbock, Tex., was checking fishermen on a local river. He met a small boy with a fine string of channel catfish, and asked what he was baiting with.

"I'm ketching 'em on these good ol' biting worms that I found under a rock," said the boy, displaying several five-inch baby rattlesnakes.

Rattles are born alive and fully equipped. Their fangs and poison sacs may be tiny—but a rattler of any size is still a rattler. The biting worms had nipped the boy's hand several times, and it was swollen. The warden rushed the boy to a hospital where he was treated and soon released. He kept his catfish, but got rid of that good ol' bait. ★★

Here! New '69 CHEVROLET PICKUPS!



Half-ton Fleetside CST Pickup with shell body

Now there are even more reasons why Chevrolet is more truck.

For '69, Chevrolet goes to new lengths in modern pickup design. We mean Chevy Fleetsides with boxes as long as 8½ feet. Get one for the biggest of camper bodies — or cargoes. You'll get more style in any '69 Chevy pickup model. Including a bold new profile and new aluminum grille. In the cab, new bench or avail-

able bucket seats and thick insulation make it more comfortable. There's more power, too; order the new 350-cu.-in V8 or one of five other V8's and 6's. We have a whole catalog full of reasons why a Chevy pickup is more truck. You'll see when you see the new '69's at your dealer's. . . . Chevrolet Division of General Motors, Detroit, Mich.



More trucks are Chevrolets
because Chevrolet is more truck!

SOLUTIONS FOR MECHANICAL HEADACHES

AUTOMOBILE CLINIC

BY MORT SCHULTZ

Carbon cleaning

Are additives worthwhile in getting rid of carbon deposits once they have formed in cylinders?—Robert E. Beaudoin, Brookfield, Ill.

Let's put it this way. It's a heck of a lot less expensive to try a few cans of an additive made by a reputable manufacturer than to rip the engine apart for a carbon job. There's another thing to try before engine work. Fill the gas tank with a premium-grade fuel and get the car on a superhighway. Open it up for a long period. I had a car that developed a ping I eventually attributed to carbon, and I tried the high-octane-fuel, high-speed method. It got rid of the carbon and ping.

Wonder why I wander

I own a 1967 Chevy II that wanders when the car's cold. Miraculously, after I drive several miles, the problem clears up by itself. I've had front-wheel bearings checked, the brakes don't grab, and the front end's not out of line. What's the cause of this mystery?—Miss Virginia Halloran, Earlton, N.Y.

You probably don't have a mechanical problem. How long's it been since you've checked your tire pressure? Conceivably, your front tires could be underinflated. This will cause wander. As you drive the car, tires get warmer, and the air pressure increases. This could account for the wander with tires cold and lack of wander with tires hot.

Chattering lifters

The valve lifters of my 1963 Oldsmobile Super 88 with 390-cu.-in. engine begin to clatter after I drive about five miles and keep it up more or less on a constant pitch. So far, I've replaced the lifters twice, tried different brands and viscosities of oil, had the valves ground, and overhauled the carburetor. I've just about had it unless you can come up with a solution.—Donald W. Trusty, Akron, Colo.

The answer is probably in Oldsmobile's service bulletin No. 62-W-32 dated 7/15/63.

Olds says the problem could be caused by oil level being too high or too low. Make sure you check oil with the engine cold or a good 10 minutes after you're turned it off. Also, make sure the dipstick is seated fully. It should be 10-7/8 inches long. Check for external oil leaks if you get a low reading. Secondly, you could have air in the oil causing aeration and foaming from a leak at the oil screen. Finally, worn valve-train parts (such as guides and seals) could lead to low oil level by letting oil leak into combustion chambers.

A hot tip

I have a 1967 Ford Galaxie 500 with 390 engine. I'm fouling plugs every 2000 miles. The Ford dealer has checked everything and finds nothing wrong. What can be the matter?—T.E. McLain, Stanhope, N.J.

Your Ford dealer hasn't checked everything. He ought to look at the service instructions sent to him by the company. He'd find that the plugs recommended for this engine have been changed. You should be using Autolite 42s, which are hotter plugs than the 82s that were called for originally.

Wrong number

I would like to call your attention to an error in a part number in the May Auto Clinic. The article speaks of repairing low brake-pedal height in the 1965 Mercury. You listed the number for a spacer as C5A2-2849-B. An order from a dealer to a parts depot would be marked "no item listed for this part number." The correct number is C5AZ-2849-B.—A.G. Torrance, Milledgeville, Ga.

P.S.: I enjoy reading Auto Clinic.

You're so right.

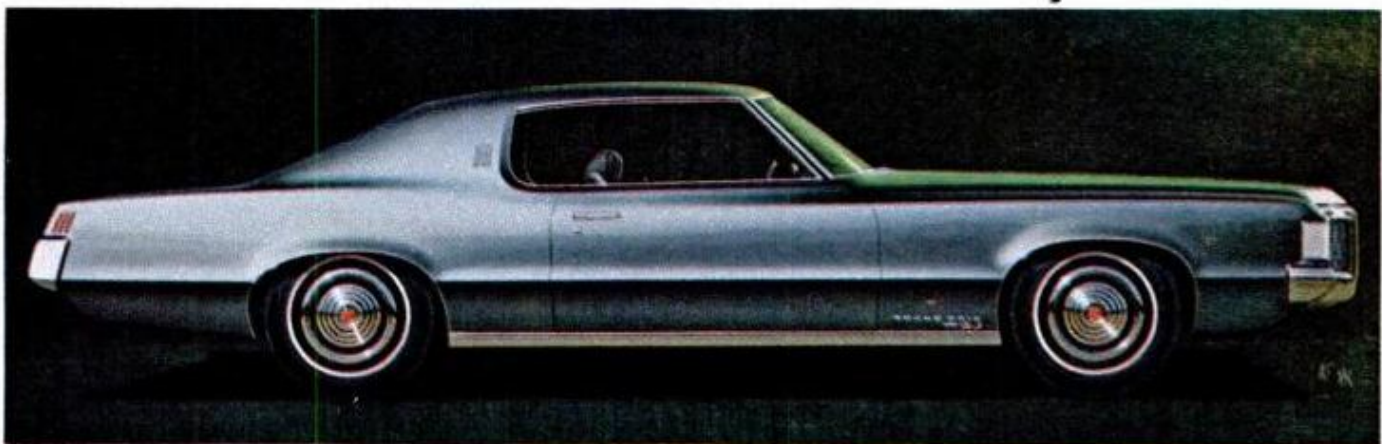
P.S.: Thanks for your P.S.

Points a poppin'

I have a 1960 Rambler Classic I use for a second car. It runs well, but I'm burning points every 200 to 400 miles. I have a new coil, ignition resistor, rotor and cap. All parts are those specified for the car. What (Please turn to page 84B)



Pontiac announces the great break away: '69 Grand Prix.



Pontiac Motor Division

Meet our newest and most exciting invention. That's the swank Grand Prix parked on this page. A car so completely new, you couldn't get a radio antenna on it if you wanted one. (It's hidden in the windshield.) And under that six feet of hood, a list of equally impressive power plants: 350-horsepower standard. Or you can order up to a 390-horsepower V-8 and your choice of 3- or 4-

speed manual, or our super-slick, 3-speed Turbo Hydra-Matic—and tell your friends you're driving our Model SJ. With Grand Prix, you'll also discover a real handler with super-wide G78 tires. And an interior that looks ready for interplanetary travel. Pontiac Grand Prix—the break away car of the year. Get in line at your Pontiac dealer as soon as you can.



AUTOMOBILE CLINIC

(Continued from page 84)

else should I suspect?—Neil Noland, Baton Rouge, La.

Excessive amperage is usually the reason for burning points so quickly. First thing to check is to make sure the coil and ignition resistor are the correct ones for your engine. You don't mention what engine is in the car, so you'll have to refer to the specs for these parts in the manual or at your dealer's. If they are okay, install an ammeter in series with the coil. With the ignition on, the meter should read 3.75 amps. for a six-cylinder engine, or 3.0 amps. for a V8. If amperage is excessive, look for a defective ignition switch or poor distributor ground.

How much of an adjustment?

My 1965 Plymouth Fury with automatic transmission often doesn't shift until speed reaches 30 to 35 mph. The car has only 33,000 miles on it. A Plymouth serviceman says I need a transmission tune-up. Am I about to be taken?—H.L. Hinkson, Youngstown, Ohio.

If your serviceman defines "transmission tune-up" as I do, then I don't think you're going to be taken. In fact, when something like this crops up it's tough to pinpoint the exact reason, so it is best to do a "tune-up." By tune-up I mean changing transmission fluid, adjusting bands, shift selector and throttle linkage. In my area, the job costs about \$25 to \$30.

A vintage whine

I have a 1967 Chevrolet with 327 engine. It has a whine in the rear end that occurs only on deceleration. The dealer has replaced pinion ring and gears, and the driveshaft. No help. What do you think it is?—Keith R. Argo, Ottumwa, Iowa.

Most likely the carrier bearing in the rear end. It could also be improper driveshaft alignment, but I'll bet on the carrier bearing.

Rear-end riddle

I read that the differentials of 1968 Chev-

rolets are filled with lubricant to a point above plug level. My question: If I had to add grease, how the devil would I get it above plug level without having it pour out the filler hole?—W. Simmons, Brooklyn, N.Y.

The instructions you refer to were sent to Chevy shops to avoid concern in new-car preparation for delivery when it was found that differentials had been filled above the filler hole at the factory. The instructions do not apply once a car is delivered. In other words, should the differential in your 1968 Chevy need grease, fill it to the filler plug. Can't see how you can do otherwise.

Service Tips

● Oldsmobile warns that nothing but the recommended solution of ethylene-glycol and water is to be used in its products—not even plain water. And this means all year long and in warm climates, like Florida and Southern California. Plain water, the company says, doesn't provide water-pump lubrication, and won't inhibit rust and corrosion. Owners who insist on using plain water as an engine coolant, the company states, should be advised that failure to use the recommended coolant "may jeopardize their car warranty."

● 1968 Chrysler Corp. cars—Dodges, Plymouths and Chryslers—with 340, 383 or 440 cu.-in. engines and Carter AVS four-barrel carburetors have a problem. The plastic bushings in the air valve of the carburetor may fail from high underhood temperature, leading to a rough-running engine because of altered air-fuel ratio.

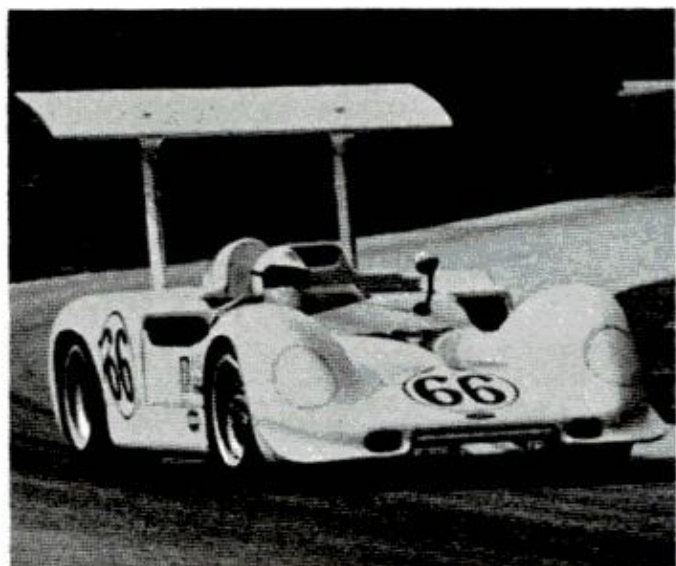
The trouble has been corrected in production by use of aluminum bushings. Chrysler Corp. dealer shops have been advised to make replacements of plastic with aluminum bushings when the trouble is noted. Authority is Service Bulletin 68-14-9 (4/3/68) for Chryslers and Plymouths, and Service Bulletin D68-14-8 (4/17/68) for Dodges.

● 1968 Mercury Montego tailpipes shouldn't be replaced just because they're flattened out just aft of the rear hanger bracket. This section of pipe is supposed to be shaped precisely that way in order to allow sufficient clearance at the frame side rails and the rear springs under full jounce and rebound conditions. ★ ★ ★

GOT A PROBLEM WITH YOUR CAR? Ask Mort about it. Send your question to Auto Clinic, Popular Mechanics, 575 Lexington Ave., New York, N.Y. 10022. Letters cannot be answered individually, but problems of general interest will be published in the column.

Spark plug advertisers go to great lengths to use race drivers.

Jim Hall went out of his way to use us.



This may surprise you.

Spark plug and automotive advertisers induce race drivers to use their products.

This is the reason you find a lot of advertising after a big race that claims several different products were responsible for a single victory.

In a way, Robert Bosch started the whole thing. In 1908, he put his newfangled

spark plugs in a Mercedes and it won the French Grand Prix. Bosch was happy. Mercedes was happy. And they let it go at that.

We haven't changed our philosophy much in 60 years. We still don't make it a project of seeking out race drivers just for the use of their names. This is why Bosch was pleased when Jim Hall, after testing many spark plugs, came to us.

So now he uses Robert Bosch plugs in the famous Chevy-powered Chaparral cars which he builds and drives. Cars that have won in competition from Nürburgring to Sebring to Riverside to Watkins Glen. And he uses them in his wife's Chevrolet—the same plugs that will give you perfect performance in your car, no matter what the make.

Next tune up, insist on Robert Bosch spark plugs. You'll get the same sparkling performance Jim Hall gets.

As for race endorsement ads, this is it. We have to get back to work.

ROBERT BOSCH CORPORATION

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People on the GO...know
Miller makes it right!

Miller Home packs are on the move... as more and more people taste and enjoy the hearty, robust flavor of Miller High Life. Taste test it yourself with a handy 6-pack of Champagne-gold cans or no-return bottles. Always right!

The Champagne of Bottle Beer



Watch It!

**Popular
Mechanics**

You're on Trooper TV



Bad-guy drivers, who put a tailgating, lane-switching show on the road find themselves performing on TV and starring in a replay for the judge

By E. D. FALES JR.

Photos by Ben Ross

A TAILGATING TRUCK DRIVER, bulldozing everyone who got in his way, forced a startled driver into a guard rail near Stamford, Conn., recently. The trucker went on his merry way, free as a bird. Nobody could prove anything.

On a New York State highway not long ago a bus was tailgating a VW at 60 mph. The bus was so close its shadow actually covered the little car. The guy driving the VW was scared silly and hailed a cop. But again nobody could prove anything. If the cop *had* nailed

him, the bus driver would simply tell the judge, "I was just waiting for a chance to pass."

Earlier this year in Chicago, a tailgater on the Eisenhower Expressway drove three feet behind one car for more than two miles. The driver of the followed car, rattled by the tailgater, sideswiped another car. Of course the tailgater drove on in blissful unconcern. And again, nothing could be proved.

But now tailgating—along with speeding, hogging the road, going too slow, driving erratically and so on—



VIDEO CAMERA CATCHES TRUCK tailgating station wagon at high speed, records it for driver and judge

can be proved. Thanks to a new weapon being tried by Connecticut State Police, nutballs may find the highway less hospitable. The weapon is videotape, and in court it provides damning evidence.

Several states are using videotape in traffic work, but its main use so far has been to record interrogation *after* an arrest, or after an accident. Connecticut is the first state to try it on actual traffic conditions.

To see the new system in action, I rode with State Police Sgt. Nelson Hurlburt in one of Connecticut's two unmarked video cars.

When Sgt. Hurlburt came by in the patrol car to pick me up, I noticed a small TV camera mounted atop the instrument panel. On the back seat was a videotape recorder and, beside it, a standard, small TV screen. On the front seat was an on-off pushbutton control cable. Around his neck, Sgt. Hurlburt was wearing a small studio-type microphone. The entire 12-volt system, which costs less than \$2000, was on and running. Sgt. Hurlburt said he usually lets the system run full-time.

"One of these tapes will run 30 minutes," he said, "and if I don't pick anything up, I just rewind it and run it through again."

I climbed in and we started out looking for trouble. The day was dark and drizzly, and I wondered whether the overcast would affect picture quality.

"Not too much," he said. "TV amplifies light. It's a lot better for our purposes than movies."

He told me he sets the camera lens opening three times a day—at dawn, at 10:00 a.m., and at dusk. Between times it adjusts automatically.

"If we go through a tunnel," he said, "the lens opens wider. In fact, if a highway is lighted, we can tape at night, too."

Even works in the dark

Even on unlighted roads TV will show taillight movements or record passing lights so that speed and recklessness can be determined later.

It was getting on toward noon when we spotted our first "case"—a speeding tailgater on the Connecticut Turnpike. He was going faster than anyone else, bullying cars right and left. Inconspicuously, two lanes over, we were getting the whole performance down on tape.

The guy would rush up behind a car and crowd its bumper, literally *intimidating* the other driver 'til he pulled over and let him by. And all this—the crowding, the switching back and forth



DRIVERS WHO BULLY MOTORISTS and get away with it better think twice in future; now there's evidence

across three lanes—at turnpike speeds.

“This guy doesn't play fair,” Hurlburt said, all the while steering with his left hand while with his right he operated the camera's small pistol grip control, swiveling the camera back and forth on its tripod mounting. The camera is always aimed at the violator, sees everything he does. And our subject was busy bullying everything in sight,

including a couple of trucks. I heard Hurlburt calling off speeds into the mike—64, 68, 76 and so on. It all went on the tape.

Suddenly there was a scream of tires. A horn blared. Trouble.

Bullyboy, blocked by one driver who refused to be intimidated, scooted by on the wrong side, running a small

(Please turn to page 201)

SURPRISED DRIVER WATCHES REPLAY of his own car bullying other cars for three miles before his arrest



A Battlewagon Returns From Mothballs

Idle since Korea, the USS *New Jersey* has been brought out of retirement. Reason: Her ability to blast targets 20 miles inland will spare pilots the risky job of dodging flak and missiles.

By **BOB ZIMMERMAN**

Photos by U.S. Navy and the San Diego Union



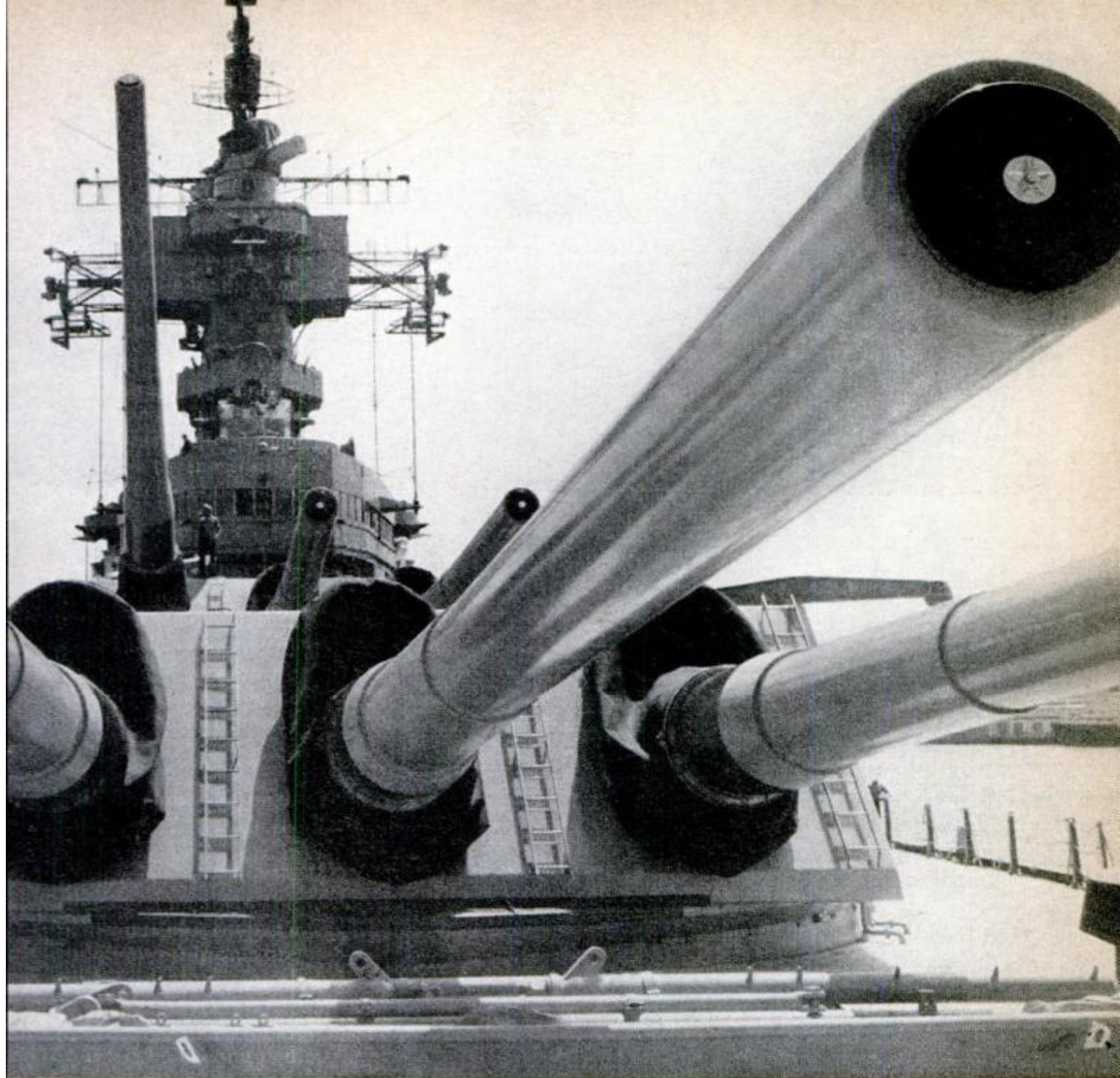
SOME WOULD SAY she belongs in a museum, along with the dodos and dinosaurs. She weighs in at 58,000 tons. Her coat of armor is 18 inches thick. Her gargantuan main turrets fire bullets as tall as a man from gun barrels 65 feet long. A seagoing behemoth—in the missile age.

I spent seven days in the Pacific aboard the recently reactivated USS *New Jersey*, and after talking with her enthusiastic crewmen and watching them breathe new, thunderous life into her long-silent guns, I came away convinced: There's at least one more war

left in that old monarch of the fleet, the battleship.

The U.S. Navy has spent \$21 million to take the 25-year-old *New Jersey* out of mothballs and prepare her for her third war. A new breed of battleship sailor has been trained to man her. The assignment: Shore bombardment and gunfire support for troops fighting a dug-in enemy along the coast of Vietnam.

The arithmetic behind this move is simple. Nine 16-inch guns make the *New Jersey* a massive, mobile artillery piece that can lob shells weighing a ton



or more at targets 20 miles inland. That's half again as far as the range of a cruiser's 8-inch guns, up to now the biggest on the line off Vietnam.

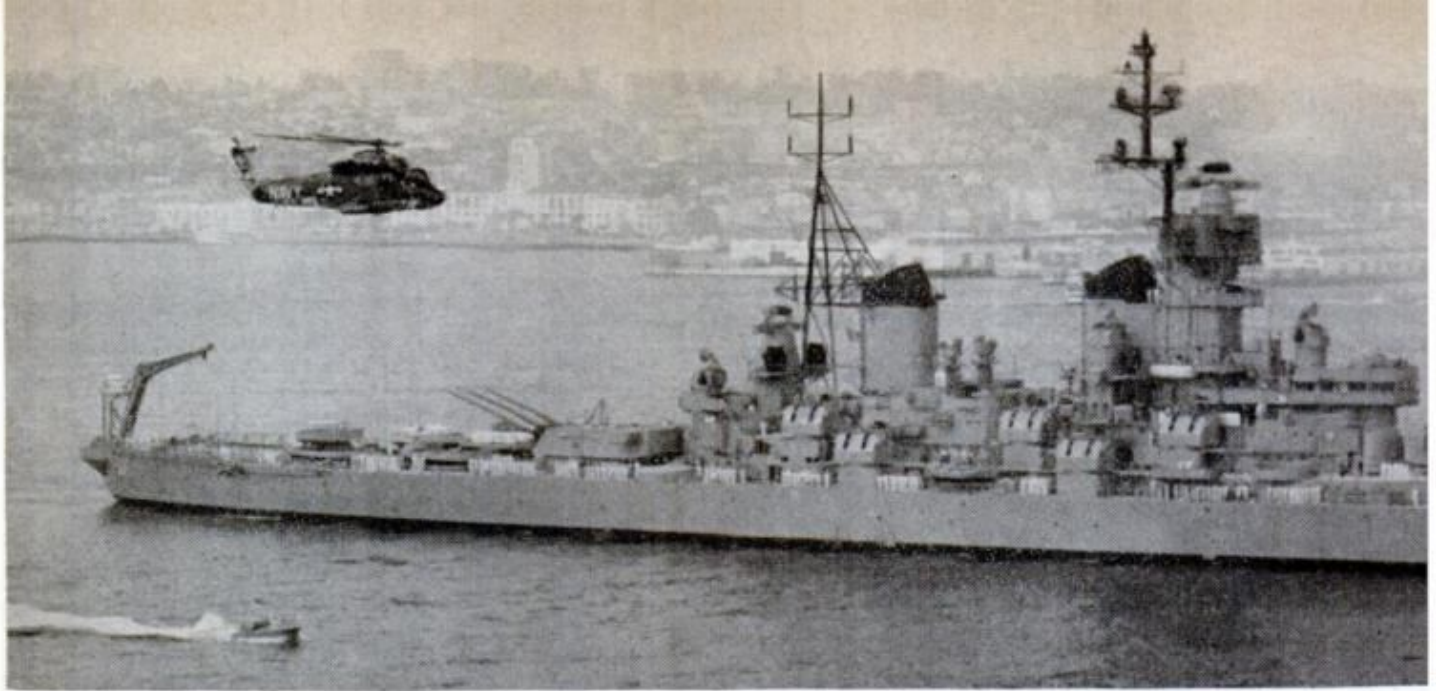
A battleship projectile, eight times heavier than the cruiser's, can penetrate more than 30 feet of reinforced concrete, or with an air burst can rain shrapnel on enemy troops in an area 200 yards wide. Broadships can sow fantastic devastation with accuracy measured in feet—in any kind of weather.

Match this capability against the only other way of hitting many heavily

defended targets—sending precious jet aircraft and even more precious pilots through a hail of flak and missiles to drop the equivalent tonnage of bombs. You get the kind of “cost effectiveness” equation they like to see in the Pentagon. That's what brought the *New Jersey* back from 11 years of retirement.

Capt. J. Edward Snyder, who began his naval career as signal officer aboard the old battleship *Pennsylvania* during World War II, is now the skipper of the *New Jersey* and a firm believer in battleship firepower.

He scoffs at the idea that the big



battlewagon is a sitting duck. "This breed of duck is one we could use more of," he says. His argument is the ship itself—no creaky veteran in spite of its age. "See for yourself," he tells the skeptics.

Come aboard the only battleship in active service in the world.

You could squeeze almost three football fields in the length of the *New Jersey*—888 feet from the high tip of her bow down the dramatic sweep of her main deck to her blunt stern. Amidships she fills out to a maximum beam of 108 feet—just the width of the Panama Canal.

You're walking on a teakwood deck, bleached almost white and scored from

countless rubdowns with "holystone." Young sailors who do the job now weren't even born when the *New Jersey* first steamed into combat in 1944.

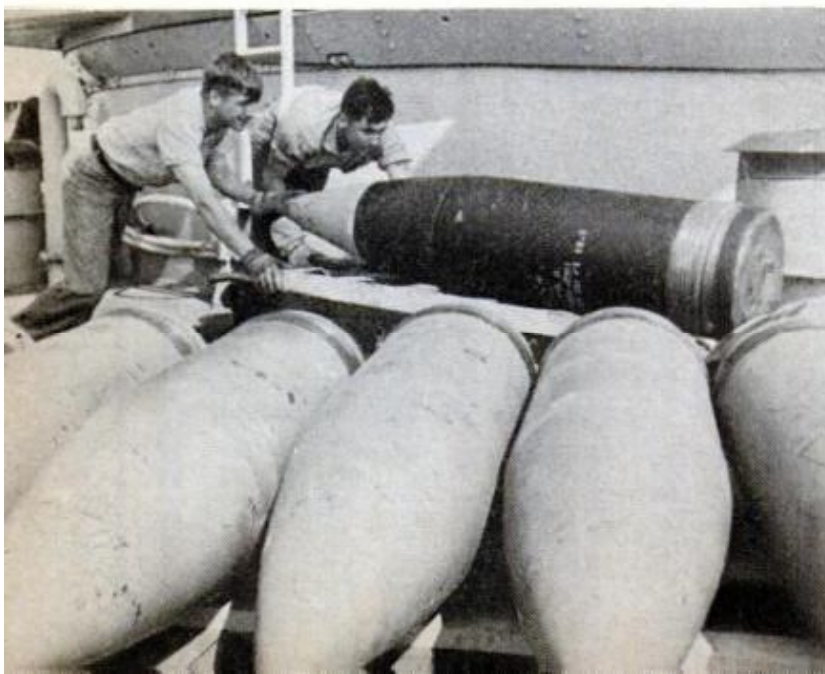
Don't let the teakwood fool you. The *New Jersey's* suit of armor begins one deck below, a shield so formidable that hatches leading to the heart of the ship have to be raised and lowered mechanically. The same steel shell extends down her flanks. "We're designed to take 10 torpedo hits simultaneously on both sides and stay afloat," says Capt. Snyder.

Down you go, ladder after ladder, through crew's quarters that were air-conditioned for the *New Jersey's* return to the fleet. Finally you're on "Broadway"—an old name that still sticks to a central passageway extending one-third the length of the ship and linking the boiler and engine rooms.

Here's where the *New Jersey* gets its go-power: eight boilers feeding steam to four engines that can send up to 212,000 hp into shafts turning four propellers, for 33-knot top speed.

But you're perspiring in the clamorous engineering spaces. The airconditioning doesn't extend down here, and the boiler crews will tell you they get used to 130° at their stations in hot weather.

HUGE SHELLS for 16-inch guns are as tall as a man and weigh 2700 pounds each. It takes six 100-pound powder bags to fire one of these projectiles to its maximum range of 23 miles





REACTIVATED SHIP *New Jersey* sails majestically past San Diego skyline, en route to Vietnam. Her 16-in. guns, bristling in silhouette, will be used to pound Vietcong entrenchments up to 20 miles inland. Old warrior, now 25 years old, was put in mothballs shortly after Korea, but looks none the worse for wear after long layup

So it's back up the ladders into the brisk breeze on the 03 level—the flag bridge. Now pause for some history. There's the same high swivel armchair where Adm. William F. (Bull) Halsey sat during some of the great battles of the Pacific war, when the *New Jersey* was his flagship. Just below is the "Halsey Suite," now empty.

The flag bridge . . . the Halsey suite . . . they're deserted now. This part of the *New Jersey* was not reactivated. And looking out over the decks you see other evidence that this battleship is something less than what it was built to be. The 40-mm antiaircraft guns that knocked kamikazes out of the sky off Okinawa—they're gone. Empty gun tubs remain, like so many kiddie-sized swimming pools.

But from up high you can see that the 40-mm cannon were popguns compared with what remains. There are two 16-inch turrets forward and one aft. Each turret with its three deadly snouts and the mechanism that feeds it weighs as much as a typical destroyer!

Its roots extend five decks below, to a powder magazine where sailors heave 100-pound, silk-wrapped bags of powder onto a "dumbwaiter" that lifts them to the gun breech. One level above, men use rope and a capstan to maneuver projectiles—they're called "bullets" here—into the cradle of a powerful hoist.

Climb into the turret and you'll know how a Lilliputian felt inspecting Gulliver's blunderbuss. The slim-nosed bullet (the biggest weighs 2700 pounds) is tipped from the hoist into a cradle and a hydraulic ram shoves it into the barrel. Then six bags of powder are shoved in behind and the breech slams shut.

Radar and electronic equipment in a plotting room elsewhere on the ship feed instructions to a chief gunner in a saddlelike seat. He turns hand-wheels to control the direction of the turret and the elevation of the barrel, and at the command of fire, squeezes a pistol-grip trigger to send more than a

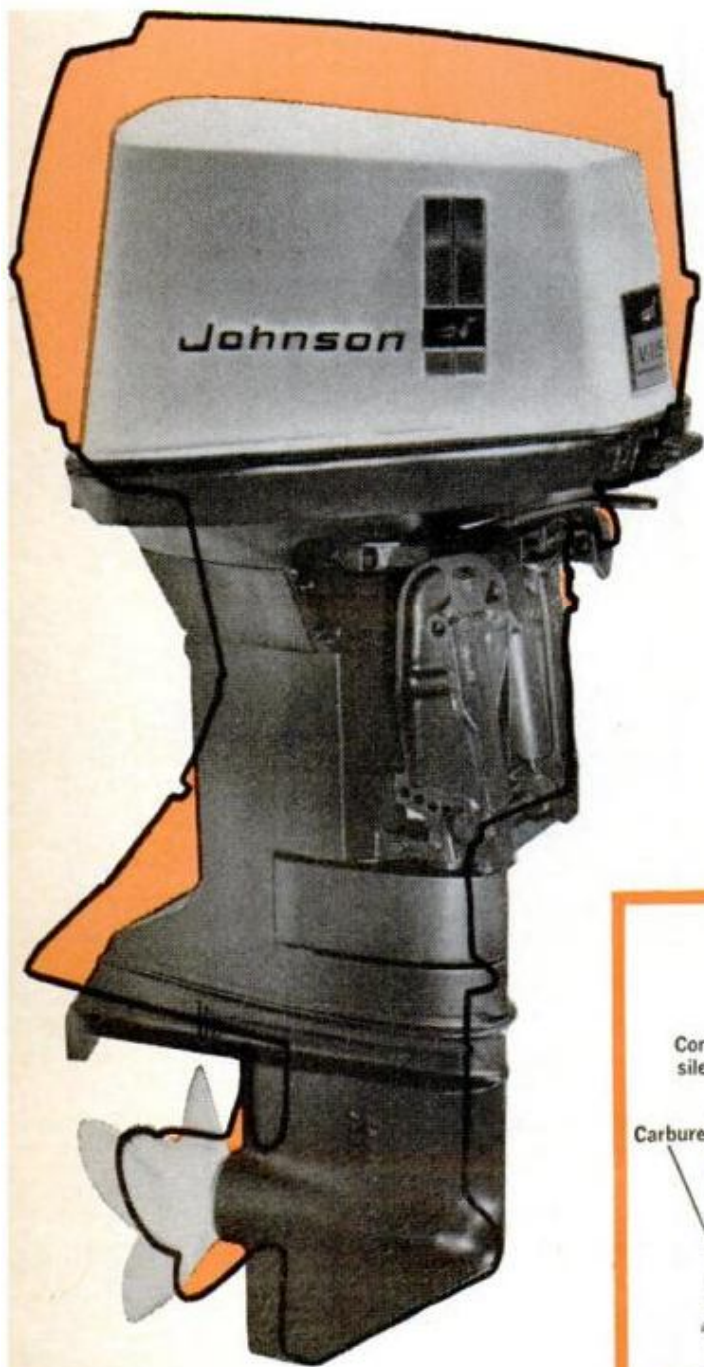
(Please turn to page 206)

QUARTERS of Adm. William F. (Bull) Halsey, former fleet commander who used *New Jersey* as his flagship during World War II, are empty out of respect. Five-star flag on wall is kept with other memorabilia



'69 OUTBOARDS

Potent Power



Smaller motors with bigger zing, better-for-the-job horsepower ratings, piston changes, metered oil—all combine to give you a wide choice in outboards this season

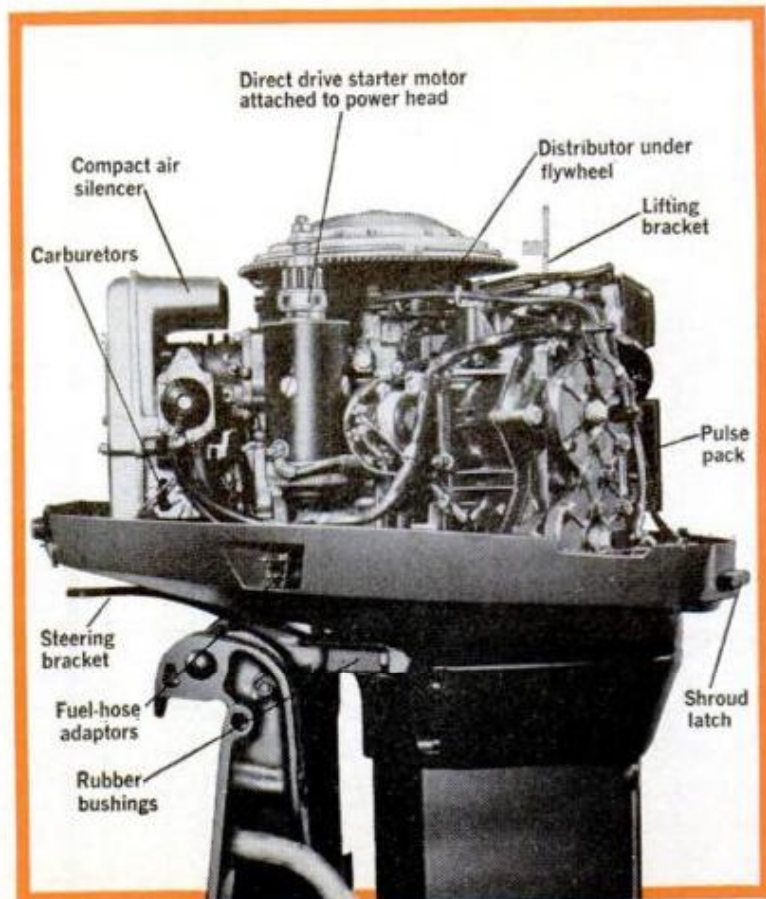
By DAN FALES, Boating Editor

ESPECIALLY in lower horsepower, outboard motors this season will have more power in smaller units. Chrysler, for example, is upping its 4.4 to 5 hp, while cutting motor weight from 49 to 48 pounds.

There are also smaller packages in the superhorsepower classes. Johnson and Evinrude are introducing 115-hp motors that are 20 percent smaller than last years' 100-hp models.

The new Evinrude 25-hp has much

COLORED AREA shows larger size of last year's 100-hp Johnson motor in a comparison with this year's more compact 115-hp model. Cutaway photo at the right shows how units are compacted around the powerhead of 115-hp motor made by Outboard Marine Corp. for Johnson and Evinrude. Attaching components directly to the head permits a smaller overall size of motor. In place of old system which provided space for powerhead movement during speedup and slow-down, OMC had to save that space and let entire motor move against bushings on transom bolts



in Pint-Size Packages

more zip than the 18-hp model, but is only 2 pounds heavier—81 pounds.

Mercury is size conscious, too, introducing a brand-new piston-cylinder design called Direct Flow. This design is incorporated in Mercury's new 80-hp motor—the most compact 80 it has ever made.

New also is Yamaha's 15-hp outboard equipped with metered oil—no need to mix gas and oil in this two-cycle motor.

Fisher-Pierce, maker of the popular Homelite 55-hp four-cycle motor, is dropping the Homelite name. From now on the 55 will be known as the Bearcat.

Seagull is boosting the power on many of its popular models and calling the line Silver Century. Brand new from Seagull is the 6½-hp Silver Century with clutch drive. Suggested price: \$265.

McCulloch isn't making any changes this year—deciding to go with the same model it had last year.

Montgomery Ward is adding a new 45-hp, while Sears is adding electric start to the 7.5 model.

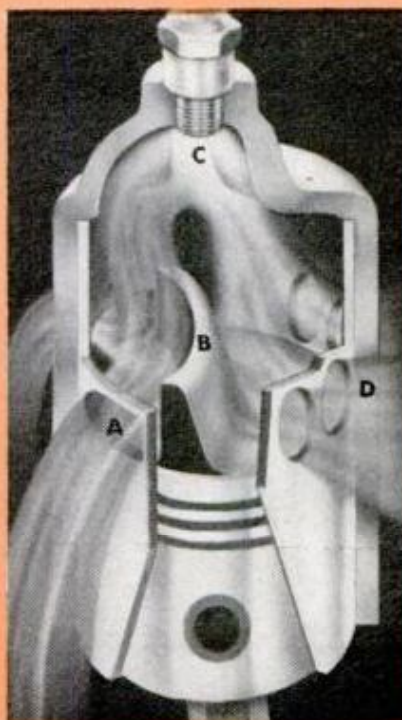
Johnson's Sea Horse line has 26 models this season in 11 horsepower classes. New are the 4-hp



EVINRUDE is adding the spiffy new 25-hp model called Sportster. This 81-pound package has enough power to handle many of your big-power needs for fishing or zipping around lakes just for the fun of it



Mercury's Direct Flow



During operation of Mercury's new 80-hp model a fresh fuel-air charge travels through a transfer passage in engine block and enters cylinders through the intake ports (A). The split-air charge meets and is deflected upward by new piston head (B). Converging streams travel a precise course to top of chamber (C) and then down sloping side of deflector, effectively scavenging spent grease from previous stroke out through four exhaust ports (D).

and 25-hp. Though the 115-hp and the 85-hp are not new for Johnson, they now come in new packages smaller than last year's 100-hp—which has been discontinued. The 115-hp has an upper unit shorter by $2\frac{3}{8}$ inches, lower by $2\frac{1}{2}$ and lighter by 20 pounds. than the 100. This space is saved by a new design. Now items like the starter motor and distributor are attached directly to the power head. (Note caption on page 92.)

Last year's 115-hp was a GT model used strictly for racing. Johnson's changed that, making the new V-115 a family-use motor that's fully guaranteed.

Sister to the V-115 is the 85-hp. The V-85 is the same motor as the V-115 with less displacement. While the V-115 has 96.1 cubic inches, the V-85 has 92.6 cubic inches. The price is different, too—\$1450 for the V-115; \$1300 for the V-85 (f.o.b. Waukegan, Ill.). Both motors have larger displacement than last year's models.

While beefing up the high-powered models, Johnson has dropped the 65-hp,

improved on the popular loop-charged 55-hp, the 40-hp and the 33-hp.

Brand new to the line is the Sea-Horse 25. This 25-hp model with 22-cubic-inch engine weighs 81 pounds. It's made for fishermen who want power to push a large skiff across lakes. The 25, with weedless prop, has a suggested price of \$510.

The Sea-Horse 20 has a weedless prop this year, too.

Johnson has restyled the 6-hp model, dropped the 5-hp and 3-hp models, and added the 4-hp. This new motor is also for fishermen.

Johnson has also improved the very popular $1\frac{1}{2}$ -hp trolling motor.

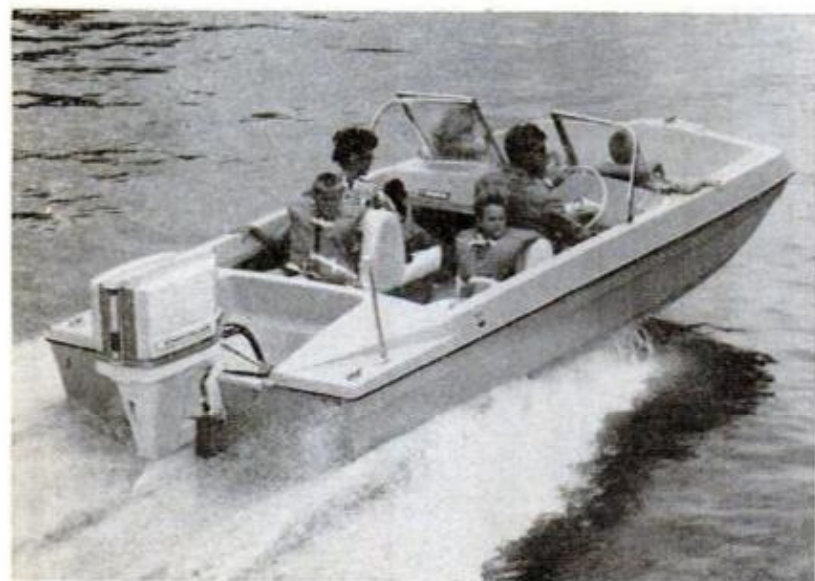
Mercury is introducing what it calls "a revolutionary means of charging the cylinders." This system is exclusive in a brand-new 80-hp outboard. This addition to the Mercury series has a four-in-line powerhead which develops 80 hp with only 66.6-cubic-inch displacement. This makes for a very compact 80-hp motor.

Mercury's new Direct Flow scavenging system takes the

(Please turn to page 212)



TWO NEW OUTBOARDS developed this year by Chrysler: a low-profile 7-hp model (right) and a three-cylinder 70-hp motor (below), the latter shown on one of Chrysler's new boats to be introduced for the '69 season. The 70 is a smaller horsepower version of the three-cylinder 85-hp Chrysler motor



SEAGULL is introducing its new Silver Century line, topped by this $6\frac{1}{2}$ -hp model with clutch drive. Silver Century motors will have 25 percent more power than the regular Century models



POPULAR MECHANICS

ALL THE OUTBOARDS FOR 1969

Hp	Cylinders	Weight	Bore & Stroke	Displacement	Starting
CHRYSLER					
105	4	248 lbs.	3.312" x 2.800"	96.55 cu. in.	electric
85	3	221 lbs.	3.312" x 2.800"	72.39 cu. in.	electric
70	3	221 lbs.	3.312" x 2.800"	72.39 cu. in.	electric
55	2	140 lbs.	3.187" x 2.800"	44.7 cu. in.	electric
45	2	127 lbs.	3.125" x 2.750"	42.18 cu. in.	manual*
35	2	127 lbs.	3.000" x 2.540"	35.9 cu. in.	manual*
20	2	79 lbs.	2.437" x 2.140"	19.96 cu. in.	manual*
9.9	2	56 lbs.	2.187" x 1.750"	13.15 cu. in.	manual**
7	2	49 lbs.	2.000" x 1.625"	10.2 cu. in.	manual
5	2	47 lbs.	1.875" x 1.625"	8.99 cu. in.	manual
3.5	1	29 lbs.	2.062" x 1.562"	5.18 cu. in.	manual
* Electric model available			** Autoelectric model available		
EVINRUDE					
115	4	245 lbs.	3.438" x 2.588"	96.1 cu. in.	electric
85	4	245 lbs.	3.375" x 2.588"	92.6 cu. in.	electric
55	3	197 lbs.	3" x 2-11/32"	49.7 cu. in.	electric
40	2	156 lbs.	3-3/16" x 2-3/4"	43.9 cu. in.	electric*
33	2	140 lbs.	3-1/16" x 2-3/4"	40.5 cu. in.	electric*
25	2	81 lbs.	2 1/2" x 2 1/4"	22.0 cu. in.	manual**
18	2	80 lbs.	2 1/2" x 2 1/4"	22.0 cu. in.	manual**
9 1/2	2	60 lbs.	2-5/16" x 1-13/16"	15.2 cu. in.	manual
6	2	51 lbs.	1-15/16" x 1 1/2"	8.84 cu. in.	manual
4	2	35 lbs.	1-9/16" x 1 3/8"	5.28 cu. in.	manual
1 1/2	1	20 lbs.	1-9/16" x 1 3/8"	2.64 cu. in.	manual
* Also available with manual starting			** Also available with electric starting		
FISHER-PIERCE					
55*	4	239 lbs.	2.75" x 2.50"	59.4 cu. in.	electric
* Four-cycle engine, the only such outboard available in the United States today					
JOHNSON					
115	4	245 lbs.	3.438" x 2.588"	96.1 cu. in.	electric
85	4	245 lbs.	3.375" x 2.588"	92.6 cu. in.	electric
55	3	197 lbs.	3" x 2-11/32"	49.7 cu. in.	electric
40	2	156 lbs.	3-3/16" x 2-3/4"	43.9 cu. in.	electric*
33	2	140 lbs.	3-1/16" x 2-3/4"	40.5 cu. in.	electric*
25	2	81 lbs.	2 1/2" x 2 1/4"	22.0 cu. in.	manual**
20	2	80 lbs.	2 1/2" x 2 1/4"	22.0 cu. in.	manual**
9 1/2	2	60 lbs.	2-5/16" x 1-13/16"	15.2 cu. in.	manual
6	2	51 lbs.	1-15/16" x 1 1/2"	8.84 cu. in.	manual
4	2	35 lbs.	1-9/16" x 1 3/8"	5.28 cu. in.	manual
1 1/2	1	20 lbs.	1-9/16" x 1 3/8"	2.64 cu. in.	manual
* Manual starting also available			** Electric starting also available		
MCCULLOCH					
75	3	196 lbs.	3 1/8" x 2-3/4"	63.3 cu. in.	electric
45	2	145 lbs.	3 1/8" x 2-3/4"	42.2 cu. in.	electric
9	2	48 lbs.	1-15/16" x 1-45/64"	10 cu. in.	manual*
7 1/2	2	39 lbs.	1-15/16" x 1-45/64"	10 cu. in.	manual*
4	1	37 lbs.	2 1/8" x 1 1/2"	5.3 cu. in.	manual
* Electric model also available					
MERCURY					
125	6	—	2 7/8" x 2-9/16"	99.812 cu. in.	electric
100	6	—	2 7/8" x 2-3/10"	89.587 cu. in.	electric
80	4	—	2 7/8" x 2-9/16"	66.6 cu. in.	electric
65	4	—	2-15/16" x 2-3/10"	62.35 cu. in.	electric*
50	4	—	2-9/16" x 2 1/4"	43.837 cu. in.	electric**
35	2	—	3" x 2-3/10"	32.516 cu. in.	manual**
20	2	—	2-9/16" x 2 1/8"	21.918 cu. in.	manual**
9.8	2	—	2" x 1-3/4"	11.000 cu. in.	manual
7.5	2	—	2" x 1-3/4"	11.000 cu. in.	manual
4	1	—	2" x 1-3/4"	5.5 cu. in.	manual
* Manual-starting model also available			** Electric starting also available		
MONTGOMERY WARD					
80	4	242 lbs.	3 1/8" x 2-3/4"	84.36 cu. in.	electric
55	2	153 lbs.	3-3/16" x 2-8/10"	44.7 cu. in.	electric
45	2	145 lbs.	3 1/8" x 2-3/4"	42.18 cu. in.	electric
35	2	145 lbs.	3" x 2.54"	35.9 cu. in.	electric
20	2	73 lbs.	2.44" x 2.14"	19.9 cu. in.	manual
9.2	2	56 lbs.	2 1/8" x 1-11/16"	11.97 cu. in.	manual
6	2	55 lbs.	2" x 1-11/16"	10.6 cu. in.	manual
3 1/2	1	29 lbs.	2-1/16" x 1-9/16"	5.18 cu. in.	manual
SEAGULL					
6 1/2*	1	37 lbs.	2.244" x 1.575"	6.1 cu. in.	manual
5*	1	37 lbs.	2.244" x 1.575"	6.1 cu. in.	manual
4**	1	34 lbs.	2.244" x 1.575"	6.1 cu. in.	manual
3**	1	28 lbs.	1.772" x 1.575"	3.8 cu. in.	manual
2**	1	26 lbs.	1.772" x 1.575"	3.8 cu. in.	manual
* Clutch			** Available in Silver Century model which is 25% more powerful		
SEARS					
75	3	196 lbs.	3 1/8" x 2-3/4"	63.27 cu. in.	electric
45	2	145 lbs.	3 1/8" x 2-3/4"	42.18 cu. in.	electric
28	2	102 lbs.	2-51/64" x 2-7/16"	29.97 cu. in.	electric
14	2	82 lbs.	2 1/4" x 2-1/8"	16.4 cu. in.	manual
9	2	49 lbs.	1-15/16" x 1-45/64"	10 cu. in.	manual*
7.5	2	42 lbs.	1-15/16" x 1-45/64"	10 cu. in.	manual*
4	1	37 lbs.	2.125" x 1.5"	5.3 cu. in.	manual
* Electric model also available					
YAMAHA					
15*	2	—	—	—	manual
7.5*	2	59 lbs.	2.13" x 2.13"	7.5 cu. in.	manual
5*	2	49 lbs.	1.97" x 1.85"	5.6 cu. in.	manual
3.5*	2	35 lbs.	1.77" x 1.57"	3.84 cu. in.	manual
* Metered oil					

THE '69 CARS

By **BILL KILPATRICK**, Auto Editor

Photography by Jeannie Weaver

GADGETS AND GIMMICKS, some for real, some for fun—but all aimed at pushing sales—are the big Detroit news for '69.

Pontiac's Grand Prix (described in the *Personal Cars* section) is the industry's only really new car. There are some safety modifications and innovations and some minor engineering "improvements." But the trump cards automakers will play to woo you into the showrooms add up to variations on performance (spelled S-P-E-E-D), appearance, comfort and convenience.

Perhaps even better than he realized, Ford Div. headman John B. Naughton, summarized his fellow manufacturers' 1969 offerings when, speaking of Ford's, he said, "We've got a basketful of goodies second to none in the industry."

Being heavily hawked are such things as wider rear-view mirrors, wipers that clear more windshield area, belted, wide-tread tires, hood scoops, trim stripes, hotter engines, a sliding roof panel (Now *there's* a novel idea), relocated door-lock buttons, and on and on. Some make sense, some nonsense.

One that makes sense is the "guard rail" General Motors features on its bigger cars. It looks like a section of typical steel highway guard rail mounted inside door panels, to protect occupants in broadside collisions.

Another that makes sense is called Super-Lite, a low-beam supplement developed by Sylvania and available as an option on the Dodge Polara and Monaco. Consisting of a single high-intensity lamp mounted in the grille, Super-Lite casts a narrow beam of light to the right, illuminating the infamous gloom between high and low beams. It's nonglaring.

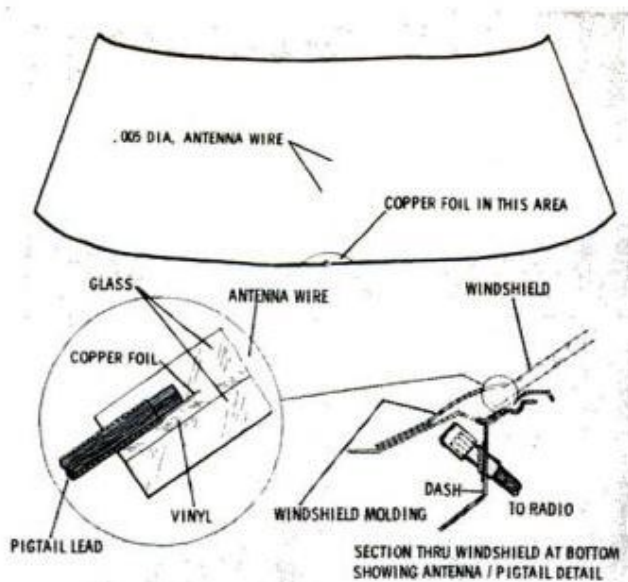
Ford is featuring what it calls an "S" frame, the front side members of which curve outwards to help soak up impact forces. This makes sense, too. So does the optional antiskid device Ford is introducing this year on the Lincoln Mark III and the Thunderbird.

As of Jan. 1, Big Brother demands front-seat headrests on all new cars. Manufacturers started off the model year with them in certain cars. The ones I've seen so far are hard, bulky and can restrict vision somewhat. I think there just *has* to be a better solution to the entire problem, but I'm personally delighted Detroit is finally admitting its shiny beauties *can* be improved from the view of safety.

GM is offering ignition locks mounted on steering columns. In the "Off" position, keys removed, the column is locked and the car can't be steered. It's an old idea that may make car theft a bit more difficult.

Dodge this year is offering as an option a seat that can be mechanically adjusted for height. Hooray! At last! Only every manufacturer should have it (soon will, hopefully) and it shouldn't be an option, but as basic to car seats as fore and aft adjustment.

Chrysler and Ford station wagons offer what may prove a useful idea. Via a sort of "spoiler" at the back of the roof, air is deflected down over the rear window, the thought being the wrinkle will keep the window clean.



PONTIAC'S NEW GRAND PRIX has radio antenna concealed in windshield. Wire is .005-in. diameter

The relocated door-lock buttons mentioned earlier are situated about midway on the upper sill, meaning you won't have to spring a shoulder or get a crick in your neck twisting around to lock the door from inside. It seems obvious and long overdue, but we'll take anything we can get.

What we *are* going to get whether we like it or not are higher prices. Altruism is not the name of Detroit's game, and that "basketful of goodies" referred to by Ford's Naughton is going to cost money—*yours*. As this is being written (early August), automakers have been reluctant to discuss just how much they plan to tag onto car prices. Industry observer estimates (an editorial euphemism meaning my own estimate) are bandying about figures from \$35 to \$125. Anyhow, know your new car is going to cost you more.

In general, what you'll get for what you'll pay is about what you got last year, the year before, and presumably will get next year—that is, a basically sound overall concept that may or may not be worth its price, that may or may not—depending upon initial workmanship, dealer service, economy, and so on—be a delight to own and operate. The '69 cars *are* nice, *are* good, *are* in theory better than they have ever been. Individual dogs, however, can give the entire pack a bad name. Nothing can

assuage the outrage of a man who has had a sad experience with a new car.

Detroit knows it, too. Witness the second thoughts regarding warranties. Automakers, believers in their own stars, are appalled at the mounting pile of warranty claims. The warranty idea has proved more trouble and expense than it's worth. The subject is up in the air, so when and if you go to buy a new car, realize there have been some warranty changes made.

Another thing you should realize is that the auto business is changing by the minute, more so now than ever. In many respects, the manufacturers have created a marketing monster even *they* are finding difficult to control.

Perhaps the best example of this took place last summer at a press preview of '69 cars. A prominent industry marketing executive was speaking.

"This beautiful new car," he was saying, pride in his voice as he pointed

DODGE'S NEW SUPER-LITE, mounted halfway up left side of grille, is option on Polara, Monaco, beams light to right side of road, illuminates critical area between low and high beams, does not glare in eyes of oncoming driver. The idea works very well



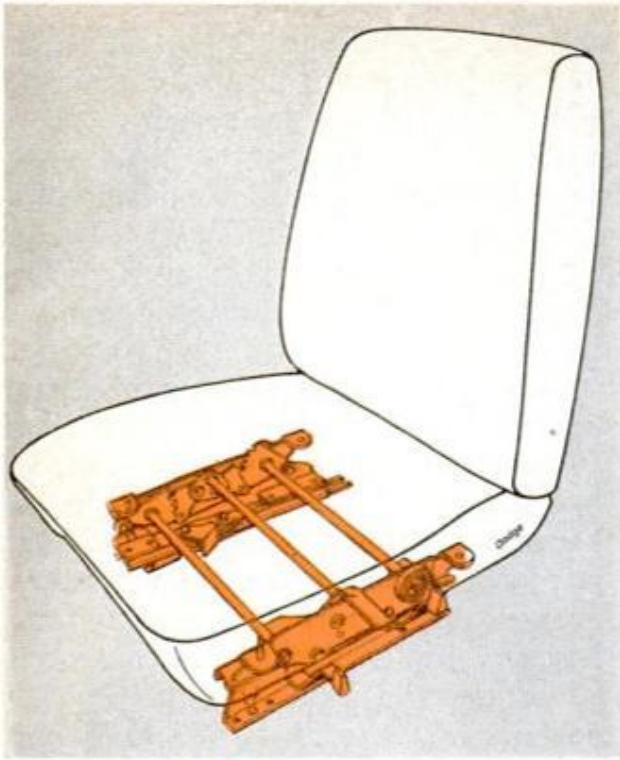
HIGH



LOW + SUPER-LITE



LOW



DODGE manually operated seat adjusts height, too. Front lever is horizontal adjustment, rear vertical

at a spotlighted and sparkling example of Detroit's consumer-awareness, "is aimed squarely at the upper premium segment of the medium-priced field."

I nearly fell off my chair. What kind of mumbo-jumbo was *this*? Is there a *middle* or *lower* premium segment of the medium priced field?

Yep. The speaker knew exactly what he meant. So did every other auto man in the room. He had summed up a car market that has become so "fractionalized"—to quote a Ford executive—it's becoming ever more difficult to pigeonhole industry production in

PONTIAC GRAND PRIX options include a wired rear window that provides quick defogging, ice removal



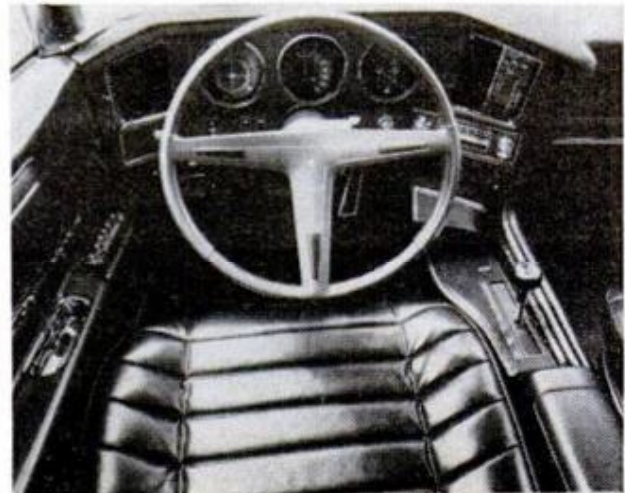
clearly defined marketing categories. Thus automakers, faced with a self-created maze of options within models within series within lines within makes, have had to resort to a "fractionalized" lingo just to keep track of things.

But what about you, the poor buyer? Must you master the tongue in order to make an intelligent buying choice? You can't, for example, just go in and order, say, a Chevy, period; you have to choose between 35 models within seven distinct product lines. Is it any wonder you don't know exactly *what* to buy? As a result, you buy *something* and tell yourself you like it and have done well, but it's touch and go there for awhile, isn't it? Yet industry executives claim *you* are the culprit.

'Tain't so. Their good eye on the money machine, they've created this mutual monster by covering all conceivable market bases so thoroughly they're hard-pressed to find a niche into which they can introduce anything really new. Your attention, therefore, must be attracted by a plethora of gadgets and gimmicks. And as mentioned, '69 looks like a vintage year.

Is this bad? Not really, I suppose. Just thoughtless. Each year automakers crank out still another version of a worn-out theme postpones the day we—you, me, the industry—must grow up regarding automobiles and face the tremendous social and economic problems we've let them become. ★★★

COCKPIT of new Grand Prix resembles just that—a cockpit—typifies industry's new dash panel designs





BUICK LESABRE, billed as standard-size value leader, has a new grille, side-body accent line of two elements

Family Cars: '69

Size up, market down

THE
'69
CARS

ONE OF THESE DAYS we may witness the end-of-the-line for the traditional, full-size family car.

Current manufacturer marketing philosophies and buyer preferences are fragmenting the market, giving greater and certainly louder emphasis to intermediates, the personal/specialty field, and all-out luxury cars. As a result, sales of what used to be "the only game in town" are falling off.

Is this a good thing? Well, to a man who lives and works in, say, traffic-clogged New York City, perhaps yes; to a man who appreciates a few more inches of, say, rear-seat legroom, but can't (or won't) pop for a luxury job, perhaps no. In any event—death watch or no—carmakers are enthusiastically (albeit more quietly) pumping new styling

and engineering life into their heretofore most profitable, thus most venerable idea—a car designed for the entire family. On tap for '69: **AMERICAN MOTORS:** Styling changes fore and aft mark the new Ambassador. There's new front-end sheet

metal, a new grille and bumper, new taillights, a new deck lid, new rear quarter-panel caps. I think the car is better looking than it has been in recent years. Wheelbase and overall length are up four inches, front and rear tracks widened two inches. You can get a plain Ambassador four-door, a four-door or two-door hardtop and station wagon in either the DPL or the SST. Airconditioning is again standard.

Check this one out. It's worth a look.

PONTIAC CATALINA, here in Ventura option, highlights split bumper look





MERCURY MARAUDER X-100 is new this year, features tunneled back-light in a styling mix of semi-fast-back, hardtop themes. Entire rear deck is in matte black, giving car unique look, may be hard to clean

THE '69 CARS

BUICK: That Li'l Ol' Phrasemaker is back in business, this time at Buick. He assures me the styling on the '69 Wildcat will "excite the most jaded individual." No chance. While I'm far from jaded, neither the Wildcat nor the lower-priced LeSabre caused jumps for joy. They're both nice cars, both

look very much like they did last year. Grilles have been changed, and that single, flowing sideline along the body broken up into two elements. Interior trims have been juggled around, as has ornamentation. Buick says suspensions have been improved to provide "the best directional stability ever experience in an automobile." The Phrasemaker apparently has never driven, say, a

BMW, and he can't always find the letter "d" on the keyboard. Wonder where he'll be working next year? **CHEVROLET:** Consistently leading the sales race, Chevy's back in the pack when it comes to new styling for 1969. Changes on the Caprice, Impala, Bel Air and Biscayne are few and far from obvious. Grilles have been slightly altered, there's a new front bumper, and

DODGE POLARA has new grille, new exterior lines, new taillight styling. Available only on Polara and Monaco this year is Super-Lite, an auxiliary system that illuminates area between high, low beam lights



PLYMOUTH FURY is longer overall, wider, has a one-inch longer wheelbase, a new grille, more interior room





FORD XL, with LTD, is at top of Ford's full-size line, features luxury options, minor styling changes



CHEVROLET CAPRICE heads full-size line of 11 models including Impala, Bel Air, Biscayne. Overall length is up 1 in. throughout line. Car still has 119-in. wheelbase. Styling changes are minor, with concealed headlights, special grille available only on Caprice. Included in Impala series is a hot SS 427 powered by 390-hp, 427-cu.-in. V8

AMC AMBASSADOR this year is all-new, features new grille, fenders, hood, rear-end styling. Additional features include 122-in. wheelbase, up 4 in. over '68, and 4-in. boost in overall length to 206 in. Car is available in seven models, three series—Ambassador, DPL, SST. Wagons are available as DPL and SST



CHRYSLER NEWPORT is up 5 in. overall to 224 in. for '69, as is entire full-size line. Grilles have been slightly modified, dimensions of interiors, exteriors increased. Hidden headlights on 300 feature a manually operated fail-safe setup for emergencies. On Newport, 383-cu.-in. V8 is standard, a big 440 standard on the 300 and New Yorker

FAMILY CARS—HOW THEY COMPARE

Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (Ambassador)	122.0	60.0/60.0	206.5	77.2	232-6-2bbl., 290-2bbl., 343-2&4bbl., 390-4bbl.
Buick (Wildcat, LeSabre)	123.2	63.44/63.00 (Wildcat) 63.0/63.0 (Le Sabre)	218.5	79.5	350-2&4bbl., 430-4bbl.
Chevrolet (Biscayne, Bel Air, Impala, SS427, Caprice)	119.0	62.5/62.4	215.9	79.8	250-6-1bbl., 327-2bbl., 350-4bbl., 396-2bbl., 427-4bbl.
Chrysler (Newport, Custom, 300, New Yorker)	123.5	62.1/60.7	224.7	79.0 79.1 (4dr.)	383-2&4bbl., 440-4bbl.
Dodge (Polara, Monaco)	122.0	62.1/60.7	220.8	79.3	318-2bbl., 383-2&4bbl., 440-4bbl.
Ford (Custom, 500, LTD, XL, Galaxie 500)	121.0	63.0/64.0	214.0	79.4 79.8 (4dr.)	240-6-1bbl., 302-2bbl., 390-2bbl., 429-2&4bbl.
Mercury (Monterey, Custom) (Marquis, Brougham)	121.0 124.0	63.0/64.0 63.0/64.0	218.0 224.3	79.8 79.8	390-2bbl. (reg. or prem. fuel), 429-2&4bbl.
Oldsmobile (Delta 88, Custom, Royale)	124.0	62.5/63.0	218.6	79.9	350-2bbl., 455-2&4bbl.
Pontiac (Catalina, Ventura) (Executive, Bonneville, Brougham)	122.0 125.0	64.0/64.0 64.0/64.0	217.5 223.5 (Executive) 224.0 (Bonneville, Brougham)	79.8 79.8	400-2bbl. (reg. or prem. fuel), 428-4bbl.
Plymouth (Fury I, II, III, Sport, VIP)	120.0	62.1/60.7	214.5	79.6	225-6-1bbl., 318-2bbl., 383-2&4bbl., 440-4bbl.

*Not all engines available in all models

rectangular taillights have been incorporated in the rear bumper. There's a new instrument panel and a new two-spoke steering wheel, plus 13 new exterior colors. A lot of things—according to Chevy—have been “improved,” or made “wider, smoother, quieter, richer,” and so on, all of which is probably true. What the cars are, however, are Chevrolets. And that ain't bad.

CHRYSLER: Overall length of the Newport, Newport Custom, 300 and New Yorker is up five inches over last year to 224.7. Wheelbase remains 124 inches. Dimensions inside are up, too, the result being a roomier, more comfortable car all-'round. There are new grilles, new looped, “wraparound” bumpers in front, new concealed windshield wipers, and a new taillight arrangement. Standard power on the Newport and Custom is a 383-

cu.-in. V8, with Chrysler's 440 as the option. The 440 is standard on the 300 and the New Yorker with a higher performance option of the same engine available to muscle enthusiasts.

I think Chrysler's coming on.

DODGE: The Polara and the top-of-the-line Monaco have been completely re-

styled for '69, but the changes are subtle and general as opposed to startling and specific. The car offers a lower, rounded, more aerodynamic appearance emphasized inside by new interior layouts featuring “cockpit” dash panels. Throughout the line there's a strong hint of Charger, i.e.,

(Please turn to page 216)

OLDSMOBILE DELTA “88” retains a by-now-traditional Olds grille theme





MERCURY CYCLONE CJ features minimum trim, blacked-out grille, hood scoops, is all "go" with 428 engine

Intermediates:

THE
'69
CARS

Where buyer action is

CRYSTAL BALL genius isn't needed to figure out at least three big reasons why intermediates are the fastest-growing segment of the auto business.

One, they're big enough for family use, yet small enough to provide a "personal"-car feeling. Two, they're priced right. Three, the wide range of available power and other options make them the most flexible cars on the market.

Intermediates are locked in a neck-and-neck sales race with standard, family-size cars, each type grabbing off approximately 25 percent of the market. Auto men, cautious to a fault at times, confidently expect intermediates to pull ahead in the coming year. A few, speaking privately, predict that within five years, inter-

mediates will represent between 40 and 50 percent of the market. It could happen.

Here's what manufacturers are entering in the 1969 sales battle:

AMERICAN MOTORS: Changes on the new Rebel and its companion SST are minor. There's a new grille, new wraparound taillight assembly, new deck lid, new instrument panel, and new trim and ornamentation changes. Front and rear tracks have been upped from 59 to 60 inches, but all other dimensions—both inside and out—have been carried over. The 550 and 770 model designations have been dropped, as have all AMC convertibles. You can get the Rebel in a four-door sedan, a two-door hardtop and a station wagon. Same with the SST. The 232-cu.-in. Six is the

standard engine, a 290 V8 and 343 V8 optional. The manual transmission is a column-mounted three-speed. The automatic is called Shift-Command.

BUICK: Offered here are the Special Deluxe, GS 350, Skylark, Skylark Custom, GS 400 and Sport Wagon. In the two-door coupes and convertibles, the wheelbase is 112 inches, carried over from last year. In the four-door sedans, hardtops and Special Deluxe wagons, the wheelbase is 116 inches, also carried over. In the Sport Wagon, it's 121 inches.

Styling changes include new grilles and trim and ornamentation changes, plus revamped interiors. The GS series features a distinct grille, also functional hood air scoops that stuff cool air directly into the carburetor. A 250-cu.-in. Six is standard on the Special Deluxe and Skylark, a 350 V8 on the Special Deluxe wagon, Skylark Custom and GS 350, and a 400 V8 on the GS 400 and Sport Wagon 400.

CHEVROLET: Two series here—the Malibu and 300

INTERMEDIATE



OLDS 4-4-2 for '69 gets an appearance change via altered hood, grille, bold lettering, hood paint stripes

AMC REBEL has dropped 550, 770 series designations this year, will offer three models—two-door hard-top, four-door sedan, station wagon—in Rebel and Rebel SST series. Front and rear track have been increased almost 2 in. for what AMC says is a smoother, quieter ride



PLYMOUTH BELVEDERE series includes Belvedere, Sports Satellite, GTX, Road Runner, the RR also as convertible



THE
'69
CARS

INTERMEDIATES—HOW THEY COMPARE

Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (Rebel)	114.0	60.0/60.0	197.0	77.2	232-6-1&2bbl., 290-2bbl., 343-2&4bbl.
Buick (Special Deluxe, GS350, Skylark, GS400)	112 (2dr.) 116 (4dr.)	59.0/59.0 (2&4dr.GS350) 59.4/59.0 (GS400)	200.7 (2dr.) 204.7 (4dr.) 202.0 (GS Models)	75.6	250-6-1bbl., 350-2&4bbl., 400-4bbl.
Chevrolet (Chevelle, Concours, SS396, Malibu, 300 Deluxe)	112 (coupe & convert.) 116 (sedan)	59.0/59.0	196.9 (coupe & convert.) 200.9 (sedan)	76.0	230-6-1bbl., 250-6-1bbl., 307-2bbl., 350-4bbl., 396-4bbl.
Dodge (Coronet Deluxe, 440, 500, Super Bee)	117	59.5/58.5	206.6	76.7	225-6-1bbl., 318-2bbl., 383-2&4bbl., 426(2)4bbl., 440-4bbl.
Ford (Fairlane, 500, Cobra, Torino, Torino GT)	116.0	58.8/58.5	201.1	74.6 (2dr.) 74.8 (4dr.)	250-6-1bbl., 302-2bbl., 351-2&4bbl., 390-4bbl., 427-4bbl., 428-4bbl. and 4bbl. with Ram Air
Mercury (Comet, Montego, MX, Brougham, Cyclone, CJ)	116.0	58.8/58.5	206.2 (2dr. & 4dr.) 203.2 (fastback)	76.0	250-6-1bbl., 302-2bbl., 351-2&4bbl., 390-4bbl., 427-4bbl., 428-4bbl.
Oldsmobile (F-85, 4-4-2) (Cutlass, Supreme)	112.0 116.0	59.0/59.0 59.0/59.0	201.9 205.9	76.2 76.8	250-6-1bbl., 350-2&4bbl., 400-4bbl.
Plymouth (Belvedere, Satellite) (Road Runner, Sport Satellite, GTX)	116	59.5/58.5 59.5/59.2	202.7	76.4	225-6-1bbl., 318-2bbl., 383-2&4bbl., 426-(2)4bbl., 440-4bbl.
Pontiac (Tempest, Custom, LeMans)	116.0 112.0 (coupe & convert.)	61.0/60.0	205.5 201.5 (coupe & convert.)	75.8	250-0HC6-1&4bbl., 350-2&4bbl.
(GTO)	112.0	61.0/60.0	201.5	75.8	400-2&4bbl.

*Not all engines available in all models

Deluxe. In Malibu, you can get a sport coupe, a sport sedan, a four-door sedan and a convertible; in the 300 Deluxe, a coupe, sport coupe and four-door sedan. Available only on the Mali-

bu sport sedan is a dressy Concours option consisting of special trim and appointments. On the Malibu sport coupe and convertible, and on the 300 Deluxe coupe and sport coupe, you can

order an SS 396 option consisting of special trim and ornamentation, a black-accented grille, a twin-domed hood, and a 396-cu.-in. V8 of either 325 or 350 hp.

With the exception of a new grille and restyled bumpers and taillights, exterior appearance changes are few and minor. Inside, there's new trim, a new instrument cluster, a new two-spoke steering wheel.

DODGE: Exterior changes are minor, the main ones being a new grille and taillight treatment. Dodge's intermediates—called Coronets—are offered as a Deluxe, a

(Please turn to page 218)

PONTIAC GTO carries over its energy-absorbing rubberized front bumper





PONTIAC FIREBIRD features a new grille, front bumper extensions made of energy-absorbing polymeric plastic

Personal Cars:

High style combined with speed 'n' sport

THE
'69
CARS

AUTOMOTIVE PUNDIT David E. Davis Jr. once said something to the effect that when a man buys a car, he makes a public statement about himself.

Perhaps with the exception of out-and-out sports or specialty cars, nowhere is Mr. Davis more on the money than in the category of so-called "personal" cars—cars in which utility is played down, mild self-aggrandizement played up. Cars of this type are highly visible ornaments that tell it like their owners earnestly hope it is—that by own-

ing and driving such a car it's obvious they're the tuned-in people of our times.

Delusion or not, the type is a howling success, its sales in both stripped-down and all-out luxury versions accounting for about 25 percent of the market.

In previous years we've confined the personal car category to the sporty compacts—Mustang, Camaro, et al. But if you pay attention to the ads, you'll note that the Buick Riviera, say, is heralded in essentially the same terms as, say, AMC's

Javelin. Both are sold with the implied promise that plunking your money down for a car of this type will immediately unlock the gates of paradise and social equality and acceptance.

Thus a teen-ager behind the wheel of a hot Mustang is heedless of failing grades and acne, and an aging sport tooling his Toronado or Thunderbird up to the country club veranda is every bit the man he always was. Beautiful.

On tap for the new model year . . .

AMERICAN MOTORS: Two cars here—Javelin and AMX, the former a four-seater, the latter, two.

Javelin was all-new last year and is carried over pretty much as is for '69. There's new ornamentation, new trim, a new grab handle on the dash above the glove compartment. There's also a new floor-mounted



BUICK RIVIERA features slightly altered grille, new hood ornament, modifications of side marker lamps and backup lamps. Choice on inside trim is widest in Riviera history. For '69, car retains its appeal to both high style and a luxury feel, accounted for in part by completely restyled interiors. Buick claims to have given car "more drama." What?

PLYMOUTH BARRACUDA is available in three body styles—a hardtop, a fastback and a convertible. There are slight changes front and rear, new taillight styling, new accent striping. New for '69 is the 'Cuda, a stripped-down performance model featuring standard 275-hp engine



AMC JAVELIN retains last year's styling features, adds new emblem, ornamentation changes. Also new is floor-mounted three-speed on both the standard 232 Six and 290 V8. Other V8 engines for Javelin include 225, 280 and 315-hp. Car is hot performer in high-hp versions

DODGE CHARGER is little changed for '69, offers slight grille restyling, new taillight treatment, interiors



OLDS TORONADO is up almost 4 in. in overall length this year, features a restyled rear end. Optional is an electrically heated backlight defogging system. Relocated is the driver's ashtray, and there's a new rotary latch on the glove-box door. Interiors have been revised. Olds claims ride has been improved at no sacrifice of car's unique handling

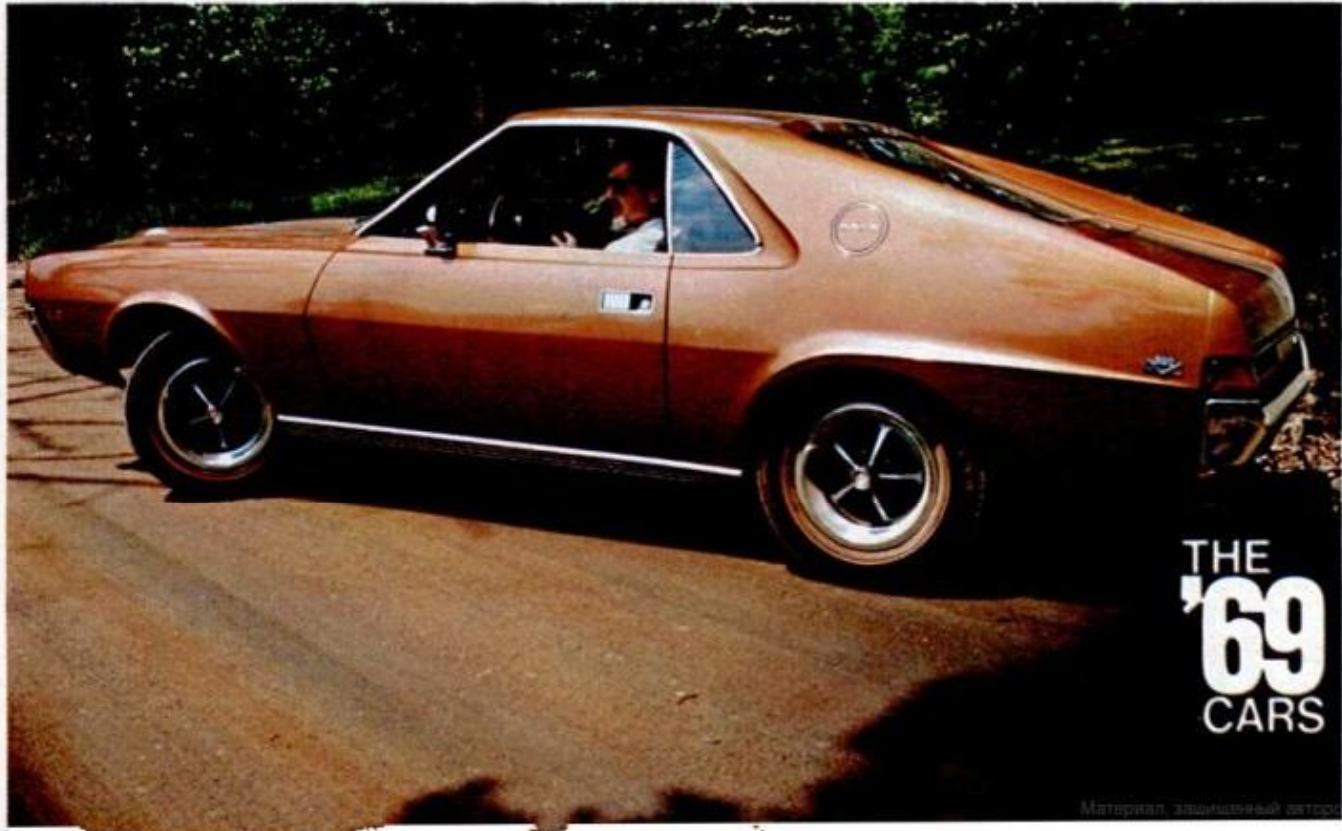


FORD MUSTANG for '69 features two new models—a fastback called Mach 1, and a hardtop called Grande. New styling includes grille, taillamps, ornamentation. Interior dimensions have increased. Also new, high-performance 428 engine

CHEVROLET CAMARO features all-new grille, bumper, parking lights, is slightly over 1 in. longer, wider overall. SS shown here has 300-hp V8 as standard engine, with a 325 as optional. Four-wheel discs are available on all models, as is new rubberized-plastic resilient bumper



AMC AMX preserves the status quo this year, being virtually unchanged, remains an absolute delight to drive



THE '69 CARS

THE '69 CARS

three-speed synchromesh transmission that replaces 1968's column-mounted three-speed. It's standard overall.

Engines range from a 232-cu.-in. Six to a 390 V8. In addition to the transmission mentioned above, you can get four-on-the-floor or an automatic.

The car is available only as a two-door sports coupe in either the plain Javelin or dolled-up SST versions. Either way it's a supple, tidy package.

Even less has been done to the AMX. About all there is outside is an increase from two to five of color choices for the over-the-top racing stripe. Inside you'll find a 140-mph speedometer (a little optimistic, I'd say) and a new 8-8000-rpm tach, both of which are standard. There's new trim and new carpeting.

The standard AMX engine is a 290-cu.-in. V8, with a 343 and 390 V8 available as options, all of which can be ordered with either a four-on-the-floor manual or an automatic. The one available body style is a two-door hardtop coupe.

BUICK: The Riviera is the entry here, and an enduring one it is, too, having been on the market since 1963. Over the years it hasn't changed too much, the theory presumably being that there's no need to mess with a good thing. I'd have to agree; it's a striking-looking car.

This year Buick claims to have given the car more "drama" (whatever that means) via a new grille and hood-top ornament. Could be. In any event, there are new side-marker lamps up

front, new back-up lamps incorporated in the rear bumper.

Inside you'll find new trim in a wide choice of materials and colors. You'll also find a new console featuring a side-mounted transmission shift lever that stays below the top of the console during operation.

Important but out of sight is a new electric fuel pump located in the gas tank. It feeds the carburetor under pressure, helps cut down on engine stalling and acceleration lag.

There's one engine—a 430-cu.-in. 4-bbl. V8—and one transmission—a three-speed automatic.

CHEVROLET: Again we have two cars—Corvette and Camaro.

Camaro, although up almost two inches in overall length and width, hasn't been fussed with too much. There's a new grille, some new sheet metal, new bumpers and parking lights, a new instrument panel and steering wheel, new rear panel and taillight styling. Otherwise things look about the same. You can still get all kinds of trim options—bumblebee stripes, fender stripes, and so on. A special grille featuring hidden headlights is available in the Rally Sport option. An option I really like is four-wheel power disc brakes, available on all Camaros. Hear! Hear!

The car comes as either a two-door sports coupe or a convertible. Bucket seats are standard.

Engines include a 230-cu.-in. Six, a 250 Six, a 327 V8, two 350 V8s (one of 255 hp, one 300), and a 396 V8. The 300-hp 350 and the 396 are available only in the SS Camaro. Transmissions

include two three-speed and one four-speed manuals and three automatics.

The Camaro's a lovely little car, but finding your way through the labyrinth of model variations, engines, transmissions and options requires study.

The Corvette comes as either a coupe or convertible, the latter with either a folding rag top or removable hardtop (you can even get both if you want 'em). The car was strikingly new last year and looks about the same this year. There's a new black grille, some new taillight and back-up light styling, new interior trim, new built-in headlight washers, some fractional changes in length, width, track. But that's about it.

Engines start with a 300-hp 350-cu.-in. V8, end with a 435-hp 427. This last one is out of sight, as you'll be the moment you tromp on it. In between are a 350 of 350 hp, and two 427s of 390 and 400 hp. Transmission choices include a manual three-speed, a manual four-speed and an automatic.

In all, a boss car.

DODGE: Okay, I admit the Charger is an intermediate, but the Dodge Boys are pushing it like a Walter Mitty Special, and that's why it's here and not there.

The car was new and handsome last year and it's just as handsome this year, changes being strictly minor. There's the usual "new" grille and some new taillight treatment. Interiors have been revamped, including an optional "Special Edition" decor package featuring wood grain dash panel inserts, leather bucket seats, a wood grain steering wheel and special exterior ornamentation.

PERSONAL CARS—HOW THEY COMPARE

Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (AMX) (Javelin)	97.0	58.4/57.0	177.2	71.6	290-4bbl., 343-4bbl., 390-4bbl.
Buick (Riviera)	109.0	57.9/57.0	189.2	71.9	232-6-1bbl., 290-2&4bbl., 343-4bbl., 390-4bbl.
Chevrolet (Camaro)	119.0	63.44/63.00	215.3	79.2	430-4bbl.
(Corvette)	108.0	59.6/59.5	186.0	74.0	230-6-1bbl., 250-6-1bbl., 327-2bbl., 350-4bbl., 396-4bbl.
Ford (Mustang)	98.0	58.7/59.4	182.5	69.0	350-4bbl., 427-(1)4bbl., or (3)2bbl.
	108.0	58.5/58.5	187.4	71.3	200-6-1bbl., 250-6-1bbl., 302-2bbl., 351-2&4bbl., 390-4bbl., 428-4bbl. & 4bbl. with Ram Air
				(Hdtop, Convert.)	
				71.8	
				(2+2)	
(Thunderbird)	115	62/62	206.9	77.3	429-4bbl.
	(2dr.)		(2dr.)		
	117		209.4		
	(4dr.)		(4dr.)		
Mercury (Cougar)	111.1	58.5/58.5	193.8	74.2	351-2&4bbl., 390-4bbl., 428-4bbl. & 4bbl. with Ram Air
Oldsmobile (Toronado)	119.0	63.5/63.0	214.8	78.8	455-4bbl.
Plymouth (Barracuda)	108.0	57.7/55.6	192.8	69.6	225-6-1bbl., 318-2bbl., 340-4bbl., 383-4bbl.
Pontiac (Firebird)	108	60/60	191.1	73.9	250-0HC6-1&4bbl., 350-2&4bbl., 400-4bbl.
(Grand Prix)	118	62/60	210.2	75.7	400-2&4bbl., 428-4bbl.

*Not all engines available in all models

The car is available as a Charger, period, or in a beefed-up R/T version. The only body style is a two-door sports hardtop.

Engine choices range from the standard 230-hp, 318-cu.-in. V8 to two optional 383 V8s—one 290 hp, the other 330—on the plain Charger. On the R/T, the 375-hp 440 Magnum is standard, the 425-hp 426 Hemi optional. Transmissions include a manual three-speed, a manual four-speed and an automatic.

When this restyled Charger was introduced last year, Dodge figured to sell about 35,000. Instead, well over 80,000 were sold. It's easy to see why—it's a stopper.

FORD: Again two cars, this time Mustang and Thunderbird. The T-bird first.

Styling changes are slight. There's a recognizably new grille, new bumper, tail and back-up light treatment. Also, there have been some

minor ornamentation changes.

The big T-bird news involves much improved handling and braking. I've never been a devotee of the car, largely because I thought both inadequate for its power and weight. But this new one may convert me. While no Mustang on a handling course, it doesn't wander all over the lot as it once did. And it stops. Huzzah!

The usual plethora of plush options prevails, of course, including a new, electric-powered sliding sun roof, a new "Headlight On" light and warning buzzer, and a new electrically heated rear window for fast snow and ice removal and defogging.

Models available include a two-door hardtop and a two or four-door landau. The standard engine on the T-bird is a 429-cu.-in. V8. It's the only one you can get. The only available

transmission is an automatic.

There are two new Mustangs, one aimed at performance, the other at luxury. An all-out muscle car is the new Mach I 2+2 fastback. The luxury entry is called the Grande Hardtop.

Although still on a 108-in. wheelbase, all Mustangs are almost four inches longer overall. Overall height has been lowered, too. The result, while still very much Mustang, is a somewhat more sleek appearance. There's a revised grille and revamped taillights and ornamentation. Inside is more room and a new instrument panel.

Mustangs come in five models—two hardtops (including the Grande), two fastbacks (including the Mach I), and a convertible. Both fastbacks are dubbed 2+2.

Mach I is an impressive
(Please turn to page 220)

PERSONAL



FORD THUNDERBIRD features optional all-metal, electrically powered sun roof, electrically heated backlight. Grille has been changed; handling, braking much improved. Car is somewhat lower in two-door hardtop and landau. Another option is warning light-buzzer telling driver headlights are still on

CHEVROLET CORVETTE is offered in two models—coupe and convertible, latter being available with either folding top or removable hardtop at no extra cost. Changes for '69 are minor, include restyled interiors, slight trim variations. A 350-cu.-in. V8 is standard this year. You can get a 435-hp, 427-cu.-in. mill; if you do, hold onto your hat



MERCURY COUGAR adds a convertible this year, has upped overall length nearly 4 in., overall width almost 3 in. Car is also lower, affords increased luggage, fuel capacity. Front-end styling treatment is new as is side body sculpturing. Car's available in standard or XR-7 types. Windows are ventless

PONTIAC GRAND PRIX, the auto industry's only all-new car this year, is built on General Motors' new "G" body



IT'S A TEMPTATION to be glib about luxury cars. More often than not, one would guess, they are bought as status symbols, and as such—in these egalitarian times of ours—are prime targets for whatever envious barbs the have-nots choose to hurl.

But to niggle over these opulent behemoths is to deny them due respect for what they are as opposed to what they represent. What they represent is money, displayed right out there for all to see. What they are are big, powerful, plush, comfortable automobiles. And it is as such, I think, they should be viewed.

Keeping this in mind, it would be tough to find fault with Detroit's luxury offerings for 1969. They remain all they've traditionally professed to be, affording those who buy them most of whatever it is owning and driving such a car has to offer.

Other than the new Imperial by Chrysler, there are no extensive styling changes. Radical innovations in this class of cars are—in general—rare, the idea being that at these prices this year's status shouldn't become next year's stigma. Grilles have been altered a bit here and there, interiors made even more luxurious, mechanical refinements incorporated, and the list of available options seems to proliferate like crabgrass. But real revolution in the luxury-car field is as unthinkable as it presumably would be in the Houses of Parliament.

BUICK: Side body line curve in the Electra 225 has been reduced somewhat, giving the car a longer look. Interiors have been restyled and there's an all-new dash panel featuring what Buick



OLDS "98" this year plainly indicates a strong Cadillac styling influence

Luxury Cars: '69

THE CARS

Just bring lots of money



CHRYSLER IMPERIAL, handsomely restyled, should be highly competitive

LINCOLN CONTINENTAL MARK III remains virtually unchanged—all luxury





BUICK ELECTRA 225 appears longer and lower thanks to less curve in uninterrupted side body crease line

THE '69 CARS

calls "upper level ventilation," regrouped instruments and controls, and a larger glove compartment. In the Limited, top of the Electra line, the front-seat armrest has been offset left to allocate 40 percent of the seating space to the driver, 60 percent to the passenger(s). The setup works, being extremely comfortable and reducing lateral driver movement at critical control times. Both sections of the seat are adjustable and power options are available. The new seat is standard on the Limited, an option on the Electra Custom.

Power for all Electras is carried over from last year—a 430-cu.-in. V8 with a single four-barrel carburetor. The only transmission available is GM's new three-speed automatic called the Turbo-Hydramatic 400.

CADILLAC: Again this year I didn't get to drive any of the new Cadillacs; my schedule never seems to jibe with theirs (which may be telling me something about myself I'd just as soon not know). Also, we didn't get to photograph any of them, the prototypes not being ready in time to make *PM's* deadline.

The car is available in three series—Calais, DeVille and Fleetwood, the latter including the front-drive Eldorado. You can get a coupe or hardtop sedan in the Calais, a coupe, convertible, sedan and hardtop in the DeVille, and, in addition to the Eldorado, a Sixty Special, Brougham, Seventy-five sedan and Seventy-five limousine in the Fleetwood. Power up and down the line is the 472-cu.-in. V8 introduced last year, and the aforementioned GM Turbo-Hydramatic 400 automatic transmission is standard on all cars.

Hood length is up over two inches and grilles have been restyled. In back are new vertical taillamps incorporating stop, turn signal, emergency flasher and back-up lights. Rear bumpers have been restyled, as have dash panels. Front-wheel disc brakes are standard, as are power windows and head restraints.

You get a lot to like in "The Standard of the World"—quality, enduring style and value, plus the personal satisfaction of knowing you've "arrived."

CHRYSLER: They've finally restyled the Imperial, doing away entirely with what I've always felt was

the "trying too hard" look of the past few years. The new Imperial is sleek, tasteful, eye-catching. Fore and aft, it has been completely redone. Overall length is up five inches, while the 127-inch wheelbase has been carried over. The result is a long, low, graceful-looking car that for the first time in years is competitive in style with Cadillac and Lincoln. The car is available as a Crown four-door sedan, a LeBaron two-door and four-door hardtop. Headlights are concealed. So are windshield wipers. There's a new dash panel featuring ultraviolet floodlighting of instruments. Power remains the 440-cu.-in. V8 and the transmission is automatic.

If, as a cherished Detroit maxim goes, styling sells cars, Imperial should have a good year. In any event, the car's appeal within an admittedly narrow market should be much broader.

LINCOLN: Two cars here—the Mark III and the "plain" Continental. The Mark III was introduced earlier this year and is carried over as is, meaning a plush two-door coupe that strives to combine the concept of a personal car with all-out luxury. Whether or not the idea is a success is in the

LUXURY CARS—HOW THEY COMPARE

Car	Wheel-base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	V8 Engines in Model(s) Series (Displacement, cu. in.—carburetion)
Buick (Electra 225)	126.2	63.44/63.00	224.9	79.5	430-4bbl.
Cadillac (Eldorado)	120.0	63.5/63.0	221.0	79.9	472-4bbl.
(Calais, DeVille)	129.5	63.0/63.0	225.0	79.9	
(Brougham, Sixty Spec.)	133.0		228.5	79.9	
(Seventy-five)	149.8		245.5	79.9	
Chrysler (Imperial)	127.0	62.4/61.1	229.7	79.2	440-4bbl.
Lincoln (Mark III)	117.2	62.0/62.0	216.1	79.4	460-4bbl.
(Continental)	126.0	62.1/61.0	224.2	79.7	
Oldsmobile ("98")	127.0	62.5/63.0	224.4	80.0	455-4bbl.

eye of the beholder. The "plain" (blasphemy!) Continental features a new grille that really sets the car off from its immediate predecessors. It's still distinctly Continental, however. Overall length is up three inches in both the four-door sedan and the two-door coupe. Power is a big 460-cu.-in. V8 of 365 hp, the same engine that debuted in the Mark III. Transmissions are automatic throughout.

Ford knows I'm not nuts about the Mark III, but I think the regular Continental is handsome.

OLDSMOBILE: Long known as a "baby Cadillac," the '69 Olds "98" does nothing to discourage the impression. To the contrary—with the exception of a by-now-almost-traditional Olds grille—the car looks more like a Cadillac than ever, complete with an Eldorado-ish, sharply creased hood. The front

part of the rear fender has been peaked and accented, which—combined with a slightly longer overall length and wheelbase—gives the car a long, low look. Interiors are posh and tasty, as is the case with all Olds cars. Power is a carried-over 455-cu.-in. V8, the transmission automatic. You can get three four-door sedans, a hardtop sedan, a coupe and convertible.

—Bill Kilpatrick

LINCOLN CONTINENTAL features newly styled grille that's different, at same time resembles recent models





PLYMOUTH VALIANT, offered in 100, Signet series, features new grille

Compacts:

Good size, good sense

THE
'69
CARS



CHEVROLET NOVA SS with optional 300-hp V8 is potent performance car

DODGE SWINGER is a new stark Dart offered as a low-priced muscle car



YOU'LL NEED a sharp eye and lots of car know-how to detect changes in the '69 compacts. There aren't many, and what changes have been made are elusive.

Still, in my book, anyway, compacts as offered by U.S. manufacturers add up to good buys. I think they make sense as to size, economy of operation and dollar-for-dollar value.

True, compacts in general—unless they bear an exotic-sounding foreign name (and in fact *are* imports)—don't do much for the ego. And true, they tend to drop dead on the resale or trade-in market. But these "drawbacks" are more a matter of human folly than an adverse reflection on the cars themselves.

When you come right down to it, all you're getting for more money when you buy a larger car is more of what compacts offer as a minimum; i.e., they, too, start, stop, cruise at 85 mph, carry in reasonable comfort a driver and one or more passengers, plus a fair amount of attendant luggage. All they really lack, I gather, is prestige.

Note we've said nothing about compacts as being fun to drive. They can be. In their warmer versions, such as AMC's Rogue or Dodge's new Dart Swinger, they can approach performance levels to gratify all but the most jaded enthusiasts.

So why don't more people buy 'em? Beats me. But then I thought *A Hard Day's Night* was bad Keystone Cops.

Anyway, here's how the new compacts stack up:

CORVAIR: Chevy's minimal offering is rapidly taking on the attributes of a hardy

perennial. Despite troubles in court, a concerted attack led by Ralph Nader (God's last angry man?), and a ho-hum attitude on the part of car buyers, the Corvaire blooms every fall, looking pretty much as it always does—neat and tidy.

There's nothing new outside. Interior trim has been changed slightly. The Monza is offered as a sport coupe or a convertible, the 500 as a sport coupe only. A single 164-cu.-in. engine is offered in three versions—95, 110, and 140 hp. Transmissions can be either three-speed, four-speed, or Powerglide automatic.

DART: As mentioned above, new this year is something called "The Swinger," a low-priced muscle car aimed at the kid market. The car is available only as a two-door hardtop and only in a bright, day-glo-ish red. The "Swinger 340," powered by a 340-cu.-in. engine and equipped with four-on-the-floor, dual exhausts, wide tires, and stiff suspension, is what the kids would call "tough." For those of voting age and more, there's the plain Dart, a new Dart Cus-



CHEVROLET CORVAIRE, offered as Monza and 500, is a holdover from '68



FORD FALCON, little changed from last year, retains purposeful look

tom (replacing the 270 series), the GT, and the GTS (for Sport), each of which does its own thing very well. What does its own thing very, *very* well is a GTS that for the first time can be equipped with Mopar's 383 Magnum engine.

Don't look for two-door sedans. There aren't any. You'll notice a slightly al-

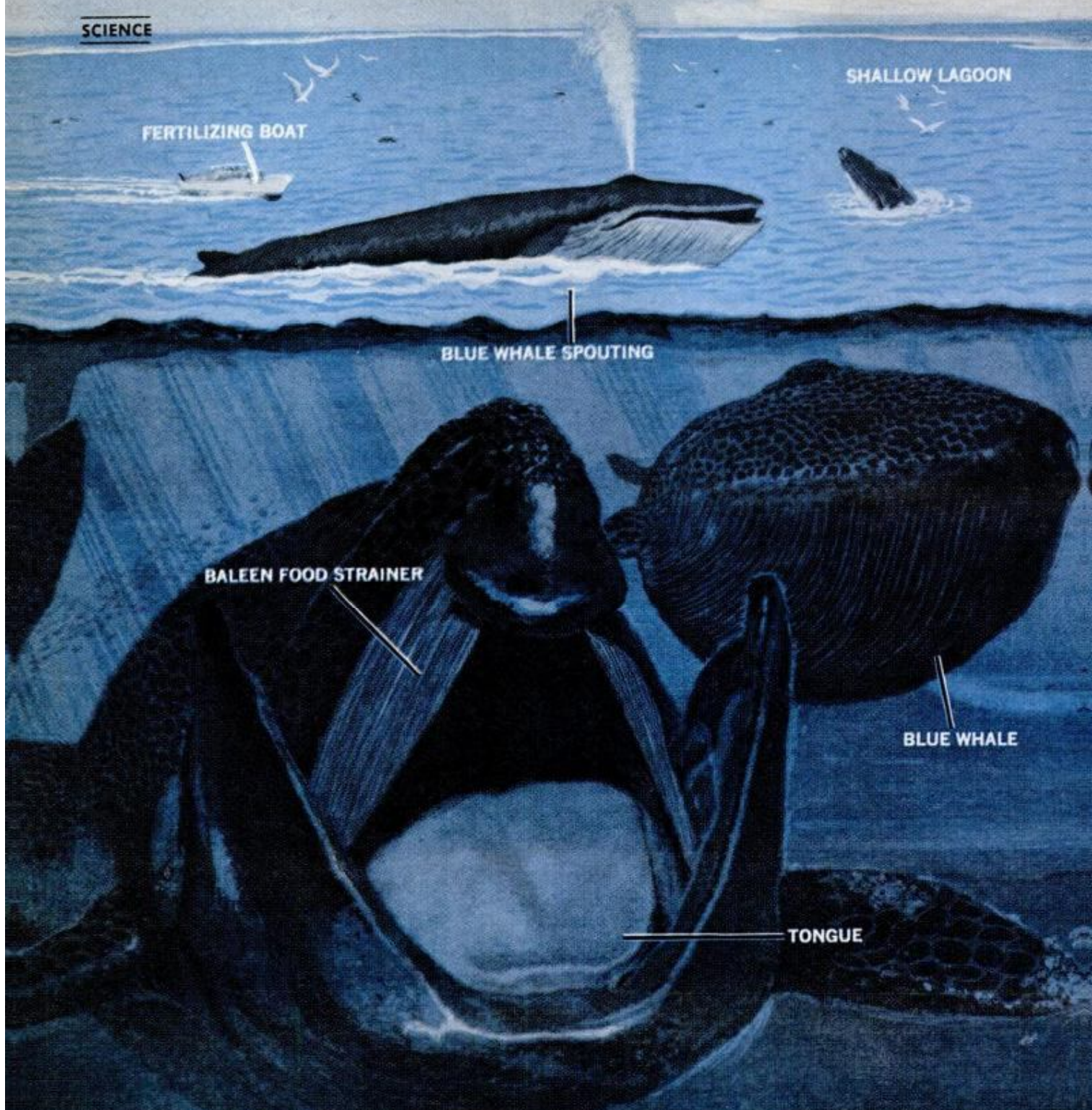
tered grille, a different headlamp setup, and a few interior trim changes. But that's about it.

FALCON: As near as I can make out by poring over the promotional literature, and from what I saw and experienced driving the car early this past summer, Falcon's biggest news this year has to do with differently

(Please turn to page 222)

AMC RAMBLER is offered as base Rambler, Rambler 440, Rambler Rogue. The name "American" has been dropped



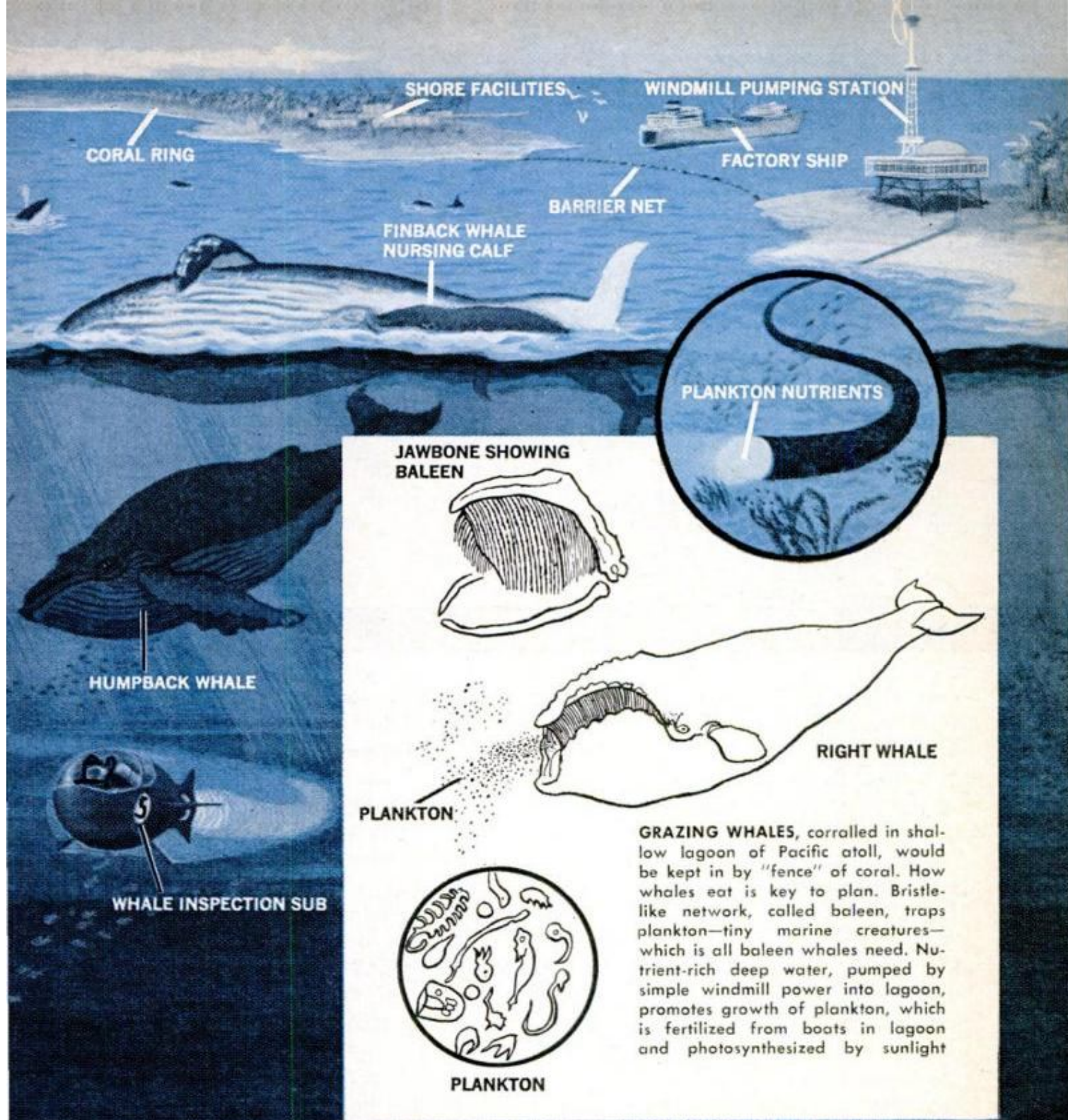


WHALE FARMING IN A CORAL CORRAL

Man has domesticated other animals. Why not the largest one of all?

By KEVIN V. BROWN

Illustrations by Miller Pope



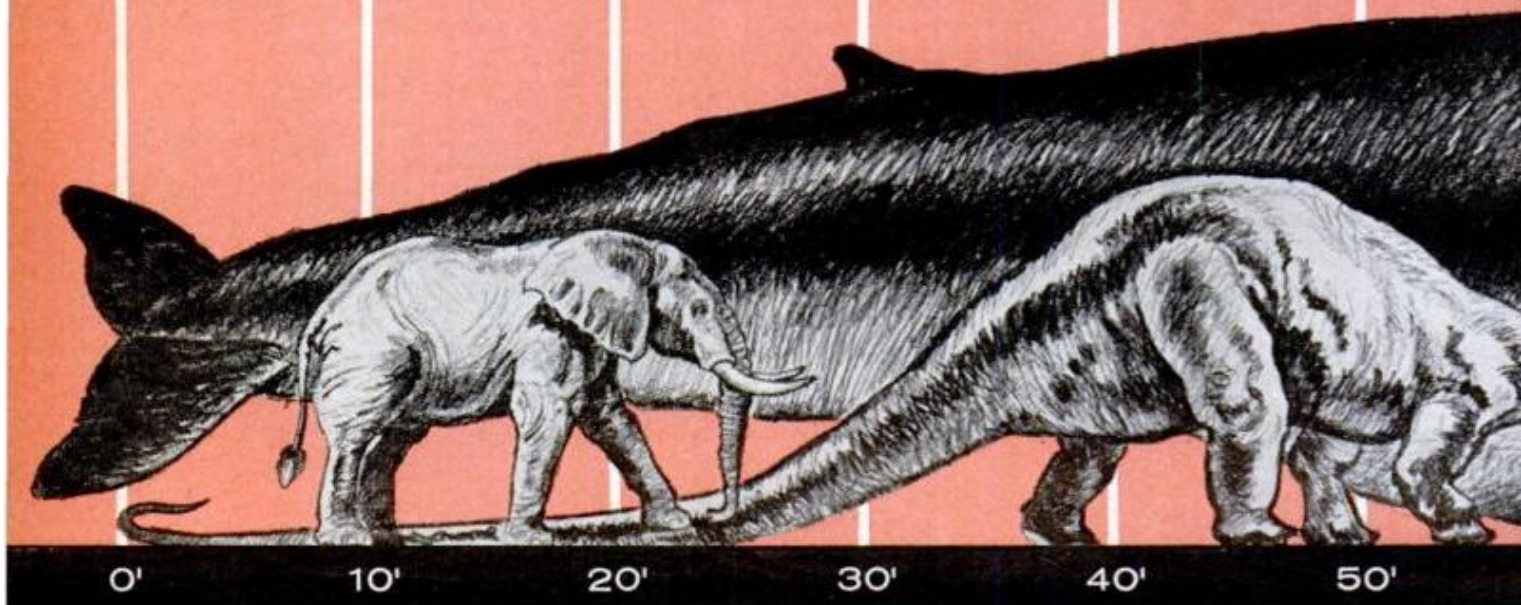
GRAZING WHALES, corralled in shallow lagoon of Pacific atoll, would be kept in by "fence" of coral. How whales eat is key to plan. Bristle-like network, called baleen, traps plankton—tiny marine creatures—which is all baleen whales need. Nutrient-rich deep water, pumped by simple windmill power into lagoon, promotes growth of plankton, which is fertilized from boats in lagoon and photosynthesized by sunlight

HOW DO YOU LIKE your whale steak—rare or well done? You may have a chance to find out. If so, your choice cut may someday come from a whale "farm" far out in the Pacific Ocean where the mighty mammals could be bred and fattened up for eating in much the same way that cattlemen raise beef on the hoof.

While whale meat may not become a standby on American dinner tables, it may well be an answer to the world's rapidly worsening food shortage. With many underdeveloped and overcrowded regions already facing near-famine conditions, a fresh, new source of food is urgently needed. Whales may be that source.

A plan to establish whale farms in the Pacific, using circular coral atolls as natural pens or corrals, is exciting serious interest. Fenced in by rings of coral, the whales would breed and graze contentedly, growing plump for later slaughter. The proposal was made recently by Professor Gifford B. Pinchot, a biologist for the

THE WHALE is the largest creature ever to live on Earth; larger than elephants, even prehistoric dinosaurs. Food potential from such an animal might help solve world's critical food shortage



Johns Hopkins University, Baltimore, Md. Into Prof. Pinchot's plan dovetail many of the world's great challenges: expanding populations, diminishing food supplies and, especially, the immense, untapped resources of the sea.

"We still hunt, rather than farm the ocean," he argues.

In its simplest terms, his plan goes like this. It has its roots in the fact that all life depends on using energy from the sun in photosynthesis to convert inorganic nutrients into organic foodstuffs, a process carried out by plants on land and in the ocean.

"All the rest of us," he says, "those who are not capable of photosynthesis, live either directly or indirectly on these plant products."

And, Prof. Pinchot goes on, oceans cover almost three-quarters of the surface of the earth, so they receive roughly three times as much sunlight and are potentially three times more capable of food production.

So "farming" the ocean would involve seeding, fertilizing and harvesting it just as we do the land.

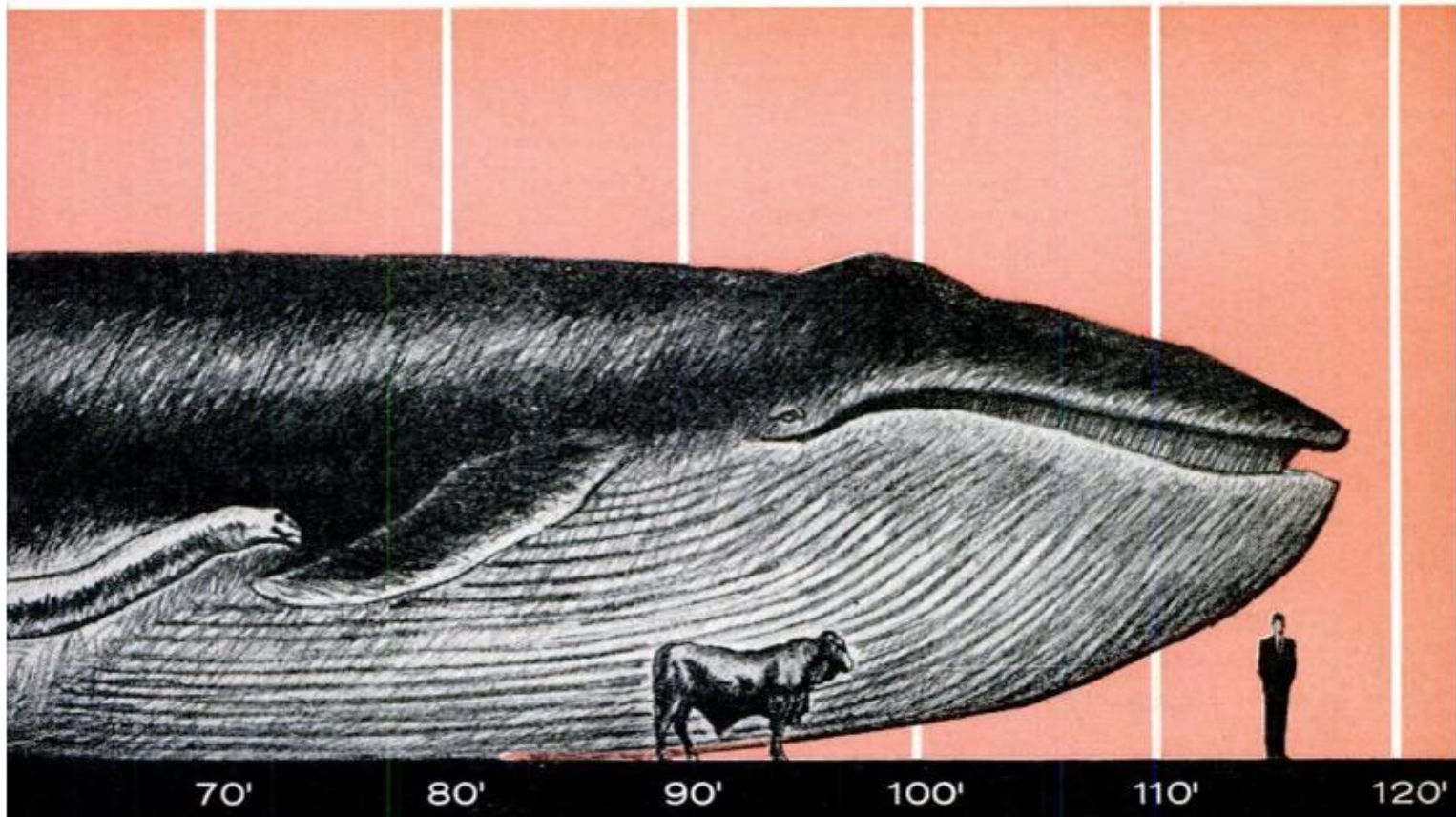
Enter the whales. Prof. Pinchot chose whales for the obvious reason—they're

the biggest mammals that ever lived—but for other reasons that conservationists and sociologists would applaud. They've been hunted almost to extinction and could use some help from man to survive. Also they are a great source of animal protein.

Not only is the world's food supply dwindling in relation to its expanding population, but even in areas where food is available, there's a shortage of animal protein, and some sources blame half the deaths of children between one and five in underdeveloped areas on the lack of animal protein.

But how do you domesticate a whale in the same way as a Hereford steer? Prof. Pinchot's plan is to use tropical lagoons in the center of coral islands. These islands are actually the tops of extinct underwater volcanoes, so the area within the ring or lagoon is relatively shallow, and the openings could be closed off by underwater fences. A coral corral.

Whales, like any other animals, have only two basic needs: food and the propagation of the species. If they're content, they'll take care of the propagation themselves, and food will be



the only problem. Just as the farmer brings feed to his livestock to fatten it, the whale farmer would have to do the same. And we're back to photosynthesis.

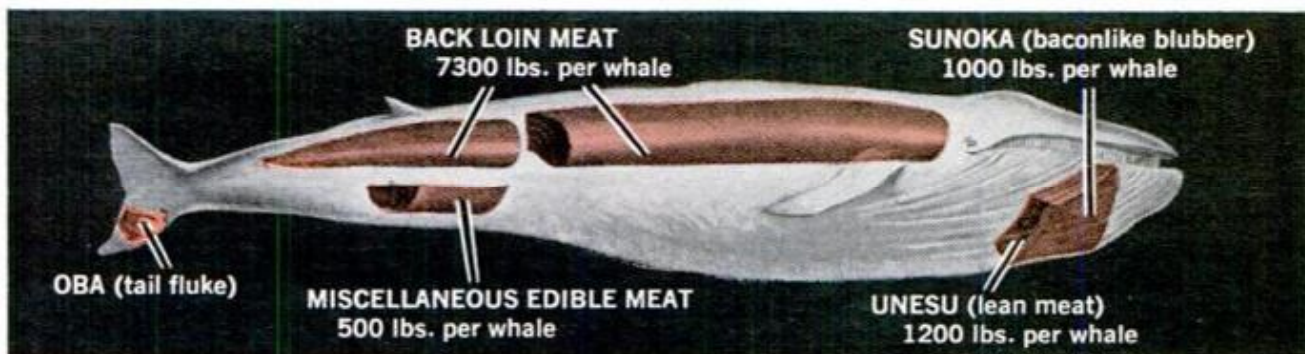
Most whales, notably the blue, humpback and sei species, live almost entirely on infinitesimal plants and creatures called plankton. Killer and sperm whales are carnivorous, so they could not be raised under these conditions.

Tropical waters are rich in inorganic nutrients, but not at the surface. Pinchot would draw nutrients from deep outside the coral reef, perhaps with windmills, and pour them into the coral corrals where they would be fertilized by man, photosynthesized by

nature and consumed by contented whales.

Whales used to be hunted for their oil with their meat as a lightly regarded by-product. Now, however, with other, less expensive sources for oil, whales are looked to more for their meat.

Capturing the whales initially would not be a major problem, although the logistics would be whale-sized. They could be drugged and towed to the corrals. Hopefully, after that nature would take its course and the whale population would increase in size without any help from man. At slaughter time, these chores could be carried out on shore facilities on the corral ring or, as they are done now, on whaling ships. ★★★



EDIBLE MEAT from just one blue whale would total five tons, equivalent of more than 20 good-size steers
 OCTOBER 1968



Sound of (gurgle) music

It's said that you get a gin fizz by playing a chord on the "Piano cocktail." The instrument will appear in the film, *L'Ecume des Jours*.



Old-timer

Oldest human remains found in the Western Hemisphere is this skull, about 13,000 years old, in southeastern Washington state.



These pyramids will turn into peanut butter

Though they look like Egyptian monuments, these pyramids are simply stacks of peanuts that are awaiting shipment to world markets out of Kaduna, Northern Nigeria.



Mile-long radiotelescope

Three bowl antennas, each 60 feet in diameter, ride on rails that extend the length of the mile-long "array" of the Mullard Radio Observatory in England.

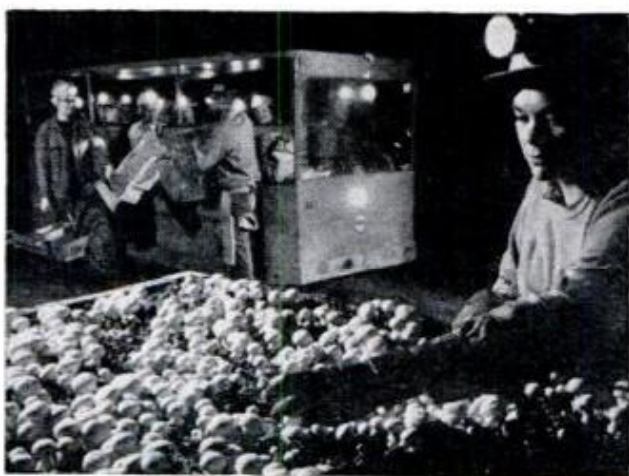


For cool-weather sunbathers

There's a lot to be said for sunbathing in early spring or late autumn—just ask this young lady's neighbors. She's in a new fiberglass-framed plastic tent made in France.

Traffic beater

This is one way to beat traffic congestion, claims a London commuter. The only road hazard, he adds, is ducks. The Power-Ski is also a good means of recreation on the water, points out the manufacturer, Bond Minicar Works of England. The skier stands with one foot on each of the two 10-foot-long fiberglass floats and steers via the upright tubular frame that tilts the skis in the direction of the turn. The controls are also mounted on the frame. The Power-Ski uses an outboard motor of up to 18 hp.



Maids mine mushrooms

An attractive "mushroom maid" harvests succulent saprophytes in an abandoned limestone mine that's now the Butler County (Pa.) Mushroom Farm. The farm, world's largest, yields mushrooms year-round.



20-second physical

It takes just 20 seconds for Philco-Ford's "MediScreen" to monitor and chart each of these children's heart rate, electrocardiogram, heart sounds, pulse volume and rate of breathing. Patients simply sit in the chair.



Electronic teacher delivers chosen lesson within seconds

Up to 25 students can use Ampex's random-access audio information retrieval system at Oak Park-River Forest High School in Illinois. A student selects one of 224 15-minute programs, which, within 30 seconds, is transferred to his unit from a master tape and begins to play. Even if all other students have selected the same program, maximum wait is 59 seconds.





Call of the Wild—Man-Made

An expert hunter tells you why game calls work and why you should use them

By ROGER LATHAM

CALLING WILD ANIMALS is by no means unique to the modern-day hunter—even though he has the advantage of some mighty sophisticated equipment.

Centuries ago, the American Indian and the Eskimo learned that they could imitate the voice or sounds of various kinds of wild game and bring them within bow and arrow or harpoon range. To them, it was a matter of survival. You either called successfully or you didn't eat!

But today, modern, efficient instruments are made to call just about anything. You can even get portable record players for attracting predators. These cost \$75 to \$125 with records.

Among upland game there are callers for wild turkeys, bobwhite quail, mourning doves, pheasants (in a sense), Hungarian partridges and squirrels.

The duck callers include quackers (black and mallards) and whistlers (pintails, wood ducks and widgeon). Goose callers are made for Canadas, blues, snows and whitefronts (specklebellies). Bird callers are reed instruments made from walnut, cherry wood or plastic. Some are more exotic models made from zebra wood or mahogany. For the sound, you must blow from your diaphragm, not just from your mouth. These calls cost \$1.50 to \$20.

The fife devices bugle in bull elk and entice buck deer. These are made from

bamboo, rubber or plastic. Bears may even come to some predator calls. The moose is still called with the voice, using a birchbark horn as an amplifier.

The range for predator calling is great. These reed calls, which imitate the squalling of a terrified cottontail or jackrabbit, will bring foxes, coyotes, big cats and many other animals on the run. Even cows and mother rabbits will respond!

Then there are distinct callers for crows and magpies, owls and hawks—again reed calls costing \$1.50 to \$4. Audubon Society members even use a little squeaker to bring songbirds within close range.

But why do these creations of wood, metal, rubber and plastic work? Several principles seem to be involved.

Some work because the animals involved have strong flocking instincts. Scattered wild turkeys, bobwhite quail, ducks or geese want to find more of their kind and will respond to imitations of their voices. They're lonesome.

Many kinds of game can be called during the mating season. Some species thus deluded are the moose, wild turkey, dove and horned owl.

Still others seem to answer a challenge when they think another male is invading their rightful territory. Bull moose, bull elk and deer all get fighting mad when someone is able to imitate the throaty cough, bugling or low grunting of these big game animals. In parts of the West, buck deer are brought to

the hunter by rattling two antlers together. The wild tom turkey may come to a gobble on a box caller with fire in his eyes, when it's springtime in the mountains.

Predators which come to a rabbit squeal or mouse squeak are looking for food. But they are just as likely to be fooled by the imitation squeal of their own young. This response is obviously a protective instinct.

Then there's curiosity. Deer will answer a predator call, as will many other kinds of wild game which certainly have no intention of eating a rabbit! Domestic cattle and horses behave the same, often come on a dead run. Maybe they want to be where the action is.

And finally, there's the reverse-action effect! Hunters in the know often use a hawk caller to hunt pheasants. Pheasants notoriously run before a bird dog and may never stop to permit a point and a shot. However, a blast on a hawk caller and the pheasant will usually "freeze" in its tracks and stay put. He's scared to death to move for fear the hawk he hears will swoop down upon him. So, the dog points, the hunter moves in and there's a bird in the bag.

Learning to call game successfully is more than a matter of becoming adept on the mechanical device itself, although this is mighty important. It takes hours of practice to be able to get just the right note or tonal quality. The smart hunter practices while listening to the animal itself or to a good instructional



WATERFOWL CALLERS. Wide assortment of reed types that are used for varieties of geese and duck
OCTOBER 1968



TURKEY CALLERS. These include slate callers (left), box callers (center) diaphragm callers and a yelper
125



BIG GAME CALLERS. Birchbark horn to amplify moose calls; rubber band deer callers; a bamboo flute for elk

record. You can get these records for \$2 to \$5. Better still is a tape recorder. With a small cassette type, you can record game in the off-season, practice, and be ready for opening day.

But knowing something about the habits of the wild game is just as important. The hunter has to know where to find his quarry and where to place himself for best results. For some animals which aren't color blind, like

the wild turkey, you may find it necessary to wear camouflage clothing. Turkeys, ducks, geese, coyotes and elk don't miss much and all operate under the theory that "every stump is a man."

The nimrod is warned against the reckless use of callers, too. Well hidden hunters yelping like a turkey have been filled with fine shot. Brush shooters have been known to take a "blind" shot at another hunter rattling antlers or bugling for elk. The best rule for the hunter is to leave his back open to view and to screen himself in front only where he can see anyone approaching.

But actually, calling game is safe enough and it's most certainly one of the most rewarding ways to take game or to get good pictures.

There's a double delight in success. First, the hunter must have mastered the calling technique, and his art gives him as much satisfaction as that of an accomplished musician. Then, too, there is a far greater anticipation as the game approaches, often answering as it comes. Anyone who has listened to an old turkey gobbler talking as he gets closer, or heard the angry grunting of a bull-moose crashing through the alders, or thrilled to the roar of an answering jaguar, knows full well how the adrenalin flows.

One thing sure, there's no dearth of

(Please turn to page 212)



PREDATOR CALLERS. Crow call (upper left) owl call (center), other four for rabbit, fox, coyote, bobcat



SQUEAK AND SQUEAL CALLS. Squirrel caller (lower left), songbird squeaker, dove caller (upper right)

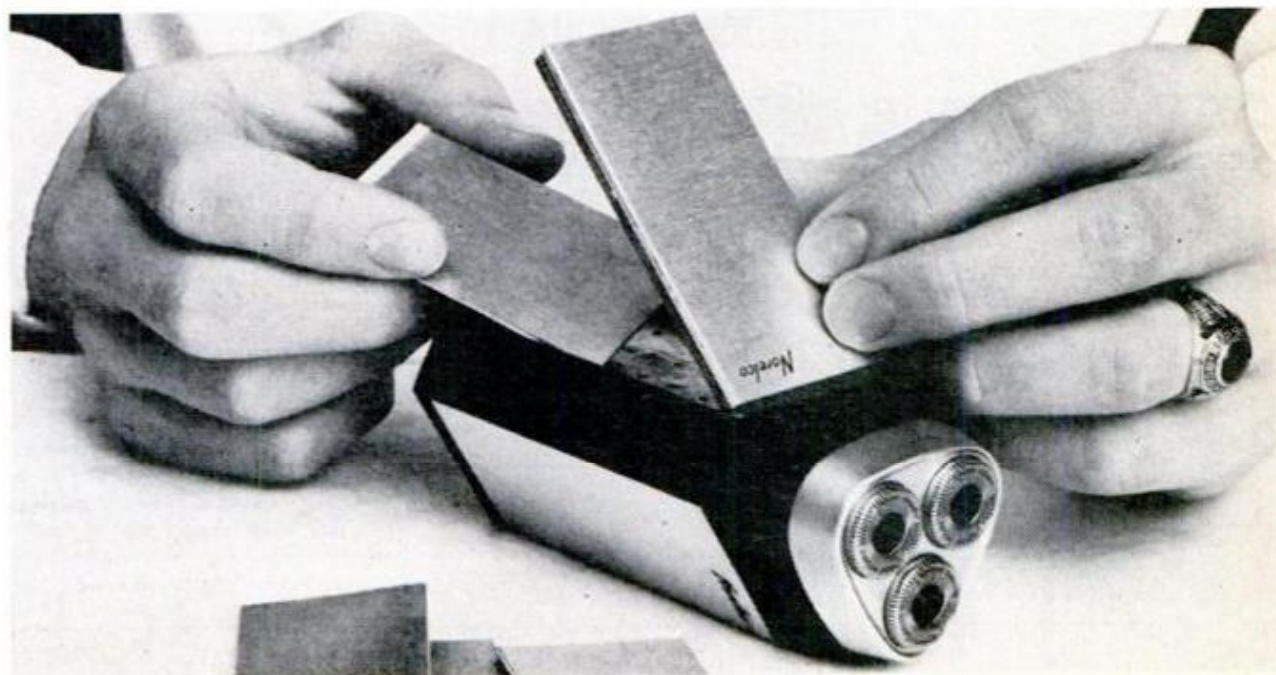
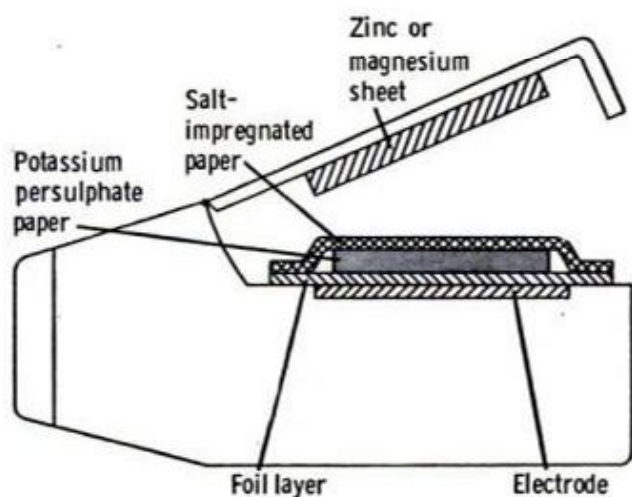
New Paper Battery

Just Dunk It and It's Charged

THE MAN dunking a small, thin object in a glass of water is activating a battery for a cordless shaver. It's the world's first paper battery, a dramatic development in portable power by North American Philips, marketer of Norelco products. No bigger than a business card, it consists of paper layers impregnated with salt and potassium persulphate. When moistened, the salt acts as electrolyte. Electricity flows from a zinc or magnesium plate to the potassium persulphate.

Still experimental, the battery will run a shaver for five minutes—enough for a

quick shave. Envisioned for the future are all sorts of cordless devices powered by disposable batteries you could carry in your wallet. One possibility: an emergency booster for a dead car battery. ★ ★ ★



Just patented

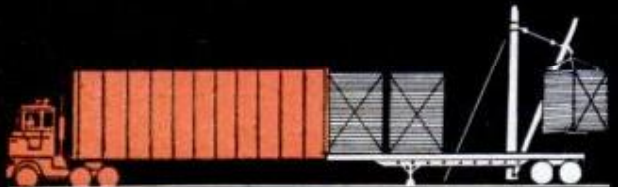
PM'S PICK OF THE NEW INVENTIONS

Prepared in cooperation with Roger S. Shashoua Director, International Inventors Association, Inc.

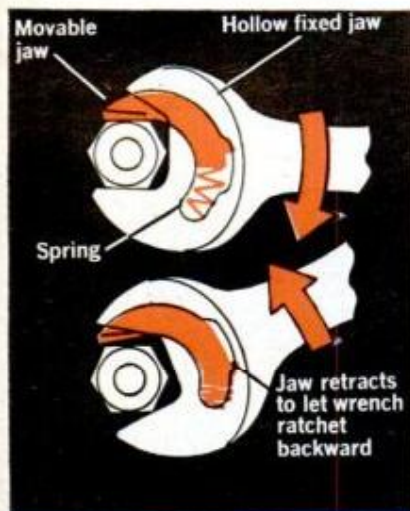
CLOSED FOR TRAVEL



OPEN FOR LOADING



1. **FASTER LOADING** is the object of this clever telescoping tractor trailer. To pick up cargo, the tractor uncouples and moves forward, pulling the trailer body with it. This leaves the trailer bed open and unobstructed for quick loading from an overhead crane. When the trailer is full, the tractor pushes the body back into place and the truck is ready to go. The body slides on rails along the trailer's sides

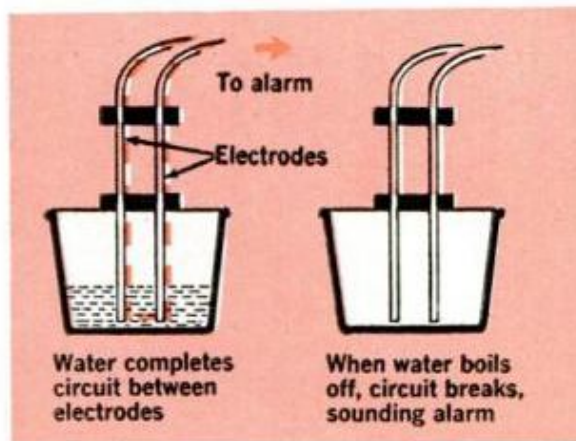
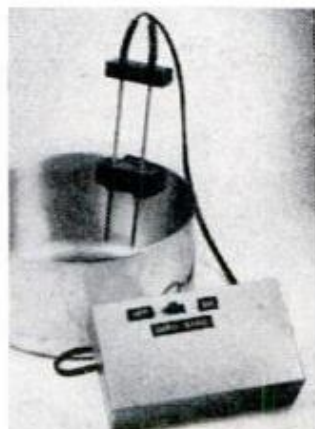


2. **EVER WISH YOU HAD** an open-end wrench that would also ratchet when working in cramped quarters? Well, the design at left does just that. All you have to do is slip it on a nut once and swing the handle rapidly back and forth. As the wrench is turned forward, a spring-loaded jaw hooks snugly against the nut to tighten or loosen it. On the back stroke, the jaw retracts into a curved channel, allowing the head to slip past the corners on the nut. The jaw then springs out, takes a new grip on the nut, and the wrench is turned forward again. There's a conventional box head on other end

Inventors of the items shown on these pages are as follows: 1. George Stewart and Ernie Laprairie, North Vancouver, B. C., Canada; 2. Briles Mfg. Co., El Segundo, Calif.; 3. David Tait, Peacehaven, Sussex, England; 4. Alvin E. Walker,

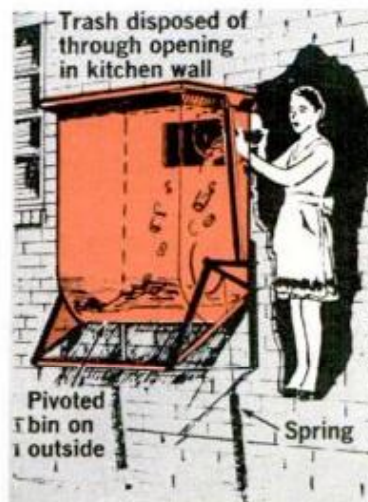


3. WORKING LIKE A SEESAW, this simple back-yard lift for a car lets you tilt up either end for making repairs easily underneath. It consists of two triangular ramps with adjustable spacers to fit different wheel widths. You just drive onto the ramps until the car's weight is centered, then you can tip the rig in either direction at the touch of a hand. Rolling the car slightly past the center point insures that it won't tip back the other way while you're under it. For added safety, it can also be blocked up



4. FOOD CAN'T BURN in the pan shown at left. Two electrodes are attached to the side and stick down into the cooking water. As long as the water remains high enough to cover the electrodes, current flows between them, holding a relay open. If the water level drops below the electrodes, it breaks the circuit and the current stops flowing. This closes the relay, shutting off the burner or sounding an alarm

5. THIS WALL-HUNG TRASH BIN lets your wife get rid of garbage and refuse from inside the house and have it collected from the outside without her going outdoors. In its upright position, the pivoted bin connects with a small chute in the kitchen wall through which rubbish is discharged. To empty the bin, it's simply swung down against counterbalancing springs, making it easy to handle. The bin automatically interlocks with the lid and chute to form airtight seals against odor and moisture. It would also be out of the reach of animals and couldn't be tipped over like conventional trash cans



Phoenix, Ariz.; 5. L. E. Smithers, Silver Spring, Md. Anyone interested in bringing new inventions to the attention of Mr. Shashoua at the International Inventors Association, Inc. can reach him at 554 Fifth Ave., New York, N. Y.



69

A SURPRISE

YEAR IN

Snowmobiles

Superpower, sexy design, startling stability are all part of the new snowmobile you'll see this fall

By **DAN FALES**, Boating and Outdoor Editor

YOU'RE IN FOR SURPRISES this year—be you first-time snowmobile buyer or one who's trading up.

You'll find eye-catching machines, rugged back-trail rigs, speedsters that are light on your pocketbook.

You'll find, as I did during a snowmobile preview, new trends, new makers, new models in established brands.

The first surprise will come through your eardrums. This year the industry is adopting guidelines on noise. I find most machines are quieter running.

But mufflers mean a loss of a few horsepower. Thus the second trend—high-horsepower engines. Where the average motor last year was 15 hp or 16 hp, you'll find 18 hp to 22 hp this year.

The third trend you'll notice is sleek design and the addition of gadgets. This year, snowmobiles have gas gauges, fuel-tank filters that bar ice crystals from the carburetor, beefed-up thumb throttles, sturdy handle grips, cigaret lighters, tachometers, speedometers, pushbutton primers.

But this isn't all. You'll find that except for a few cases, there's been a general elimination of reverse.

"It adds weight," says one maker. "Besides, if you're so fouled up that you can't drag the machine out or turn it around, reverse won't help."

Some buyers didn't want reverse last year. But they did want electric start. So all companies are offering it as an option. On some big models, it's standard.

And don't forget to look at the big powerful models. They're running as high as 660 cc and 744 cc. That's power. That's money, too. If you're not planning to run off with all the trophies in the unlimited class races—just look and yearn—don't touch. They're real hot.

Though there are many changes in snowmobiles this year, price increases are few. Most companies are suggesting prices that are very competitive.

This is true of the new machines being introduced by Mercury, Yamaha and Massey-Ferguson.



SKI-DOO has a new bullet-shaped design this year. Being added to Ski-Doo's line are Nordic and T'NT

Mercury is hitting the market this year with a sleek new model fully equipped with a 399-cc, 25-hp motor. The engine is a two-cylinder in-line type activated by Mercury's Thunderbolt capacitance-discharge ignition. The 17-inch-wide track is made of rubber with reinforcing steel cable. The drive chain runs in an oil bath. Steering skis

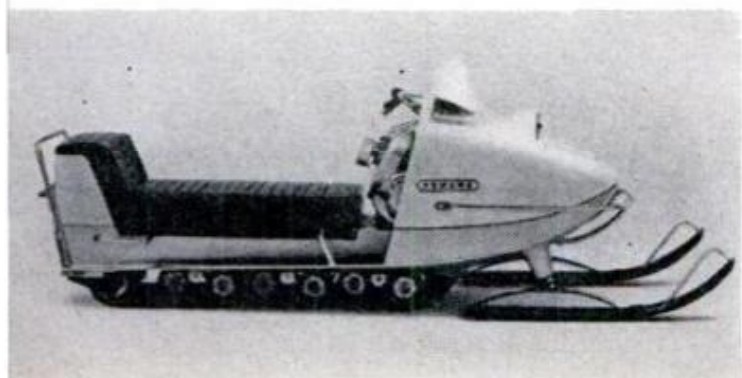
3 BRAND-NEW ENTRIES



MERCURY (left) is just entering snowmobile market this season, offering the new 250 series. All models, designed by Kiekhaefer engineers, have 25-hp motors, run on 17-inch, steel-reinforced tracks for stability

YAMAHA (lower left) is introducing an SL-351 line using motors which turn up 23 hp at 6000 rpm. The engines have metered-oil systems which eliminate mixing oil and gas. The SL-351 runs on 15-inch tracks

SKI-WHIZ (below) is the new machine being made by Massey-Ferguson. With a track width of 15½ inches, this snowmobile comes with 17.5-hp or 22-hp engine. Shroud covers engine which is mounted backwards





POLARIS Mustang is a family-size machine. The track has been widened to 20 inches for more stability. Mustang is available with any of six engine sizes

cant on turns. There are three Mercury models—250 (manual start), 250E (electric start), 250ER (electric start with reverse).

Yamaha is the first on the market to use metered oil (oil and gas separate) in a snowmobile engine. Entering one model this year called the SL-351, Yamaha is using a 350-cc, 23-hp motorcycle engine with a looped scavenged system (flathead piston, five-port fuel-exhaust configuration).

The motor is driven through an automatic clutch transmission with V-belt and with secondary chain drive in an oil bath. The 15-inch-wide track is rubber with reinforcing steel. Equipped with an automatic rewind manual start, the Yamaha's suggested retail price is \$975. The machine weighs 320 pounds.

Massey-Ferguson, the tractor maker, is entering the snowmobile market this year with two models—the 297-cc JLO 17.5-hp and the 372-cc, 22-hp JLO. Called Ski Whiz, the machines have a unique feature—the engine is mounted backwards, to help weight distribution and engine efficiency, and permit complete engine enclosure under the hood.

A torque converter and roller chain drive the 15½-in. polyurethane track. The 29-cc model weighs 350 pounds; the 372-cc unit is 370 pounds. Ski Whiz has adjustable ski springs and rear idler sprockets so machine height can be varied depending on weight of operator. Suggested prices are \$949 for 297 cc and \$1059 for 372 cc.

You'll be seeing another new machine, too. The Bolens Co., in the snowmobile business for several years, is introducing a brand-new conventional-looking model called Sprint. It still makes the two-section Diablo Rouge.

Powered by a 297-cc, 17-hp engine, Sprint has a track width of 15 inches. In two models—the manual-start weighs 325 pounds and sells for \$895, and electric-start, 355 pounds and \$995.

Changes in snowmobiles are not just limited to new entries. The so-called old-line makers have new ideas, too.

Ski-Doo is modifying the general shape of many of its machines. The new "bullet look" is adding sleek aerodynamic design. Ski-Doo is also introducing two new models this year—the Nordic and the T'NT. Bombardier, maker of Ski-Doo, is keeping the low-priced Olympic series (12-hp, 15-inch track still sells for \$695) and the twin 15-inch track (30-inch) Alpine series in the \$1200 area.

The Nordic brings a new track size to Ski-Doo's line: 18 inches. In both manual and electric-start, it's powered by a 371-cc, 24-hp Rotax engine. Manual weighs 360 pounds, the electric, 400. Suggested prices are \$1045 and \$1165.

Ski-Doo's big guns this year are in the T'NT class. Here you can get a speedster with a 399-cc (30-hp) engine

SNO-JET is offering four new engine sizes and eight models priced from \$750 to \$1299. Engines range from 15 to 35 hp. Sno-Jet is now part of Glastron





BOTH EVINRUDE AND JOHNSON are offering snowmobiles with 25-hp engines priced from \$985 to \$1255. Each company is also introducing new lines which offer 19.5 and 23.5 hp models. Evinrude's new line is called Bob Cat—Johnson's is called Challenger



on a 15-inch track. The whole thing weighs 314 pounds and sells for \$1045. But the real tiger is the T'NT 640—a monster with a 640-cc (40 hp) motor weighing 385 pounds, running on an 18-inch track, and selling for \$1395.

Polaris takes the prize this year for choice. There's available everything from the brand new Charger models up through the big rugged Voyagers. You can get small 275-cc Sachs engines, medium and high-horsepower Hirths, JLOs, Kohlers and Polaris's own engine. And you can get Wankel engines as well. In all, there're 29 models.

Polaris's new Charger is what they call the "sports car" of the snowmobile set. It's a snappy light machine with 15½-in. track weighing about 298

pounds—depending on motor size. You have a choice of motors from 275-cc Sachs to the 634-cc Hirth.

The widest variety in models is found in the 330-pound, 15½-inch track Colt series, offered with choice of 12 motors, or twin Polaris engines which up the cubic-centimeter rating to 744. The Colt has electric-start options.

The Mustang series has a new 20-inch track width. This 365-pound machine has options for electric starting and for a forward-neutral-reverse shift.

Polaris's big Voyager, a tough 477-pounder with 30-inch-wide track, has a 372-cc JLO or 634-cc Hirth engine.

Another Polaris surprise is Playmate, an 80-inch mini-snowmobile with a

(Please turn to page 224)

AMF'S SKI-DADDLERS are available in six models this fall. They range from the Wide Track 22 at right in photo to the "essentials only" Sno-Scout at left

ARCTIC CAT is specializing in its Panther series. Eight different models range in size from 246 to 600-cc machines. All models have AC's special suspension



That New Patent Law: Blessing or Blunder?

By **NORMAN CARLISLE**
Co-Author, *The Successful
Inventor's Guide*



INDEPENDENT INVENTOR would be no match for big "invention factories"

Aimed at reforming our antiquated patent system, the proposed bill may actually work a hardship on small, independent inventors. Here's what the law will mean

LEGISLATORS in Washington are about to tackle America's 175-year-old patent system. The system is admittedly outmoded and full of faults. But the question many inventors are asking is whether the proposed remedy, a new Patent Reform Act, will kill the patient in the process of attempting to cure his ills.

It's a good question. The reform law, embodied in House Bill 5924 and Senate Bill 1042, was presented to Congress recently with great fanfare. In offering it, President Johnson stated: "The Patent Reform Act contains a series of far-reaching and fundamental proposals. They will benefit businessmen, scientists and inventors."

The trouble is, they will *not* benefit the small, independent inventor—the fellow who sweats out an idea in his

basement workshop or at a kitchen table, perhaps working for years on a single, lifelong dream. This type of inventor has been completely forgotten by the framers of the new patent law. As a leading patent attorney put it, "They propose to reform the independent right out of existence."

Let's take a specific example. An independent inventor, Edwin Foster of Austin, Tex., recently patented and sold an invention to a leading appliance manufacturer. It's an arrangement of springs that automatically lifts an iron off the ironing board when a housewife lets go of it. It was a triumph of ingenuity, hard work and long effort. In fact, Foster worked on it on and off for more than 25 years!

Foster was able to take his time about developing his invention, secure

in the knowledge that U.S. patent law would protect him. He was able to make experimental models and have them tested by consumers. He was able to delay seeking a patent until he was sure that he had perfected his invention and that the conditions were right for marketing it.

Foster's case is typical of the thousands of inventions that are developed every year by hard-working independents. The new bill would rob the independent inventor of many rights Foster exercised in making his invention—the right to experiment long enough to perfect it, the right to let consumers test it, and the right to delay seeking a patent until the market appears ready.

Can we afford to ignore the welfare of the independent inventor? We can't. Even in this age of teamwork invention, we owe an astonishingly large part of our technological progress to the independent. The contributions of such creative individuals include the vacuum tube, Xerography, DDT, the zipper, the automatic transmission, the gyro compass, FM radio, the helicopter, power steering, airconditioning and many others in a wide variety of fields.

Despite such great contributions by the independent inventor, the new bill is full of booby traps for him. Let's



GETTING USERS to test your invention would nullify your claim to a patent under the proposed law

look at the most dangerous provisions.

A sweeping change in the new proposal calls for the patent to be awarded to the first to apply for it. Under present law, the patent is awarded to the "true" inventor, the one who thinks of the invention first and who works diligently to develop his concept into a workable invention.

What's so bad about giving a patent to

(Please turn to page 226)



RACE TO BE FIRST would cause inventors to rush to the Patent Office with half-baked ideas, say experts
OCTOBER 1968



Only a few left of the 'Few' that flew

It took three years to collect the airplanes for the filming of *The Battle of Britain* 28 years after the great World War II encounter. Among the craft are 24 Spitfires and Hurricanes (left) and a Stuka dive bomber (right). At upper right are two Battle of Britain pilots, E. Lacey (left) and R. Stanford-Tuck (right) with H. Manhaddie, who collected the planes.



Stairway art exhibit

Dennis Huntley, a British woodcarver, makes art objects of his banisters, creating a permanent display that takes up little space.



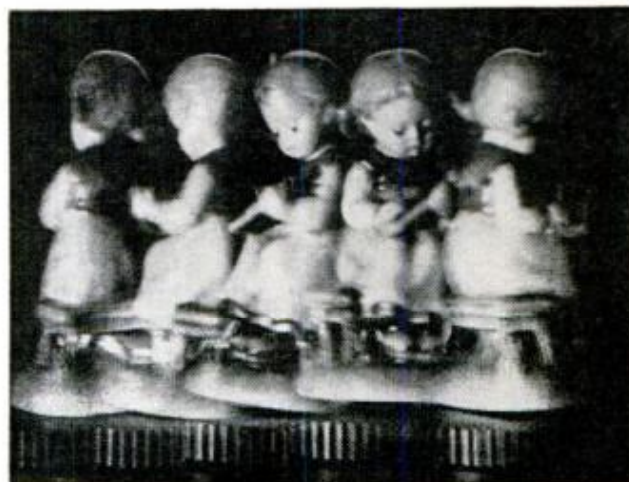
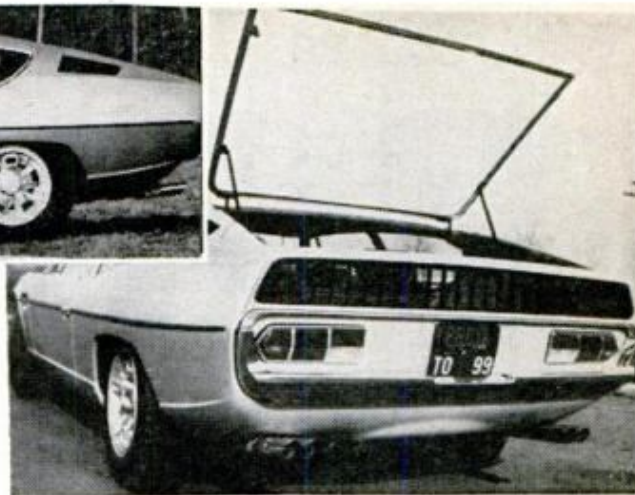
Gently sloping bank

Sloping sides give Chicago's First National Bank Building a distinctive look. The 60-story structure will be completed in 1969.



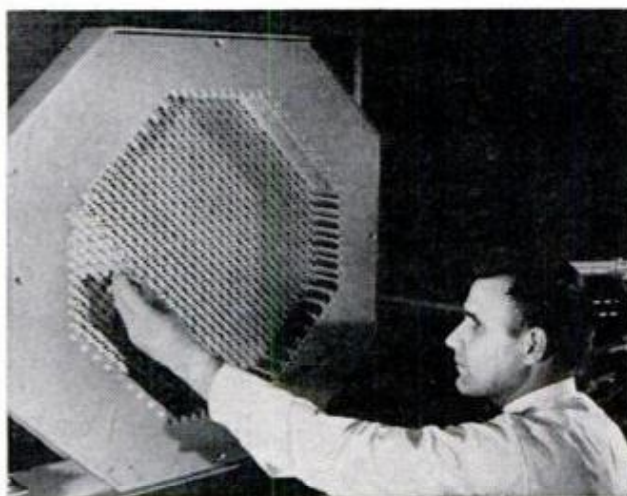
Lamborghini 'family' car

Sleekly styled and featuring a huge rear window that raises for access to the baggage compartment (right), the Lamborghini-Espada Bertone is described as the "family version" of the sports car. It has four bucket seats.



Full-circle holograms

A new kind of hologram made at Bell Telephone Lab allows a viewer to see a three-dimensional image rotate through a full circle when he moves his head from side to side in front of the flat hologram. Multiple-exposure (above) is from five different positions.



Rotator eliminator

A new phased array radar system eliminates the need for a rotating antenna. Each of 604 modules contains a transmitter and receiver; electronic scanning of the modules provides the sweeping vision.



Deep-diving Beaver IV

On display here is a full-scale mock-up of the *Beaver IV*, a new deep submersible being constructed by North American Rockwell. In the foreground are pilots Joe Thompson (left) and Ed Cargill, who'll test-dive it.



WHAT LOOKS LIKE a single photo of five sprinters is actually a picture made on moving film of each runner the instant he crossed the finish line. Note how two men at right—Harry Jerome of Canada and Willie Turner of the United States—appear to have tied. But when lines are drawn from runners' chests to time scale below, winner is shown to be Jerome (in middle lane) by $2/1000$ ths of a second. Picture was made by Photosprint camera at the '67 Pan American games in Canada

How They're Killing The Dead Heat

By JAMES R. BERRY

During the '68 Olympics, new second-splitting timing gear will be used to eliminate ties.

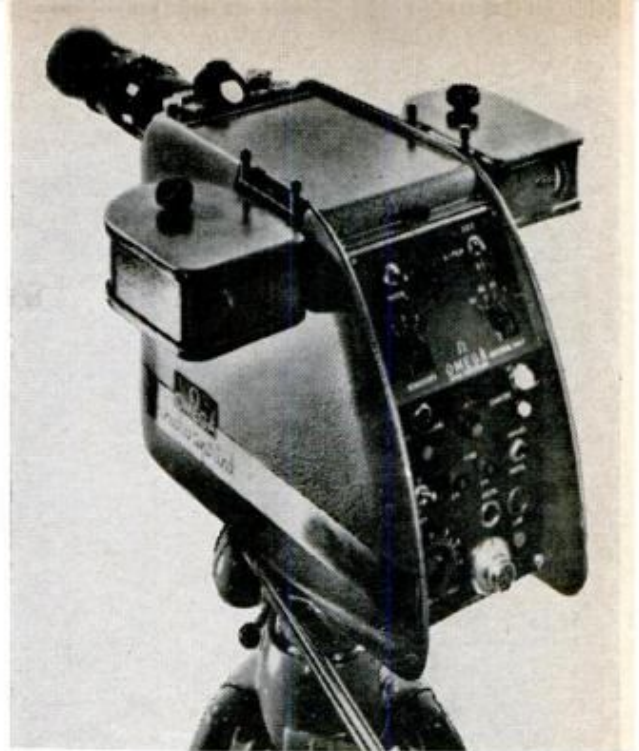
THE TWO LEAD RUNNERS, legs pumping like pistons, thundered down the track side by side. The men—Canada's Harry Jerome and the United States' Willie Turner—had each run the 100-meter dash in a record 10 seconds in earlier races. Now, at the 1967 Pan American games, the two were finally getting a chance to prove who was faster.

The crowd's roar mounted to a frenzy as the runners flashed across the finish line. Then a hush fell over the Winnipeg Stadium. Jerome and Turner had chested the finish tape at exactly the same instant—at least it appeared that way to the naked eye.

But not to the mechanical umpires presiding over the meet. In less than two minutes, officials announced that Jerome was the winner—by a scant 2/1000ths of a second.

No human eye or conventional camera could be trusted to judge a race as close as this. In times past, such a finish would have had to have been declared a tie—a dead heat.

In the 1932 Olympics, contestants were timed to 1/10th of a second. By 1948, the second had been split into 100ths. Today, superaccurate robot



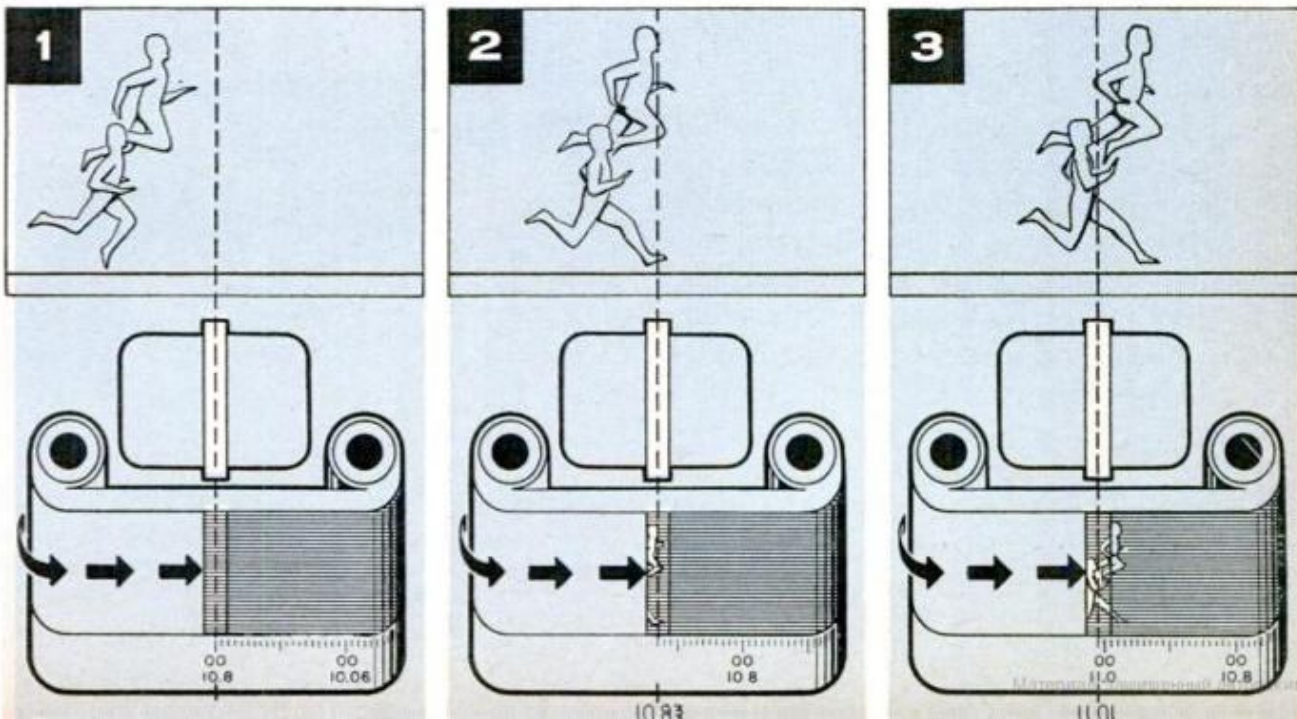
NO BIGGER THAN A TV CAMERA, Omega's Photosprint timer not only photographs the contestants—it even processes the film at the same time. As the film moves from the left-hand reel past the lens, it is automatically developed and is ready for viewing by the time it winds onto take-up reel on the right

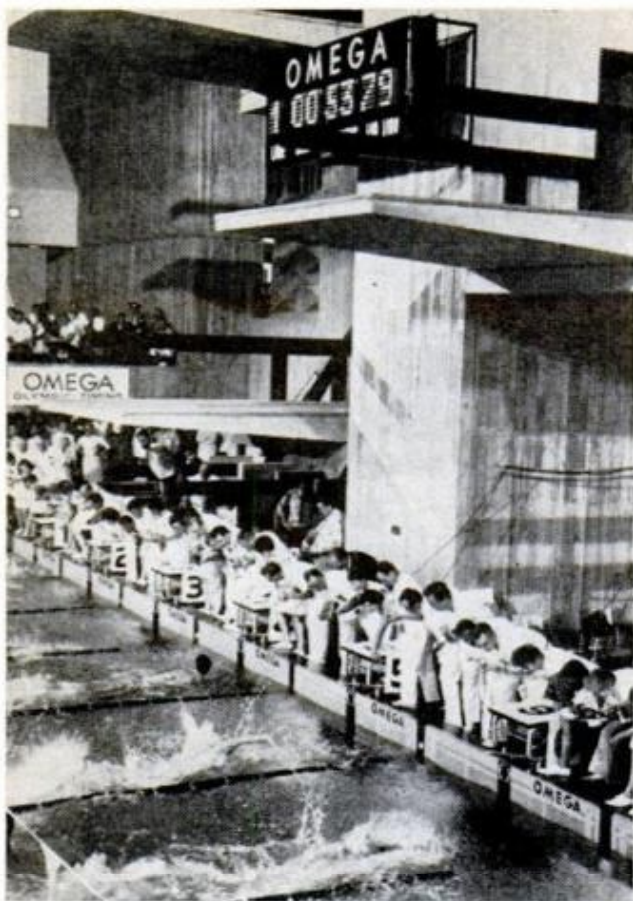
referees are chopping seconds into 1000ths, virtually eliminating the possibility of the old-time dead heat.

These timers, which will be watching competitors at the Olympics in Mexico City this month, have been developed none too soon. High-powered training is steadily edging athletes toward

HOW THE PHOTOSPRINT TIMER WORKS is shown in the diagrams below. The camera consists of a lens, a narrow vertical slit that serves as a diaphragm, and a strip of 35-mm film on motor-driven reels. The diaphragm slit is lined up precisely with the finish line. The film moves across behind the slit in the same direction as the runners, and its

speed is adjusted to match their speed. As the runners pass the slit, their images are recorded on the moving film in exactly the same relative positions, revealing which man crossed the finish line first. A time scale along the bottom of the film shows each runner's time in thousandths of a second so there's no dispute over who the winner is





SENSITIVE TOUCH PLATES in this Olympic pool are triggered by swimmers as each reaches the end of his lane, actuating a timer. Times in thousandths of a second then show on overhead display board

the limits of human performance. Consequently, contestants tend to reach the finish line in closely bunched packs. In a 500-meter race, for instance, runners speeding 30 mph or better often breast the tape within $3/10$ ths of a second of one another.

One of the prime robot referees picking winners and recording their time at the 1968 Olympics will be a camera that shows the moment every contestant crosses the finish line on a single photograph.

Called Photosprint, this device—about the size of a small TV camera—replaces the conventional blinking shutter of typical motion-picture cameras with a half-inch-high slit about the thickness of this paper. As athletes approach the finish tape, a reel of 35-mm film starts to slide in back of the slit at almost precisely the same speed as the moving contestants. The men crossing the finish line are focused through the slit onto the moving film. Since the film and

the runners are moving at the same speed and in the same direction, the photograph results in a sharply focused, uninterrupted picture of the finish.

But that's not all. The time elapsed for the race is projected onto the base of the film, which is automatically developed as it passes into the pickup reel. Within a minute or so after a race, officials have an enlarged, positive photograph of the exact instant each runner passed over the finish line. Such a photo reveals the time (read off the film's base)—not the distance—between runners at the race's end. *This* time is recorded on Olympic records.

Another Olympic arbiter is a device called Swim-O-Matic. Because of the splashing water and the fact that contestants are partially underwater, judging swimming meets was particularly difficult. Formerly, three judges were assigned to each swimmer and the times on their stopwatches averaged out: a grossly inadequate method by today's Olympic standards.

Recently Dr. Charles Sickert of the Omega Watch Co., official timers of the Olympic games, demonstrated just how imprecise human referees are. He handed stopwatches to three sports fans. Then he jerked his hand off his desk to signal the start of a "race," held it aloft a few moments, then ended the simulated race by slamming it down. The



NEW STARTING GUN has microphone on muzzle to relay sound to a loudspeaker in each contestant's lane. Each hears signal at same instant, eliminating delay caused by sound's slow travel through air

three fans clocked the race at 15.8, 15.2 and 14.9 seconds—a spread of 9/10ths of a second, which is an eon in Olympic competitions.

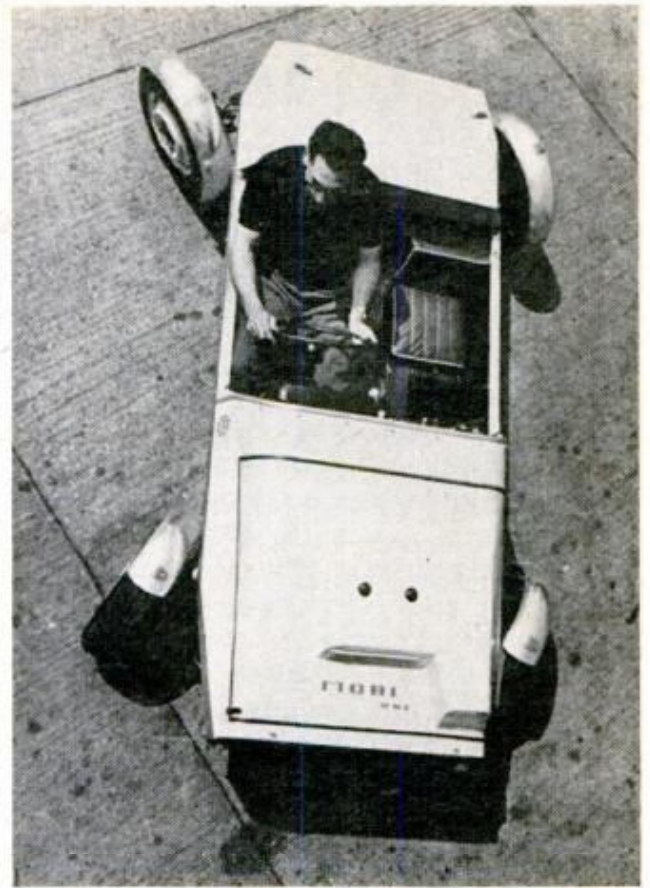
Swim-O-Matic scraps this problem by submerging a touch plate 32 inches below the water line at the end of each swimmer's lane. The plates are hinged so that a slight movement presses them against waterproof switches that are connected to an electronic stopwatch. The touch plates are perforated so that while the pressure of a swimmer's finger will close the switch, the force of waves flowing through the holes won't.

The electronic stopwatch linked to the touch plates automatically prints out a swimmer's lane number, the order of his arrival and his swimming time in 1000ths of a second. Hopefully, Swim-O-Matic, which will be used for the first time at the Mexico City Olympics, will end the controversy that has formerly accompanied many meets.

Still another way Omega plans to make Olympic records more accurate is to feed athletes a starting signal at the same instant. Sports events usually count on a gunshot to signal a race's beginning. But sound travels about 650 miles an hour. Therefore, a contestant a few feet from the starting gun will hear the signal 1/100th of a second or so before an athlete 30 yards away. Once, this wouldn't have mattered. Today, it's considered a huge disadvantage.

To end the discrepancy, Omega now attaches a small microphone to its starting guns. The sound, recorded by the mike, is fed to amplifiers and from there broadcast over loudspeakers at the head of each contestant's lane. All contenders now hear the starting signal electronically before the noise passes through the air to the nearest athlete.

Will the highly trained athletes make measurements to 1/1000th of a second obsolete? Omega Watch Co., at least, isn't taking any chances. Already the Swiss firm is working on yet more precise sports timing devices. Reportedly these robot referees will list Olympic records to 10,000ths of a second! ★★



He does a good turn

When Morris Bishop turns the steering wheel of his home-built car, all four wheels respond—enabling the nine-foot "Mobi One" to turn within a nine-foot space. The vehicle has three rack and pinion steering systems, two at front and one at back; a shaft connects them. Top speed is 120 mph.



Army gets new ACVs

Two of the Army's first three assault air-cushion vehicles are shown after delivery by Bell Aerosystems. The 70-mph ACVs carry two 50-cal. and two 7.62-mm machine guns plus a 40-mm grenade launcher. The Navy has used ACVs in Vietnam since early 1966 (see [Tiger Sharks](#), page 131, Nov. '67 PM).

How to Choose and Use Screws

Screws are among the most efficient fastening devices in your workshop . . . if you know how to use them

By STEVEN J. HOWARD

AS A HOMEOWNER and workshop enthusiast, you're concerned with only two general types of screws—the ordinary wood screw and the sheet-metal screw.

Wood screws are used to fasten pieces of wood to each other or to anchor objects to a wood surface. They probably form the bulk of your screw inventory.

Sheet-metal screws (also called tapping screws or self-threading screws) are used for fastening pieces of metal together or for attaching objects to metal. They have sharp threads that can cut their own grooves into the metal.

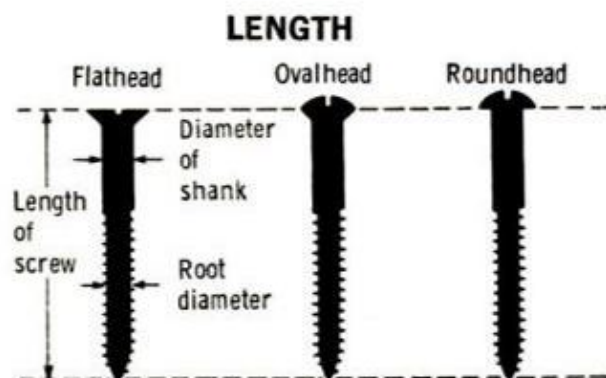
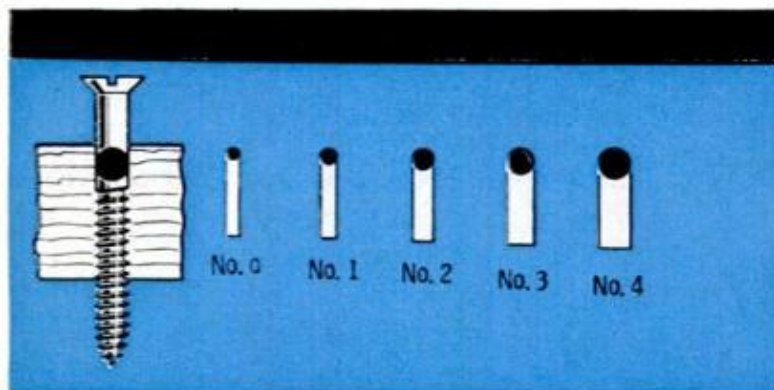
The easiest way to distinguish wood screws from sheet-metal screws is to look at the threads. Sheet-metal screws are threaded all the way from point to head. Wood screws, on the other hand, have threads running only two thirds of the way up from the point. A smooth shank extends the rest of the way to the head.

The special characteristics of screws, as opposed to other methods of fastening, make them ideal for the following jobs:

- *When the pull of the load is directed along the length of the fastening device and you need maximum holding power.* This would cover jobs such as hanging a door.
- *When there's a chance that you may have to take the work apart some day.* It's much easier to back out a screw than to pull a nail. You also run less risk of damaging the work.
- *When there's a chance you'll mar the piece of work while installing the fastener.* You'll be safer driving a screw into fine finish work than hammering a nail into it. The hammer is more likely to slip.
- *When you plan to leave the fastener exposed.* Screws are somewhat more decorative than nails.

If your job doesn't fall into one of these categories, use nails instead of screws. They're not only cheaper, but require a lot less time and effort to install.

Once you've decided to use screws, you have to consider four things: the type of



HEAD



FLATHEAD screws don't protrude above the surface. They can either be driven flush or slightly countersunk and concealed with wood putty or small wood plugs



ROUNDHEAD screws protrude more than other types but offer good slot depth. They're designed for universal application and can be used in practically any project



OVALHEAD screws share characteristics of round and flat heads. The bottom of head is countersunk into surface, while rounded top increases depth of the slot



TRUSS-HEAD screws have a wide low-profile configuration often described as an "oven head." They are ideal for covering large-diameter holes in sheet metal



PAN-HEAD screws resemble truss heads—low with a large diameter—but have thicker outer edges to allow maximum driving power. Dotted line shows contour of the head when cut with Phillips slot

POPULAR MECHANICS

head, the metal the screw is made of, the length and the diameter.

The type of head includes both the shape which is explained in the table, and the "style." The term style refers to the notch in the head, either a straight slot or Phillips (a cross). Wood and sheet-metal screws come in either style.

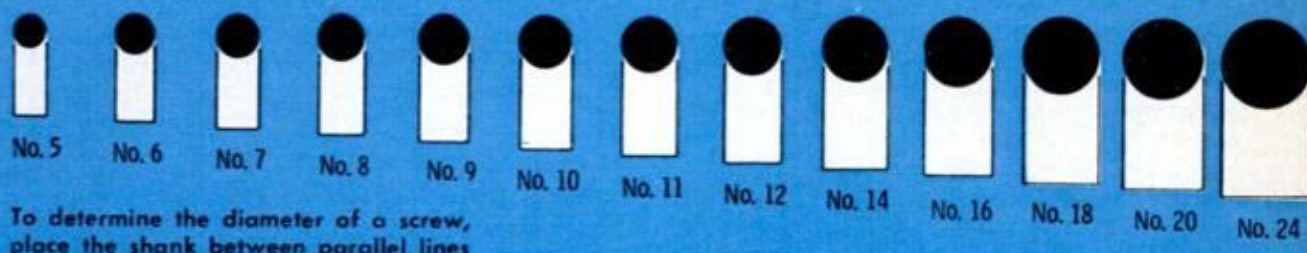
The main advantage of a Phillips head

is that it permits application of maximum driving pressure. A Phillips screwdriver makes a close fit in the cross-shaped slot, so that pressure is applied on four sides instead of only two, as with a straight-slotted head. Also, there is less chance of the screwdriver slipping out of the screw head and marring the work.

As for the type of metal used, steel and

KNOW YOUR SCREWS

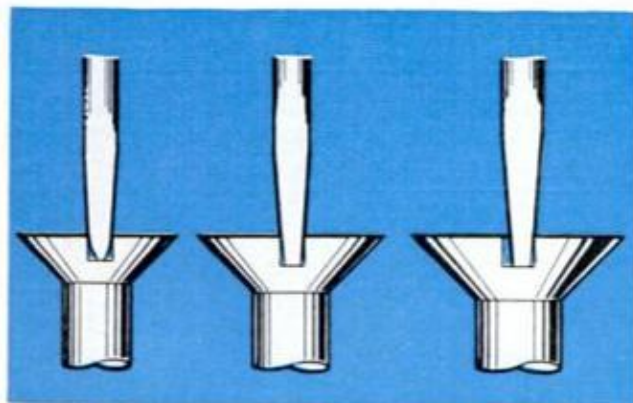
DIAMETER



USEFUL TIPS ABOUT USING SCREWS

- When drilling lead holes in softwoods, such as pine or spruce, make them only half as deep as the threaded portion of the screw. If you're working with hardwoods—oak, maple or birch, for instance—drill the lead hole as deep as the screw.

- Choosing the right screwdriver is extremely important, as shown in the drawing below. The blade should be as near the length of the slot as possible. It should also be thick enough to fill the slot completely, yet thin enough to reach to the bottom. A worn blade, such as the one on the left, is not only difficult to use but likely to damage the slot. So is a too-thin blade (right). Middle view shows proper fit.



- While applying soap to the threads will make a screw easier to drive, this isn't good practice. The soap eventually turns to a form of glue and cements the screw in the hole. It also causes corrosion. You're better off using paraffin or graphite. They work just as well and involve less risk.

- A screw that's frozen in place can often be freed by heating it with a soldering iron.

- When you back out a screw, the hole that remains is slightly larger than that cut by the threads originally. Before you replace the screw, fill the hole with wood putty or use a plastic plug to provide a firm grip. Or use a larger screw.

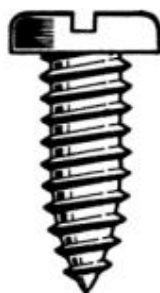
- There are two ways of removing a screw that has broken off in the hole. If you know its size, you can drill dead center into the screw with a drill that's of the same size. This will clear the hole, but it's somewhat risky because you have to drill absolutely straight in order not to mess up core threads. If you don't know the size of the screw, and thus can't pick the right drill to remove it this way, try using a drill that's smaller than the diameter of the broken screw. Just drill a small hole in the end of the broken screw and use a regular screw extractor, or tap a square-end nail into it, and use the nail like an Allen wrench to back out the stub.

SAFE LOAD PER INCH OF THREADS

WOOD	SCREW NUMBER				
	4	8	12	16	20
In Oak	80 lbs.	100 lbs.	130 lbs.	150 lbs.	170 lbs.
In Yellow Pine	70 lbs.	90 lbs.	120 lbs.	140 lbs.	150 lbs.
In White Pine	50 lbs.	70 lbs.	90 lbs.	100 lbs.	120 lbs.

NOTE: Keep in mind that the threads of a wood screw represent two thirds of the length of the screw. Also, setting a screw into end grain reduces the holding power by 40 percent. For example, a No. 20 screw set with threads 1 in. into the cross grain of white pine will hold 120 lbs. Set into the end grain, however, it will hold only 72 lbs. If threads penetrate only 1/2 in. into end grain, the holding power drops to 36 lbs.

SHEET-METAL SCREWS



TYPE A sheet-metal screws have coarse threads and are used for joining pieces of sheet metal of gauges from .015 to .050 in. They are available in diameters ranging from Nos. 4 through 14 and in lengths from ¼ to 2 in. You can buy them with either style head, slotted or Phillips.

TYPE B sheet-metal screws can be used for the same applications as Type A screws, but they are recommended for the more rugged jobs involving joining sheet metal with gauges of from .050 to .200 in. They are available in the same diameters and lengths as Type A in both Phillips and slotted.



TYPE C screws differ from the first two types in that they have standard threads rather than coarse. Type C tapping screws are used for sheet-metal joining when the gauges range from .030 to .100 in. They are available in diameters ranging from ⅜ in. to 1¼ in.

TYPE F sheet-metal screws are used primarily for joining metals ranging in thickness from .050 in. all the way up to ½ in. They are sold in diameters from No. 2 to ¼ in. and in lengths from ⅛ in. to ¾ in. Like the three above types, you can get Type F screws with either Phillips or slotted heads.



TYPE U screws actually seem more like nails than screws. Their heads are not slotted because they're installed with a hammer rather than with a screwdriver. Type U screws are used with heavier-gauge metals—.050 in. to ½ in.—and are made in lengths from ⅛ in. through ¾ in. One common use is attaching metal nameplates to sheet metal.

TYPE 21 sheet-metal screws are commonly used for fastening other materials to metal—fabrics, cardboard and leather, for instance. Like the type U screws, they have plain heads and are installed with a hammer. This type of screw is available in three lengths: ⅓, ⅜ and ½ in.



brass are the most common. Generally, brass screws are used for lightweight work, steel for heavy work. If there is a possibility of corrosion, use screws of aluminum or those protected by some kind of plating—galvanized steel, zinc chromate or plated cadmium.

Selecting the right length simply means picking the longest possible screw that won't pass entirely through the wood. The more screw body in the wood, the greater the holding power.

Although you can get screws as long as 6 in. on special order, commonly available sizes range from ¼ in. to 4 in. Below 1 in. the length increases by ⅛-in. increments; from 1 in. to 3 in. length goes up in ¼-in. steps; and above 3 in. this increases to ½ in. intervals.

Screw diameter is expressed in arbitrary numbers which represent relative differences in thickness rather than actual measurement. Wood screws are made in diameters of No. 0 (.060 in.) to No. 24 (.372 in.). However, your hardware store probably carries sizes from No. 2 (.086 in.) to No. 18 (.294 in.).

You have to know the screw's diameter in order to select the right drill size for making the lead hole. While this will depend on the hardness of the wood, it's generally equal to or slightly less than the screw's root diameter. For maximum holding power, use the smallest drill diameter that won't cause cracking or difficulty in driving. ★★

DRILLING LEAD HOLES

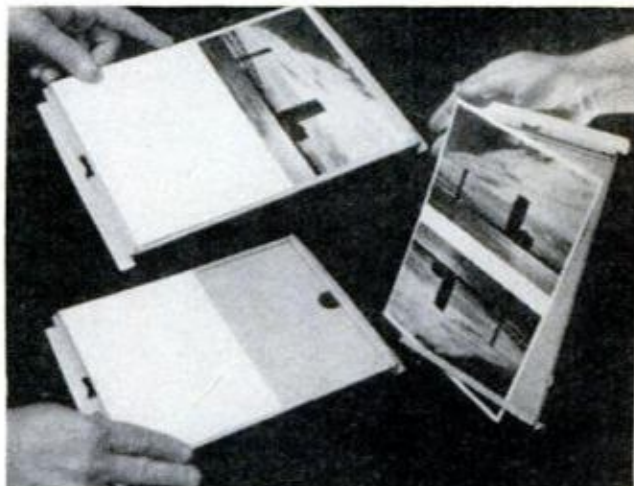
SCREW SIZE (No. and Diameter)	DRILL SIZE (No. and Diameter)	
	HARDWOODS	SOFTWOODS
0 (.060")	70 (1/32")	71 (1/32")
1 (.073")	66 (1/32")	65 (1/32")
2 (.086")	56 (3/64")	58 (3/64")
3 (.099")	54 (1/16")	55 (3/64")
4 (.112")	52 (1/16")	53 (1/16")
5 (.125")	49 (5/64")	52 (1/16")
6 (.138")	47 (5/64")	51 (1/16")
7 (.151")	44 (3/32")	48 (5/64")
8 (.164")	40 (3/32")	45 (5/64")
9 (.177")	37 (7/64")	43 (3/32")
10 (.190")	33 (7/64")	38 (7/64")
12 (.216")	30 (1/8")	32 (7/64")
14 (.242")	25 (9/64")	29 (9/64")
16 (.268")	18 (5/32")	26 (9/64")
18 (.294")	13 (3/16")	19 (11/64")
20 (.320")	4 (13/64")	15 (3/16")
24 (.372")	1 (7/32")	

NOTE: Lead holes aren't usually required for Nos. 0 and 1 screws. For sizes smaller than No. 6, lead holes can be eliminated in softwoods, except near the edges and ends of boards.

PHOTO HINTS



DISCARDED PLASTIC PILLBOXES make neat cases for filters. For padding, line the bottom with thin plastic foam. The square, shallow boxes stack snugly together and take up little room in a camera bag. Bind them together with a rubber band to keep them from scattering in the bag. The boxes are used for several different kinds of medication and are readily available at all drugstores.—Arthur L. Ramos



IF YOU HAVE A NUMBER of duplicate 5x7 prints to make, you can turn them out faster using an 8x10 easel this way. Cut a cardboard mask to cover slightly more than half of the easel as shown. Expose half a sheet of 8x10 paper with the mask covering the other half. Then, without moving the easel, carefully turn the paper around and expose the other half, giving you two 5x7 prints—Bob Corley

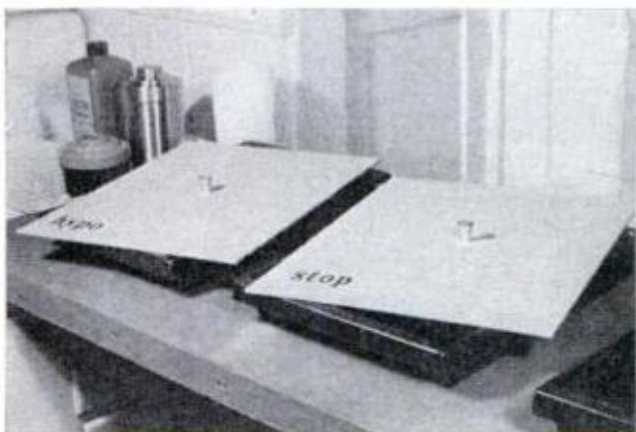


PHOTO-PROCESSING CHEMICALS quickly pick up dust and dirt if allowed to stand in open trays. If you leave your trays filled for more than a few hours, it's a good idea to cover them with homemade lids. Cut the lids from thin hardboard or plywood, making them slightly larger than the trays all around. Seal the covers against moisture with a coat of shellac or varnish. Ordinary wood or metal cabinet knobs make excellent handles for the lids, as shown above. Even when empty, the trays will stay cleaner if you keep them fully covered.—Arthur L. Ramos

NEED AN EXTRA FLASH for an extension setup? You can make one up from common items, as shown in the photo at right. Use a small aluminum pieplate for the reflector—it makes a fine fill light. Fasten the plate to a spring light bulb clip of the type used on lampshades. The reflector can then be clipped right on the flashbulb and swiveled to any angle. For a flashbulb holder, you can use a standard spring-clamp floodlight socket. Large-base flashbulbs can be screwed directly into such a socket, or you can use an adapter for smaller bulbs. The extension outlet on most flashguns will take a regular two-prong lamp-cord plug.—Ken Patterson



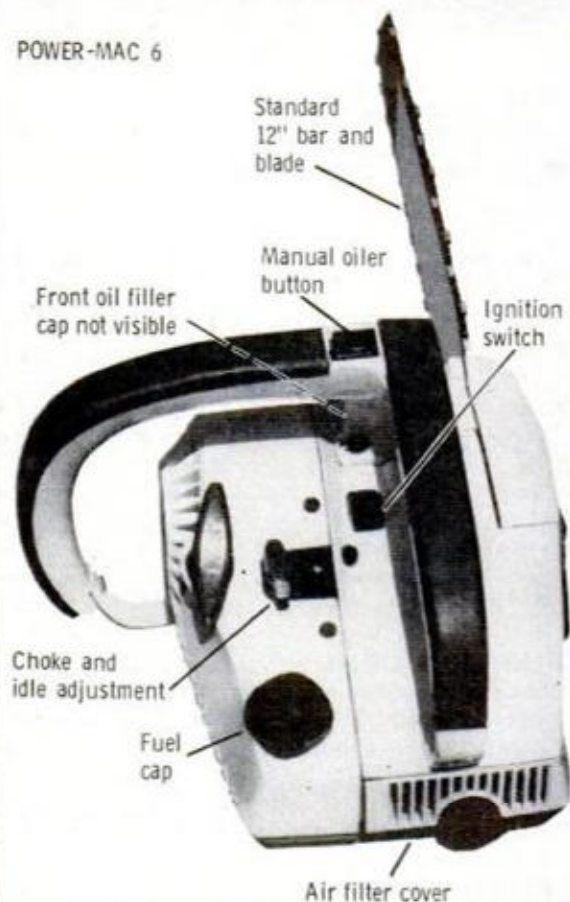
New 7-Pound Chain Saw— A Rip-Roaring Performer

By LEONARD E. SABAL
Workshop Editor

Photos by the Author



POWER-MAC 6



HANDY TO HEFT and easy to start, McCulloch's mini-saw has well-located controls, adjustments

"IT LOOKS LIKE A TOY!" was my first reaction—but after a weekend with McCulloch's new ultralight chain saw, I had to admit that while it *was* fun to use, it proved remarkably surprising in the performance department.

Six and 8-in. diameter logs were no match for the mighty mite. In fact, in a test running a little less than a minute, I sliced better than a dozen three-finger chunks from a 5-in.-dia. tree branch. While this test in itself doesn't set any records, it would take a modern Paul Bunyan to match this *one-handed* test with a conventional-size chain saw.

And *that*, as any 10-year-old will tell you, is where it's all at. The Power-Mac 6 is light enough to be controllably wielded with only one hand, yet it's powerful enough for all but professional lumber-jacks.

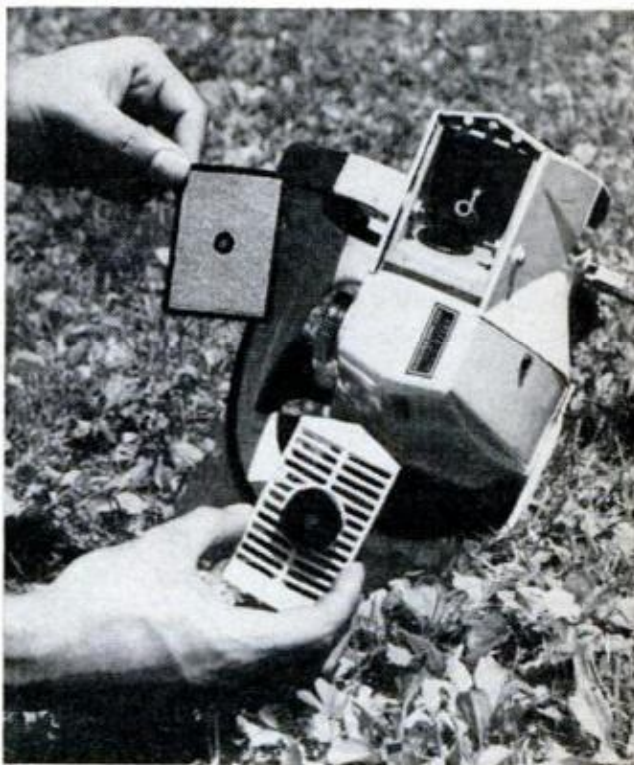
Its tiny 1.96-cu.-in., two-cycle, single-cylinder engine belts out almost 2 hp, and will run for a half-hour or so on a single tank ($\frac{1}{2}$ pt.) of 40-to-1 gas-to-oil mixture. Length of the bar is a standard 12 in., although if desired, an optional 16-in. bar can be factory-fitted for about \$6 over the basic price. Use of the 16-in. bar increases total weight from $7\frac{1}{4}$ to $7\frac{1}{2}$ lbs., but unless you live in a heavily wooded area, the 16-in. bar and blade is an unnecessary frill.

The body of the saw is made from a magnesium alloy, which makes possible the low $6\frac{1}{2}$ -lb. weight of the power unit. The black tip at the end of the bar is an alloy inlay to reduce friction and possible burning of the bar due to insufficient oiling. This is the only fault I could find with

the Power-Mac 6—automatic oiling would make continuous one-handed operation possible without running the risk of overheating the bar and blade.

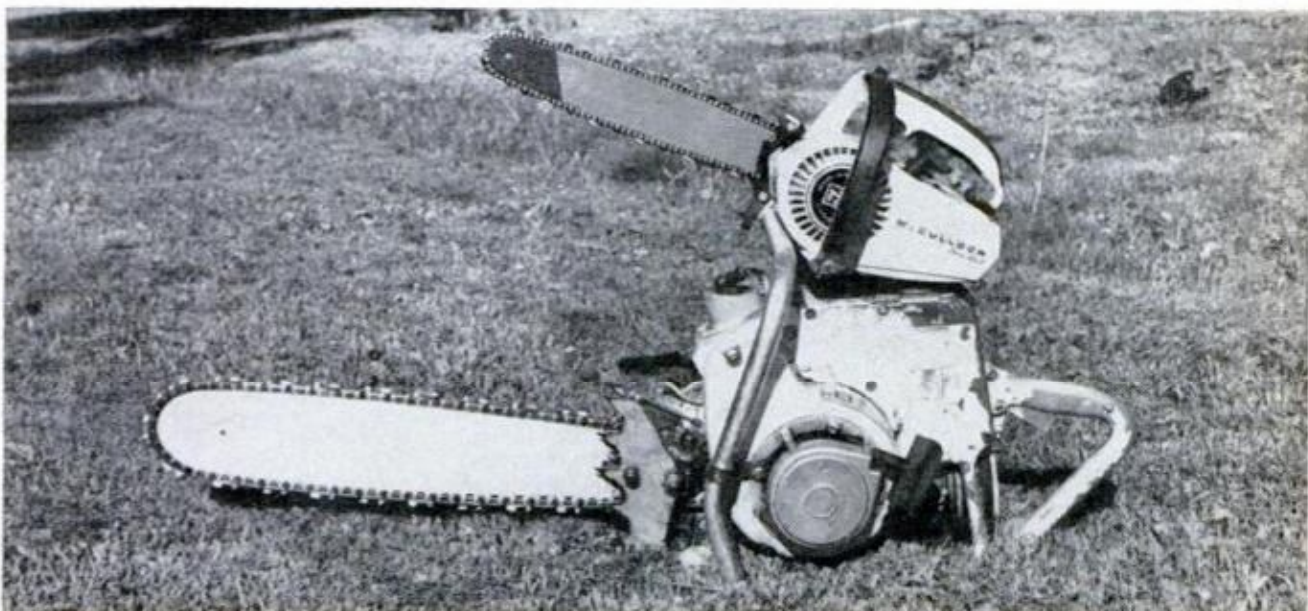
All controls and adjustment points are conveniently located, although I wished the handles were covered with soft rubber, bottom as well as top. Ribbed or contoured handles would also reduce the chance of accidental slippage.

Priced at \$169.95 complete with 12-in. bar and tension adjustment tool, the little saw will require only one test run to convince you that it's anything but a toy. ★★★



AIR FILTER MEMBRANE should be cleaned daily, is readily accessible by turning knob, removing cover

DWARFED BY ANTIQUATED MONSTER, Power-Mac 6 comes with 12-in. bar and chain; 16-in. bar is optional



13-Point Check

You're gambling with your life if you leave the driveway without knowing if your car will let you see, steer, stop and communicate with other drivers on the road

By MORT SCHULTZ

A SAFE CAR is one that gives you every chance to avoid an accident. Specifically, it's one that lets you see, stop, steer and communicate properly.

The equipment necessary for visibility includes windshield washers, glass, mirrors, windshield wipers, defrosters and lights.

Just a glance at windshield, rear window and side panes is all that's necessary to check for cracked, discolored or cloudy glass. Replace any that hampers your vision. Also, keep glass clean and watch where you place decals.

You can check your wipers simply by wetting the windshield and operating them

for a few cycles. If the motor doesn't work, the cause is most likely the switch, although wiper motors do gum up or burn out and need cleaning or replacing.

If your wipers leave the windshield streaked, the rubber blades are deteriorated and should be replaced.

If your car has windshield washers, activate them while the wipers are operating. If they aren't spritzing, you're out of water, have a clogged reservoir strainer or jets, or connecting tubing has slipped off somewhere in the system.

If your heater is working, the only reasons for inadequate defroster action are an obstructed duct or torn or disconnected

1

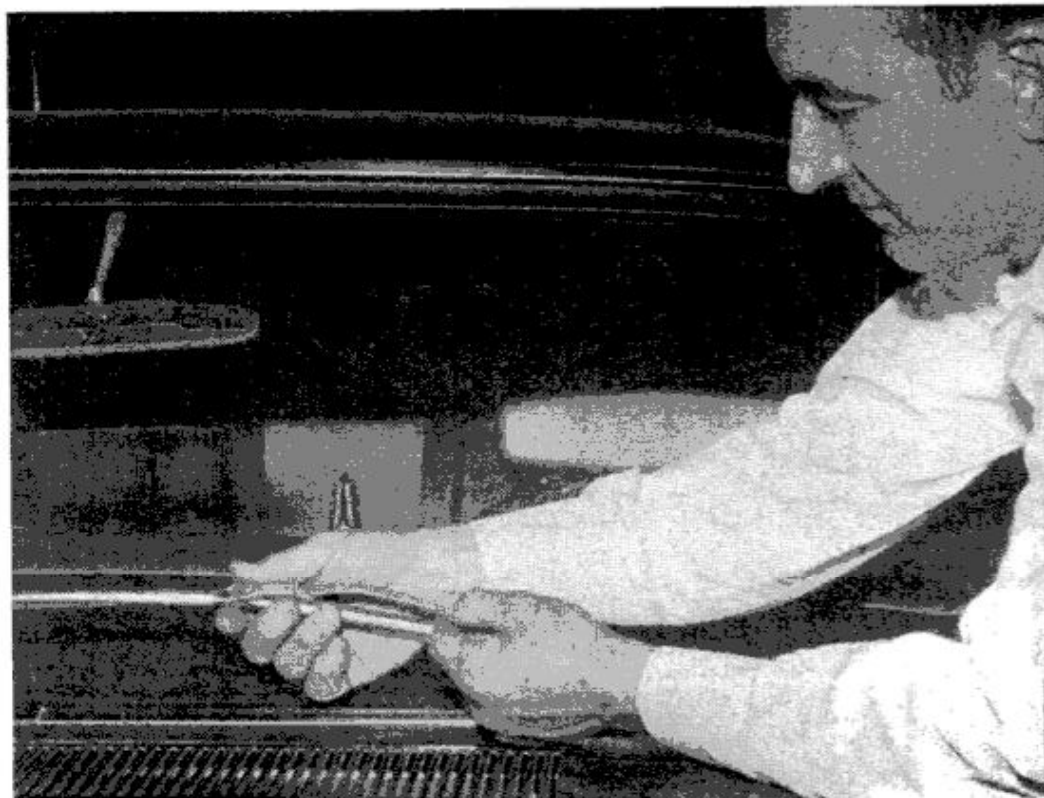
WINDSHIELD WIPERS get their hardest workout in winter snow. Check motor, arms and linkages. Replace rubber if it's streaking windshield

2

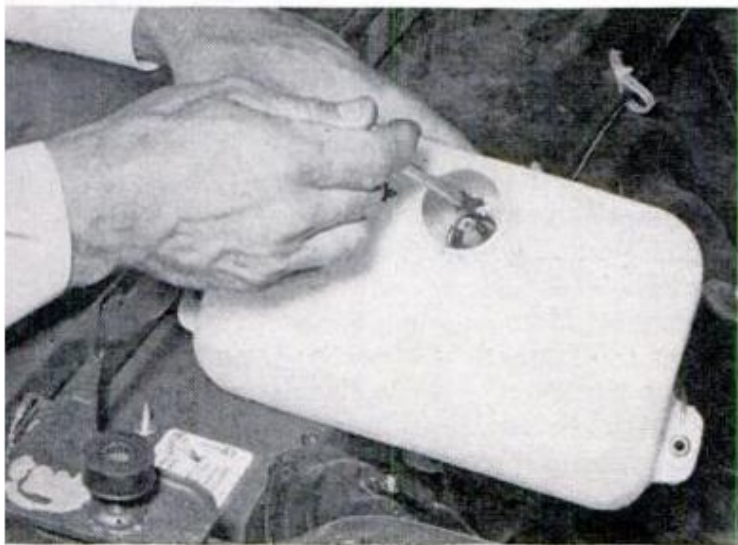
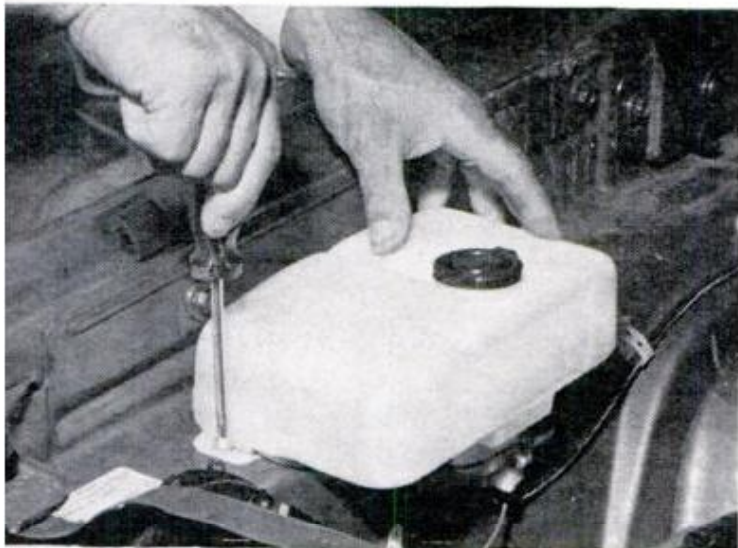
WINDSHIELDS and all other glass should be inspected for cracks and other faults that would obscure your vision or otherwise be unsafe

3

REAR-VIEW MIRRORS and side-view mirrors, too, should be examined for faults in the glass. Also check the swivel mountings for tightness



Luck . . . Make This for a Safe Car



4

WINDSHIELD WASHER reservoirs are easy to remove for cleaning. Disconnect wires to the centrifugal pump and check that tubing is tight and can't be forced off by fluid pressure. Clean strainer with a brush

5

DEFROSTERS can be lifesavers . . . as long as they're working. Don't assume they're working just because your heater is. Defroster hoses often become disconnected and are susceptible to splits and tears

hose. Check them and replace if necessary.

Rear and side-view mirrors should be checked for cracks and discoloration. While you're at it make sure to check swivel mountings that hold the mirror firmly in place. If they're loose and can't be tightened, get a new mirror.

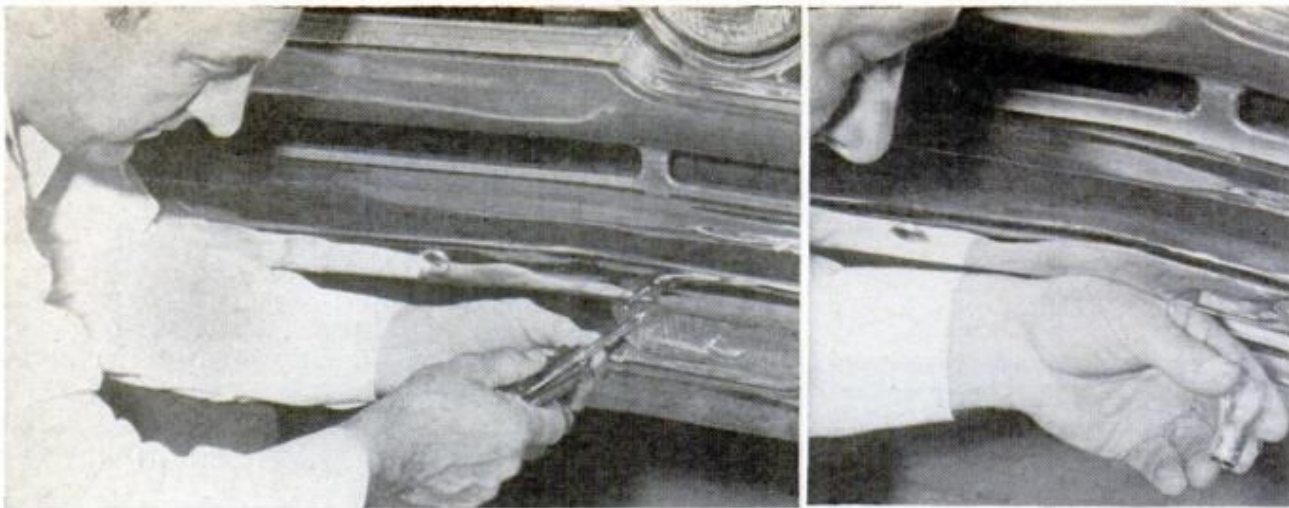
The many lights on your car are used for both seeing and communicating with other drivers. Up front, check your parking lights, headlight high and low beams, and turn-signal lights. In the rear, check license-plate light, taillights, stoplights, turn-signal lights, and backup lights.

A burned-out bulb or sealed-beam headlight unit is easy enough to replace. Simply remove the lens or retaining ring of the sealed-beam unit, remove the unit and replace with a new one of the same number.

If a group of bulbs fail to work, the problem is most likely a bad switch. For example, if both headlights fail to light when you pull out the switch, it's not likely that both bulbs have burned out. The trouble is probably a bad headlight switch.

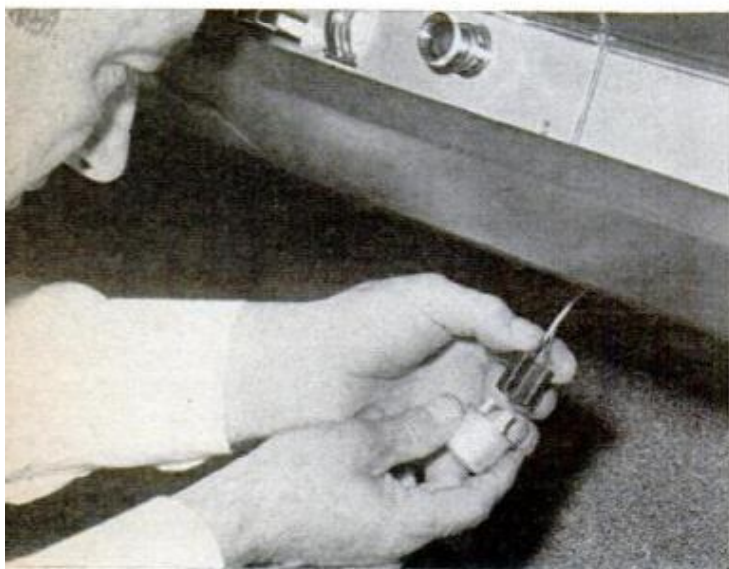
Details on how to remove switches vary from car to car. It can be a tough job, so check a service manual for your car. Generally, the procedure is to remove the battery ground cable (do this when replacing





6 **CAR LIGHTS** always fail unexpectedly and the cause is most often a burned-out bulb. It can be reached by removing the lens and frame or, in many cases, directly from the rear without removing the frame. Make sure you replace with same number bulb. A good idea is to keep spares in your car

7 **DIRECTIONAL-SIGNAL FLASHER** is most often mounted under the dash or on the firewall in your engine compartment. A bad one is easily replaced with another unit of the same number. Mark wires if you don't have plug connector



any switch), and pull the switch to full ON position. Loosen the retainer and pull the knob shaft out of its hole.

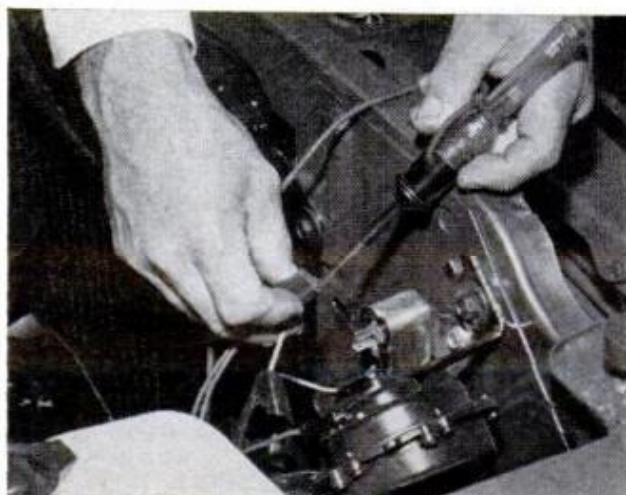
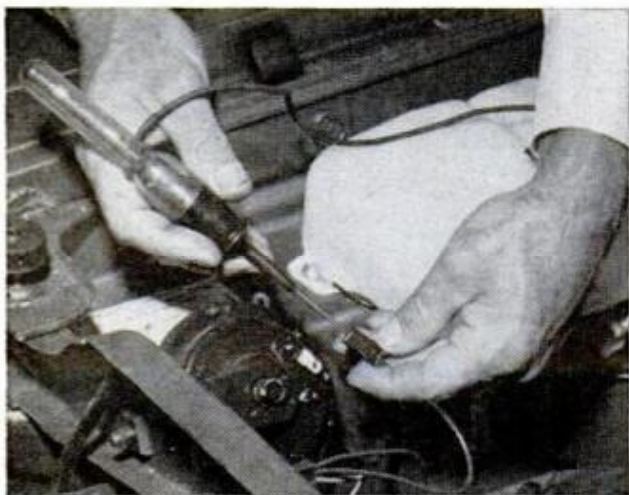
Reach behind the dash and pull the switch down. Disconnect the leads, reconnect them on a new switch and replace it.

If your headlight dimmer switch seems faulty—if it doesn't cause lights to go from high to low beam, or vice versa—throw back the floor mat and unscrew the dimmer switch from the floor. Pull the switch from connector leads and hook up a new switch.

There's one other aspect about headlights you've got to consider from a safety standpoint—vertical and horizontal adjustment. Home-grown methods of alignment are “guessy” at best, so invest a dollar or two every year to have the job done with professional equipment.

If your directional-signal light bulbs

8 **AUTO HORN** that's not working needs immediate troubleshooting. A troublelight across leads removed from horn proper (left) will light when the horn ring is pressed if the horn is bad. If good, move to relay (right) and check it with same technique. Finally, check wiring and horn-ring switch



9 **TIRE TREAD** should be checked for depth. Trade in tires with less than a 16th of an inch on the gauge. Also inspect for even tread wear and damage. Sidewalls should get equal attention; look for cuts, breaks, bruises. Check air pressure, too

10 **BRAKES** can telegraph trouble through brake pedal and steering wheel. A low or spongy pedal, excessive pressure needed to apply brakes, pulling to one side are all symptoms to watch for. Visual checks of lining keep you alert to rate of wear

11 **STEERING LINKAGE** should be checked for positive response, damping, lubrication, and alignment. Power-steering components should also be checked for proper functioning. Front suspension alignment is integral to steering setup and should also be true

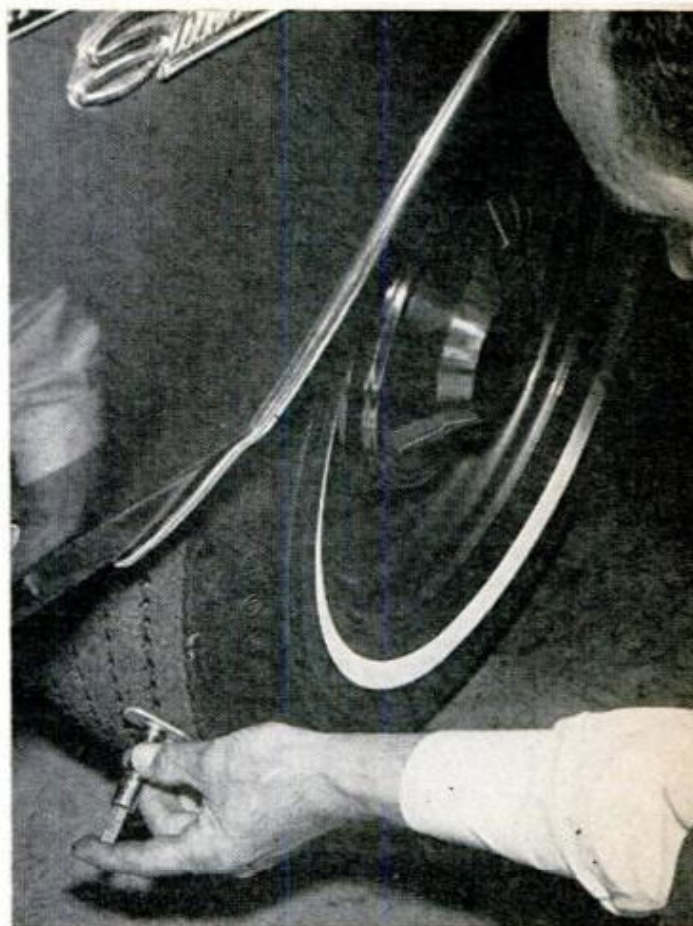
12 **EXHAUST SYSTEM** components can rust through without your knowing it. Lightly probe rusted muffler and tailpipe areas; paper-thin metal will crumble, and the part can be replaced before small but dangerous leak of exhaust gases develops unnoticed

check out okay, the problem is most likely a burned-out flasher. On most cars, the flasher is mounted on the back of the instrument panel. To replace it involves dropping the flasher, unhooking it and connecting a new one.

If directional signals fail to function after bulbs and flasher have been checked, the trouble has to be the turn signal switch. If it's inside the steering column, it's usually hard to get at. If you've got a steering-wheel puller you can do it. Otherwise leave it to a mechanic.

The chief means of communicating with other drivers and pedestrians is with your horn. It's used sparingly, but when it's needed, it had better be working. A horn (or horns) that isn't working usually has either a dirty horn-switch contact plate, a bad horn, a bad horn relay, or broken or poorly grounded wiring.

You troubleshoot a horn circuit like you'd troubleshoot any other circuit. First you need a test light, which you can buy in an auto parts store. Disconnect the wire at the horn and connect one lead of your test light to the terminal. The other lead goes to ground. Press the horn button. If the test light lights, you know the horn isn't blowing because it's bad. Replace it. If the test light fails to light, the trouble is



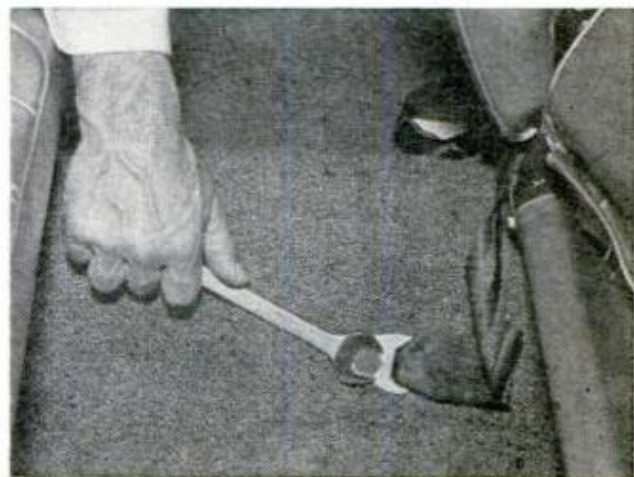
further back in the circuit, so you've got to trace it back, using the same technique at the relay and wire connections.

If the problem's a bad relay, replace it. If bad wiring seems to be the problem, make sure connections are tight and clean before you start replacing it.

If all these things check out, the trouble's probably a dirty horn switch contact plate. It's inside the steering column, and

(Please turn to page 229)

13 **SEAT BELTS** and shoulder harnesses don't help you see, steer, stop your car, or communicate with other drivers, but they do stop you from flying around in the event of an accident. Check the buckles, webbing and anchor bolts... just for good luck!



What's So Hard About

It's all in knowing where to put your lights. This step-by-step pictorial guide gives you easy setups for a variety of dramatic effects

By SHELDON M. GALLAGER

Photos by Robert D. Borst

IF YOU THINK that portrait photography is for professionals only, take a few minutes to study the pictures and diagrams on these pages. They show that portrait lighting is not only basically simple—it's also a lot of fun to try because there are so many interesting and unusual effects you can get.

Shooting a portrait does require some know-how, but it doesn't take a studio full of fancy equipment. You can create just about any lighting setup you want with four ordinary mushroom-type photo-floods available at photo shops. Light

stands are helpful, but you don't need to assemble a whole bunch at once. The back of a chair, a broomstick taped to a table leg, a standing lamp borrowed from the living room—such makeshift aids will hold your lights quite adequately.

There are four basic light positions. Your lights don't always have to be in exactly these positions, but they give you a starting point from which to try other variations. The main or "key" light is usually placed to one side of the camera so it lights the subject from an angle. This cross light casts shadows that give depth

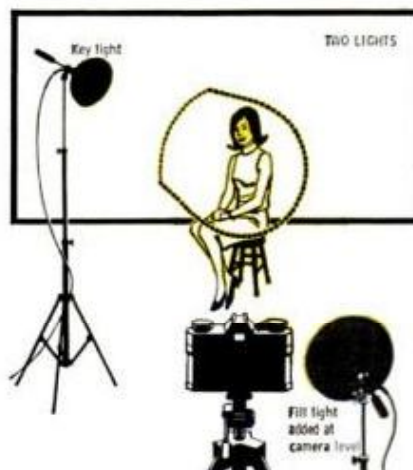


1

HOW YOU BUILD UP BASIC



2



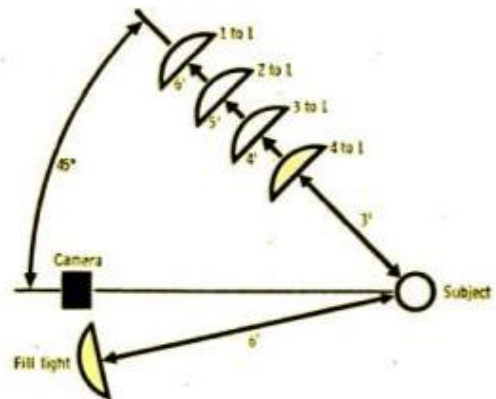
SEQUENCE OF PHOTOS here and on opposite page shows what happens as you add one light at a time in a four-light setup. Using a plain rubber ball helps to illustrate effect that each light produces. Key light (1) provides main illumination. Placed off to the side, it creates strong shadows, giving shape

Shooting a Portrait?

and shape to the subject's facial features.

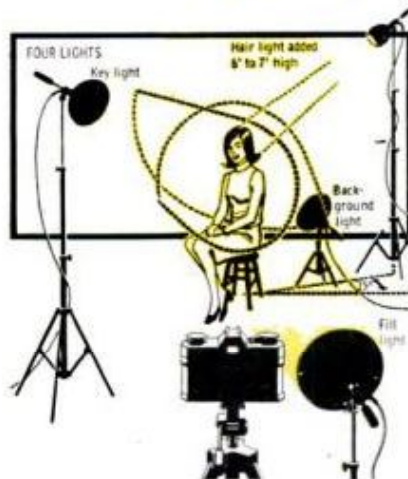
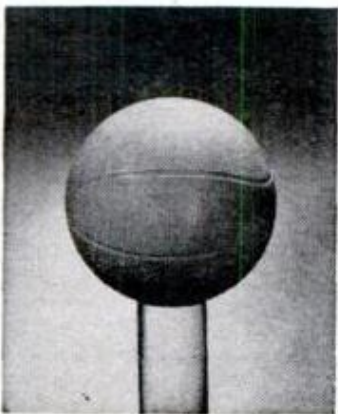
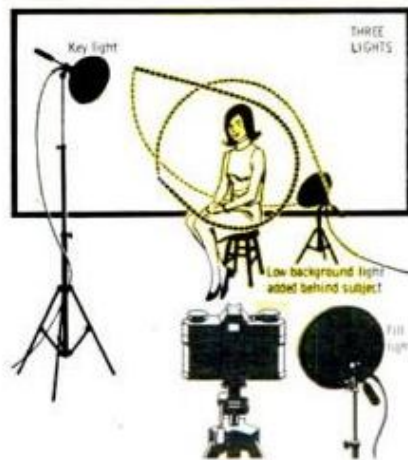
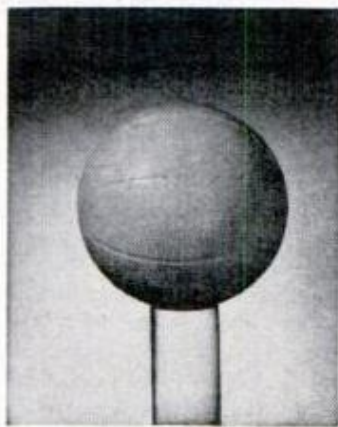
A "fill" light at or near the camera illuminates the side of the face that's away from the key light and softens the shadows so they don't become too harsh. A third flood is used to light up the background so the subject stands out clearly. A fourth flood, called a "hair" light, is placed so it shines down on the subject's head from the rear, adding a brilliant glow to the hair.

While there are four different light positions, you don't have to use all four to make a good picture. Many eye-catching portraits are made with only two or three lights. Once you learn the basic arrangement, you can experiment—that's when the fun starts. Try different combinations of lights and see what happens. You'll



HOW FAR AWAY you put the key light in relation to the fill light determines your "lighting ratio." When both are at the same distance, their ratio is 1 to 1 and they illuminate the subject more or less equally. As the key light is moved closer, its ratio increases. It becomes stronger and the fill light gets weaker. The higher the ratio, the deeper the shadows and the more contrasty the effect

FOUR-POINT LIGHTING



to facial features. Adding fill light (2) softens shadows and evens out lighting. Background light (3) outlines subject's head, separating it from background. Final light (4) puts attractive shine on hair

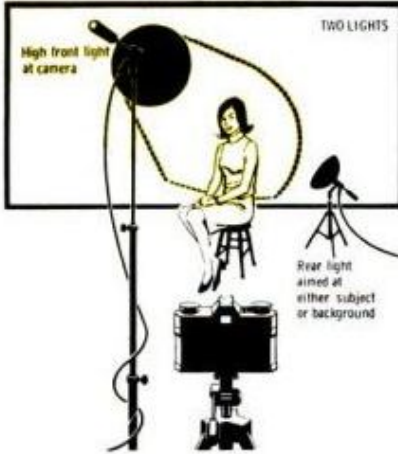
find, for instance, that killing the fill light heightens the contrast on the face. Omitting the background flood makes everything go dark except the subject's face, creating a moody effect.

Using various combinations of the four lights, you can actually make 15 different setups—four with only one light in each, six with two lights, four with three lights, and one with all four lights. Not all will produce pleasing or useful results, but

they'll let you see the wide variety of effects that are possible.

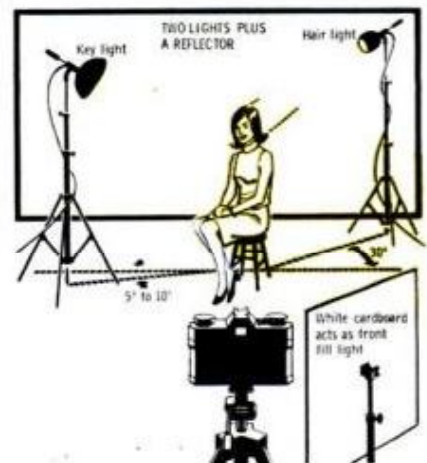
Proper location of the key light is important. The familiar "45/45" rule—angled 45° from the camera and tilted down 45° to the subject—is a handy guide, but don't stick to it rigidly. Study what the light does in different positions. Moving it farther from the camera sharpens the shadows it casts. Up to a point, this looks dramatic, but eventually it becomes gro-

WHAT YOU CAN DO WITH ONE OR TWO LIGHTS



IT DOESN'T TAKE a lot of lights to make a picture. The results may not be technically perfect, but they're often unusual and eye-catching. The photo at left above was made with a single high front flood. Adding a second flood to illuminate the background provides good separation between the subject and background, but doesn't make a particularly interesting picture. Now note what happens when you turn the rear flood around so it backlights the subject instead. The brilliant edge lighting on the hair creates a dramatic effect, yet you've used only two lights

NEED AN EXTRA LIGHT? The two photos below show how a white cardboard reflector can serve the same purpose as a light. Here, it acts as a front fill, and the key light is swung around almost broadside to the subject to provide a dramatic cross light. The photos show the effect without the cardboard on the left and with it added on the right. Note how it casts just enough light to open up the dark side of the face and keep it from going completely black. Even if you have plenty of lights, a reflector is often a better choice where you need only a small amount of fill



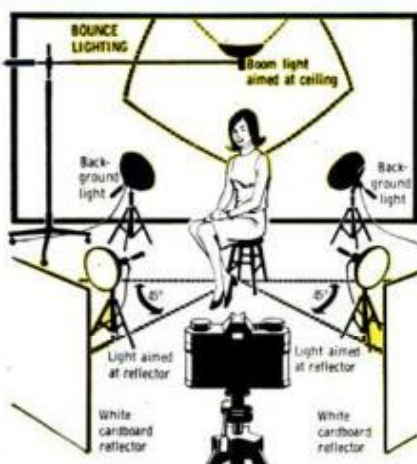
tesque. If your subject has a prominent nose that casts a long shadow, keep your key light low to make the shadow as short and inconspicuous as possible. On the other hand, raising the key light will help to de-emphasize an excessively long chin by throwing the lower part into shadow.

The relationship of the key light to the fill light is another important factor. Since you want the key light to do most of the work, you usually place it closer to the

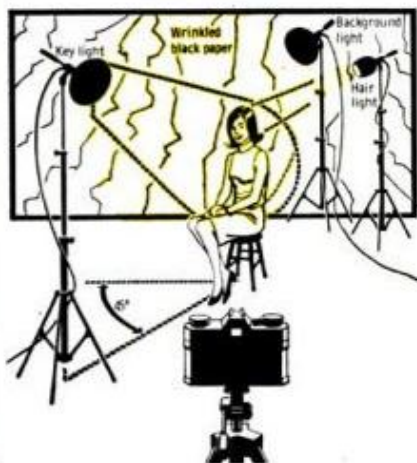
subject than the fill. The difference between the two distances is expressed as a ratio. The closer you move the key light to the subject, the stronger it becomes in relation to the fill light and the higher the ratio. Its shadows become deeper and more pronounced as the effect of the fill light gets weaker. High-ratio lighting produces striking results, but is better suited to rugged masculine features. A

(Please turn to page 230)

THREE WAYS TO CREATE SPECIAL EFFECTS



BOUNCE LIGHTING creates a soft, pleasing effect without shadows. While not as dramatic as direct lighting, it's often more flattering, especially on subjects with prominent features that cast deep shadow lines. Here, the illumination is entirely by reflected light. Front lighting is provided by two photofloods aimed away from the subject at white cardboard reflectors. Two more floods light up the background. A fifth light is aimed straight up so it reflects downward, casting a highlight (if ceiling isn't white, tack up a white bedsheet to give good reflection)



A FEW SIMPLE PHOTO PROPS can completely change a subject's appearance and personality, as shown at left. The background is an old piece of black paper deliberately crinkled to produce a coarse-textured pattern of light and dark tones. A peaked cap and high-necked sweater give the subject the tough, sexy look of an apache dancer—just the opposite of the sweet little girl mood in the upper picture. Note there is no fill light to soften shadows cast by the key light. This heightens the dramatic effect. Hair and background lights complete the setup

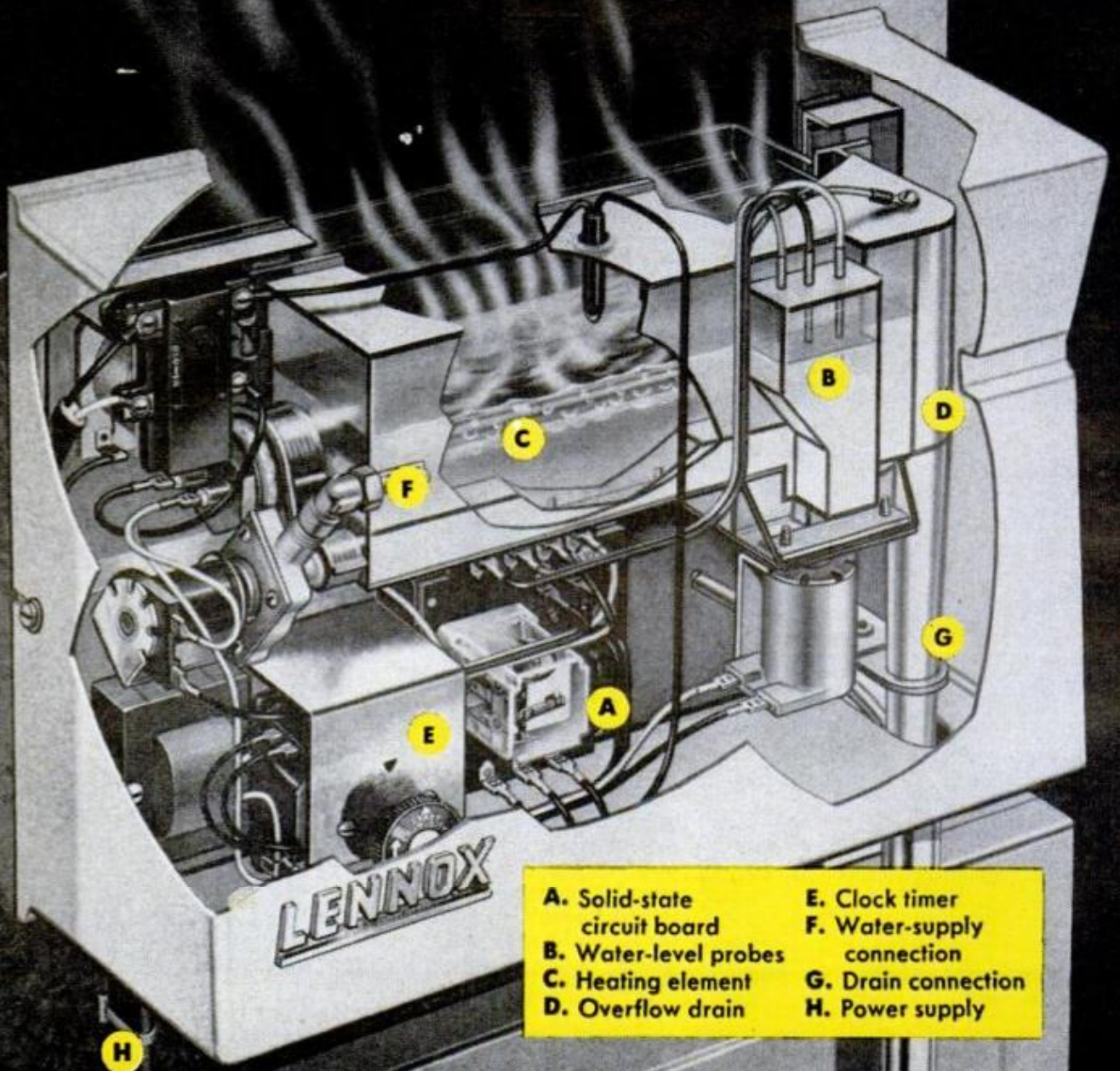


RANDOM SHADOW PATTERNS often add an unusual touch to an otherwise routine picture. You'll find many objects around the home that can be used to create interesting shadow effects. You'd never guess that the mottled background at left was produced by an ordinary kitchen stool turned upside down. One light is placed so it shines through the stool, casting shadows of its legs on white background paper. Locating the light low and off to the side, as shown at right, lets you throw shadows behind the subject without the stool itself getting in the way. Moving the light closer or farther away varies the shape and intensity of the pattern. Also in the setup are a key light (behind camera), a hair light overhead and a fill light at left



At Last: a Self-Cleaning

The new Lennox computer-controlled unit sets moisture level with solid-state precision and flushes away mineral deposits automatically



- | | |
|------------------------------|----------------------------|
| A. Solid-state circuit board | E. Clock timer |
| B. Water-level probes | F. Water-supply connection |
| C. Heating element | G. Drain connection |
| D. Overflow drain | H. Power supply |

Furnace Humidifier

WATER IS THE CAUSE of most humidifier problems. When it evaporates, it leaves behind mineral solids which tend to cake on float assemblies and clog drains. At best, this causes a drop in efficiency. At worst, it can mean a messy overflow and costly damage.

The new Lennox WE-9 electronically controlled humidifier represents a major breakthrough in the battle against mineral residues. It's an automatic self-cleaning unit which can operate almost indefinitely without service on any kind of water. Furthermore, its special design features permit a number of new installation possibilities in all types of warm-air systems.

Because the WE-9 generates steam electrically, it doesn't require heat from a furnace in order to operate. Thus, the unit can be installed in the supply or return air duct. It can be used with a heat pump or with electric heating. You can even put one on a central airconditioning system.

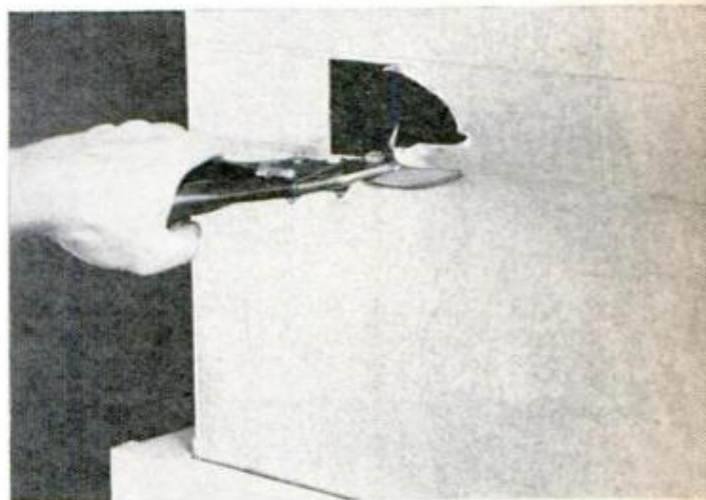
Control circuitry of the WE-9 regulates three operating cycles—filling, flushing and humidification.

The fill cycle is controlled by three water-level probes connected to a solid-state electronic circuit. As water evaporates and drops below the low-level probe, a signal goes to the circuit board which automatically opens the fill valve and shuts off the heating element. Water enters through a water distribution channel with six inlet jets positioned to scrub the bottom and sides of the reservoir. When water reaches the high-level probe, the fill valve closes.

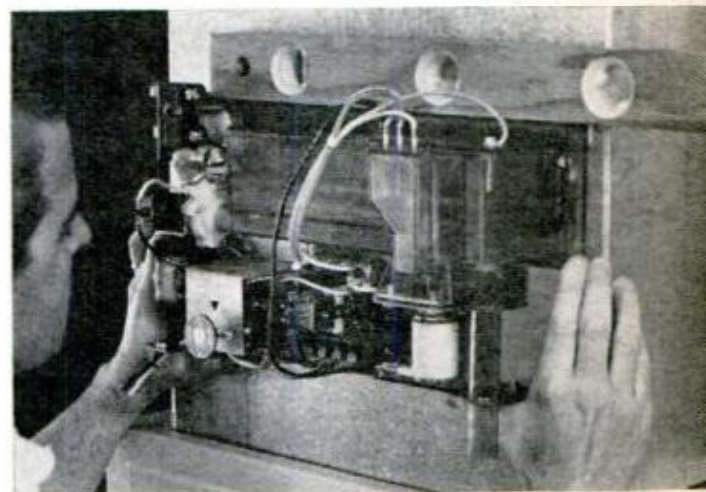
Clock timer runs flush cycle

The flush cycle operates from a clock timer wired in parallel with the fill valve. You can adjust the timer to flush the reservoir after anywhere from two to ten hours of humidifier operation, depending on how hard the water is in your locality. At the preset time, the clock opens the drain valve to empty the reservoir and start the flush cycle.

The reservoir in the WE-9 is made of

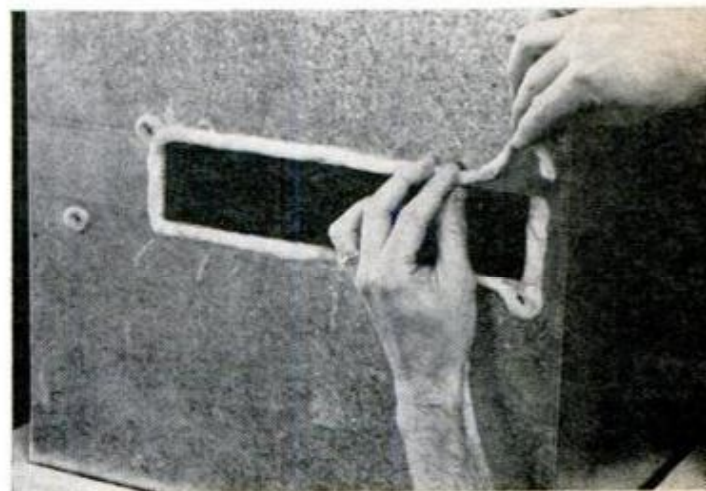


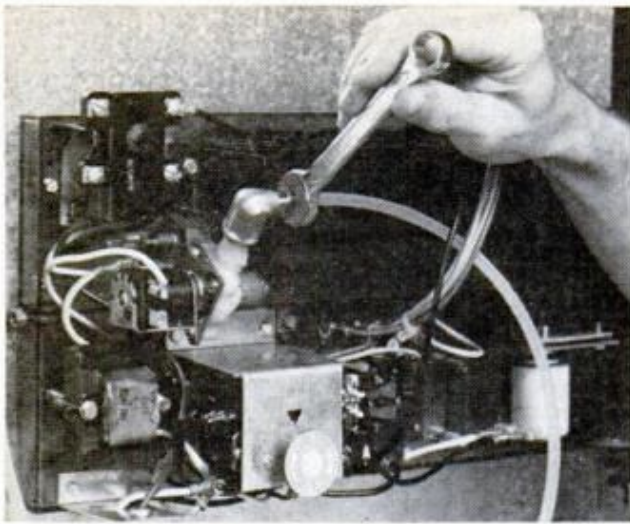
OPENING REQUIRED by the WE-9 measures $2\frac{1}{4}$ x 11 in. Unit can be mounted on plenum or on air ducts



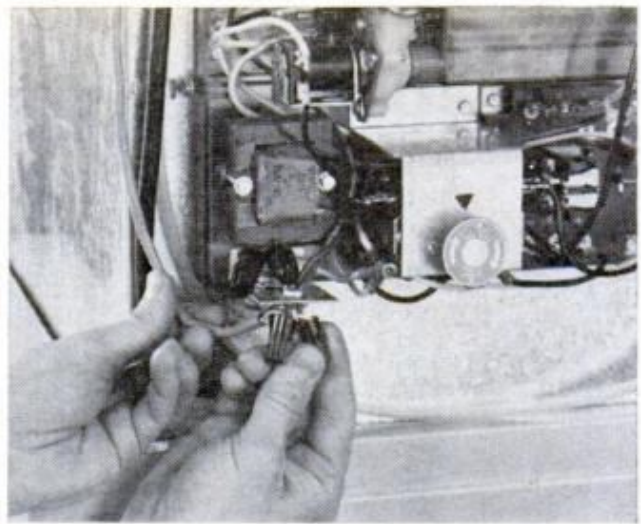
MOUNTING HOLES are located by positioning unit in opening and leveling it with a carpenter's level

WATERTIGHT SEAL between humidifier and plenum chamber is ensured by caulking all mounting openings

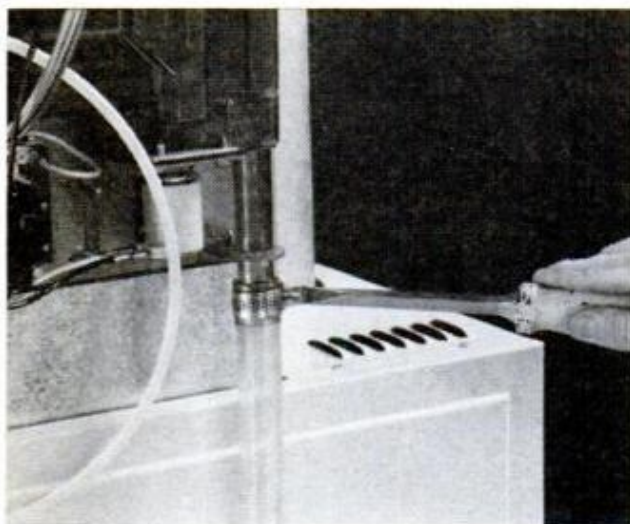




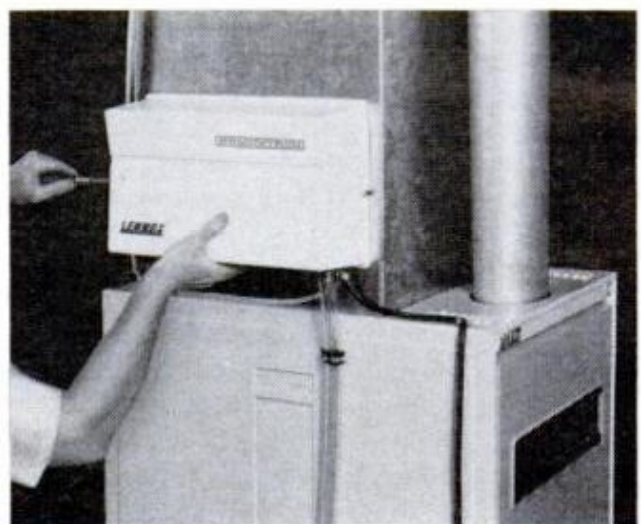
PLASTIC WATER LINE runs from nearest water supply to the inlet side of the unit. Fittings are provided



POWER CONNECTIONS, all standard 110-v., are made by following detailed instructions included with unit



DRAIN LINE is simply pushed up over the drain extension on humidifier and secured with a hose clamp



AFTER TESTING the entire operation of the unit, the plastic cover is installed to complete the job

a transparent heat-resistant plastic which has a hard nonporous finish that resists scale buildup. Jets of water scrub this surface as the water level drops, breaking away any deposits of solids that have formed so they can then be flushed down the drain.

Flushing sequence is as follows: 1. Drain valve snaps shut for 10 seconds, breaking up any residue caught in drain hole and permitting partial filling of reservoir; 2. Drain opens for two-minute flush; 3. Drain closes for 10-second fill; 4. Drain opens for final 10-second flush; 5. Drain closes and reservoir is refilled.

The humidification cycle is triggered by a humidistat which causes the control relay to close and send current to the heating element. The unit will continue to produce steam until the humidistat signals that the air contains sufficient moisture.

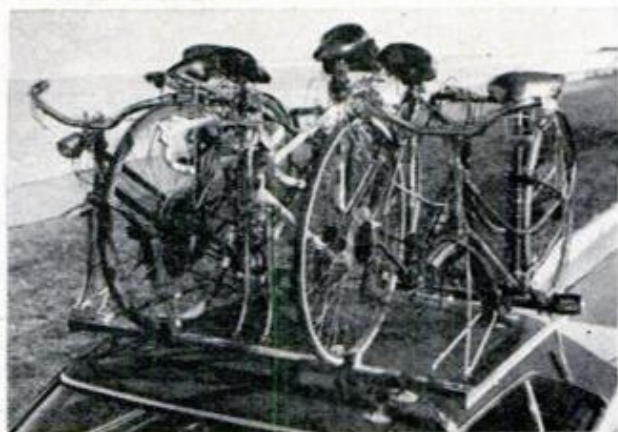
For safety, the WE-9 features double protection against overflowing. If the fill valve should fail to close, potential overflow is channeled out the overflow drain. If this drain should become plugged, a special overflow safety probe sends a signal overriding the fill control and shutting the fill valve.

Fuse guards against overheating

To prevent overheating, a hermetically sealed fuse will open if the temperature just above the heating element reaches 235°F. However, the only possible cause for this would be failure in the solid-state control circuit or mechanical failure of the control relay. Either one is highly unlikely.

The WE-9 weighs just seven pounds and has an evaporation capacity of 8.6 gal. per day. It's available only through authorized Lennox dealers. ★★★

Cartop Carrier Gives Bikes a Free Ride

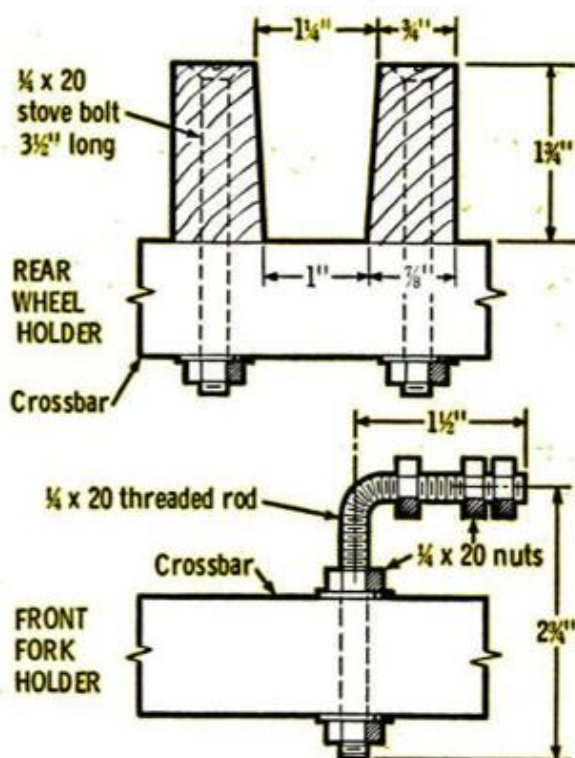


PEDALING ALONG to admire scenic spots is great sport and exercise, but getting to such spots on a bike is not so easy in congested areas for the bike-riding family.

The safe way is to head for the country with the bikes perched on the roof of the car. Then when heavy traffic is left far behind, you can switch from car to bike and be off on your merry way.

The cartop carrier shown here will transport as many as five bikes, all in an upright position; you simply take off their front wheels and stow them in the trunk. Each bike is anchored securely to the crossrails by tightening the front fork to a pair of L-shape bolts and then wedging the rear wheel between tapered blocks as detailed at the right.

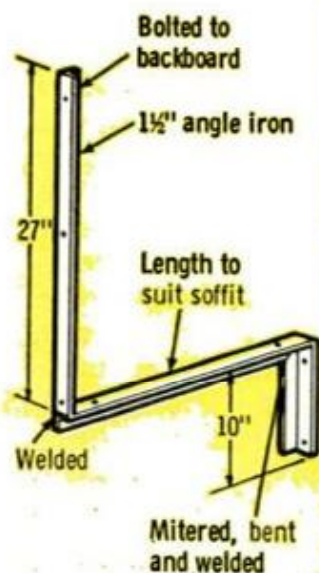
A detailed plan for building this rack can be obtained free of charge by writing to Bicycle Institute of America, Inc., 122 E. 42nd St., New York, N. Y. 10017.



Offset Brackets Support Basketball Backboard on Hip Roof

MOUNTING a basketball backboard on a garage is fairly simple when it has a gable roof, but not when it has a hip roof and wide overhang. Not wanting to go through the shingles in attaching the necessary braces, I decided to support the backboard from the underside of the overhang. I made three offset brackets of angle iron, cutting the pieces long enough to clear the gutter, drilled them for bolts and had them welded together. To attach the brackets, I used 12-in. bolts to pass through both fascia board and door header and screws into the soffit.

—Frank A. Bartonek



Down-to-Earth Facts About PREFINISHED SIDINGS

PVC, aluminum, hardboard, plastic-coated wood—these ready-to-go sidings solve paint problems for good

BY STEVEN J. HOWARD

IF YOU'VE BEEN READING the ads for prefinished sidings, you're probably familiar with all the miraculous claims being made for these wonder building materials. Thus, let's forget about miracles for a moment and begin with a bit of nitty-gritty which isn't mentioned in most ads: *How much does it cost?*

Good-quality prefinished siding usually sells for around 40 cents per square foot, give or take a few pennies. To put this in more easily understandable terms, it will cost you about \$1200 to re-side a home having 3000 sq. ft. of area. Another way to think of it is to divide the walls of your house into 10-ft. squares and put a \$40 price tag on each one. So much for the actual cost.

A second down-to-earth question: *How does this compare with the cost of painting?* On a strict materials-cost basis, that \$1200 would buy enough paint to give your 3000-sq.-ft. house a two-coat paint job every five years for the next half century. Obviously, this is an unrealistic basis for comparison, since it doesn't take into account the total amount of labor involved, much less such things as durability, maintenance or appearance. Once you begin to consider these factors, you're back to the miracle-material claims being made for prefinished sidings, and most of them are solidly based in the nature of the materials involved.

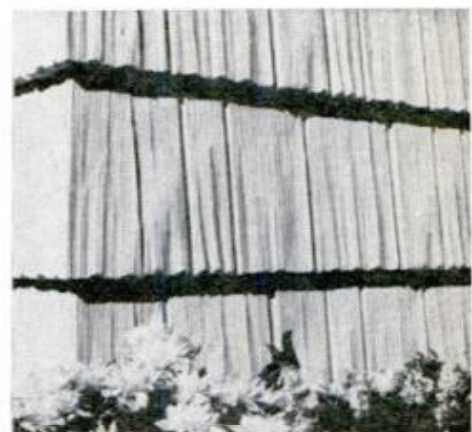
There are five basic types of prefinished sidings being sold today. The newest is poly-



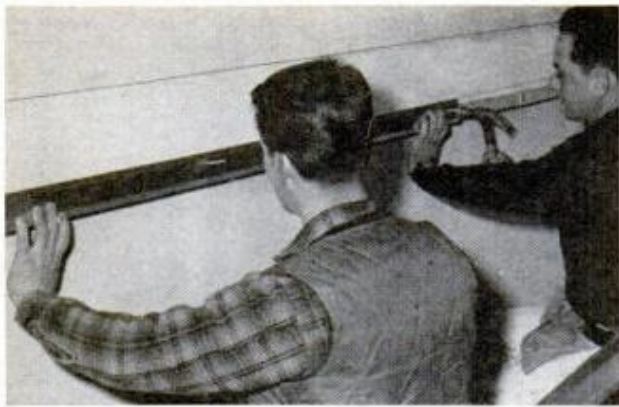


OCTOBER 1968

Alcoa Photo



ALUMINUM SIDING comes in wide variety of styles in addition to the conventional smooth-finish clapboard. Shown above are (top to bottom) rough-sawn vertical, rustic shingle (which can also be used for roofing), rough-sawn clapboard in popular 8-in. width and double 5-in. clapboard



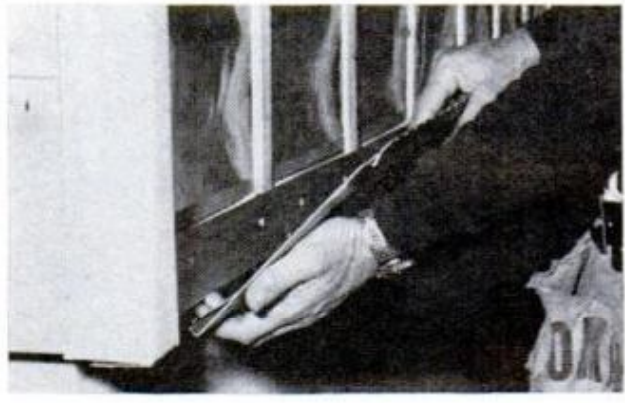
ALUMINUM SIDING installation begins with nailing a starter strip along the bottom. Use aluminum nails



LAYER OF FOIL under the siding protects against condensation. Vertical laths bridge old lapped siding



INSTALL TRIM PIECES around doors and windows and in corners before you begin nailing siding



FIRST SIDING PANEL is locked over the lip of the starter strip, which automatically aligns the siding



SIDING IS NAILED to the lath. It's important that you leave 1/32-in. gap between nailhead and crown



JOINTS IN SIDING should always be reinforced with backer. This makes entire panel more rigid

vinyl chloride (PVC), a solid vinyl siding. The other four are more familiar materials—aluminum, wood, plywood and hardboard—featuring a baked-on or laminated plastic finish.

PVC won't blister, peel, flake, warp, dent, corrode or scratch. It can be cleaned with soap and water. It scoffs at fungi, termites and vermin. Unlike aluminum, you don't have to ground this type of siding, because PVC doesn't conduct electricity. Neither does it support fire.

The only trouble with PVC is that you

probably won't be able to buy it for do-it-yourself installation. As of this writing, it's sold only to contractors.

One PVC manufacturer told me, "We disagree with the concept which aims at encouraging installation of vinyl siding by do-it-yourselfers." The industry claim is that this siding can only be installed properly by "dealer-trained, experienced applicators." This is pure nonsense.

PVC can be handled with relative ease by any man who can swing a hammer properly, measure a straight line and fol-

PREFINISHED SIDINGS: HOW THEY COMPARE

	PVC	ALUMINUM	WOOD, PLYWOOD, HARDBOARD
Styles and sizes	Limited to clapboard and vertical styles only with traditional smooth finish. Sizes include double 4" horizontal, 6" horizontal, double 6" horizontal, 8" horizontal, double 5" vertical, 8" vertical.	Great choice including rustic shingle; wood textures in 8" clapboard, double 5", and board and batten; sculptured (8" face); stucco embossed clapboard; traditional clapboard in all sizes.	Greatest variety in lap, paneled, textured and grooved boards. Included are board-and-batten, channel groove, traditional clapboard, shingle, saw kerf and plain.
Cost	Most expensive of all—\$1 to \$1.25 per sq. ft. installed (difficult to quote uninstalled price, which depends on how you barter with man selling it).	Ranges from 40¢ to 50¢ per sq. ft. for plastic coated and as low as 30-35¢ per sq. ft. for enamel coated.	Least expensive of all. Even with plastic coating, price is about 35¢ per sq. ft. However, plywood siding that has an aluminum sheet finished in baked enamel is more expensive, running to about 60¢ a sq. ft.
Performance characteristics	Most sturdy of all. Resists practically every form of normal damage. Guaranteed by most manufacturers for 20 years. Will in time weather, but resists weathering better than other types.	Plastic-coated is very sturdy. Resists every form of normal damage except denting, chemicals and fire. Weathering resistance is as good as PVC. Less expensive aluminum without plastic coating more prone to damage. Guarantees in 10-20-year range.	Plastic-coated products generally guaranteed for 10 years against weathering, cracking, blistering, and peeling. Aluminum-covered plywood generally carries a 15 year guarantee.
Installation factors	Can be done by competent do-it-yourselfer. No more difficult to install than aluminum.	Can be done by competent do-it-yourselfer.	Can be done by competent do-it-yourselfer.
Accessories	Anything you need, including window/door channels, window/door caps, window/door trim, corner posts, gutters and downspouts, shutters, roof edgings.	All accessories available in aluminum, including shutters, gutters and downspouts, corner posts, window/door trim, louvers, soffits.	

low the simple installation instructions which are packed with the material. It's installed in the same way as aluminum siding, which is available to anyone.

The manufacturers' main objection to do-it-yourself installation is that "special" nailing must be done to compensate for the "great" tendency of the material to expand and contract when subjected to variations in temperature. However, PVC installation instructions are the same as

aluminum siding instructions on this point.

The instructions packed with PVC carry this warning: "Important—avoid driving nails too tightly." You are cautioned to allow a 1/32-in. gap between nailhead and siding crown. This same instruction appears in the *Aluminum Siding Application Manual* prepared by the Aluminum Assn., 420 Lexington Ave., New York, N.Y. 10017. (If you're planning to install

(Please turn to page 231)

EXCITING NEW PRODUCTS

By CAROL SCHULTZ

HIGH SECURITY ENTRY CONTROL SYSTEM limits the use of a door to holders of an invisibly coded plastic card instead of keys. Insertion of this coded card into the sensor unit completes a low-voltage circuit which activates the release and allows the door to be opened. Duplication of card is almost impossible. Literature and price information on the system, called "Dentco," are available from Detex Corp., 53 Park Pl., New York.



PLASTIC TAPE is ideal for sealing ductwork seams, wrapping tool handles, sealing doors and windows, patching hoses, tents and dozens of other jobs around the home. "Duc-tape" (shown at right) provides an airtight, waterproof seal because it has a plastic coating on a heavy adhesive base. A 30-foot roll of 2-inch tape sells for \$1.29. Arno Adhesive Tapes, Inc., Michigan City, Ind.

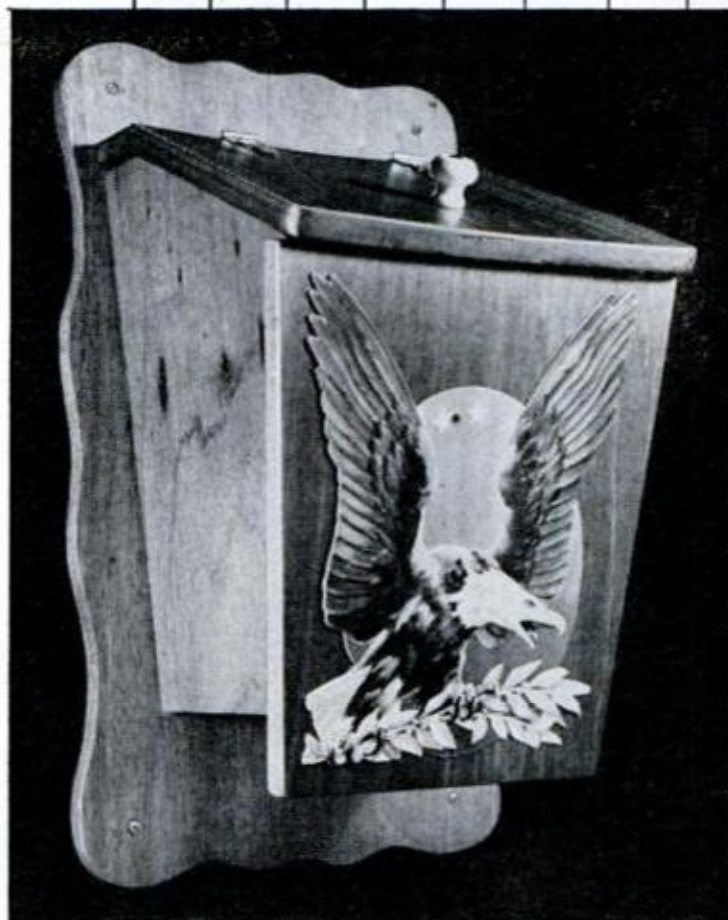
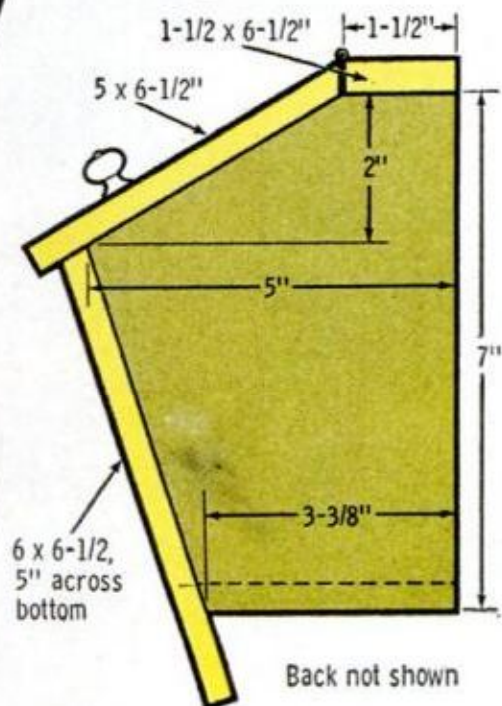
A BATTERY AND CHARGER SYSTEM is a practical alternate to the constant buying of batteries for use in flashlights and radios. General Electric's nickel-cadmium batteries are rechargeable again and again, and used instead of a standard battery. Battery charger costs \$9.95; battery twin-packs in three sizes sell for about \$3.95. Made by General Electric, Gainesville, Fla.



GARDEN EDGER with its convenient hand-grips and footplate was designed to give a clean, good-looking edge without tiresome bending or squatting. It's ideal for lawns, walks and driveways. "E-Z Edger" features a seven-inch cutting blade of 12-gauge steel, which may be sharpened as often as necessary with a file or emery wheel. Costs \$7.95. Made by Kemp Mfg. Co., 838 Kemp Bldg., Erie, Pa.



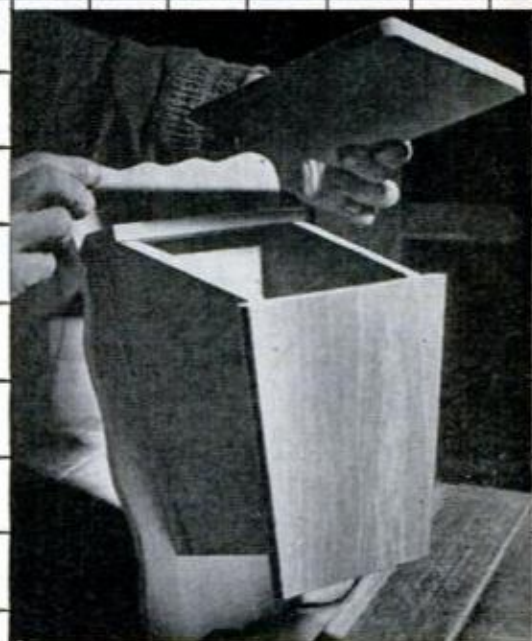
Colonial String Box



IT'S CALLED A STRING BOX mainly because in days gone by, colonists found string hard to buy. Thus, every scrap was usually saved in boxes handily hung on kitchen walls.

This modern version of the colonists' string box is just as handy for storing cord, tape and string for gift-wrapping and mailing packages. It's made of $\frac{3}{8}$ -in. solid cherry or soft pine and has scalloped edges for that Early American look. The cutting pattern on this page will make it easy to cut the scalloped rear panel.

—Don Shiner



HINGED TOP overlaps the front panel. The American eagle cutout is of cardboard

1/2" squares



EASIEST REINFORCEMENT to install is steel block mesh set in mortar. Ends of mesh strips are overlapped

How to Lay Concrete Blocks

The best jobs are often those of an interested beginner who cares enough to pay close attention to all details

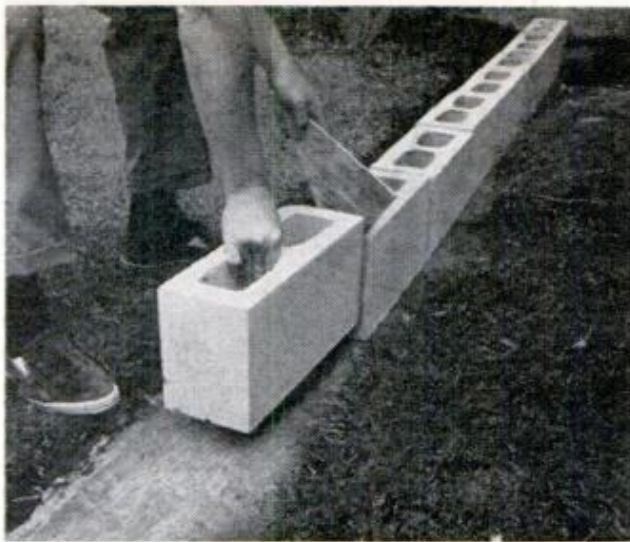
YOU'RE NOT A MASON, so why try to lay blocks like one? Especially when you can get better results by taking advantage of your amateur status.

A professional mason spends years mastering the skills of his trade. Once he has acquired the necessary experience, he can lay blocks quickly with a machine-like efficiency that seems almost effortless. On the first job, though, the professional method is actually much more difficult than a straightforward amateur approach.

The following nonprofessional method of laying concrete blocks is designed for an unskilled man working alone. True, it may take longer, but it will enable you to build a concrete block wall that's as strong and good looking as one built by a pro. All you need is the desire to do a good job and a few specialized tools.

The first tool to buy is a mason's trowel. This is used to pick up and place mortar. The blade is about 10 in. long and 5 in. across.

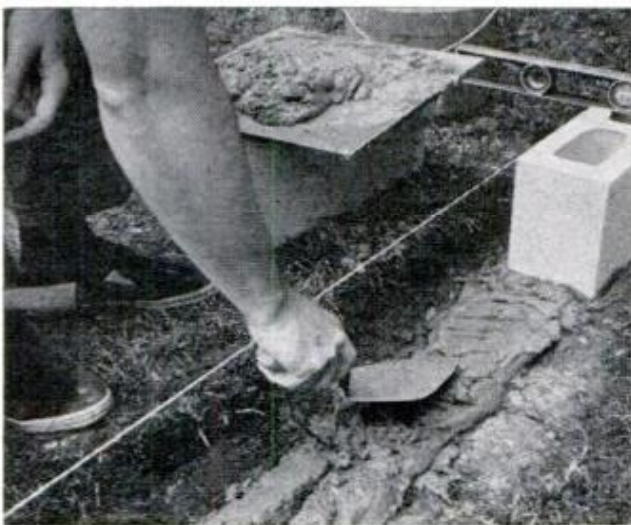
Mason's trowels come in two shapes—Boston and Philadelphia. For block laying, you'll probably prefer the Philadelphia, because its straighter edges are better for picking up straight beads of mortar.



DRY LAYOUT of blocks on the footing is a good precaution. Use scraps of $\frac{3}{8}$ -in. plywood as spacers



SMALL CONCRETE MIXER makes it possible to mix fresh batch of mortar while you are using up first



BOTTOM COURSE is laid on full mortar bed which has been furrowed with trowel point. Note guide line



CORNER BLOCKS are laid to interlock. These govern position of all other blocks, so level them both ways

Like an Amateur

By **RICHARD DAY**

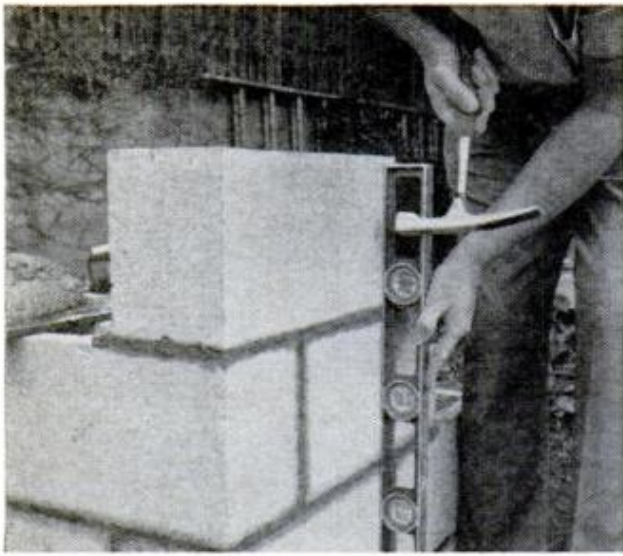
Technical Art by Glen Fleischmann

Incidentally, professionals use the wooden trowel handle for tapping blocks into position. When amateurs try this, they usually end up spattering mortar all over the place. Better to resist the temptation to "do it like a pro" and position the blocks by tapping lightly with a hammer.

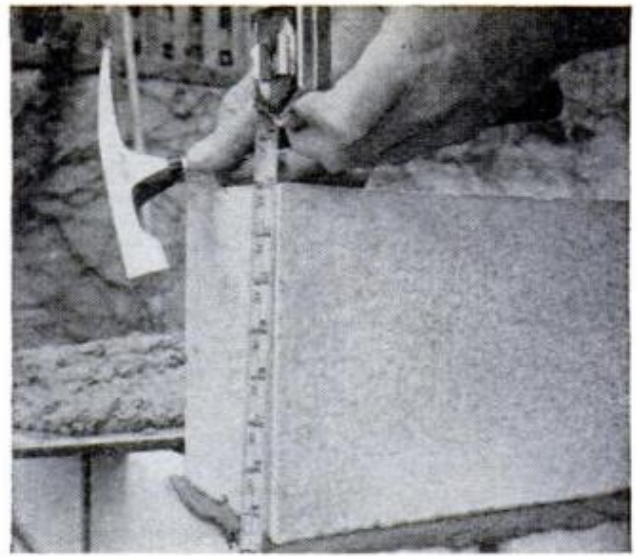
The hammer you use will depend on the job. A regular mason's hammer has a square head at one end and a chisel edge on the other. It's used for cutting the blocks to size, making holes or chipping the edges to special shapes. If your project doesn't include any of this type of work, you can get along very well without a special hammer.

You can't get along without an accurate level, for the whole success of the project depends upon how carefully it is leveled. As in the case of the hammer, however, it doesn't have to be a mason's level. A true mason's level is 4 ft. long, with the extra length more for use as a straightedge than a plumb or level. As an amateur, you can get along fine with a good 2-ft. carpenter's level.

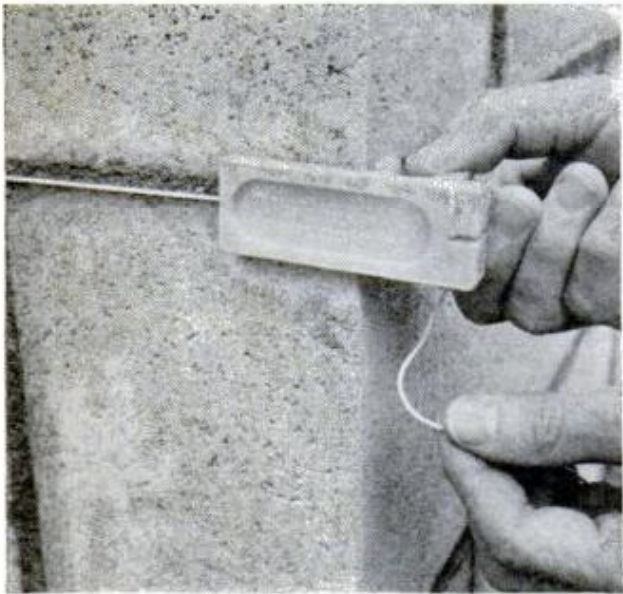
You'll also need a jointing tool in order to produce smooth, tight mortar joints. For rounded joints, the tool to use is a $\frac{5}{8}$ -in. round bar or pipe that's curved at the ends to prevent gouging. For V-joints, use a $\frac{1}{2}$ -in.-sq. bar with curved ends. The ends can be used for tooling short vertical



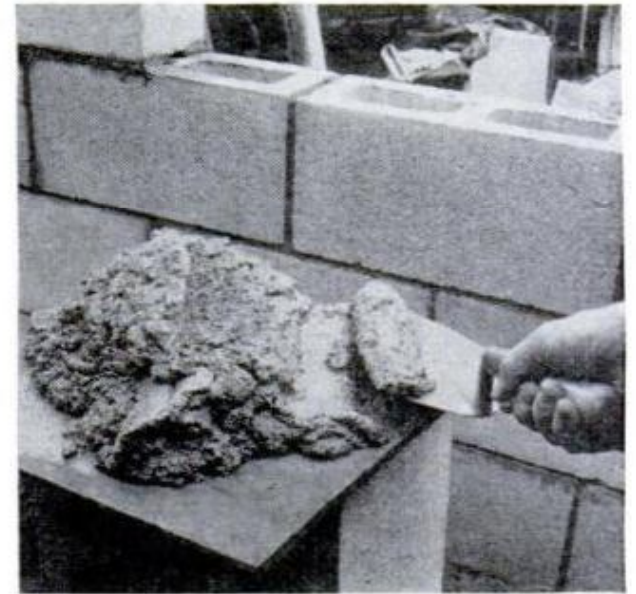
LONG FACE of each corner block must be lined up and plumb with blocks below. Tap lightly into place



CHECK HEIGHT by measuring from the footing to top of corner. If block has settled, remove and re-lay



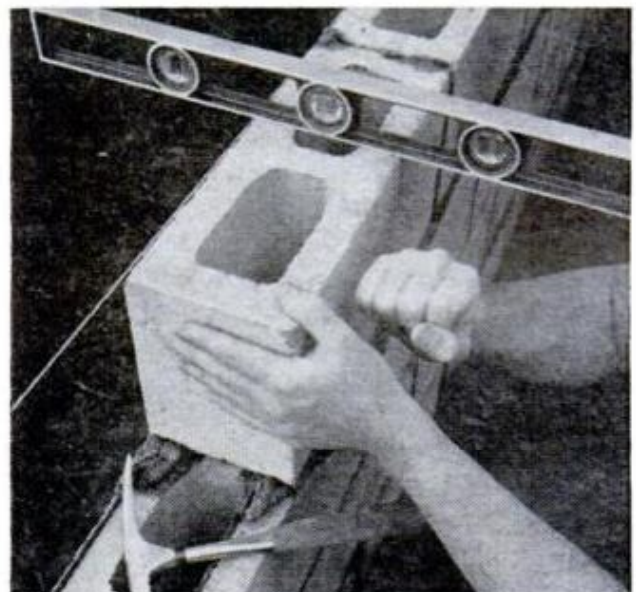
LINE BLOCK holds line flush with top of corner. Move to next course when blocks will stand pull



GOOD MORTAR BOARD is an 18-in. square piece of plywood. Support on a pair of upended block legs



RIBBONS OF MORTAR on ends of each intermediate block fill vertical joints. For best bond, slap them on



INTERMEDIATE BLOCKS should be laid to align with the guide line and leveled across to square them

joints. A good jointing tool should be at least 22 in. long to span irregularities. The main reason for tooling mortar joints incidentally, is to compact them and make them more weather-resistant. Just as important, though, is the fact that this finishes off the joints and produces a better looking wall.

Other useful items are a nylon mason's line (the amateur can use a strong fish-line) and a pair of line blocks. The blocks hook over the ends of the wall to anchor the line, keeping it properly positioned and taut. The cost is peanuts.

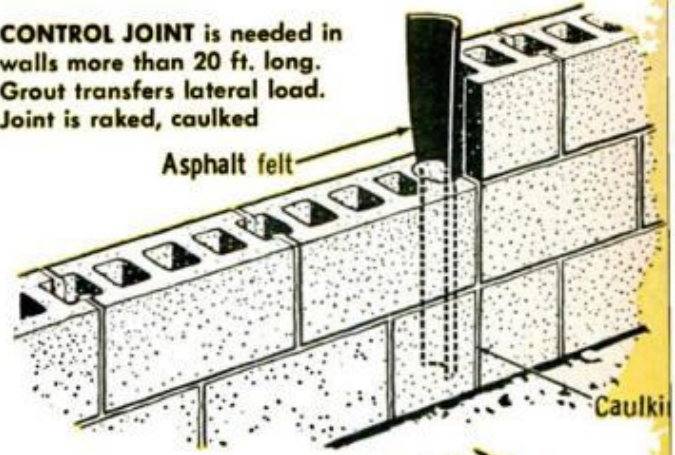
A small concrete mixer is also highly desirable, since it produces better, more workable mortar than you can get by mixing with a hoe or shovel. The 5-gal.-bucket type is ideal. If you can't rent one, they sell for about \$40.

So much for the equipment. Now you're ready to plan the job. The most important thing here is to use modular dimensions, if possible. This will avoid hours of tedious cutting and fitting. Concrete blocks are made to fit 8-in. modules, so if you design the wall to fit them, using full and half blocks, you'll do yourself a favor. Draw a rough-dimensioned sketch to be sure you've got everything straight and you're ready to install the footing.

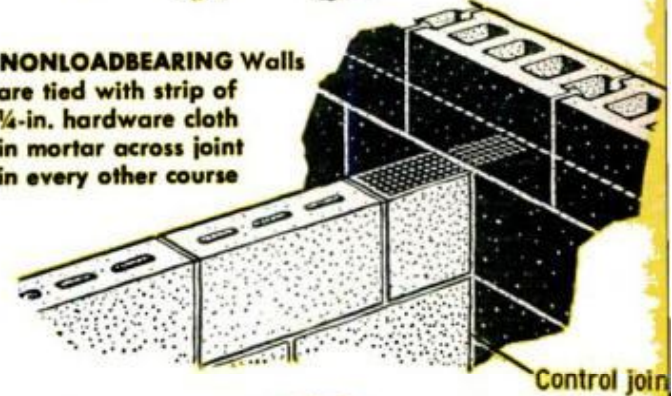
A good footing is twice as wide as the wall. It should be cast on unexcavated earth, not on backfill. The bottom of the footing must be below the frost line in your area and at least 12 in. deep.

Build your footing of quality concrete

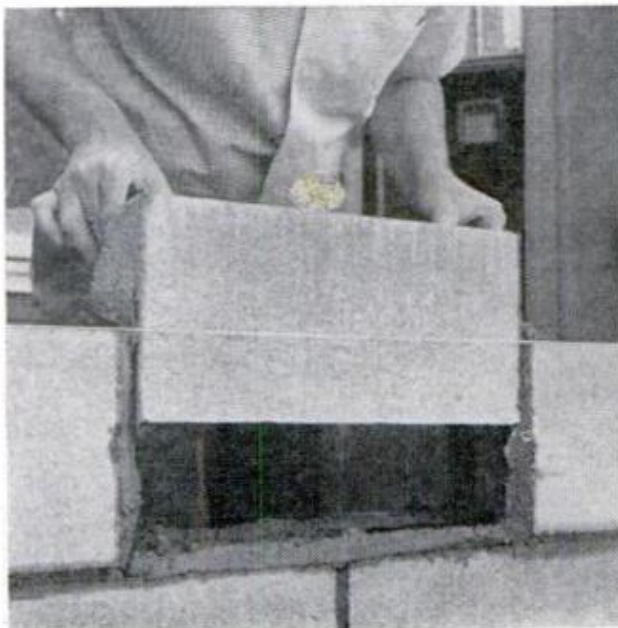
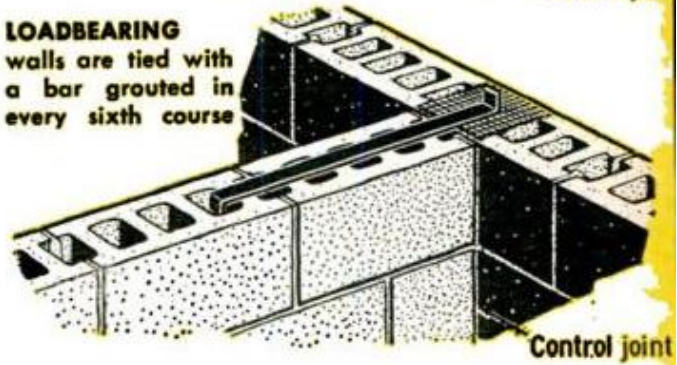
CONTROL JOINT is needed in walls more than 20 ft. long. Grout transfers lateral load. Joint is raked, caulked



NONLOADBEARING Walls are tied with strip of 1/4-in. hardware cloth in mortar across joint in every other course

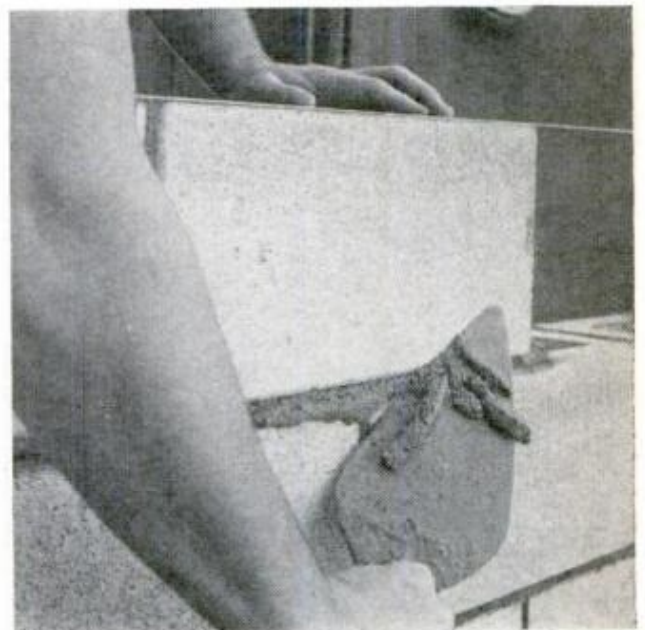


LOADBEARING walls are tied with a bar grouted in every sixth course



TO LAY LAST BLOCK in each course, butter the ends with mortar and lower it carefully down into the slot

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SLICE OFF MORTAR along joints of newly laid blocks without smearing. It may be remixed and used again

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TO KEEP MORTAR FRESH, slice through it occasionally with the trowel and add more water if necessary

containing six bags of portland cement per cubic yard and not more than six gallons of water per bag of cement. Ready-mix can be ordered to these specs. If the job is small, use packaged concrete mix. Don't overwater. Place it stiff.

Strike off the footing level and to the proper grade. Care taken here will pay off later. Floating it once will make the surface as smooth as you need it. Cover with



TOOL JOINTS when mortar is thumbprint-hard by working the jointing tool back and forth along joint

wet soil or sand and let the footing cure for six days. Then clean off all of the sand or soil and you're all set to start laying block.

The strength of your wall will depend largely on the strength of the mortar. Also important is the "bond" of the mortar—how tightly it holds to the blocks once it has set. Your best bet is to buy a packaged

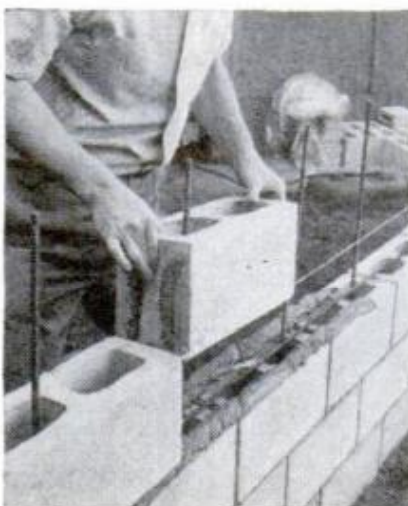
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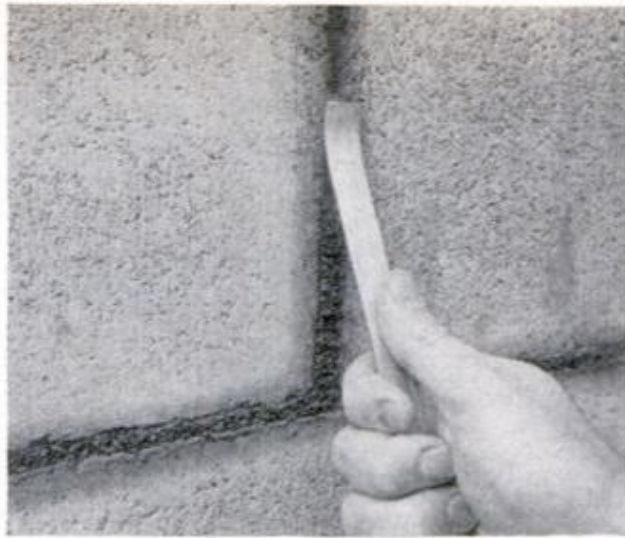


ANCHOR BOLTS or other fixtures can be installed in the wall by grouting. Just place a piece of mesh across the core beneath to prevent grout from dropping to the bottom of the wall, then fill the core with concrete or mortar and set the bolt in this. To avoid the possibility of the bolt working loose, it should either have a large head or be bent to a right angle. Use 1/2-in. bolts for most such applications



TO REINFORCE WALL laterally, use strips of steel block mesh, below left. For vertical reinforcement, cast reinforcing bars with bent ends into footing and grout cores around bars, center and lower right





TOOL VERTICAL JOINTS with end of jointing tool. Remove burrs by rubbing across joint with wire brush



MORTAR DEPOSITS on face of wall can be rubbed away with a piece of broken block after hardening

A THUMBNAIL GUIDE TO CONCRETE BLOCKS

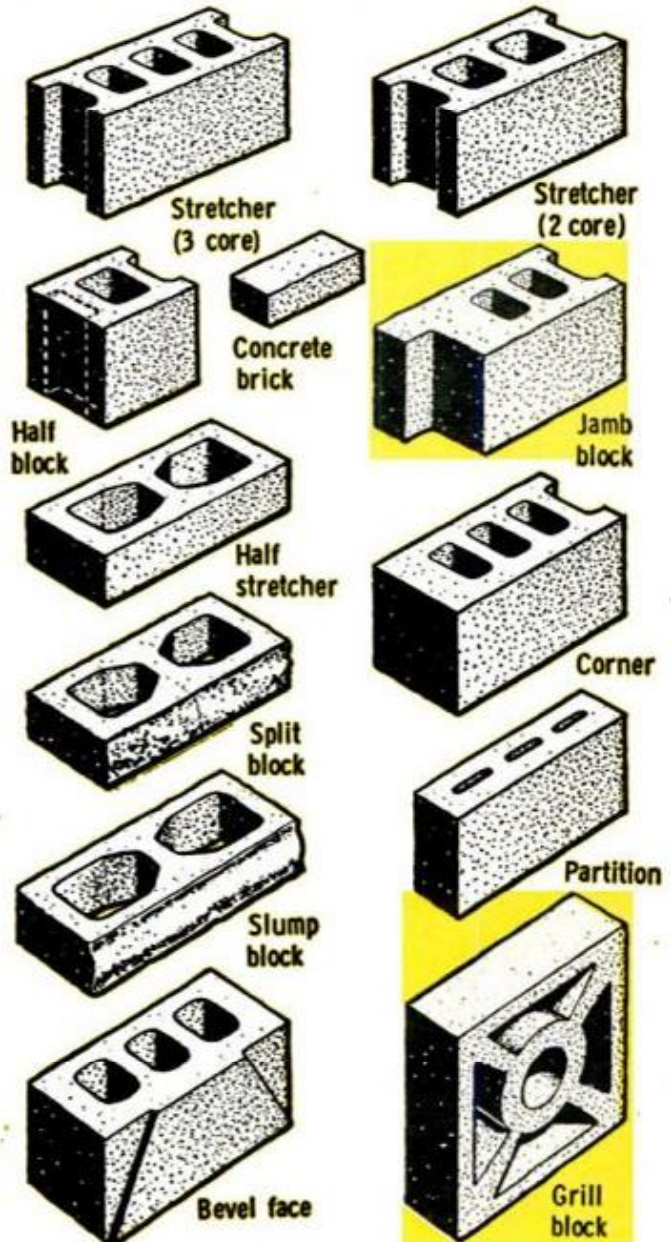
The workhorse of concrete blocks is the standard 8x8x16-in. block, commonly known as an 8-in. block because it makes a wall 8 in. wide. You can also buy 6-in. block, which is primarily for nonloadbearing walls, and 4-in. block for even slimmer nonloadbearing walls. For big jobs, like foundations and heavy retaining walls, there are 10 and 12-in. blocks.

Block measurements always describe the area a block will take up when laid in the wall. Actually, the block measures $\frac{1}{8}$ in. less on a side to allow for a $\frac{1}{8}$ in. mortar joint. To estimate the number of blocks required for a job, figure the wall area in square feet, subtract the area of openings and multiply by 1-1/9. For example, a 90-sq.-ft. wall would require 100 blocks. Half blocks used at ends and corners are counted as halves, not whole units.

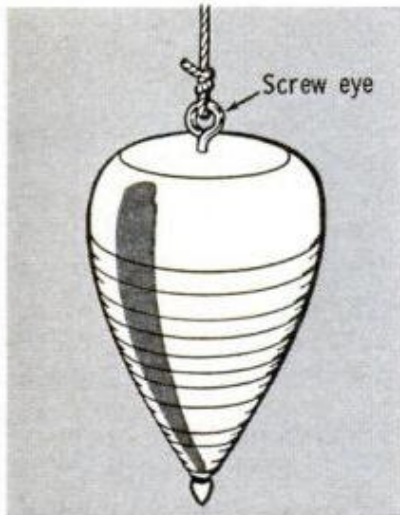
Most blocks have two or three cores. The two-core type, which offers somewhat better insulating qualities, is popular in the West. Both are available in standard and lightweight types, the latter containing cinders, shale or slag for aggregates. A standard block weighs from 40 to 50 lbs., a lightweight only 25 to 30 lbs. *Never use lightweight blocks for load-bearing walls.*

Many blockmakers are doing away with special corner blocks, and are making all their structural blocks with square ends.

Among the glamour types are: split block (made by breaking an oversize block into two pieces so the resulting faces resemble rough stonemasonry); slump block (like adobe brick in appearance); grille or screen block (for garden walls) and sculptured block (to create a three-dimensional effect). Like all blocks, they can be painted with latex or portland-cement paint. Some makers even sell blocks ready-colored with mortar to match.



HINTS FROM READERS

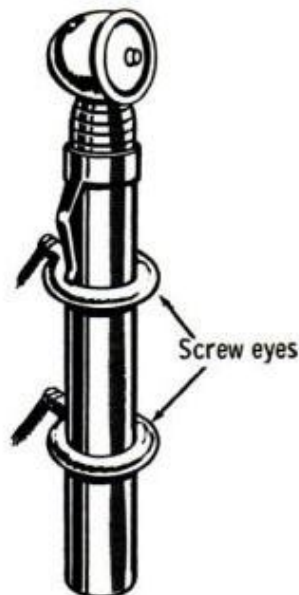
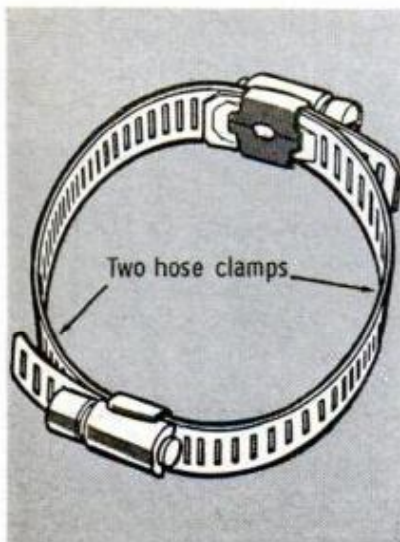


Quickie plumb bob

A toy top can be turned into an effective plumb bob by drilling a small hole in the center and driving a screw eye into it. Tie a string to the eye and your "plumb top" is ready for use. A couple of nuts placed over the cord will add weight.

King-size clamp

When you need a large hose clamp and one isn't available, try hooking two smaller clamps together as shown below. Don't forget that you'll have two screws to tighten instead of one.

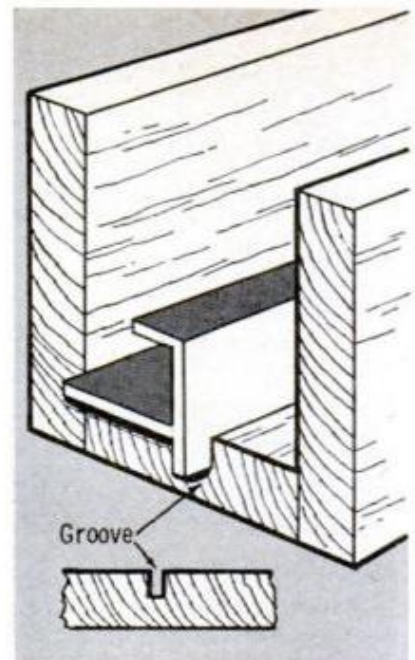


Tire gauge rack

You won't have to hunt for the pressure gauge to check cold tire pressures at home if you make a simple rack to hold it. Just drive a couple of large-diameter screw eyes into a garage stud. The spring clip will keep it from falling through.

Small parts tongs

It's easy to cut a finger when rummaging in a box of small hardware. To avoid this, make up a pair of tongs from a steel strip of the type used to reinforce packing cases. Taper ends, smooth edges.

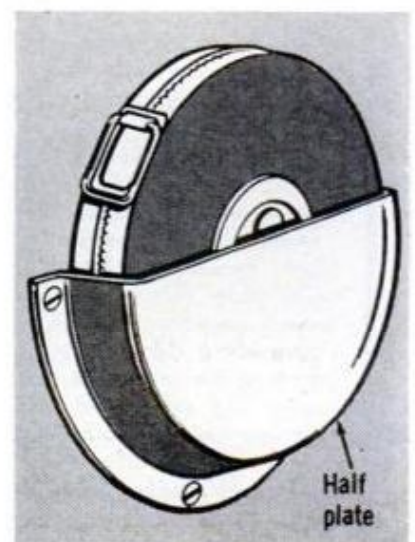


Molding miterbox

Some metal moldings have no flat side so you can't seat them properly in the miter box to cut an exact miter. It will pay you to make a special box with a kerf down the middle, or add a second bottom to an existing box to hold the molding flat.

Tape storage pocket

A shallow plastic dish cut in half and mounted on the shop wall provides an ideal storage pocket for your steel measuring tape. Drill holes in the rim and secure it to the wall with three screws.



Build It Yourself, Then Learn to Fly in This \$200 Flight Simulator

It's an ingenious and realistic simulator that you can build at home using salvaged instruments—and a paint compressor

By LEONARD E. SABAL, Workshop Editor

IF THE WILD BLUE YONDER is your cup of tea, building and “flying” this flight simulator will fill many spare hours.

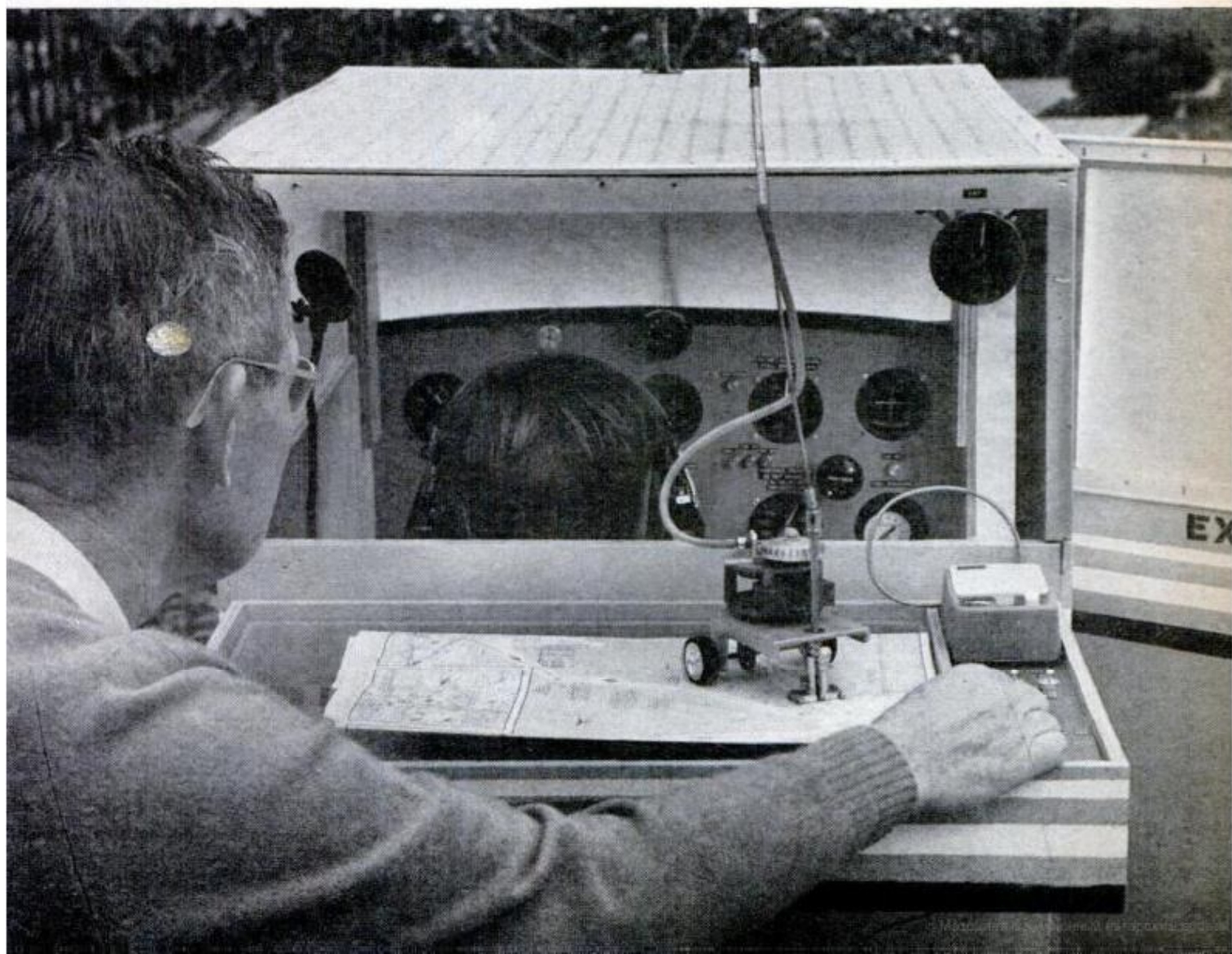
The heart of the simulator is an old paint compressor that feeds a full panel of instruments modified to operate on air pressure. A complete array of air speed, altimeter, rate of climb, turn-and-bank, directional gyro and artificial horizon indicators is included, as are navigational instruments, stall warning, radio, marker beacon and turbulence features.

“Seat-of-the-pants” flying is provided by a four-section seat that inflates and de-

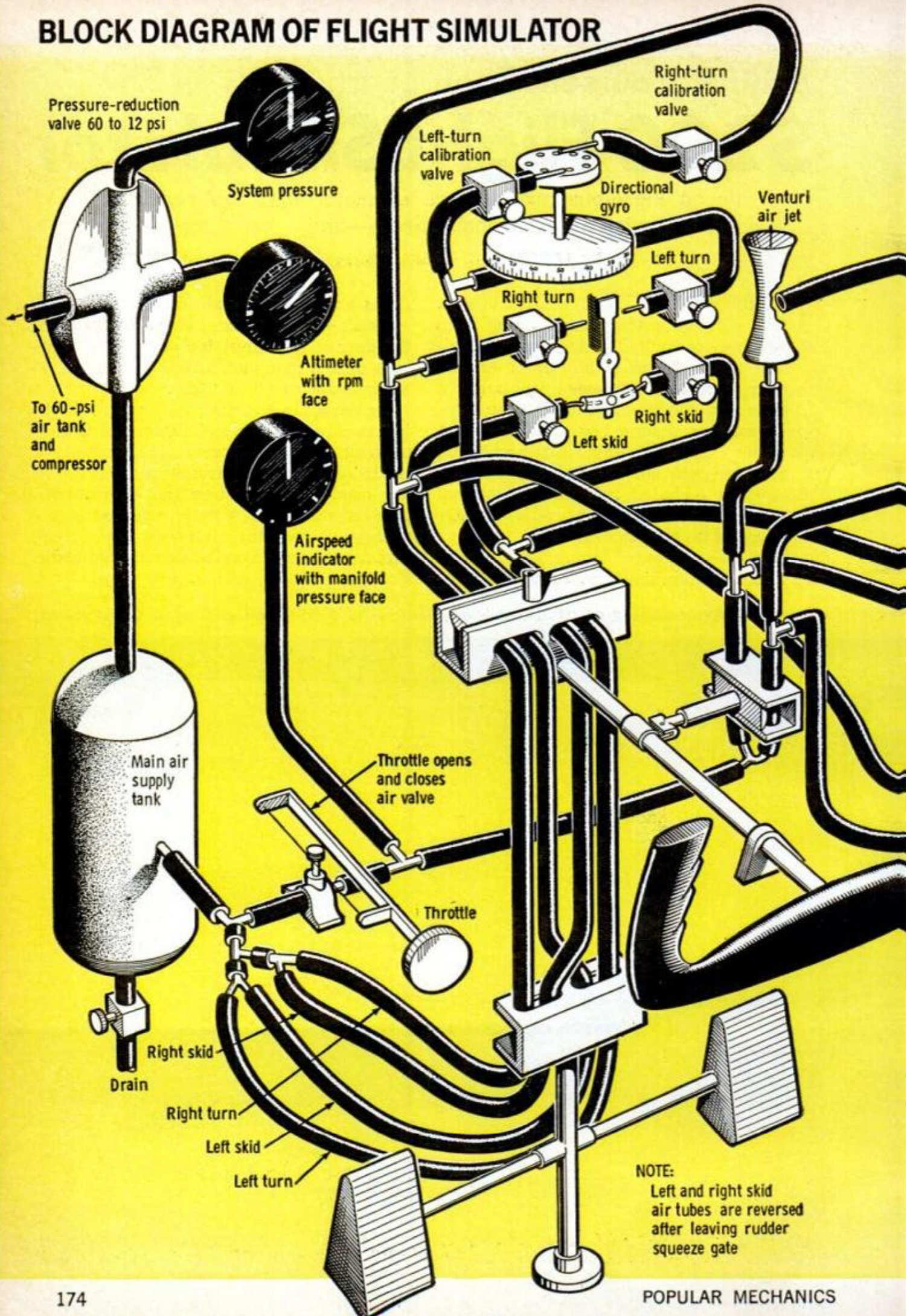
flates according to rate of climb, descent or bank—while a small tracking device at the rear of the simulator plots your progress over a map and leaves an ink line to show the route of the flight.

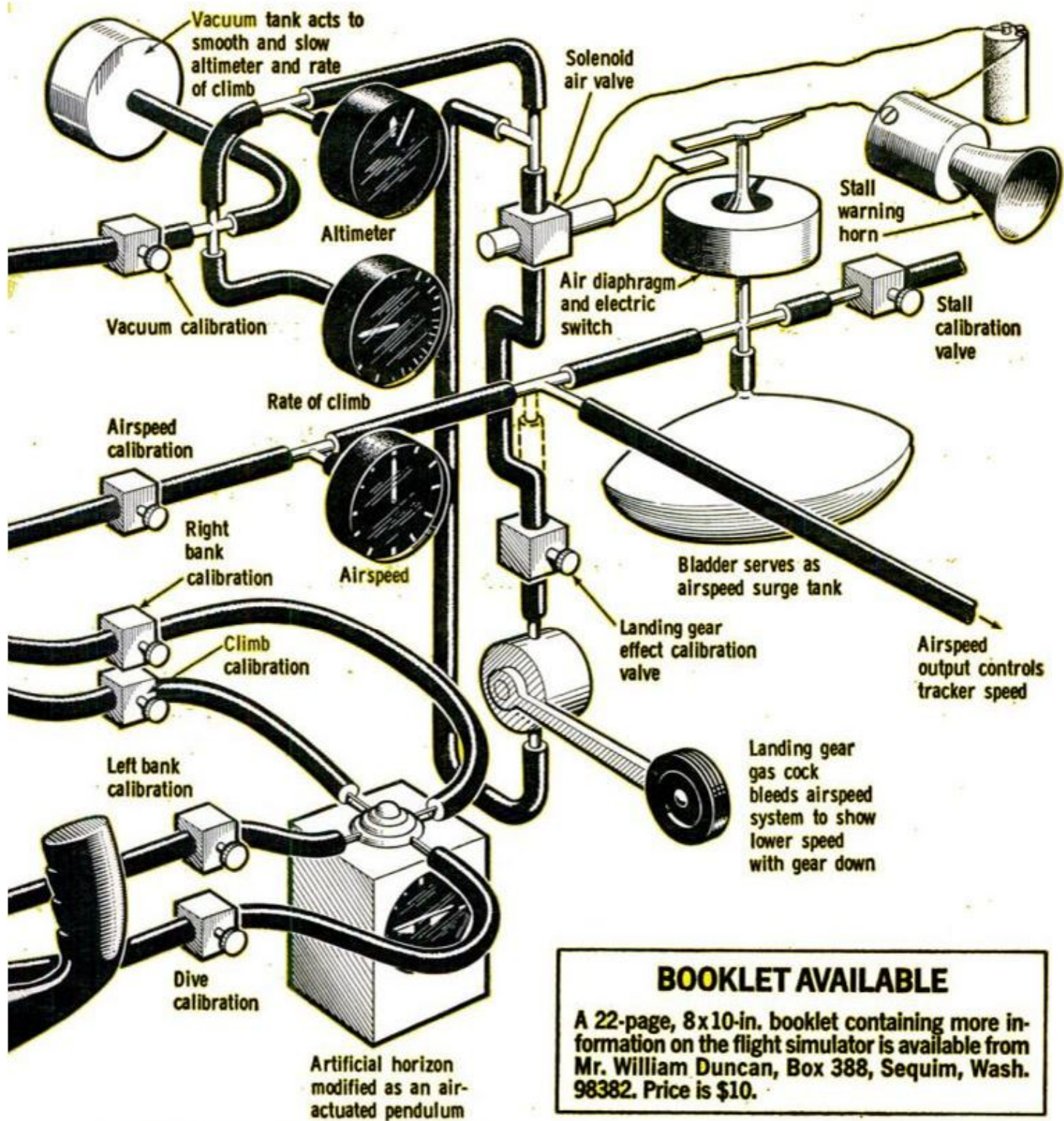
As shown in the drawing on the following two pages, surgical tubing is used to connect the instruments and indicators, while ordinary aquarium-type air valves are used for calibrating the instruments. The only electrical wiring required is low voltage d.c. for the stall warning system, directional needle and glide path indicator. For more details, turn to next page. ★★

TRACKING DEVICE IN REAR OF SIMULATOR allows instructor to watch progress of the person at controls

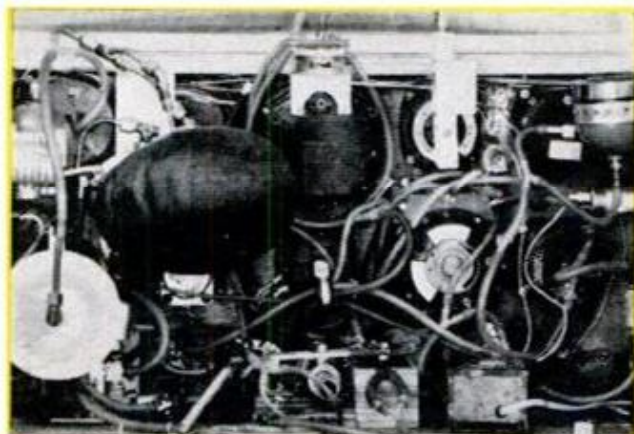


BLOCK DIAGRAM OF FLIGHT SIMULATOR





REAR VIEW OF INSTRUMENT PANEL reveals how components can be fitted in front section of simulator



OPERATOR'S VIEW OF PANEL shows complete collection of flight indicators and navigation instruments



HOME REMODELING IDEAS

Horse Idea, But Clever

Want to be different? Put a horse in your basement—the wooden kind, that is—and you'll have a surefire conversation piece as well as a wonderful toy for young buckaroos. It's perfect for adding a gay carnival note to a recreation room. Simply impale it on a sturdy floor-to-ceiling, lally-type column. Where would you go to fetch such a fine prancing steed? Keep an eye on antique barns in country towns.



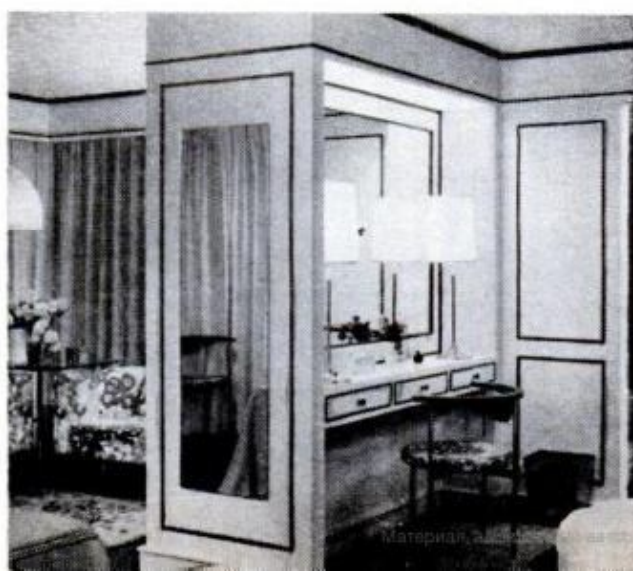
ARMSTRONG CORK CO. PHOTOS

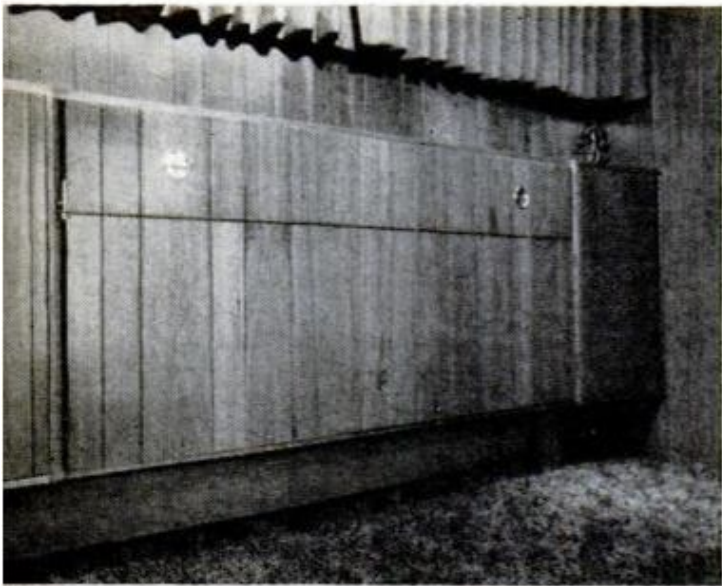
For Peace and Quiet

If your bedroom is your only haven when Suzie or Johnny invites the "gang" over for a Saturday-night watusi, you won't feel so marooned with a get-away-from-it-all spot like this. Likewise, when the adults take over downstairs for an evening of bridge, it will serve the kids as a comfortable out-of-the-way place to read, watch TV or do homework.

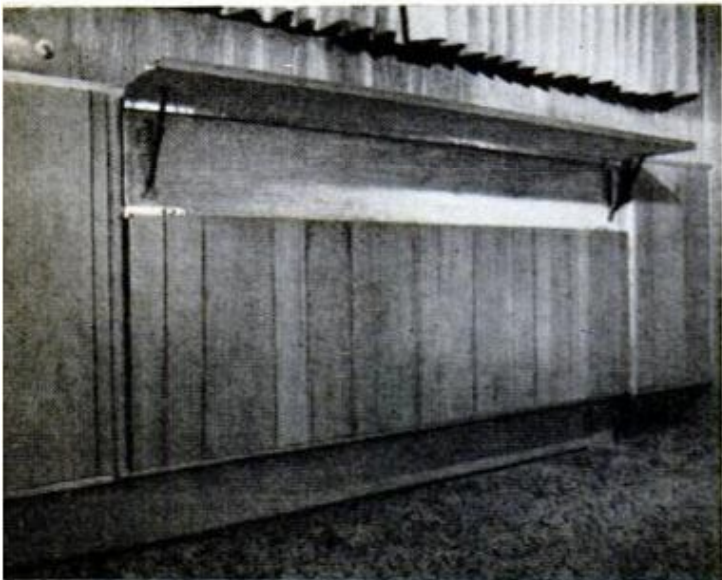
It's a great idea for putting a spare bedroom to good use, the main feature being a divider wall which earns its keep and then some. A his-and-hers affair, it's split down the center to provide a dressing table and mirror on one side and a kneehole desk and shelves on the other. The big full-length mirror lets everyone look his best. It starts out as a T-shape wall with a 10-in. soffit. Desk and vanity are built-in against a dividing wall.

TWO-FACED DIVIDER makes most of space with desk and shelves on one side, vanity and mirror on other

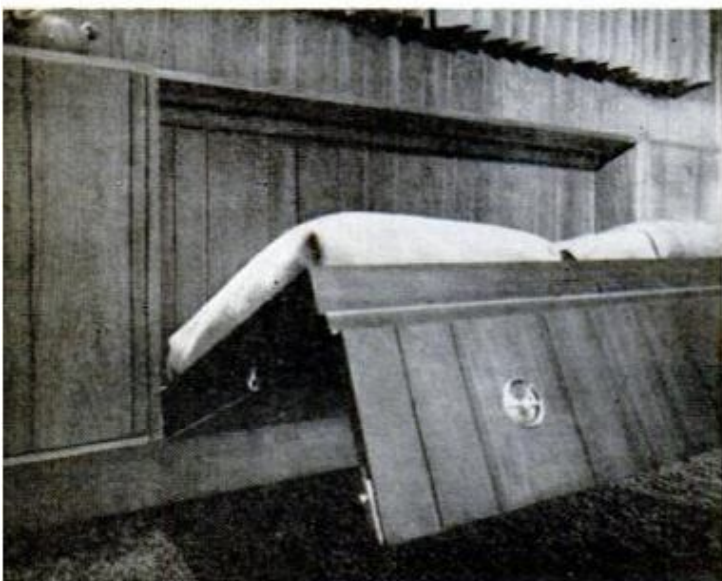




OUT OF SIGHT but not out of mind, there's an extra bed waiting for that unexpected overnight guest



SWING-UP PANEL, actually the bed's leg, is opened first and locked at 90° angle by table-leaf brackets



BED SWINGS DOWN from cabinet by unlocking flush bolts at sides. Seat belts hold mattress, bedding

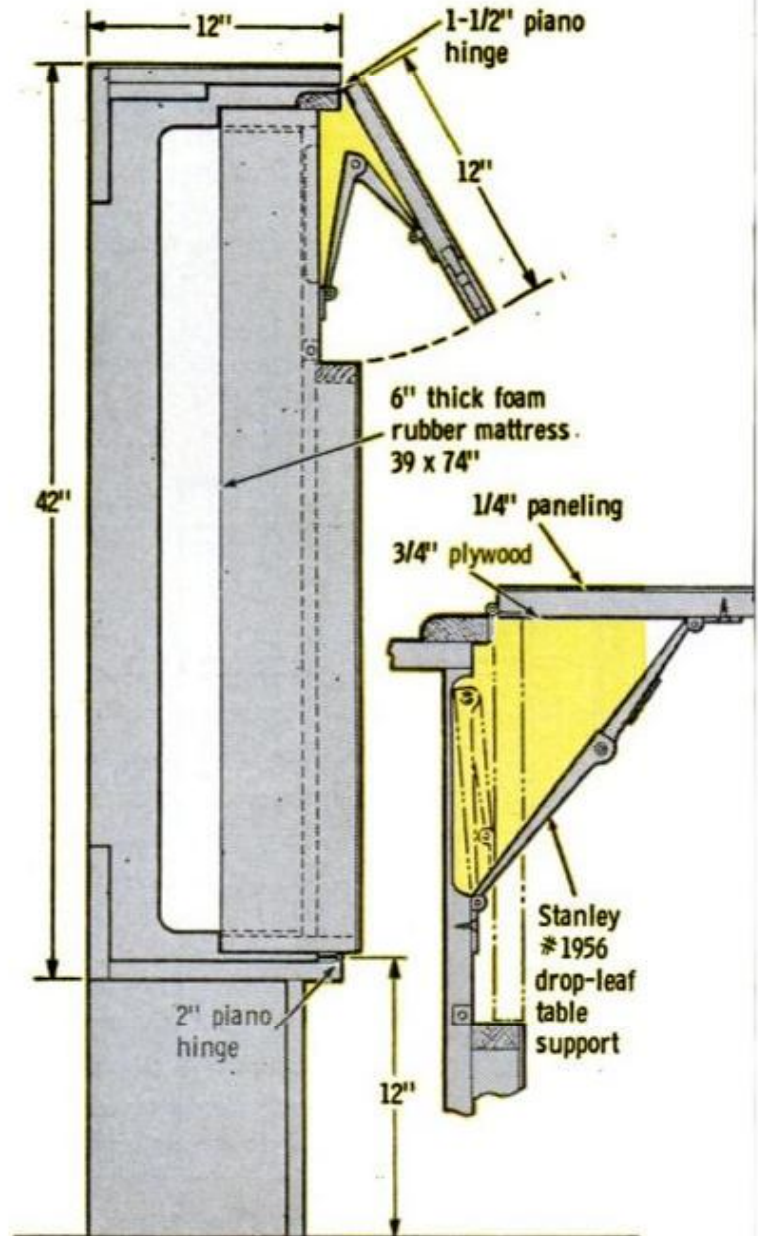
Standby Bed in a Wall

How are you fixed for an extra bed? Could you put up an unexpected guest for the night? This bed stands by out of sight for just such emergency use. It swings down like a Murphy bed and up again.

As you see in the photos at the left, the bed pivots flush in a shallow cabinet that's only 12 in. deep and which extends wall to wall. Flanking bedding-and-storage cabinets at each end of the bed add to its overall convenience. The resulting ledge across the top provides a welcome shelf area for books, bric-a-brac and pictures.

The tray-like bed frame holds a standard 6-in.-thick foam-rubber mattress. This, along with a double sheet, bedspread, blanket and pillow, is strapped in place with regular car-seat belts to fold intact.

The original unit was installed in a small dressing room off a master bedroom



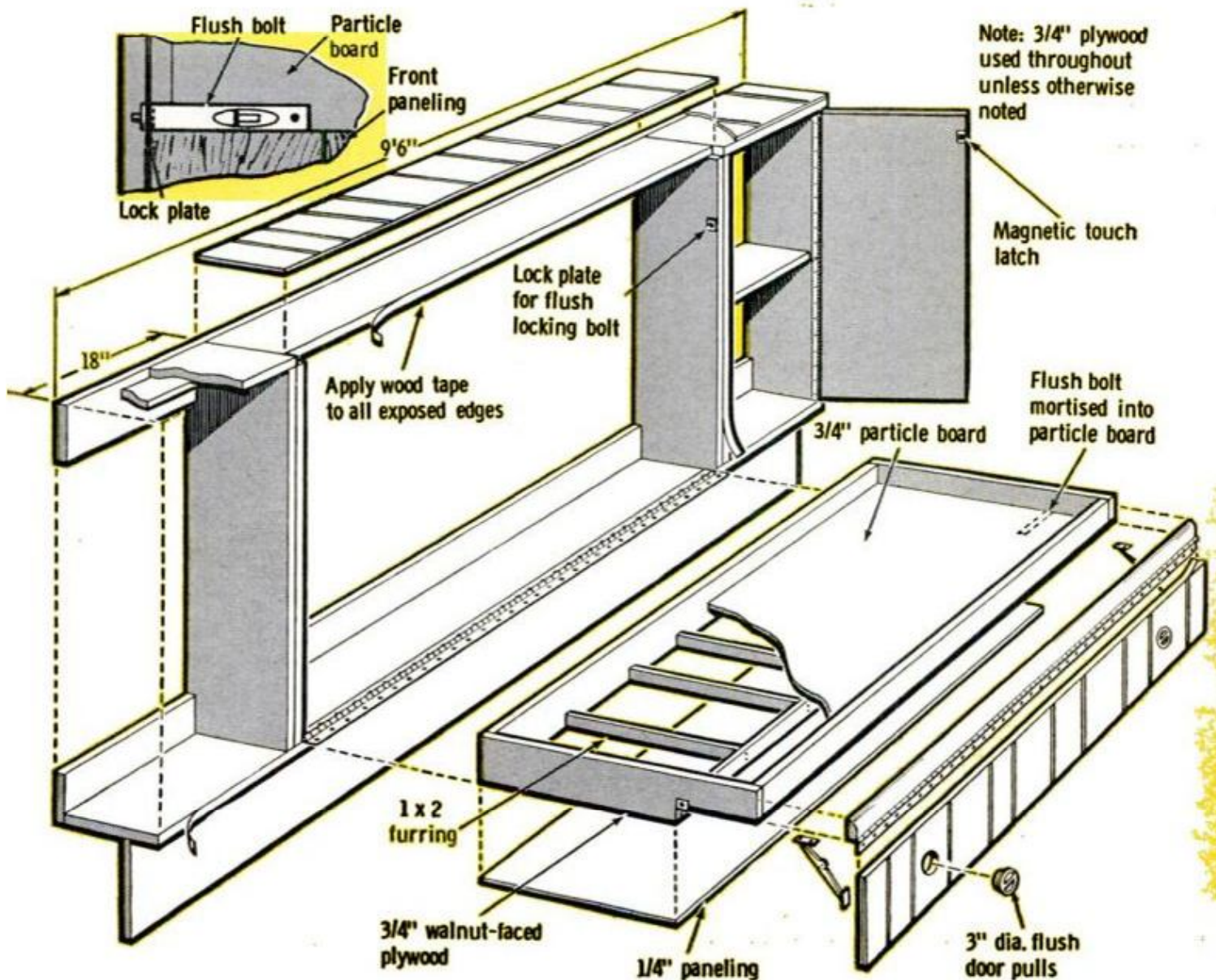
paneled with prefinished plywood. The paneling shows through the open back when the bed is down and provides a finished look. Matching paneling was used on cabinet doors and underside of the bed.

Basically, the unit consists of three cabinets, all more or less built in place and supported by a single shelf board 12 in. off the floor. Top and bottom cleats, screwed securely to wall studs, hold units firmly.

In the drawing on page 178, note how the bed's hinged "leg" folds flush in a recess extending across the top. Clearance for the spring-loaded drop-leaf table supports which hold the leg at 90°, is provided by routing wells in the bottom bed board. King-size piano hinges are used to hinge the leg as well as the bed. Sliding flush bolts lock the bed shut. Room for the two bolts at the ends of the leg is provided by making the latter an inch or so shorter than the bed.—Bill Baker



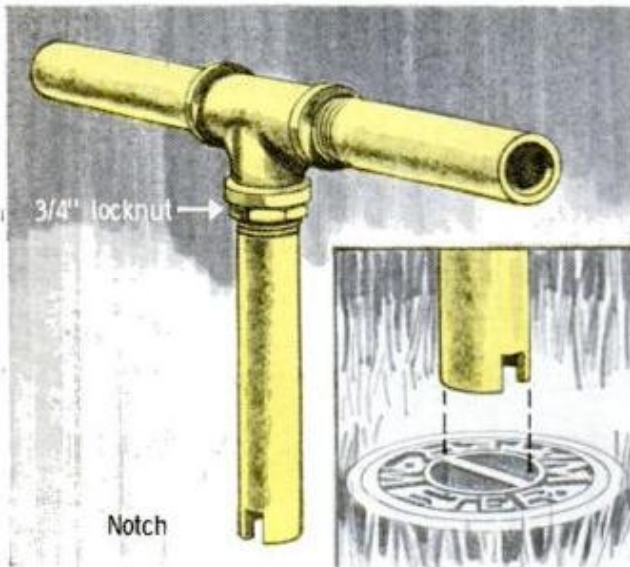
BED CABINET PROPER is anchored to wall and studs first by driving screws through top and bottom cleats



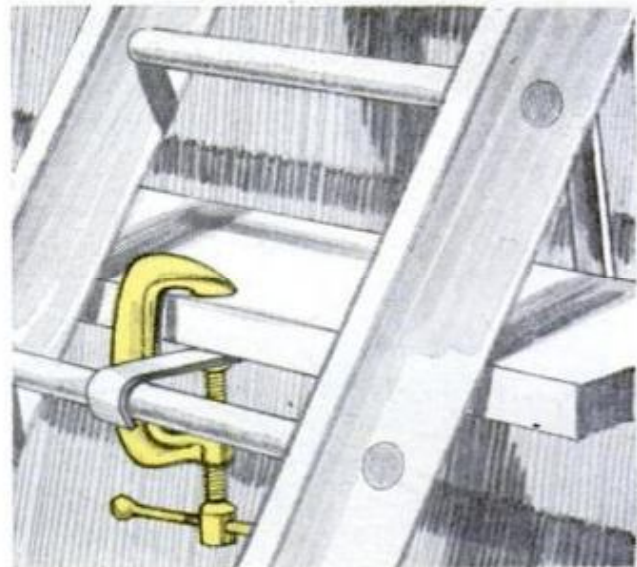
Solving Home Problems



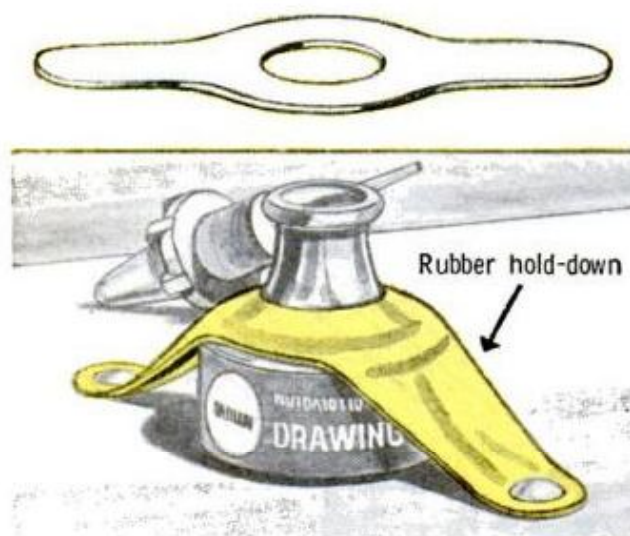
EXTENSION TUBE on your caulking gun simplifies the job of caulking hard-to-reach spots. Use a 10-in. length of plastic tubing, cutting one end to 45° and pushing the other end over the nozzle of the gun



SPECIAL WRENCH to fit the recessed stop cock at your water meter can easily be made from three lengths of 3/4-in. pipe and a 3/4-in. tee. Notch bottom pipe and use a locknut to secure it in the pipe tee



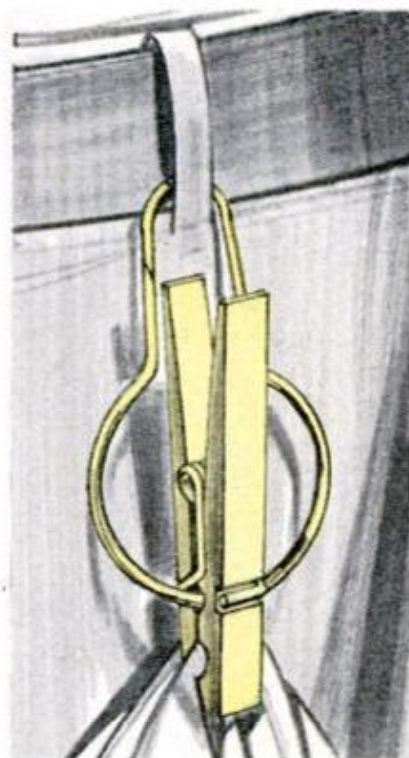
TO PREVENT ACCIDENTS when working from a scaffold plank on ladder brackets, secure the plank at each end with a C-clamp. This will prevent the plank from shifting and possibly slipping off the bracket



SAFETY BELT for a draftsman's ink bottle anchors it firmly to the drawing board, making it impossible to tip over. Made from a strip of rubber salvaged from an old inner tube, it's secured with thumbtacks



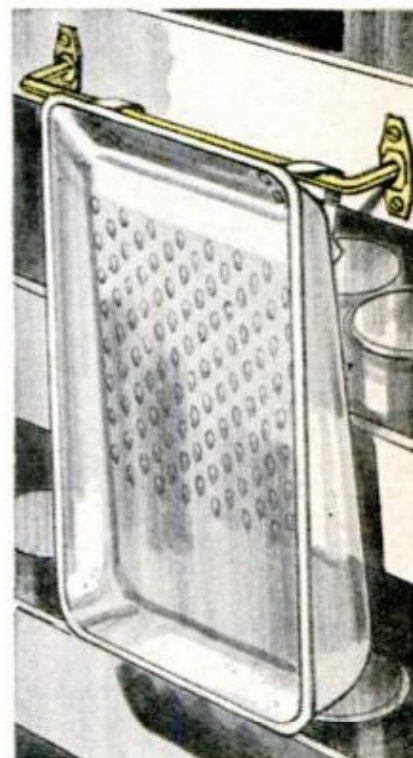
SIMPLE WAY TO avoid the frustration involved in trying to lace up a child's shoes once the ends have become frayed is to use a bobby pin to pull ends of the laces through the eyelets. Try it next time



BELT CLIP to hold a wiping cloth when you're washing windows is made by slipping the wide loop of a shower-curtain ring through the spring of a wood clothespin



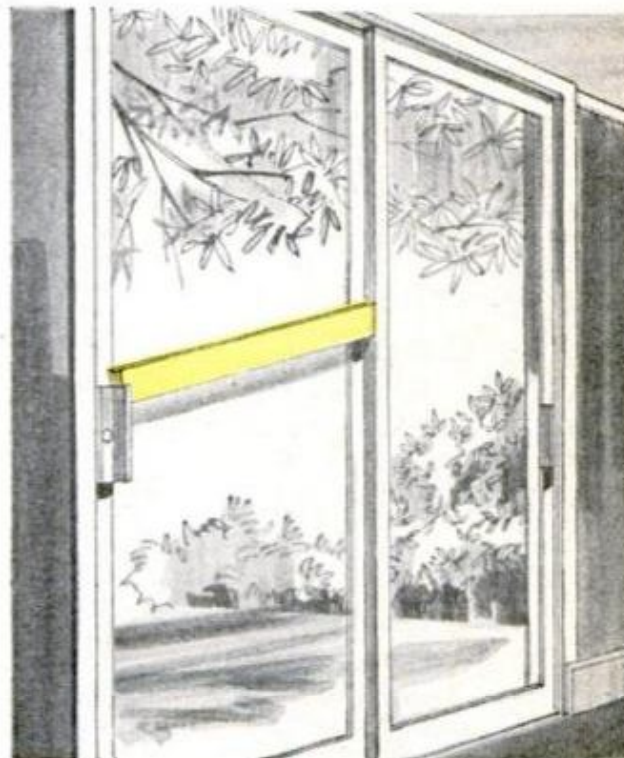
ALCOHOL LAMP can be made from an empty Magic Marker. Just clean the bottle, then pull out the felt strip and replace it with a wick (use string or shoelace)



STORAGE RACK to hold a paint-roller tray is just a cheap towel rack mounted high out of the way on a shelf edge or wall. Use tray clips to hang it on the rack

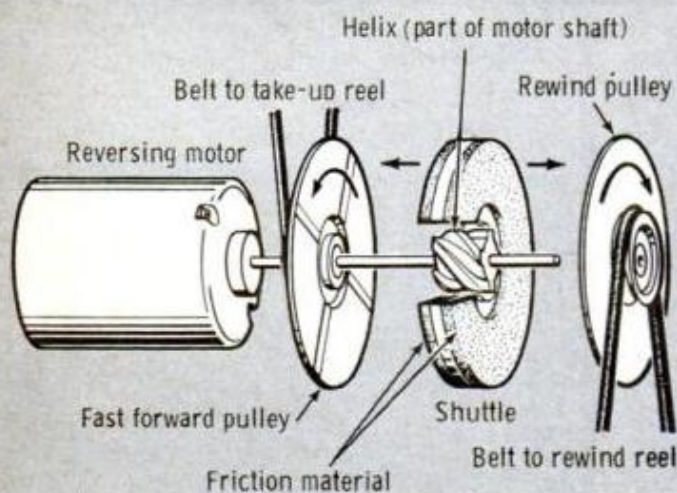


WHEN REGLUING CHAIRS, you can do a fast and neat job of removing old glue with a split sanding jig. Clamp two blocks together and drill a hole $1/16$ in. larger than spindles, then line jig with sandpaper



LOCKING BAR for sliding glass doors is notched at one end to rest on door handle. The other end is wedged against second door. It may be primitive, but this is one lock that can't possibly be jimmied

NEW IN ELECTRONICS



TAPE TRANSPORT COMPONENTS are spaced out on shaft to visualize action. Pulleys are free on shaft; only the helical gear is secured to motor shaft which turns counterclockwise (viewed from shaft end) in the "play," "record" and "fast forward" mode, and clockwise in "rewind." When the helix turns ccw in its matching internal gear in the shuttle, the shuttle is forced against the fast forward pulley driving take-up reel. Cw rotation forces shuttle against rewind pulley to drive rewind reel. In "stop" clutch disengages and brakes unwinding reel.

TAPE RECORDER features open-front tape loading, simple but ingenious clutching system and low wow and flutter. "Stop" control automatically retracts tape guides, pads and pinch roller for easy threading. Clutch, detailed above, is operated by reversing d.c. motor; capstan by its own primary motor. Wollensak 6300, \$230 including separate speakers, will be available in January along with integral-speaker and deck models

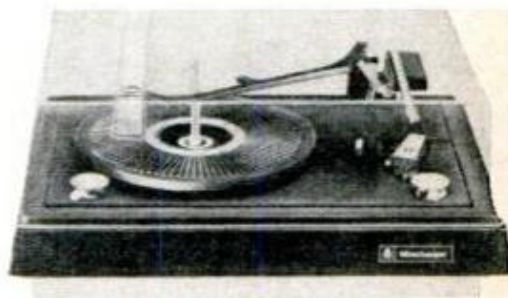


HEADSET STEREO RADIO is an anticipated entertainment product from Panasonic. The FM stereo receiver is built into the headset and battery powered to give the wearer complete mobility. Designed around integrated circuits, the receiver has tuning, balance, tone, mono/stereo and on-off controls. Model RF-60, introduced at the annual Consumer Electronics Show, operates from three AA-size batteries. Available early in 1969, it should be priced at less than \$100



VIDEO TAPE RECORDER records pictures and sound on standard one-quarter-inch magnetic tape. The combination machine records 4-track stereo sound and video using the helical-scan technique with a tape speed of 11.25 inches per second. A half-hour of TV sound and picture can be recorded off the air with a standard 7-inch reel of tape. The Roberts 1000 recorder is under \$1000 with the TV monitor set and camera extra

RECORD CHANGER of low profile design is ready to plug into your stereo rig. The compact BSR McDonald "Minichanger" includes stereo cartridge, base and dust cover. Either a 430 mv ceramic or 2-volt crystal stereo cartridge with sapphire styli can be selected with the Minichanger module. Unit is priced at \$40

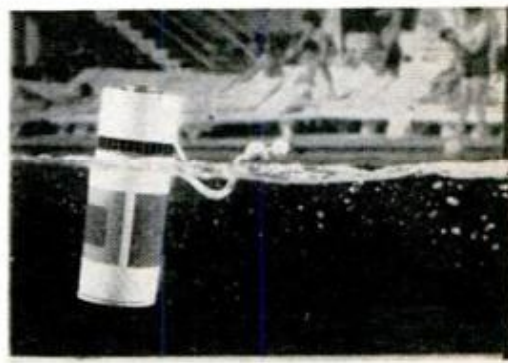


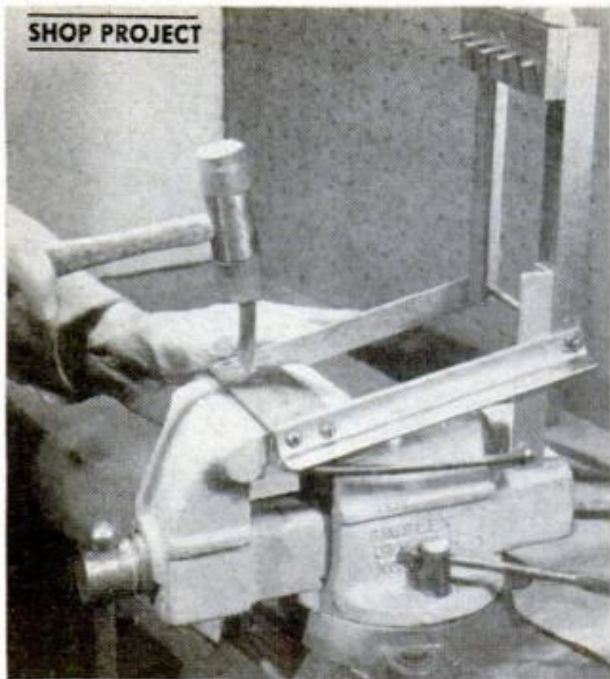
COLOR PORTABLES in larger, increasingly popular 14-inch screen size expand GE's original 10-inch Porta Color series. The WM237GWD shown here is a 38-pound set with handle and tinted sun screen. The deluxe model, it incorporates a sleep-switch and timer, earphone and woodgrain finish. A slide-rule dial can be preset for VHF channels. Price of model is \$315



CB TRANSCEIVER is aptly named "The Baton." Cylindrical design for easy handling houses 8-transistor circuit with a 100-mw. output. The single channel is crystal controlled and has a battery strength indicator for the six penlights. Toshiba unit is 1½ pounds, 9½ inches high, 2½ inches diameter. \$60

PORTABLE RADIO looks like a buoy and floats like one. The RCA design is the latest in many unique ways of packaging transistor sets. The AM "Floater" keeps its top third above water; the controls are on the top and sound is dispersed from periphery slots. Model RZG-28 is designed for fresh-water pools and lakes. \$20





PLASTIC HAMMER is used to drive blank through largest hole. Punch head is held back by coil spring



FOR SMALLER DOWELS, blank is then driven through a succession of smaller holes until it is desired size

You can produce your own dowels with this **SELF-EJECTING DOWEL MAKER**

By **WALTER E. BURTON**

Technical Art by Don Evans

A DOWEL PLATE can be a very handy piece of shop equipment, especially if you do much furniture work. With it, you can turn out odd dowel sizes for repairing antiques, make supertough dowels from different hardwoods and, if the lumberyard happens to be out of the size you need, even make your own stock-size dowels.

In case you've never used one, a dowel

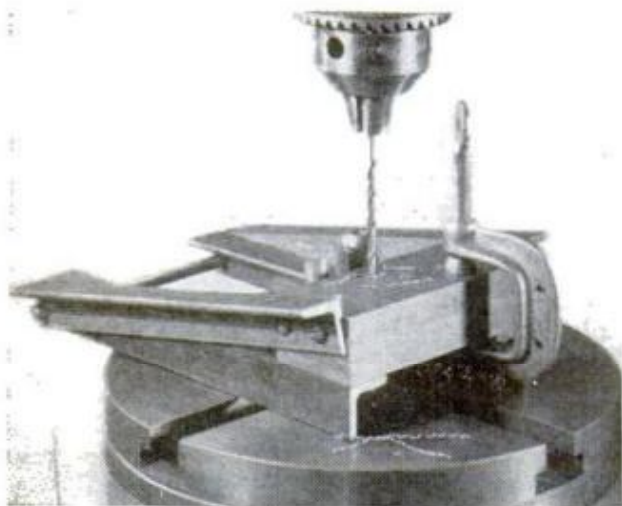
plate is just a thick steel plate with a series of graduated holes drilled in it. Square blanks slightly oversize for the holes are hammered through them to produce dowels or dowel pins.

The standard dowel plate has one big drawback. Once the upper end of the blank has been driven flush with the plate, you often have to use a drive punch to push it the rest of the way through. This dowel maker solves the problem with a swing-down "punch head."

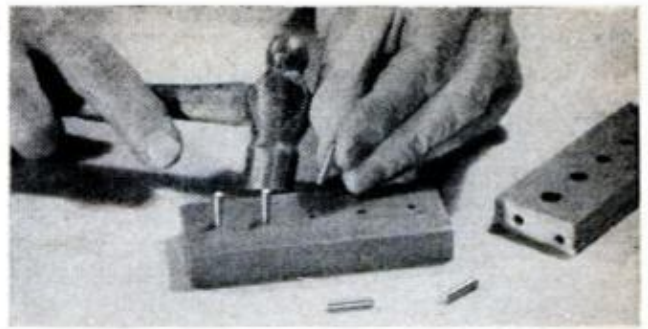
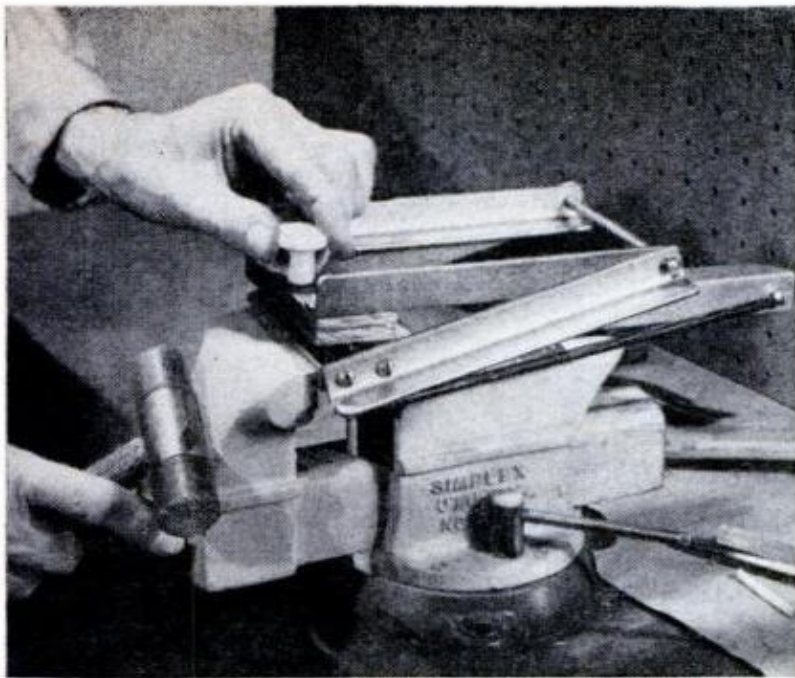
To extract a finished dowel, you simply bring the head down until one of its punches hits the dowel end. Two or three short swings are usually enough to tap the dowel out the bottom.

Plates A and B should be clamped together before you do any drilling in order to assure proper alignment of the holes. Drill the knockout holes for the punches first. These serve as guides for drilling the punch holes in A and the dowel-forming holes in B. The dowel holes can be any size you require. The punches should be small enough to enter and leave the dowel holes without binding. You may

(Please turn to page 228)

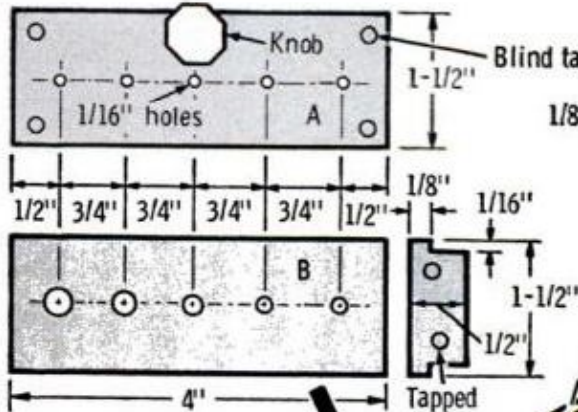


CLAMP PLATES TOGETHER to drill the pilot holes. In the top plate, these will double as knockout holes

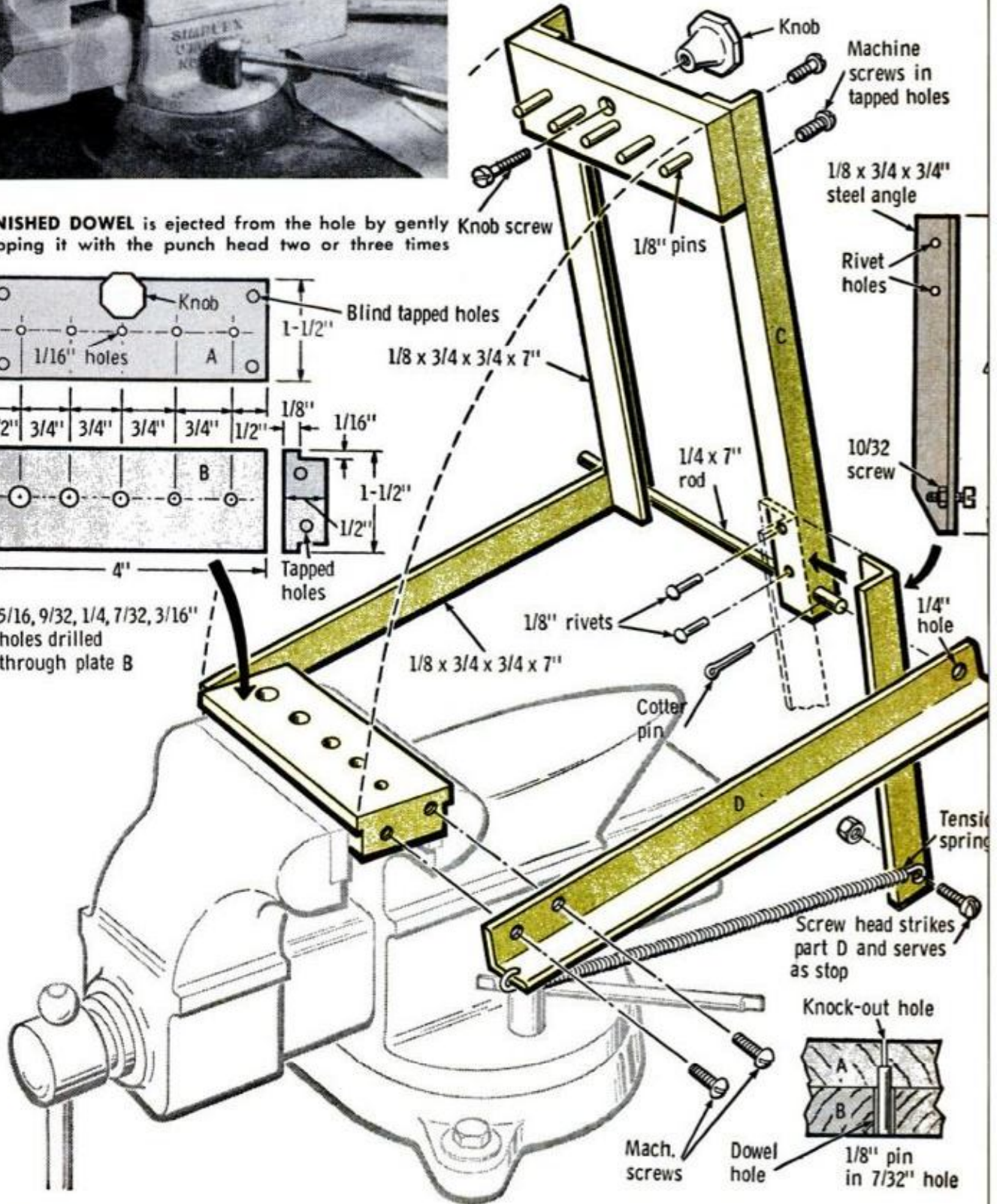


SMALL PUNCHES in the punch head fit tightly in the top plate. Knockout holes allow easy replacement

FINISHED DOWEL is ejected from the hole by gently tapping it with the punch head two or three times



5/16, 9/32, 1/4, 7/32, 3/16"
holes drilled
through plate B





Weller
Model
8200



Wen
Model
450

Easy on the Draw— Soldering Guns Are Hotter than Ever

By JOHN BURROUGHS

A BIG sheet-metal soldering job requires a large soldering iron or a torch. Delicate printed-circuit soldering, on the other hand, takes a temperature-controlled soldering pencil. But for nearly all ordinary soldering jobs between these extremes, nothing beats a soldering gun. These general-purpose guns are so fast-heating and so easy to handle they've made medium-size barrel-type irons all but obsolete.

While the leading makes of guns may look alike they aren't built alike. There are actually only two types: those heated by induction or by resistance elements.

An induction-type gun is built around a step-down transformer that induces low voltage, but very high amperage in the

gun's hairpin-like loop tip. This heavy current flow heats the tip to soldering temperature in a few seconds.

Weller Electric's popular induction-type gun, the medium-duty Model 8200, has a two-position trigger switch for convenient heat control, the first position producing 100 watts and the full-on position 140 watts. A heavier-duty Weller gun, Model D550, is rated at 240/325 watts.

Sears Craftsman guns are also dual-heat induction units. The heavier-duty Model 200 is rated at 150/200 watts; the Model 100 at 100/130 watts. Both have on-off trigger switches and high-low heat selector knobs on the backs of the casings. The slim loop tips, made of steel for rigidity, are gold-flashed to prevent corrosion.



Craftsman
Model
200



Skil
Model
340

LEADING MAKES OF SOLDERING GUNS fall into two categories; induction type and heated-element type. The Weller and Craftsman models (above, left) are induction types offering dual-heat controls and interchangeable tips, while the Wen and Skil models (above, right) have changeable heating-element tips

Transformers in both models have low-temperature windings.

Element-heated guns are built much like conventional nichrome-element soldering irons—but with refinements. Wen's Model 450, for example, uses interchangeable tips in three sizes—for light, medium and heavy jobs. Each tip has a built-in nickel and copper-wire heating element. Encased in ceramic-like insulation to exclude air and prevent burn-out, these space-age elements tend to be self-regulating. As they heat, their resistance increases and they draw less current; as they cool in use, resistance decreases and they draw more current. For this reason the tips are rated according to their heat range. The large tip covers the 100/200-watt range, the medium tip the 50/100-watt range, and the small tip the 25/50-watt range. A similar light-duty gun, designated the Model 220, uses either of the two smaller tips.

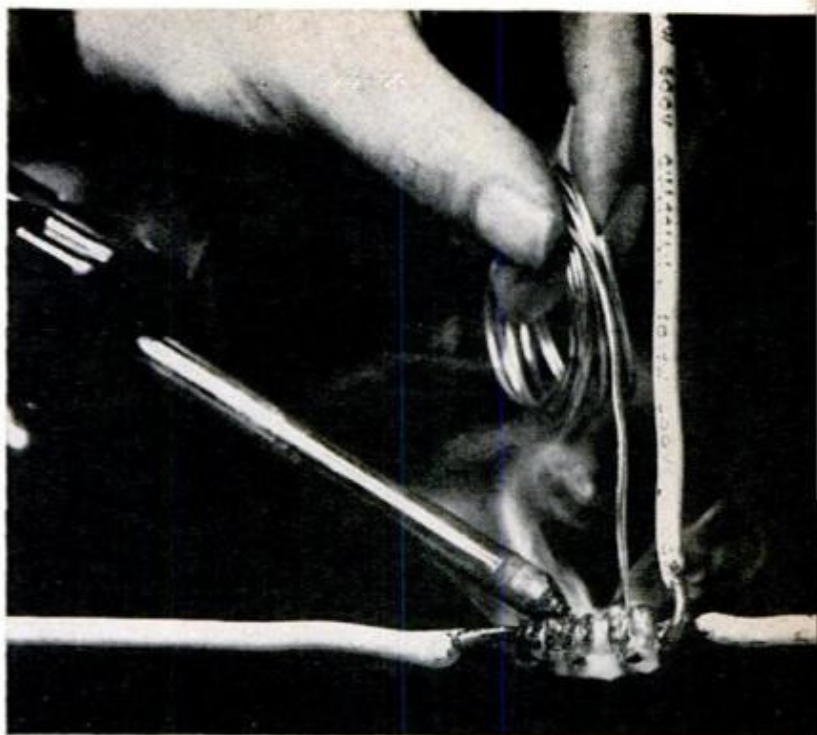
Trigger feed a new feature

Skil's new Model 340 auto-feed gun is also an element-heated tool. Its special feature is a trigger-operated pawl mechanism that feeds $\frac{1}{16}$ -in.-dia. wire solder from a spool magazine through a small tube to a continuously-heated tip. This



SOLDER-FEED FEATURE of Skil's new gun allows you to dispense solder and hold the gun with one hand

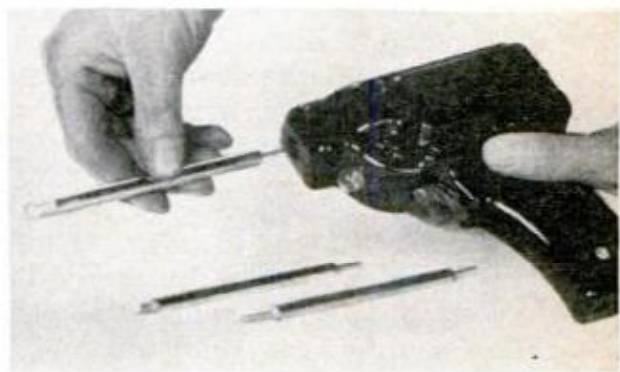
OCTOBER 1968



THE MOST IMPORTANT POINT TO REMEMBER when soldering is to heat work until solder melts. Never heat solder directly



TIPS SHOULD ALWAYS BE TIGHT to assure good conductivity. Occasionally clean the clamp bushings



THE SINGLE-POST DESIGN of element-heated guns makes it easy to solder most hard-to-reach connections

187



UNUSUAL REPAIR JOBS such as welding plastic, cutting floor tiles and heat-sealing plastic bags are also possible by fitting special-duty tips or slip-on tip attachments. When working with plastic, however, use the lowest heat possible to do job without melting work



GUNS ARE SUITABLE for many light-duty sweat-soldering jobs, but their small tips can't transfer heat fast enough for heavy sheet metal work. In that case, use a barrel-type iron with a high heat rating (300-400° F.) after tinning the point for good heat transfer

permits you to solder with one hand as you hold the work with the other, which makes the gun particularly suitable for appliance repair work. This 115-v. element is rated at 45 watts.

As a rule, induction-type guns heat faster than element-heated guns, and replacement tips cost less, but element-heated guns maintain a somewhat steadier heat. However, either type of gun is suitable for most of the home-workshop soldering jobs you'll encounter.

Rules to follow

The very fact that soldering guns are so easy to use often leads to unsatisfactory jobs. When you're working hurriedly, it's easy to disregard the fundamental soldering rule—*heat the work, not the solder*.

Other soldering rules also should be followed. For a sound bond, parts to be soldered first must be cleaned free of oxida-

tion. Use resin flux for soldering copper or brass; zinc chloride flux whenever you're soldering iron or steel.

When using zinc chloride, remember to wash off residue since the acid salts will corrode the work in time. Separate flux is nearly always preferable to flux-core solder for any job larger than an electrical connection.

Keeping your gun's tip clean and well-tinned speeds heat transfer to the work. When heating large work, melt extra solder on the tip—it will serve as a good heat-transfer medium.

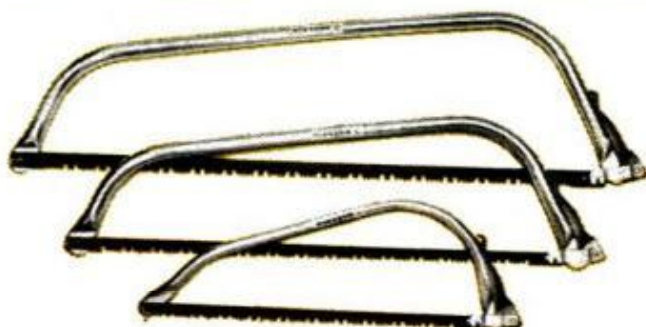
Always remember that soft solder should be used as a filler or sealant rather than as an adhesive. Be sure that joints are mechanically secure before solder-sealing them. When making electrical connections, bend the wire-ends through and around the terminals before heating the work and applying the solder. ★★★

New Tools You Should Know About



Industrial tilting-arbor saw

A new 10-in. light-industrial saw having a $3\frac{1}{4}$ -in. depth-of-cut capacity with full 45° arbor tilt has been introduced by Shopmaster. The worktable, with web extensions, measures 20x33 in., and features the new Easy-Vu blade-angle indicator. The built-in floor stand is equipped with wheels for easy moving. The TA10 sells for \$199.95 without motor or \$229.95 with a $\frac{3}{4}$ -hp motor from Shopco, Inc., 6600 S. County Rd. 18, Eden Prairie, Minn. 55434.

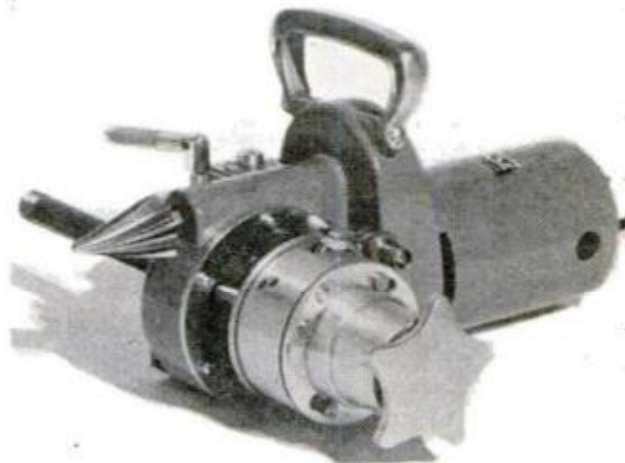
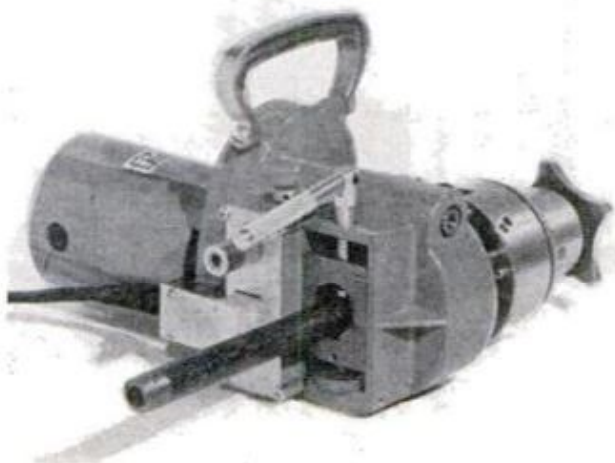


Bow saws with Teflon-coated blades

The new Disston bow saws feature blades coated with Teflon-S, a special abrasion-resistant formula developed by DuPont which not only reduces friction but rustproofs as well. Prices range from \$3.99 (21 in.) to \$5.99 (36 in.). They're from H. K. Porter Co., Inc., Porter Building, Pittsburgh, Pa.

Portable electric pipe threader with automatic shutoff

Weighing only 22 lbs., a new portable pipe threader automatically cuts thread to preset length, then disengages the die and shuts itself off. It can handle any size pipe from $\frac{1}{8}$ -in. to $\frac{3}{4}$ -in. and will thread galvanized pipe, regular and heavy black pipe, and even rigid conduit (thus eliminating the need for threadless connectors). After a pipe is inserted through a built-in vise, the machine automatically oils the threading die and pipe while it is cutting. The new machine carries a price tag of \$545.95 and is being marketed by the Ram Tool Corp., 2110 W. Walnut St., Chicago, Ill.



MAXIMAT 7

The tool to stretch your machining skills



By JOHN BURROUGHS

IT'S MADE IN AUSTRIA and looks typically European, with blockish styling, solid metal handwheels, critical surfaces ground to a near-mirror finish, and an overall scaled-down appearance—as if it were a half-size version of a larger industrial machine.

Actually the Maximat 7 is a combination and scaled-down version of *three* industrial tools—lathe, drill press and vertical mill. The vertical motor-spindle head is set on a 2 $\frac{3}{4}$ -in.-dia. column mounted behind the lathe's bedway casting and serves for both drilling and milling.

Since this vertical drilling-milling head can be swung back out of the way, it doesn't interfere with normal use of the lathe. When the head is swung forward over the ways, the lathe carriage (with the toolrest's compound slide unbolted) doubles as a precision worktable for work to be drilled or milled.

The lathe itself has several unfamiliar features. Unlike U.S.-built bench lathes, which have awkward countershaft drives, the 7-in.-swing Maximat uses a built-in two-speed (1725/3450 rpm) motor.

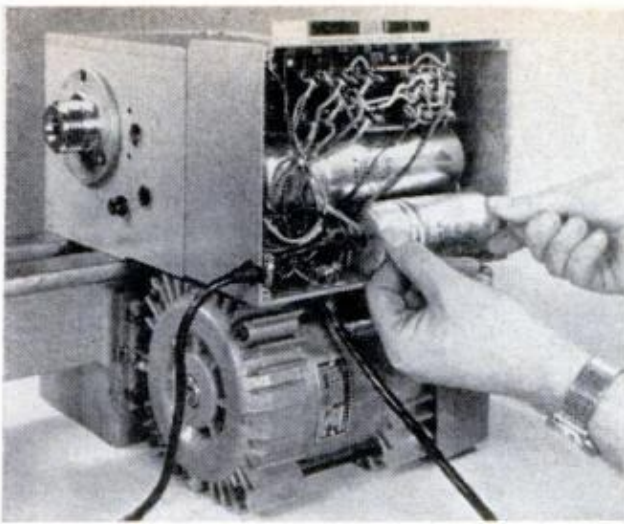
The motor belt-drives a back-gear shaft that has sliding gears shifted by levers. The levers give four geared speeds, which, multiplied by the motor's two speeds, provide eight spindle speeds in all. Both back

gears and spindle are enclosed in a transmission-like ribbed headstock casting and run in SAE 10 oil. Synthetic and steel gears are used in combination for quiet operation. The spindle has preloaded tapered roller bearings.

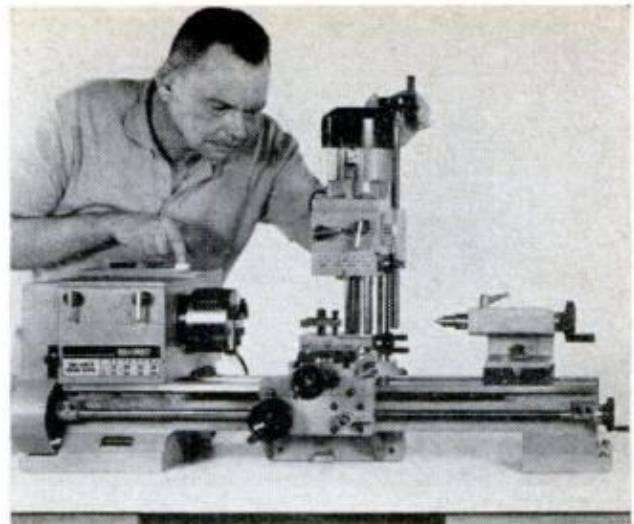
The lathe's leadscrew has no quick-change gearbox. A compound drive gear

MAXIMATS ARE SHIPPED from New York in two crates. One contains lathe; other drilling-milling unit





SHORT CORD FROM VERTICAL HEAD runs to lathe's switchbox. Both of the motors have starting capacitors



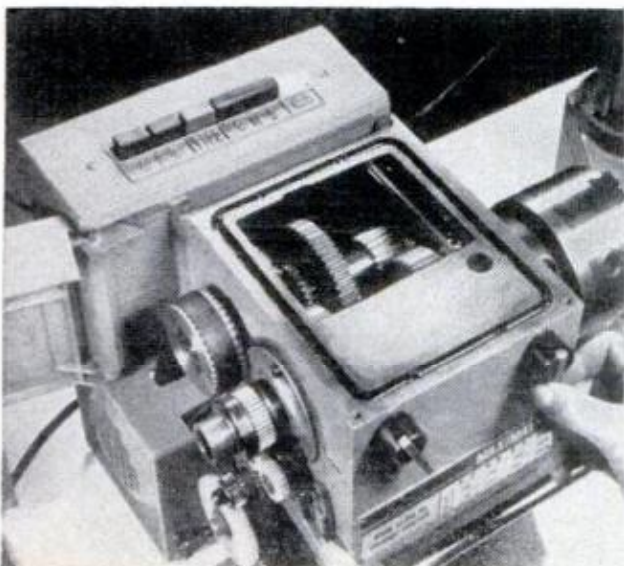
LATHE SPINDLE AND VERTICAL HEAD can be operated simultaneously. Power feeds can be used for milling

in the headstock gear train, however, has a push-pull shift mechanism providing two longitudinal carriage feeds, one "coarse" (.005 in. per spindle revolution) for roughing cuts, and the other "fine" (.002 in. per revolution) for finish turning. Since these rates are suitable for most lathe work, the gears are changed only when cutting screw-threads.

Pushbutton switches in the headstock's built-in switchbox control the lathe's two-speed reversible 1/2-hp motor and the vertical head's single-speed 1/4-hp motor. The stop button stops both motors.

Lubrication points in the carriage and tailstock have grease nipples and are lubricated with a grease gun supplied with the tool. All handwheels have friction-setting micrometer collars calibrated in thousandths of an inch.

TWO-SPEED MOTOR drives enclosed back gears (cover is removed in photo) to produce eight spindle speeds

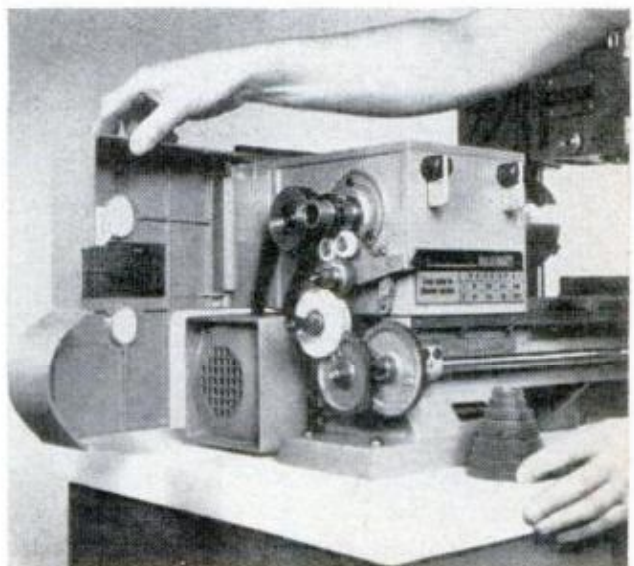


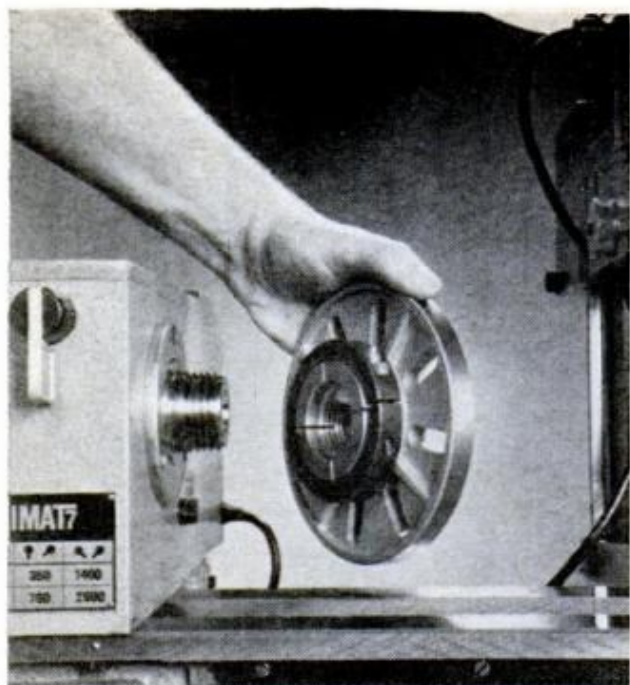
The Maximat's vertical head is a self-contained unit, with motor, gear drive and ball-bearing spindle. Shift levers provide four spindle speeds from 420 to 1740 rpm. The spindle is spring-loaded, much like a drill-press quill, and travels 1 3/16 in. Its No. 2 Morse taper bore permits the use of an arbor chuck or collets to hold drills.

When the head is used for milling, the spindle's rack-and-pinion is locked, and the head's precision feed screw is used for accurate depth-of-cut control. The head slides the full length of the column. The carriage worktable can be engaged at any of 16 power feeds, or work can be handed to the milling cutter with the lead-screw's calibrated handwheel.

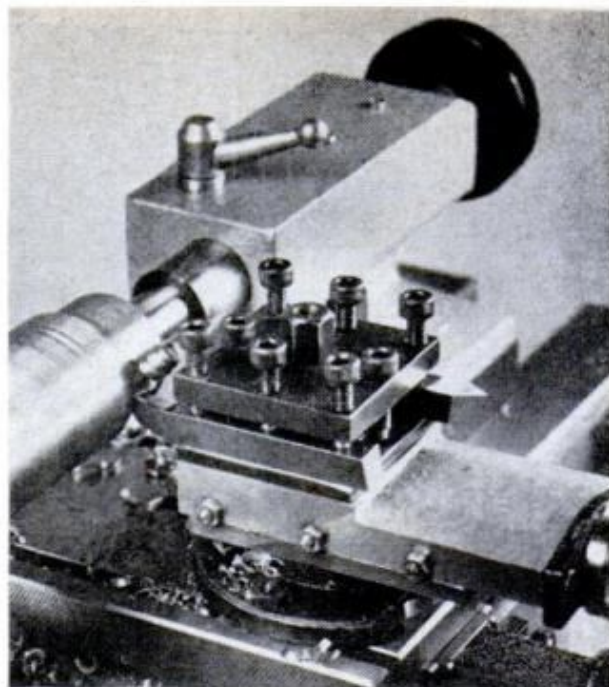
Since the head rotates 360° in two planes, it's possible to mill at compound angles. Either end mills or arbor-type

SPINDLE GEAR TRAIN has a push-pull mechanism for two power feeds. Change gears are for thread-cutting

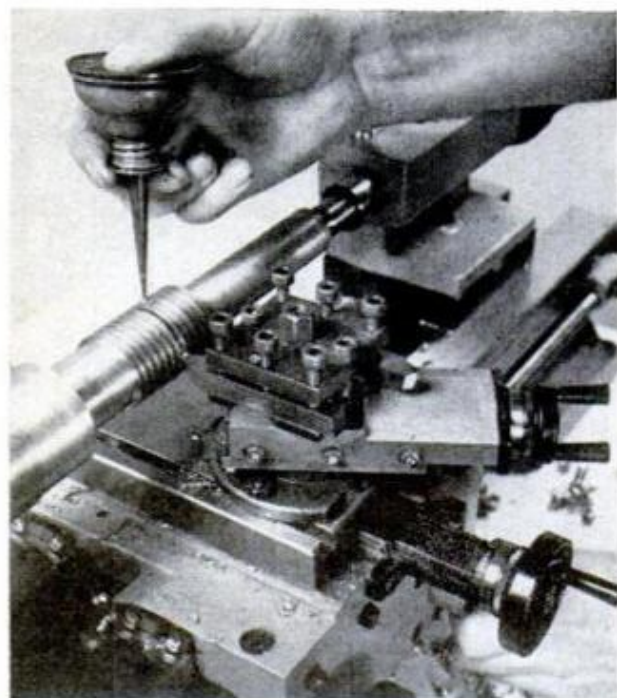




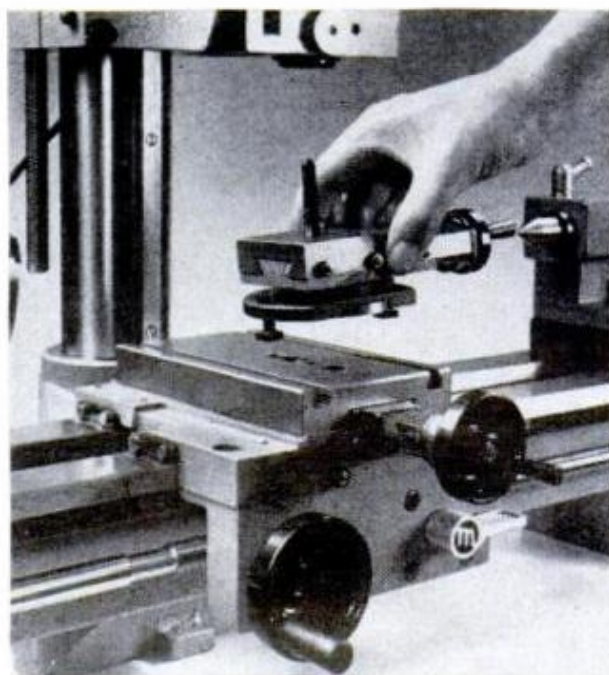
FACEPLATES and chuck-mounting plates have lock rings to keep them from spinning off as spindle stops



TURRET-BLOCK TOOLHOLDER, available as accessory, holds up to four lathe bits, replaces standard clamp



SCREW THREADS from 8 to 80-pitch—standard, Acme, square, right and left-hand—can be cut on Maximat



COMPOUND SLIDE bolts to T-slots in cross slide, which alone serves as milling and drilling worktable

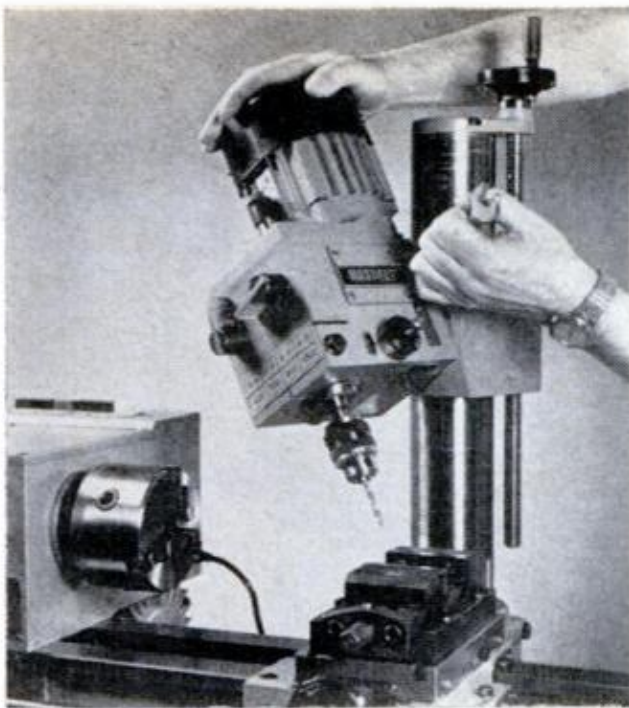
cutters (with the head turned horizontally) can do many metalworking jobs.

When operated at 1740 rpm, the head can also be used for surface grinding, preferably with cup wheels. Work to be drilled, milled or ground can be bolted to the carriage table's T-slots, or it can be held in a machine vise or on an index head accessory.

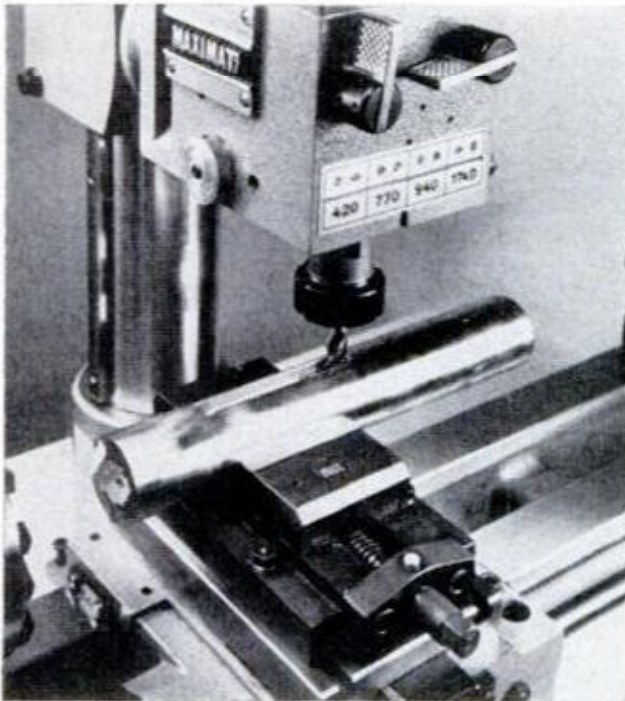
There are a few precautions to take when using the Maximat, because the tool is built to standards surpassing ASA re-

quirements for toolroom lathes. To preserve its precision, the machine must be carefully set up—shimmed level, that is, on a solid, bolted-down bench. The vertical column should be squared accurately to the worktable with a dial indicator.

While the lathe has plenty of power to lug $\frac{1}{8}$ -in.-deep roughing cuts, it can be damaged by overloading. Cutting bits, mounted horizontally rather than in angled toolholders, need suitable back rake ground into the bit. It's important to avoid



MOTOR-SPINDLE UNIT rotates 360° on mount. For compound angles, entire column rotates 360° in base



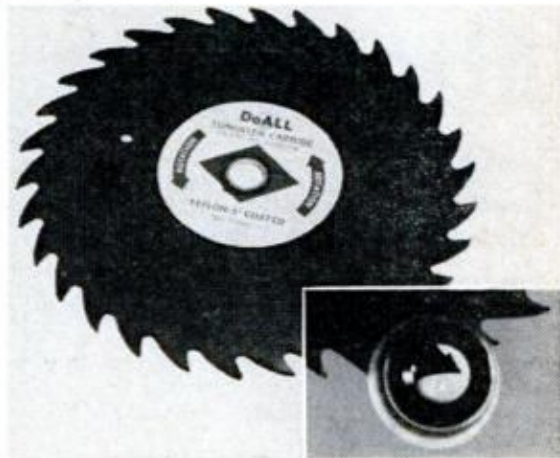
FOR MILLING OPERATIONS, spring-loaded spindle is locked in position, feed screw controls depth of cut

banging the spindles when removing chucks or other accessories. Screw-ejection is provided to press tools from the vertical head's spindle taper.

Base price of the Maximat with a 3-ft. bed (18 in. between centers), including vertical column and drilling-milling head, is \$595. Chucks, collets, machine vise and other accessories—a full line, beautifully made—are extra. For more information write American Edelstaal, Inc., 350 Broadway, New York 10013. ★★★

OCTOBER 1968

Two New Saw Blades For Your Workshop

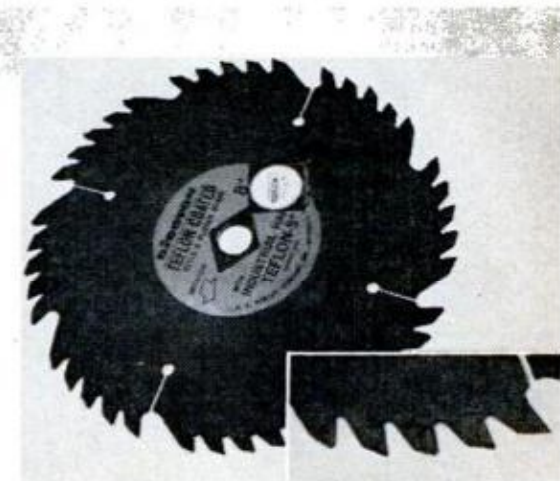


CARBIDE-TIPPED BLADES with Teflon coatings are the latest in workhorses for the workshop. The advantages of either of these characteristics are obvious: Teflon reduces friction between blade and work, and also resists the buildup of sap, pitch and other impurities on the blade. Tungsten carbide, on the other hand, is one of the hardest man-made materials and will retain its sharpness for long periods.

The DoAll blade shown above is manufactured using a patented process to weld the carbide tips to the blade. Standard blades have 6, 6½, 7¼ and 8-in. dia., with prices ranging from about \$18 to \$24.

The Disston blade (below) from H. K. Porter is available in sizes from 8 to 20-in., with prices from about \$20 for an 8-in. dia., 8-tooth blade to almost \$150 for a 20-in., 100-tooth blade.

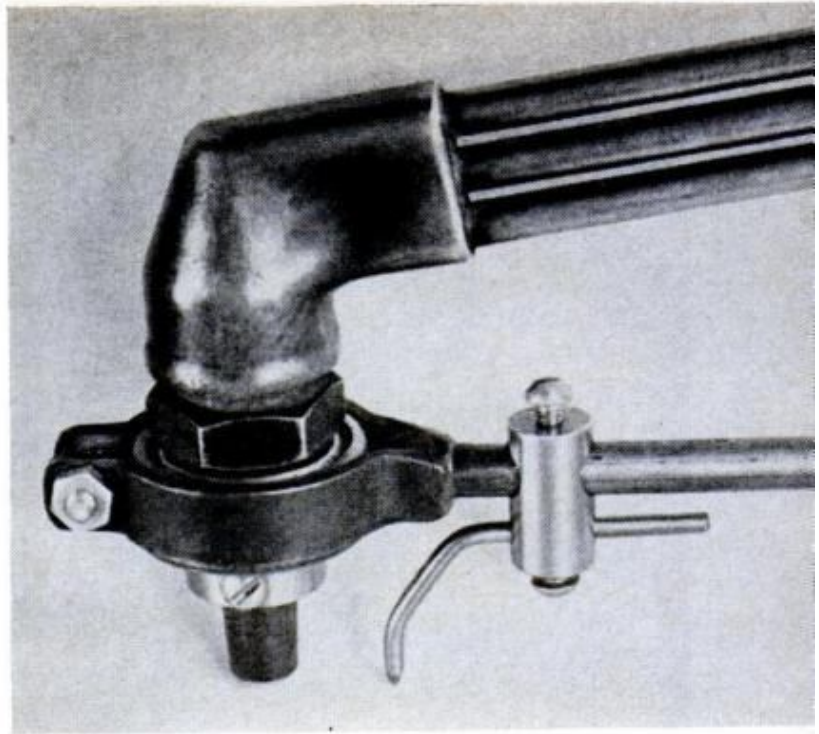
For more information and specification sheets, write to DoAll, 254 N. Laurel Ave., Des Plaines, Ill. or H. K. Porter Co., Inc., Hardware and Industrial Products Div., Porter Building, Pittsburgh, Pa. ★★★



193

Torch Attachments Guarantee Perfect Cuts

By KENNETH B. LITTLEFIELD



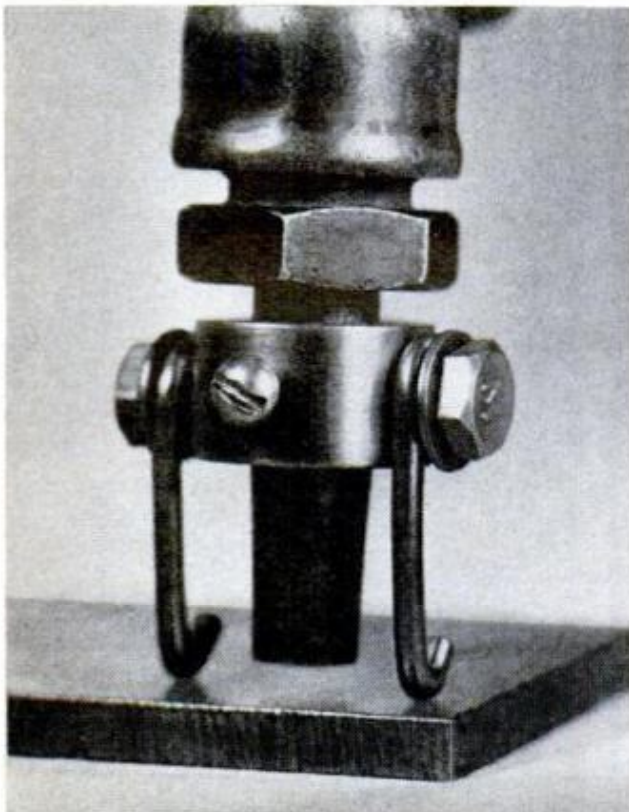
THE OXYACETYLENE TORCH is probably the handiest and fastest working tool when it comes to cutting steel. But unfortunately, considerable skill and practice are needed—both of which the infrequent do-it-yourself user seldom acquires.

Consistently good results with a cutting torch *can* be assured, however, simply by using the torch attachments shown. The cutting of circles, straight lines, bevels and other unusual shapes simply becomes

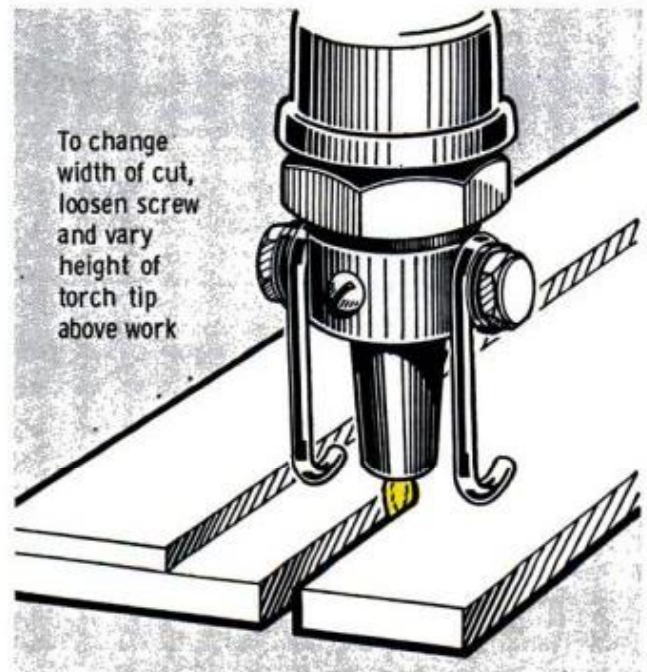
a matter of setting up a guide, then fitting and adjusting the proper attachment for the job.

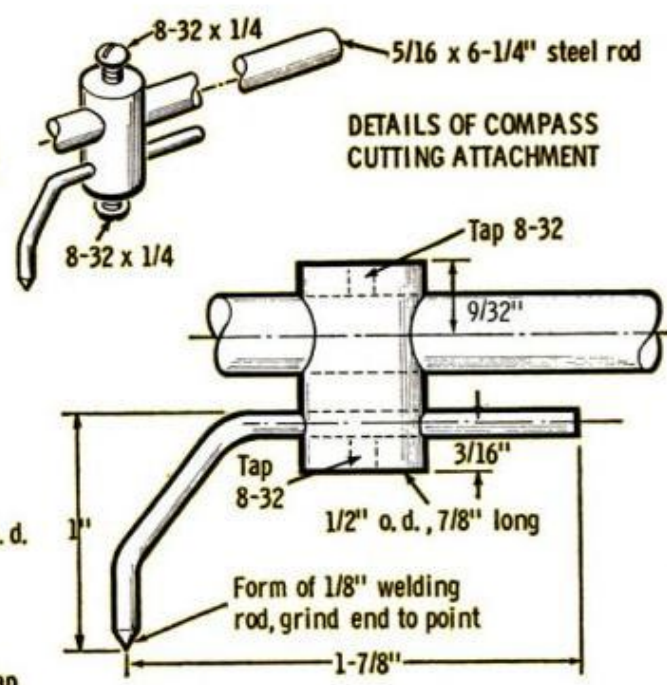
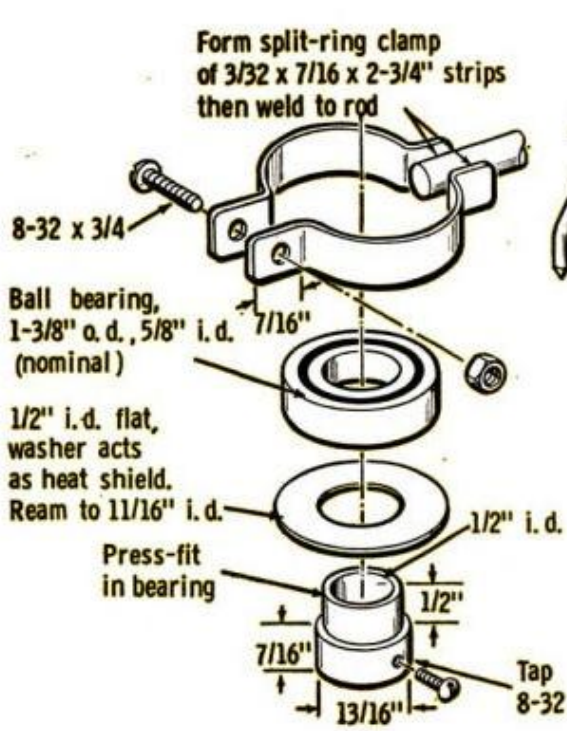
Since the tip is held at a fixed distance from the work, the preheat action of the torch is highly efficient and reduces the chances of excessive melting.

To obtain the best results with these attachments, however, some deviation from standard practice is necessary. First lay out the work with scribed lines. Then measure the distance from the jet to the



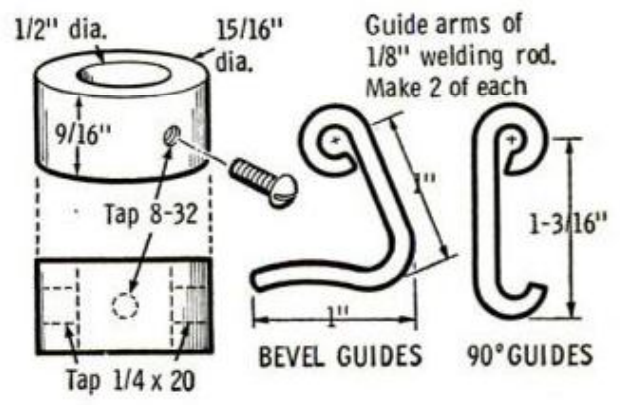
STRAIGHT CUTS AND MODERATE CURVES are easy to cut with this attachment. The two legs assure exact 90° cuts, while the height is easily adjusted to suit length of preheat flames and width of the cut



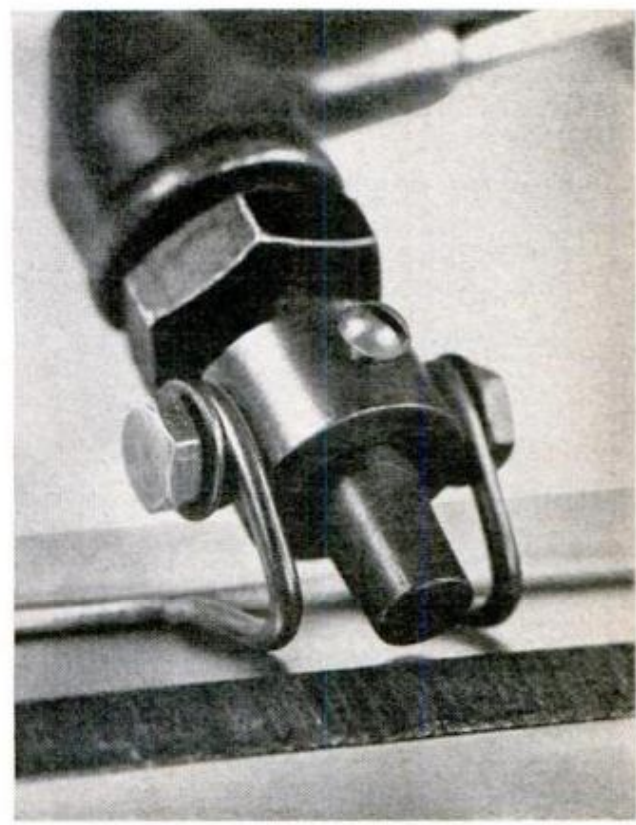
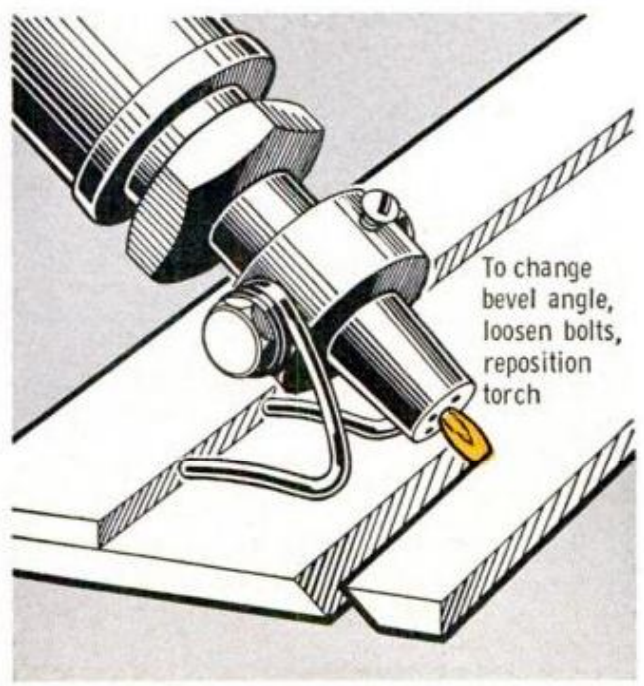


guide leg and set up a guiding straight-edge the same distance away from the scribed lines. Thus, as you start moving the burning torch evenly along the guiding edge, a clean, uniform cut will appear on the scribed line.

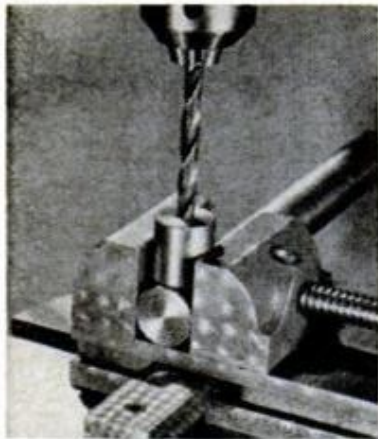
For an inside cut, a small hole (at least 1/8-in.) should be drilled in the work as a starting and ending point—while cutting circles with the compass attachment requires a centerpunched hole and a similar 1/8-in. hole to start the cut. ★★★



WHEN MAKING BEVELED CUTS, first make a trial cut in a piece of scrap to determine the exact distance from the straightedge to the cutting jet. Then clamp or weight the straightedge to work to be cut

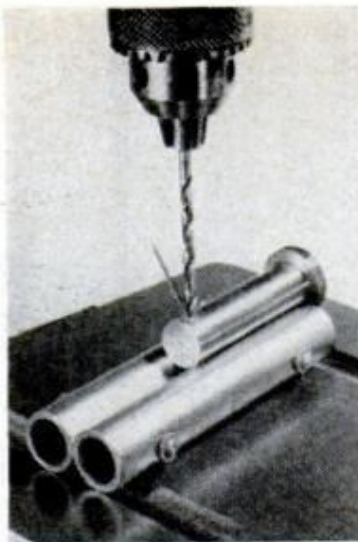


HINTS FROM READERS



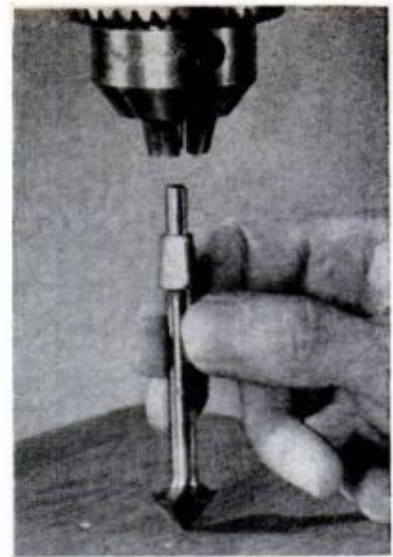
A sleeve does it

When the hole through a rod or pipe must be dead accurate, there's a simple trick to follow. First make a sleeve from a scrap of the same diameter rod by chucking it in the lathe and center-drilling it with the drill bit to be used. Then with both the sleeve and the work clamped in a drill vise as shown, and the same bit chucked in the drill press, lower the bit through the hole in the sleeve. The resulting hole will be right on center.



Quickie V-block

There are several ways to make a V-block for supporting round work for drilling it transversely, but none is as simple, perhaps, as bolting together two lengths of pipe of the same diameter. To cross-drill the pipe accurately you can make use of the sleeve idea as explained at the left. The trick here is to drill all four holes so they align and permit the bolts to pass through. Drill first four holes at same time; insert bolt to align.



Countersink trick

Rather than cut the square head from a rose-head countersink which means it then can only be used in the drill chuck, play it smart and form a round shank at the end. This way it can be used in both the chuck as well as the brace. The most accurate way to round the end is to mount the countersink in a four-jaw lathe chuck and turn it. However, it's possible to do a fairly accurate job by grinding the end and rotating the tool.

NEXT MONTH IN SHOP AND CRAFTS

HOW TO BUILD A BRUSH BUGGY. Made for rough and rugged terrain, this little brother to the dune buggy is made from standard Volkswagen driveline components and will outperform many four-wheel-drive vehicles. Next month's story details construction and shows some action photographs that must be seen to be believed.

WEEKEND PROJECTS MAKE GREAT CHRISTMAS GIFTS. A single weekend in the workshop can produce a collection of seven handsome gifts you'll be proud to present to friends, children—even yourself. Drawings and construction details make them all easy to fabricate.

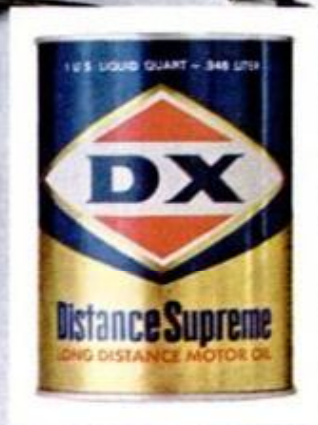
BUILD THIS SLEIGH FOR YOUR SNOWMOBILE. Taking the rest of the family along on winter outings will be simple when you hitch this sleigh to your snowmobile. A five-passenger seat down the middle lets riders sit saddle fashion to center the weight over the runners. Complete plans are included.

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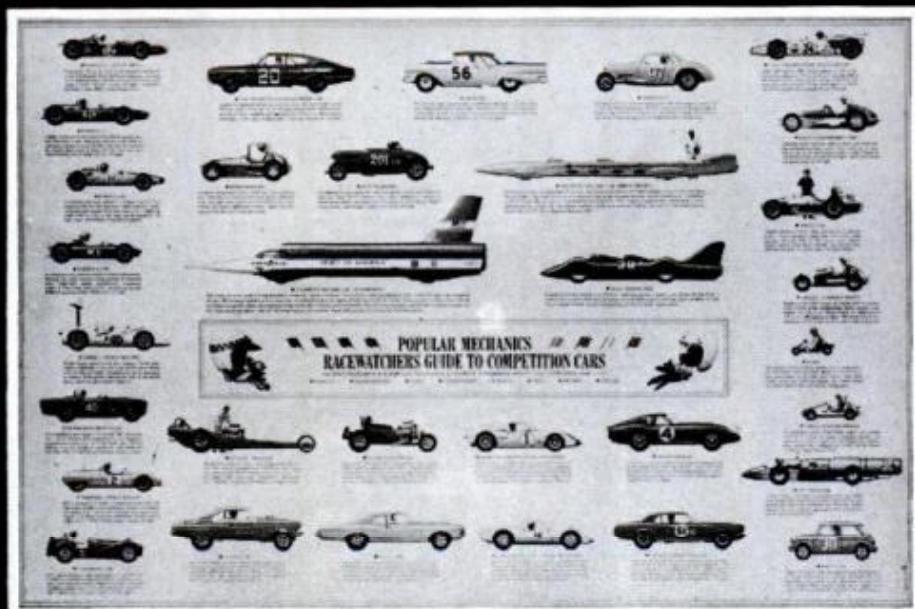
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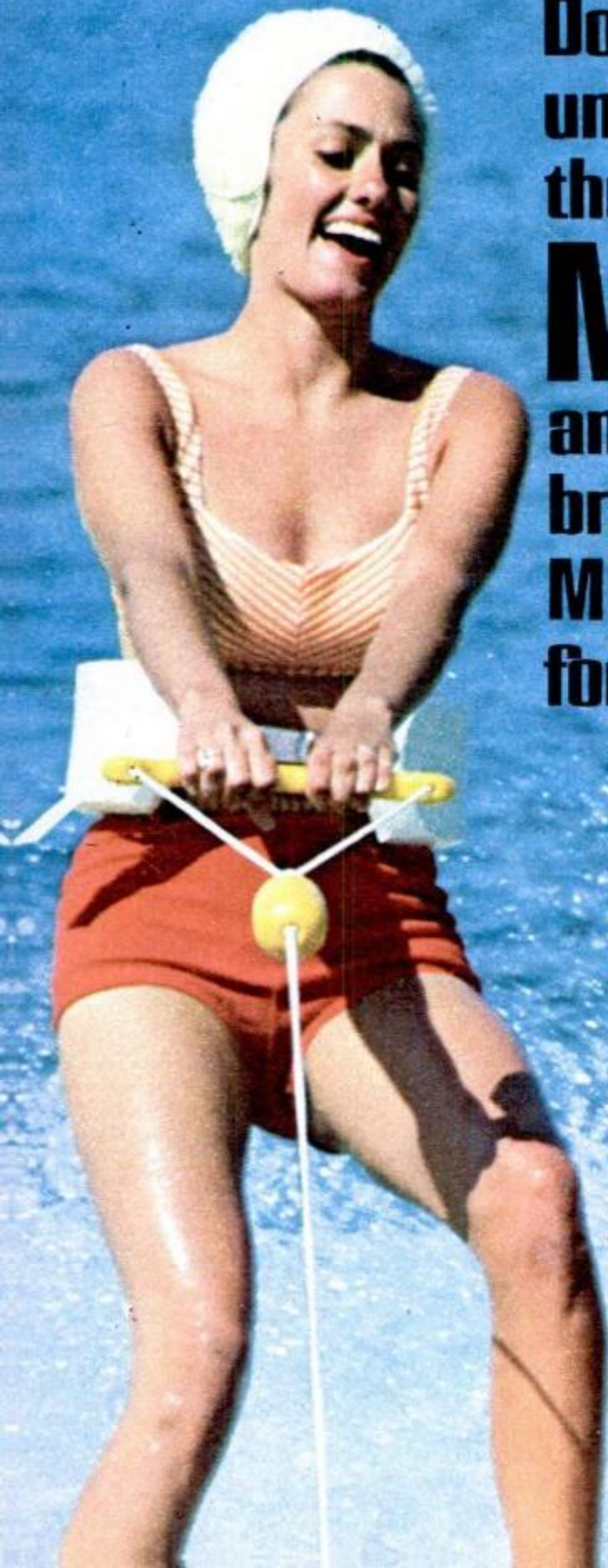
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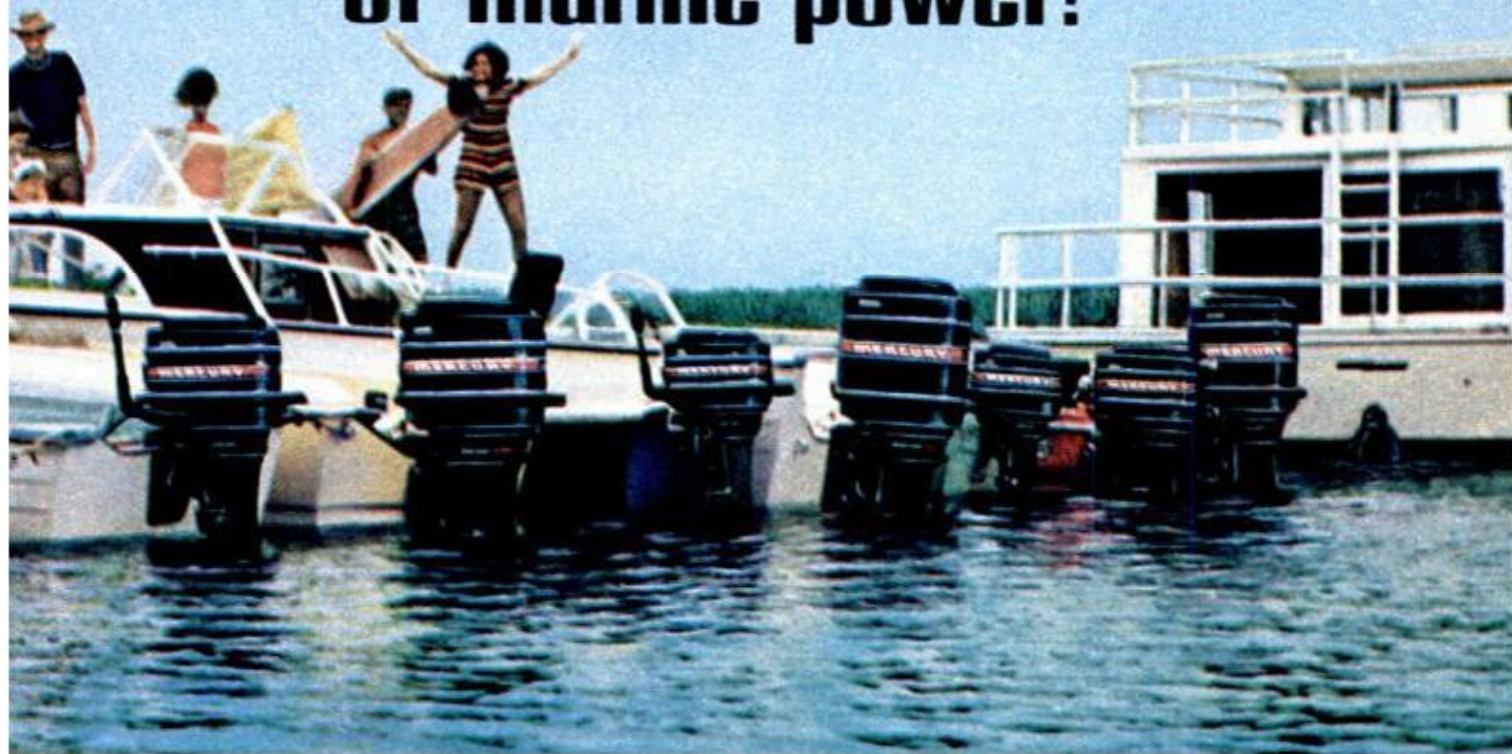


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YOU'RE ON TROOPER TV

(Continued from page 87)

truck off the road in the process. Hurlburt hit the siren and seconds later a very surprised violator was walking back toward a flashing red light.

"What did I do?" he demanded angrily.

Hurlburt, a lean, good-humored man, smiled gently. "Want to see yourself on TV? Step into my studio."

The guy peered through the window. Hurlburt rewound the tape and started playing it.

"Now look," he said, pointing to the screen. It's said that when a man is dying his whole life flashes by. True or not, the guy looked as if he was dying as the TV screen showed him his last seven miles of driving. The tape even recorded the sound of the siren when Hurlburt stopped him. In fact, he even got to see how he looked as he walked back to our car.

"What's all this for?" he asked.

"I just thought you'd like to see yourself on TV before the judge does," Hurlburt said.

"Okay, Trooper," the guy said. "You win. I must be nuts to drive like that."

Hurlburt agreed, wrote out a ticket, and we went back on the prowl.

Hurlburt was climbing a long, narrow two-lane country road when the camera caught our next "case." Approaching the top of the grade, a car came at Hurlburt like a jet strafing a highway. The guy obviously had it floored. What's more, he was on *Hurlburt's side of the road!* On the viewing screen, the road and surrounding countryside flashed by in a dizzying blur. Hurlburt, braking to evade him, went into a long spin. A former race driver, he caught it, rode it into the ditch. When he came out, he'd done a full 180. And this was all on tape!

"He's gotta be drunk," Hurlburt grunted grimly. He shot up out of the ditch and went after the car. Into the mike around his neck Hurlburt said, "Southbound in pursuit . . . white convertible . . . ran me off the road . . . clock one mile . . . clock two . . . doing 84 . . . 94 . . . I'm stopping him."

It had been a wild ride.

The guy stumbled out of his car and staggered back.

"I'm cold sober," he said thickly, his eyes blank. "I do something?"

"Like run me off the road," Hurlburt said.

"Unh-unh. Not me."

"Want to see what you did?"

Goggle-eyed, the drunk stared at the screen, saw himself come over the hill on

(Please turn to page 204)



The Smart Set.

That describes Kodak's top super 8 movie twosome—the new KODAK INSTAMATIC® M9 Movie Camera and the KODAK INSTAMATIC M95 Movie Projector.

The instant-load M9 movie camera gives you greater movie-making versatility. Battery drive—no winding ever. A wide zoom range—5 to 1. More shooting speeds—four, ranging from 12 to 32 frames per second. Precise through-the-lens viewing, zone focusing, and automatic exposure control. Sports finder, too. And handsome wood-grain vinyl styling.

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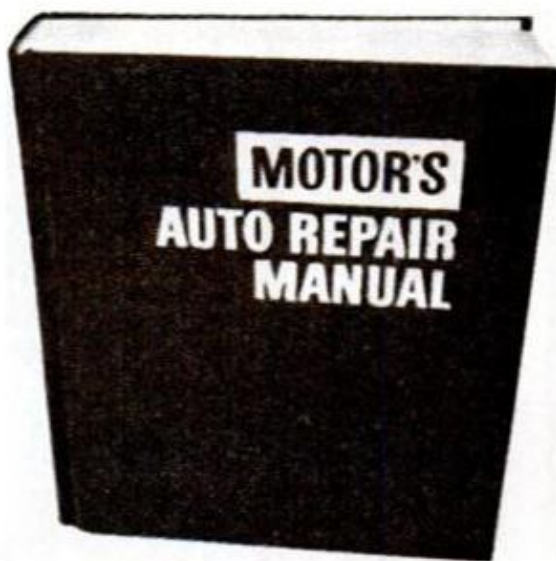
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DOW CORNING

DOW CORNING

YOU'RE ON TROOPER TV

(Continued from page 201)

the wrong side of the road, saw the world spin as Hurlburt evaded him, saw himself chased, saw himself weaving so bad a front wheel wobbled almost out of control, saw himself stopped.

"Gee," the driver said quietly, "I must be stoned."

"Yeah," Hurlburt said, making the official arrest.

For men of Hurlburt's skill and experience, arresting a killer-drunk is almost routine. But it's never easy to convince a judge and jury that this "upstanding, sober citizen here in court with us today" (complete with neat haircut, a freshly pressed suit) could be a potential killer. That's where TV comes in.

"This guy will deny everything tomorrow," Hurlburt pointed out. "He's still so stiff he'll even forget the TV. But wait'll his lawyer sees it."

Later, throughout that day and the next, we nailed the driver of a stolen truck, a second driver whose diesel rig was blowing clouds of thick smoke, another tail-gater, a truck that cut us off, a couple of speeders. In each case the offense and subsequent apprehension was recorded on videotape. In one case—that of the stolen truck—the driver was taken to the nearest police station where the video unit was removed from the car, plugged into a wall socket, and a record made of the suspect being duly advised of his rights. In court, all this presents a powerful argument on the law's behalf.

But use in court of such taped proof of bad and/or illegal driving is only beginning. To date, only two or three courts have admitted videotape as evidence. Yet court acceptance of the tape isn't always necessary.

"Just the fact the tape is there has a tremendous effect on bad drivers," Hurlburt pointed out. He told about a time he chased a speeder only to lose him in traffic. But not before the guy had a chance to see the TV camera and guess that a record was being made of his asinine driving.

"Later, when I got back to my station," Hurlburt said, "the guy came in and gave himself up. He said he figured he couldn't beat a camera. And he couldn't have. I had it all . . . his license number, the year and make of his car, the speed he was traveling, *everything* . . . all on tape.

"What did I do? Well, I was so surprised that the guy gave himself up, I let him off with a warning. I know damn well that's one guy who'll think twice before trying to outrun a cop again." ★★★



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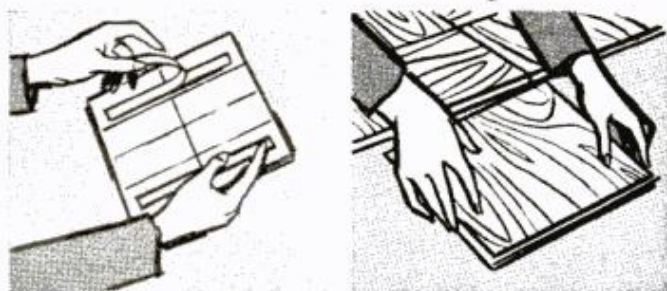
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A BATTLEWAGON RETURNS

(Continued from page 91)

ton of steel and explosives on its way in a peal of thunder!

The *New Jersey's* 16-inch turret crews—no less than 97 men in each turret—can fire their mammoth shells at a rate of once every 40 seconds, in single shots, multi-gun salvos or broadsides of all nine.

The 16-inchers are the *New Jersey's* offensive power. You'll see a forest of smaller gun barrels huddled around the superstructure—five turrets on each side mounting twin 5-inchers. They're the same kind of gunmounts seen on most destroyers.

"These five-inch mounts give us the equivalent of two and a half destroyers, port and starboard," says Capt. Snyder. These rapid-fire guns can blow a torpedo boat out of the water, or they can shut out the sun with a dense curtain of flak.

Snyder believes the 5-inchers can even protect the *New Jersey* against a missile attack. What if a Russian-made Styx missile like the one that sank an Israeli destroyer in 1966 should come at them?

"We'd shoot it down," says Snyder flatly. "If we didn't hit the missile, the missile would hit the flak."

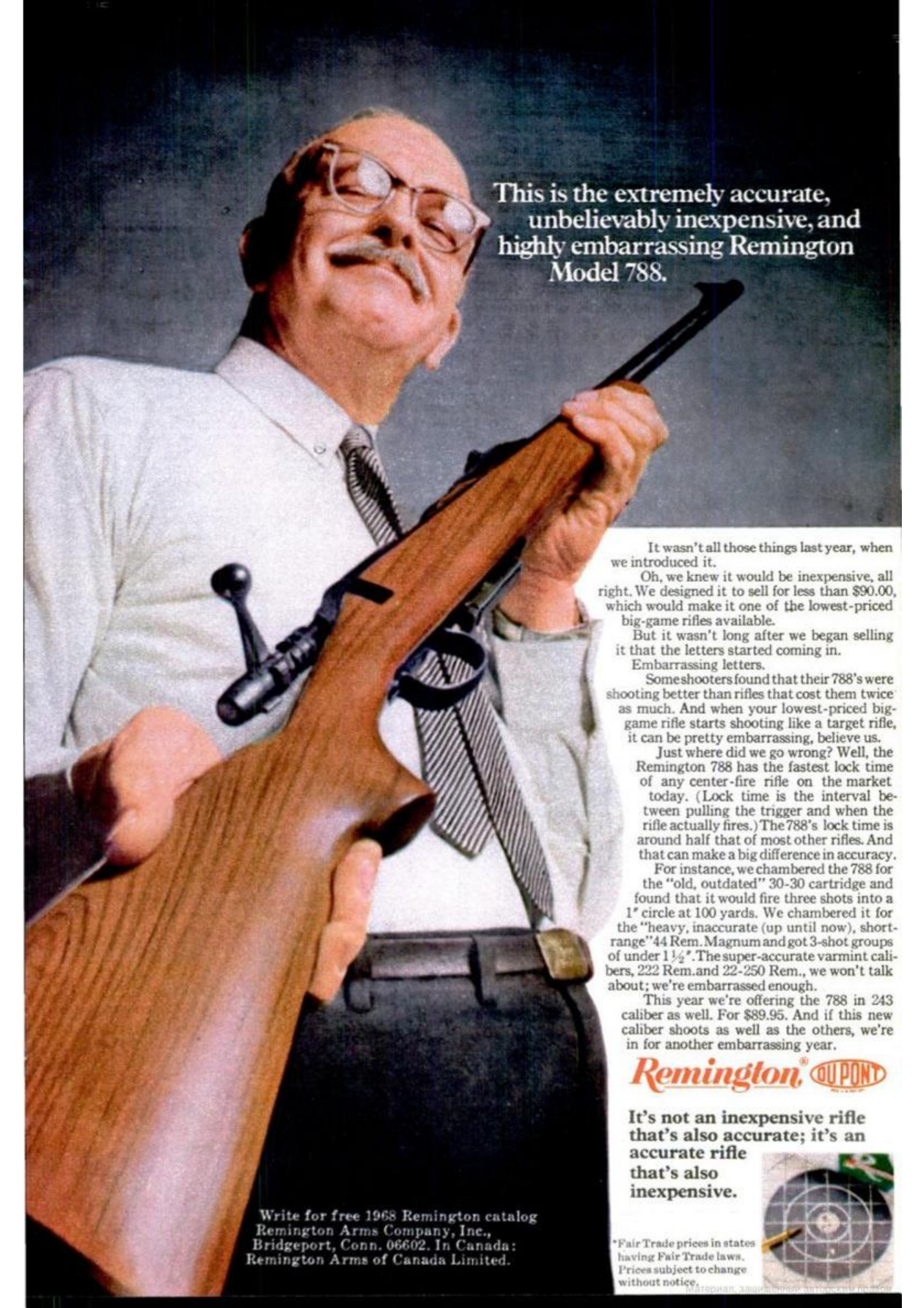
Maybe. But high in the *New Jersey's* forest of masts and antennas is a big gray oblong box. If you climb that high, signs saying "Security Area" will warn you away. Officially this rig is called "electronic counter-measures." Ask a *New Jersey* officer what that means and you get a blank look. But it's no secret that enemy guidance and homing devices on missiles can be jammed or confused.

At their combat stations are sailors too young to remember when the *New Jersey* was in its heyday. But they're learning fast, thanks to seasoned officers and petty officers who cut their teeth on battleships in World War II and Korea.

As a "gun platform" the *New Jersey* is back at war with a crew of just over 1500—half of the complement she was designed for. Removal of the anti-aircraft batteries accounts for much of the reduction.

"We're confident we can do the job they're giving us," says Capt. Snyder. "But we don't know all the answers. Only time will tell whether the battleship really has a future in this limited role."

Come what may in Vietnam, the Navy expects to keep the *New Jersey* in commission for at least three years, and three other American battleships, all we have left—the *Iowa*, *Missouri* and *Wisconsin*—are still available in the mothball fleet. The museums will have to wait. ★★★

A man with glasses and a mustache, wearing a white dress shirt and a striped tie, is holding a Remington Model 788 rifle. He is looking upwards and to the right with a slight smile. The rifle is a wooden-stocked, bolt-action rifle. The background is a dark, textured wall.

**This is the extremely accurate,
unbelievably inexpensive, and
highly embarrassing Remington
Model 788.**

It wasn't all those things last year, when we introduced it.

Oh, we knew it would be inexpensive, all right. We designed it to sell for less than \$90.00, which would make it one of the lowest-priced big-game rifles available.

But it wasn't long after we began selling it that the letters started coming in. Embarrassing letters.

Someshooters found that their 788's were shooting better than rifles that cost them twice as much. And when your lowest-priced big-game rifle starts shooting like a target rifle, it can be pretty embarrassing, believe us.

Just where did we go wrong? Well, the Remington 788 has the fastest lock time of any center-fire rifle on the market today. (Lock time is the interval between pulling the trigger and when the rifle actually fires.) The 788's lock time is around half that of most other rifles. And that can make a big difference in accuracy.

For instance, we chambered the 788 for the "old, outdated" 30-30 cartridge and found that it would fire three shots into a 1" circle at 100 yards. We chambered it for the "heavy, inaccurate (up until now), short-range" 44 Rem. Magnum and got 3-shot groups of under 1 1/2". The super-accurate varmint calibers, 222 Rem. and 22-250 Rem., we won't talk about; we're embarrassed enough.

This year we're offering the 788 in 243 caliber as well. For \$89.95. And if this new caliber shoots as well as the others, we're in for another embarrassing year.

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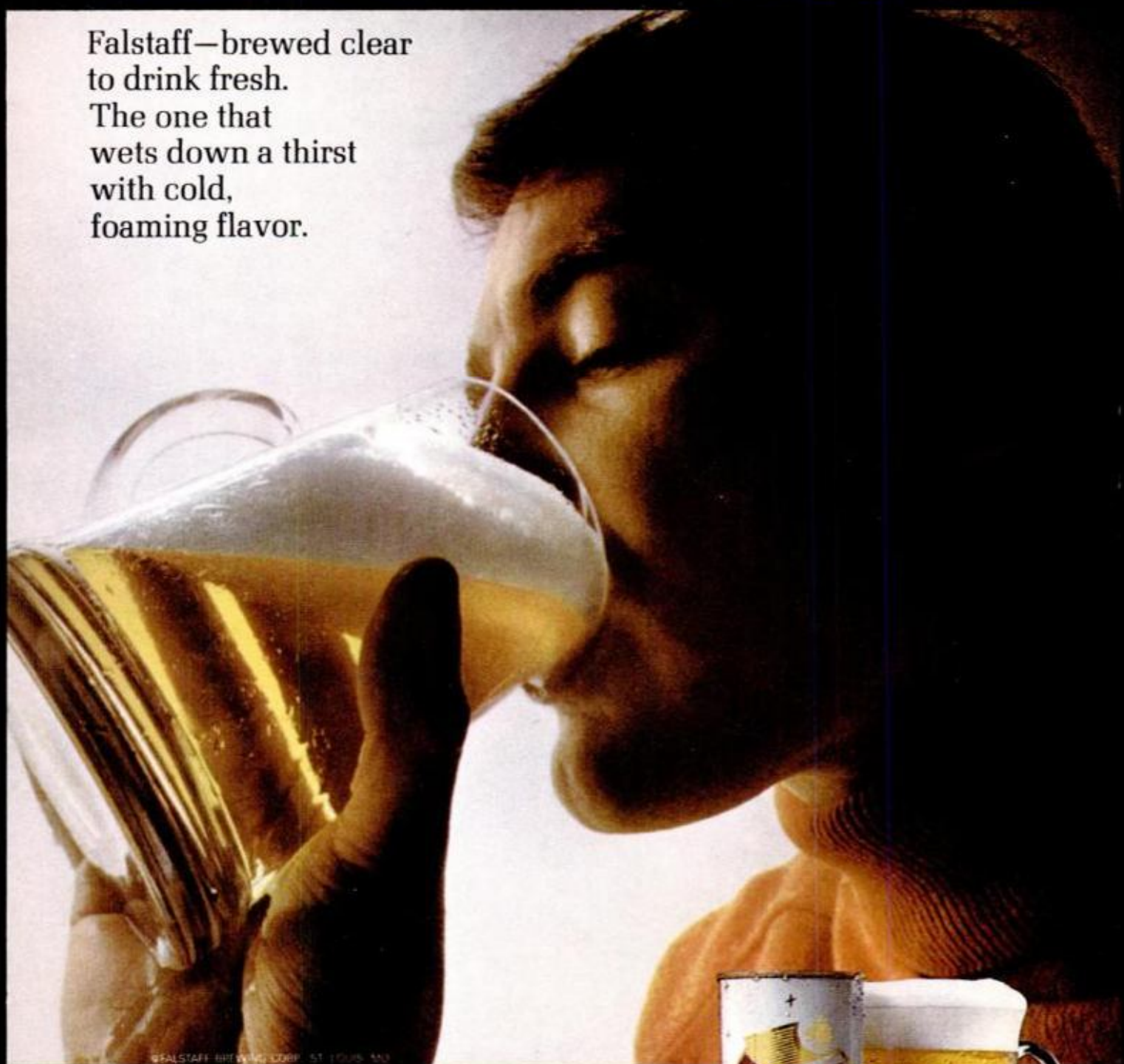
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HOMEOWNERS' CLINIC

BY W. CLYDE LAMMEY

Salvaging old bench

I've bought an old, beat-up cabinet-maker's bench for my home workshop. I can repair the legs and rails but the top stumps me. It's good maple, 2½ in. thick but it's been hacked at the edge, chopped into and drilled through in several places along the length. Any suggestions?—P.G., Mich.

Bought new, such a bench would cost you a pretty penny today, so perhaps it's well worth the salvage. At best the top is going to look rather patchy but with good repairs, it should be serviceable for years to come. If the holes are of standard diameters they can be eliminated by driving in dowels that have been dipped in glue, then cutting them off flush at top and bottom.

Neat fitting inserts in those areas that have been "hacked" and "chopped" can challenge your skill as a craftsman but, with care and a razor-sharp chisel, you should be able to bring it off. Use a scribe to mark areas where waste is to be removed, scribing the lines rather deeply so the chips will lift along the scribed lines. Then cut straight down along the lines with the chisel and chip out the waste by making a series of repeat cuts equally spaced in the waste. Square up the bottom and sides of the notch at the edge, then cut inserts from maple for a snug, true fit. Spread glue on these and clamp them in place until the glue has hardened. Then sand or scrape (with a cabinetmaker's scraper) to a smooth surface. Finish with paste wax.

Balky bookcase door

I have a sectional bookcase of the type seen in offices some years ago. One door lacks the fixture, or guide. I can find no name of the maker on the case. Is there some way to fix this door so it will open easily and without jamming?—O.N., Md.

It should be possible to duplicate the guide, assuming that the other sections of the case have the door guides, one of which you could use as a pattern. Usually these are of ¾ x ¼-in. flat steel, and typically, two pieces of a given length are riveted together at the approximate center.

One piece is usually drilled near the end to take a small staple which is driven into the back of the compartment, permitting this piece to pivot. The opposite end of this member is bent to a long radius and passed through a screw eye turned into the back face of the top rail of the door. The second member has both ends bent to a long radius. These bent ends also pass through screw eyes, one turned into the back of the compartment, the other into the back of the top rail of the door. The location of the members in relation to the door, the location of the screw eyes and the staple, and the radius of the bends all must be determined from one of the original guides. The bends should be easy to make in a vise if you are careful not to kink the material.

Paper over insulating planks

I have one room with walls of V-groove insulating planking. The planks are of uniform width with a wood trim at the ceiling and a narrow baseboard. Can I wallpaper over these planks without preparation?—N.R., S.D.

Yes and no. The wallpaper would likely show the grooves and it might pick up the texture of the planks. You might get by using thick paper with a fairly strong overall pattern, but I'm doubtful the result would be entirely satisfactory. In any case you would have to fill the grooves flush with a spackling compound or, perhaps better, the special putty used in plasterboard joints. Even so this would be rather tedious and tricky in a room of any appreciable size. It seems to me it would be better and more satisfactory in the long run to remove the planks and finish the walls with plasterboard—you probably could remove the planks and have the plasterboard on in less time than it would take to fill all the grooves in the planks neatly. Of course, you would have to sand the plasterboard putty joints lightly and size the board before applying the wallpaper but such steps can be finished in a short time.

Sansevieria propagation

How does one propagate new plants from an old sansevieria?—G.C., Va.

You can do it two ways: first, by dividing the old plant, with each division making a new plant. Repot each division in new sandy loam. Second, you can cut old leaves and insert them about half their length in new soil, which is kept moist but never wet. Select the best leaves for this purpose.

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HOW TO LAY CONCRETE BLOCKS

(Continued from page 170)

mortar mix (Sakrete, for instance) and simply add water to it.

Mortar should be mixed as wet as you can get it and still have it workable. Workable mortar is buttery, yet sticky. It clings to the trowel, even holds to vertical end-joint surfaces.

A good way to judge if your mortar is the right consistency for block-laying is to see that the blocks hold to the right height while you're laying them. If they sink, add more mix to dry out the mortar. If they have to be pounded down, add more water to the mortar and re-mix. It's important to measure everything, though, so you will be sure of getting the proper mix next time.

If you have to mix the mortar by hand, spread the dry materials on a flat concrete surface or in a mortar box and add about three quarters of the water. Mix these with a hoe until the mortar is uniformly damp, then add the remaining water a little at a time while you continue mixing. Let the batch stand for five minutes. Before use, remix the mortar thoroughly without adding water. Mortar not used within 2½ hours should be discarded. Within that time you can mix in more water with the trowel to retemper the mortar.

Long walls need control joints

The procedure to follow when laying the blocks is detailed in the accompanying photos. However, one thing that can't be overstressed is the importance of control joints in any block wall more than 20 ft. long. As shown in the drawing on page 169, a control joint is a continuous vertical joint from top to bottom which lets the wall change dimension slightly without cracking.

You can use either special control-joint blocks or regular blocks with provision for transferring lateral loads across the joint, as shown in the drawing. Lay up the joint with mortar. Then, before the mortar gets too hard, rake it out to a depth of ¾ in. and fill the joint with an elastic caulking. Be sure to follow the caulking manufacturer's recommendations about priming the surface.

One final precaution: Whatever your project happens to be, make sure you check local building codes before you begin construction. Walls under 4 ft. are usually exempt, but check anyway, just to be on the safe side. Besides, your building officials are familiar with local conditions, and they often can help you get off to a good start.

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New process to form ammonia

An ordinary electric current is capable of yielding the electrons necessary to fix nitrogen from the atmosphere to form ammonia, two scientists working at Stanford University have found.

Nitrogen fertilizer is now synthesized, at the rate of about 12 million tons a year, by chemically reacting gaseous nitrogen in the presence of iron, molybdenum or other catalysts at very high temperatures and pressures.

A method that works at room temperatures and pressures with a titanium catalyst was developed by Drs. Eugene E. van Tamelen and Bjorn Akermark.

With cheap electric power available in many countries, the laboratory-proved concept that nitrogen in the air can be converted to ammonia under ambient conditions is very attractive.

Self-destroying beer bottle

A beer bottle that disintegrates when thrown away has been made by Rigello Pak AB, Stockholm. Made of rigid polyvinyl chloride, Saran and a paper sleeve lined with thin aluminum foil and plastic glue, the container is decomposed by sunlight and acids in the soil.

Fewer meteoroids near moon

The density of meteoroids near the moon is about half that near the Earth, according to lunar orbiter data. Over the last 17 months, five satellites have collected information on the rate of penetration of thin beryllium-copper sheets by meteoroids. The rate of penetration near the moon is half that near Earth, report Drs. C. A. Gurtler and Gary W. Grew of Langley Research Center in Hampton, Va.

'69 OUTBOARDS

(Continued from page 94)

best features of the cross-scavenging (bump piston head) system and the loop-scavenging (flat piston head) system. (Scavenging is the process of replacing burnt gases after a firing stroke with a fresh charge in the cylinders.) Mercury engineers say the new Direct Flow system will give more miles per gallon and claim the 80-hp Merc 800 will outrun, and out-accelerate 85-hp motors with the fuel economy of 55-hp outboards.

Throughout Mercury's entire line of 26 models in 10 power classes, a new aluminum alloy called "XK" is being used. This and new anticorrosion finishes improve corrosion resistance.

Mercury is also adding a 7½-hp outboard. While dropping the 6-hp, Mercury has increased the horsepower rating of last year's 3.9 to 4 this season.

Still in the Merc line are the 125-hp Merc 1250, 100-hp Merc 500, 35-hp Merc 350, 20-hp Merc 200 and 9.8-hp Merc 110.

Other highlights on Mercury outboards are Shallow-Water Slant on the Merc 110, Merc 75 and Merc 40 models; elimination of fuel bleed from the crankcase on all models from the Merc 500 up; non-fouling water pumps with large spring-loaded valves on all models.

Chrysler has big news this season with its introduction of four new horsepower ratings, topped by the three-cylinder, 85 hp engine. It's the only three-cylinder outboard on the market in this horsepower rating.

Also new at Chrysler are the 70-hp, 7-hp and 5-hp motors. It has dropped last year's 75-hp model to make room for the new 70 and 85-hp models—both are three-cylinder with 72.39 cu.-in. displacement.

Chrysler is also adding its capacitor-discharge ignition system, called Magnapower, to the 55-hp models. This is already on the top-of-the-line 105-hp, and the 85-hp and 70-hp models.

In the compact, low-profile class, Chrysler is adding 7-hp and 5-hp models. These are upgrades from last year's 4.4-hp and 6.6-hp outboards used by fishermen.

Chrysler is making improvements on the rest of the line—35-hp, 20-hp, 9.9-hp and 3.5 hp. All in all, there are 39 outboard models in 11 horsepower classes.

Evinrude is making a big splash with a line of outboards from 115-hp down to the popular 1½-hp. New to the line is a 25-hp Sportster, which sportsmen can use for many big-power applications.

Evinrude's Lightwin and Yachtwin models, rated at 3 hp last year, have been com-

pletely redesigned to increase their rating to 4 hp.

At the high end of the line is the Starflite 115-S. This V4 engine has a new fuel-induction system and a new exhaust deflector which increase engine efficiency. The midsection features a sound-sealing layer of water between the inner and outer exhaust housings. Drag has been cut by the design of a one piece die-cast gear case. This big baby has electro-hydraulic drive that locks automatically in forward drive should there be a malfunction in the shift mechanism.

The Starlite 85 is virtually a twin to the 115, except for lower horsepower. Both these engines are physically smaller than Evinrude's 100-hp of last year.

Evinrude's 55-hp Triumph, introduced last year, has new-type piston rings this year to reduce friction and for higher power. New rings are also featured in the 18 hp Fastwin. To eliminate electrical failures that may be caused by corrosion, the electric-start 33-hp and 40-hp models are equipped with a new sealed electrical connector.

The 1½-hp Mate is available only in 15-inch shaft length, while the 115-S and 85 have only a 20-inch shaft length. All other models come with either a 15 or 20-inch shaft.

Evinrude has dropped the 5-hp and 3-hp models in favor of the new 4-hp.

Yamaha's new 15-hp will be the top-of-the-line for now. This motor will be added to the existing Yamaha models already in distribution (*Outboards from Yamaha?*, page 122, July '68 PM). These are the 7.5-hp, 5-hp and the 3.5 hp. Both the 7.5 hp and the 5-hp will be equipped with metered oil systems. ★★★

CALL OF THE WILD

(Continued from page 126)

callers on the market. The price may vary from as little as \$1 or \$1.50 for a rubber diaphragm turkey caller to \$15 for a deluxe, imported wood, goose or duck caller.

One basic thing you should remember is that not all callers are good. Some are better at frightening game away than attracting it. If possible, try them out before you buy. And try them outside; using them inside a shop doesn't give you the true sound. Standard models by nationally known manufacturers are likely to be fair to good, but there are definitely outstanding makes in every category. You find out which these are only by trial and error, or by asking a local expert to try the call and give you his opinion. ★★★

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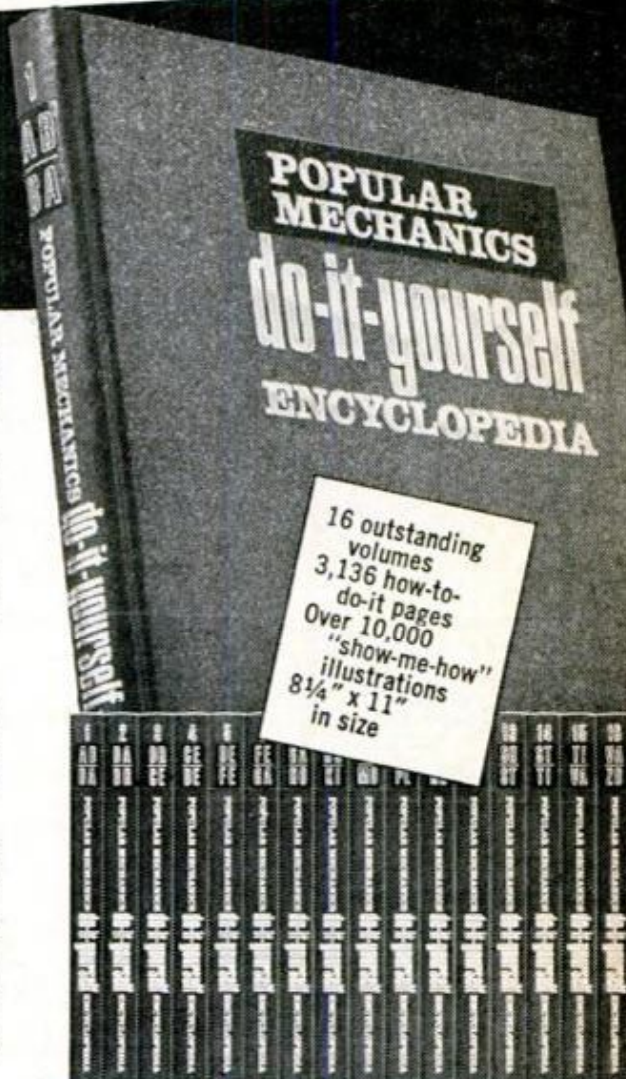
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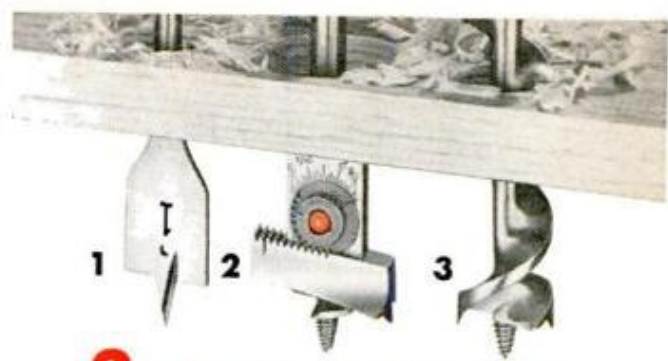
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'69 FAMILY CARS

(Continued from page 102)

side glass is rounded toward the extreme, and sills tuck under sharply. Standard power on the Polara is a 318-cu.-in. V8, on the Monaco a 383. A new "air spoiler" has been integrated into the roof of the station wagons, the idea being to deflect air down and over the rear window to help keep it clean.

FORD: You can buy a full-size Ford as a Custom, a Custom 500, a Galaxie 500, an XL, and an LTD, the main differences being—from the Custom up to the LTD—progressively more luxurious appointments and trim and hotter performance options. The entire line has been restyled, adding two inches to the wheelbase, a fraction to overall length, and one inch to front track, two in back. Grilles have been changed, and there's a new "cockpit" instrument panel featuring what Ford calls a "control center." Windshields have been slanted back 5°. The new Galaxie 500 fast-back features a tunneled backlight (a rear window when I was a boy). In Ford's convertibles, a new top-folding mechanism makes possible a wider rear seat by doing away with side linkage. Headlights on the XL and LTD are hidden.

A nice, cleanly styled, well-done lineup. **MERCURY:** Going all-out in the full-size field for '69, Mercury is offering a maze of models and options. At the top of the line are the Marquis and Marquis Brougham, both of which look like small Lincoln Continentals. Length overall is up four inches over last year's Marquis, wheelbase up one. Standard two-bbl. power is Ford's new 429-cu.-in. V8. Next in line is the new Marauder and its spin-off Marauder X-100. The concept is luxury plus performance. Front-end styling is again a takeoff on the Continental. In back it's a tunneled semifastback featuring hardtop overtones and a special matte finish over the entire rear deck.

This last thing you're going to either hate or think great. The 429 two-bbl. engine is standard on the Marauder, a four-bbl. 429 on the X-100. At the low end of the line are the Monterey and Monterey Custom. The Montclair and Park Lane have been dropped. Again the Lincoln styling hand is in evidence, but the car has an appearance continuity with previous Mercurys. The grille is new and the car is longer and wider. Standard power is a 390-cu.-in. V8.

The Mercury marque is 30 years old this year and these '69s add up to an appropriate and stylish celebration.

OLDSMOBILE: All cars in the "88" family are Deltas—a Delta, a Delta Custom, and

a Delta Royale (auto purists will probably object to this pirated allusion to the late Ettore Bugatti's elegant creation). And, as with the bigger "98s," styling is distinctly Cadillac-ish, the main difference being, of course, size, plus a grille only slightly revised from last year. Wheelbase is up an inch, as is overall length. You can get a hardtop coupe, a Holiday or Town sedan, and a convertible in the Delta, the same but no convertible in the Custom, and only a hardtop coupe in the Royale. The engine lineup has been carried over and transmissions are either three-speed manual or automatic.

The cars have a nice attention-to-detail look characteristic of the entire Olds line.

PLYMOUTH: A new grille, new headlight arrangement (horizontal rather than vertical), new bumpers front and back, new sheet metal, and new rear end styling mark the new full-size Plymouths. Available as Fury I, II, III, Sport Fury, VIP, Suburban, Custom Suburban, and Sport Suburban, the model lineup totals 17. Overall length is up almost two inches, as is overall width. Wheelbase is up one inch to 120. Interior dimensions have been increased. Windshield wipers are recessed. If you order airconditioning, you get ventless windows. Otherwise, vents. Hooray! Engine availability ranges from a 225-cu.-in. Six to a high-performance 440 V8. Transmissions are a manual three-speed and an automatic.

I said earlier Chrysler was coming on. The Plymouths support the contention.

PONTIAC: Sixteen models are offered here in three series—Catalina, Executive, Bonneville. There's a Ventura version of the Catalina, a Brougham of the Bonneville. All have been restyled, albeit not radically, all are on slightly longer wheelbases, all are fractionally wider. With the exception of the Executive, which remains as is, all are longer overall. Front track has been increased one inch to 64. Rear track remains at 64. The Bonneville has been given a different grille to set them apart from other full-size Pontiacs. In the three series you can get a two-door hardtop, a four-door sedan or hardtop, and two- or three-seat wagons (no two-seater in the Bonneville). Convertibles are available as either Catalinas or Bonneville, but you can't get the Ventura trim option on the Catalina convertible. Standard power on the Bonneville is a 428-cu.-in. V8, a 400 V8 on the others. However, the 428 is an option on the Catalina and Executive. Transmissions include a manual three-speed, a manual four-speed, and a Turbo Hydra-Matic automatic.

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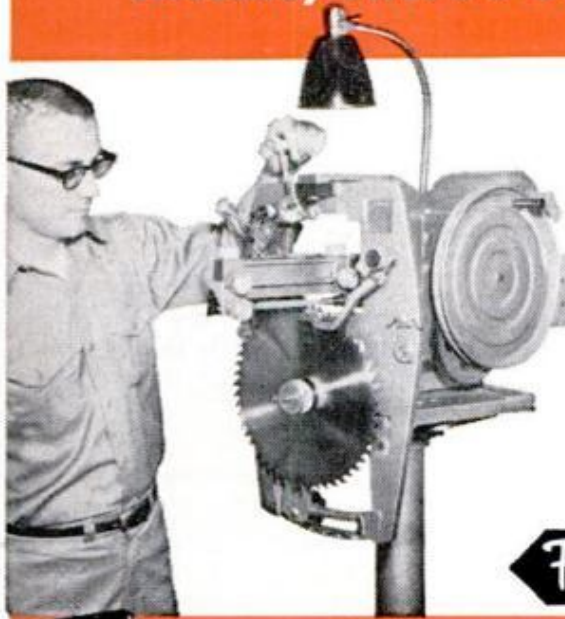
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'69 INTERMEDIATES

(Continued from page 106)

Super Bee, 440, 500 and R/T. The Deluxe comes as a two-door coupe, four-door sedan, two-seat wagon; the Super Bee as a coupe and new two-door hardtop; the 440 as a two-door coupe and hardtop, a four-door sedan, and two and three-seat wagons; the 500 as a two-door hardtop, a four-door sedan, a convertible, and two and three-seat wagons; the R/T as a two-door hardtop convertible. Engines, not all of which are available in all models, range from a modest 170-cu.-in. Six up to the howling 440-Magnum and 426-Hemi, both V8s. The latter engines, being strictly performance-oriented, call for beefed-up suspensions and heavy duty brakes.

FORD: Two new model designations here—a Cobra hardtop and a Cobra fastback, both performance cars. Other models include the Fairlane, the Fairlane 500, the Torino and Torino GT. Four-door sedans are available as Fairlanes, 500s, Torinos. You can get a two-door hardtop as a Fairlane, a 500, a Cobra, a Torino and GT. Fastbacks are offered as Fairlane 500s, Cobras, Torino GTs. The only convertibles in the series are the Fairlane 500 and Torino GT. Four-door wagons are available as Fairlanes, 500s, and something called Torino Squire.

Overall styling changes are slight. The ever-present new grille prevails, with minor variations between Fairlane, Cobra and Torino. There are distinctive trim and ornamentation differences, too, the most obvious being a reptilian horror (I think, anyway) nailed to the Cobra front fenders just aft of the wheel opening. Standard engine on everything up to the GT convertibles and hardtops is a new 250-cu.-in. Six. This is also the standard engine on the wagons. Standard on the GT convertibles and hardtops is a new 351-cu.-in. V8. Transmissions include three and four-speed manuals and an automatic.

MERCURY: Available in this series are a Comet, a Montego, a Montego MX, an MX Brougham, a Cyclone, a Cyclone CJ (for Cobra Jet, no less), and a Montego MX station wagon. You can get a four-door sedan in any of the Montegos, a two-door hardtop in the Montegos and the Comet, a fastback in the Cyclone and Cyclone CJ, a convertible and a wagon in the Montego MX. Styling changes throughout the line are minor, the most obvious being reworked grilles. The Cyclone CJ has a "no nonsense," muscle car look that plainly transmits its message—go, and plenty of it. Armed with a 428-cu.-in. 4-bbl. V8, the CJ is as subtle as a baseball bat. Ford's

new 250 Six, plus the new 2 and 4-bbl. 351 V8, are also included in the engine lineup. In transmissions, there's a manual three-speed, a manual four-speed, an automatic called Select-Shift.

OLDSMOBILE: Starting with the F-85, Olds intermediates include the Cutlass, Cutlass Supreme and the all-out performance-oriented 4-4-2. You can get a two-door sports coupe as an F-85, a 4-4-2, or a Cutlass, the latter available only in the dolled-up "S" package. Four-door sedans are offered as an F-85, a Cutlass and a Cutlass Supreme. Two-door hardtops are available as a Cutlass (the "S" package again), a Cutlass Supreme, a 4-4-2. Four-door hardtops come as a Cutlass and Cutlass Supreme. There's a Cutlass "S" convertible and a 4-4-2 convertible. Two-seat wagons are available as a Cutlass and a Vista Cruiser, which also offers a three-seater. The two-door sports coupes are built on a 112-in. wheelbase, the others (with the exception of the wagons) on 116, carried over from last year, as are all other dimensions.

Standard engines include a 250-cu.-in. Six for the F-85 and Cutlass, and, for the same cars, a 350 2-bbl. V8. Standard on the Cutlass Supreme is a 4-bbl. version of the same 350 engine. A 4-bbl., 400-cu.-in. V8 is standard on the 4-4-2, making it a real go-buggy. Styling changes are slight, mostly ornamentation and trim.

PONTIAC: Fifteen models in four series here—Tempest, Custom S, LeMans, GTO. In the Tempest, you can get a two-door coupe and a four-door sedan; in the Custom S, the same models plus a two and four-door hardtop, a convertible and a wagon; in the LeMans, everything except a four-door sedan (the wagon is called a Safari); in the GTO, only a two-door hardtop and a convertible. Not much styling news. Grilles have been slightly modified, there's a new taillight arrangement and instrument panels are new. Although the 112-inch (GTO) and 116-inch wheelbases are carried over, the entire line is fractionally longer and wider overall. Front track has been upped one inch to 61. Rear track remains at 60 inches.

Standard engine for everything except the GTO is a 250-cu.-in. OHC Six, with a 350 V8 as the option. Further options include 2 or 4-bbl. carburetion. Standard on the GTO is a 400-cu.-in. 4-bbl. V8. There are two Ram Air options available on this one, the latter of which—called Ram Air IV—approaches the unreal. Transmissions include a three-speed manual and a two or three-speed automatic.

PLYMOUTH: In this series are Belvedere, Road Runner, Satellite, Sports Satellite

(Please turn to page 220)



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'69 PERSONAL CARS

(Continued from page 111)

car of the type; i.e., a performance car. Powered by Ford's 351-cu.-in. engine, it gets out and marches. Powered by the optional 428 Cobra Jet "Ram Air," it can impart the feeling one is on a low level strafing mission. It has all the "go" styling touches, too—stripes, hood lock pins, hood scoop, spoiler, racy steering wheel.

The Grande features a special insulation package, a soft-riding rear suspension and special interior and exterior trim.

Mustang engines include the standard 200-cu.-in. Six, an optional 250 Six, and optional 302, 351, 390 and 428 V8s. Transmissions include a three-speed, a four-speed and an automatic.

MERCURY: Cougar is all-new this year and for the first time is offering a convertible. There's new sheet metal, a new grille, new head and taillight treatment, a new instrument panel and a new size. Although last year's 111-in. wheelbase is retained, the '69 Cougar is almost four inches longer, almost three inches wider. Inside dimensions are up, too.

You can get either a standard Cougar or an XR-7, both in either a two-door hardtop or the new convertible. In both you have a wide choice of trim, ornamentation and performance, comfort and convenience options.

Standard engine is Ford's 351-cu.-in. 2-bbl. V8. You can get the same engine with a 4-bbl. carburetor, or a 4-bbl. 390 and either of the two 428 4-bbl. V8s, the hottest of which comes with a Ram Air option. In transmissions, there's a three or four-speed manual and an automatic.

OLDSMOBILE: The new Toronado is almost four inches longer overall, over two inches wider. The rear-end appearance has been altered substantially, eliminating that "chopped off" look. Elsewhere you'll find new interiors, a revamped dash, some minor gadget tinkering and an electrically heated rear window for quick defogging and deicing.

The car is available only as a two-door hardtop coupe. Its front drive is pushed by a standard automatic transmission and a carried-over 455-cu.-in. 4-bbl. V8.

PONTIAC: Two cars here—the Firebird and the all-new Grand Prix.

The Firebird features a revamped grille, resilient front bumper extensions, a new instrument panel, new side marker lamps and a revised rear end. Overall length is up two inches, width an inch. Standard engine is the 250-cu.-in. OHC Six. Options include a Sprint version of the OHC Six, a 350 V8 with either a 2-bbl. or 4-bbl. carburetor, and two ver-

sions of a 400 V8, one being a Ram Air package. Transmissions include manual three and four-speed and an automatic.

The Grand Prix is the industry's only all-new car and it's more a triumph of marketing than design and engineering. The car—built on what GM calls its "G" body—gives Pontiac an impressive entry in the personal cum luxury field. It's built on a 118-in. wheelbase, is slightly over 210 inches long, 75.7 inches wide, 52 inches high, and features some impressive—albeit not radical—styling touches and gadgetry. I didn't get to spend much time with the car, so more later.

Available only as a two-door hardtop, the Grand Prix's standard engine is a 350 hp, 400-cu.-in. V8. You can also get a 265-hp version of the same engine and two versions of a 428 V8, one 370 hp, one 390. Transmissions are a three-speed manual and an automatic.

PLYMOUTH: The Barracuda is again available as a fastback, hardtop or convertible. Styling changes are slight. There's new ornamentation, new "go" options, a new, low-priced muscle entry called the 'Cuda. A 225-cu.-in. Six is standard, with 318, 340 and 383 V8s optional. A manual three or four-speed, an automatic are transmissions. The Barracuda, nicely done, deserves more attention than it seems to get.—Bill Kilpatrick

'69 INTERMEDIATES

(Continued from page 218)

and the GTX. In the low-line Belvedere you can get a two-door coupe, a four-door sedan, a station wagon. In the Road Runner, there's a two-door coupe and hardtop and a new convertible. The Satellite offers a two-door coupe, a four-door sedan, a convertible, and two and three-seat wagons. The same models apply in the Sports Satellite, except for wagons. GTX comes as a two-door hardtop or convertible.

Styling changes consist of what Plymouth terms "refinements," meaning few and far between. Grilles have been altered and rear ends given a different treatment. Dimensions inside and out remain pretty much the same. The comfort/convenience, performance and dress-up option list is impressive. The standard Six on the Belvedere and Satellite is a 225, with a 318-cu.-in. engine the standard V8, including the Sport Satellite. Optional V8 for Belvedere, Satellite and Sport Satellite is the 383 in 2 and 4-bbl. versions. Road Runner comes with the 383 4-bbl. GTX with the 440. Optional on both is the 426-Hemi. There's a manual three or four-speed, an automatic three-speed.

—Bill Kilpatrick

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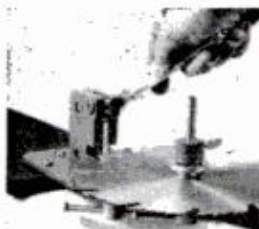
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'69 COMPACTS

(Continued from page 117)

styled wheel covers. Yet this is not to carp at Ford; the Falcon remains as honest as an old shoe and in my opinion delivers what it promises—good, reliable, reasonably comfortable, rather stylish, low-cost transportation.

Anticipating federal regulations that become effective Jan. 1, 1969, standard on all Falcons from the word go this year are fixed front-seat headrests. Adjustable headrests are optional. There's a new steering wheel, some new side trim, new side marker lights, and a new 2-bbl. version of the 302-cu.-in. V8. Transmissions include a three-speed manual and an automatic.

The present Ford idea for the Falcon isn't bad. Maybe next year's will be even better.

NOVA: Chevrolet has dropped the "Chevy II" designation this year, choosing to go along with the name it last year applied only to certain models of the car. It's still a Chevy II, however, and just as trim and handsome as always. Very little has been changed. Some exterior trim has been what Chevy calls "refined," but that's about all there is outside. Inside you'll note a few differences. There's a new instrument cluster, a newly designed steering wheel, a wide rear-view mirror, some trim changes, relocated door-lock buttons, front-seat head restraints and—as with all GM cars—the anti-theft steering column ignition system. As a standard Nova, the car is available as a two-door coupe or a four-door sedan. In the hotter SS version you can only get the coupe. Depending upon what you want to pay, you can order the Nova powered by one of three standard engines—153-cu.-in. Four, 230 Six, 307 V8. Optional engines include a 250 Six and a 350 V8. In the SS the standard engine is the 350, but hp has been upped from 255 to 300. And this little kid can step, believe

me. Transmissions include a manual three or four-speed and an automatic.

As you've surely figured out, I like this car, particularly the SS.

RAMBLER: Last year's "American" tag for this series has been dropped and the entire line redesignated Rambler. The name change is one of the very few changes AMC has made in the car, the company's philosophy here being to hold annual styling changes to a minimum and the price down. There's some new exterior trim, new interior trim, and that's it. The best way to tell a '69 is by a new triangle tricolor hood ornament.

The car is available as a basic Rambler in a two-door and four-door sedan, a Rambler 440 in a four-door sedan and a station wagon, a Rambler Rogue in a two-door hardtop. Standard engine on the Rambler and the 440 is a 199-cu.-in. Six, with a 232 Six as an option. As a further option on the 440, you can get a 290 V8. The 232 Six is standard on the Rogue, the 290 in two versions the options. A manual three-speed and an automatic are the transmissions, with a manual four-speed optional on the Rogue only.

VALIANT: Last year we reported a Plymouth engineer as terming the Valiant "the world's smallest limousine." We thought him right then and—had he said it this year—he'd be right again. The car hasn't been changed much. There's a revamped grille, a modified rear-window design and new taillight treatment. Interior trim has been redone, too. A new option this year is a fold-down arm rest.

You can get either a Valiant 100 or a dressier Signet in a two-door or four-door sedan. Again depending upon what you want and can afford, standard engines are either a 170-cu.-in. Six or a 273 V8. Optional engines include a 225 Six and a 318 V8. Transmissions include manual three and four-speeds and an automatic. You can only get the four-speed with a V8, however.—*Bill Kilpatrick*

COMPACTS—HOW THEY COMPARE

Car	Wheel- base (in.)	Track (f/r, in.)	Overall Length (in.)	Overall Width (in.)	Engines in Model(s) Series* (Displacement, cu. in.—V8 except as noted—carburetion)
American Motors (Rambler, 440, Rogue)	106.0	56.0/55.0	181.0	70.8	199-6-1bbl., 232-6-1bbl., 290-2&4bbl.
Chevrolet (Nova, SS)	111.0	59.0/58.9	189.4	72.4	153-4-1bbl., 230-6-1bbl., 250-6-1bbl., 307-2bbl., 350-4bbl.
Dodge (Dart, Custom, Swinger, GT, GTS)	111.0	57.4/55.6	195.4	69.6	170-6-1bbl., 225-6-1bbl., 273-2bbl., 318-2bbl., 340-4bbl., 383-4bbl.
Ford (Falcon, Futura)	111.0	58.8/58.5	184.3	73.2	170-6-1bbl., 200-6-1bbl., 302-2bbl.
Plymouth (Valiant, Signet)	108.0	57.7/55.6	188.4	69.6	170-6-1bbl., 225-6-1bbl., 273-2bbl., 318-2bbl.

*Not all engines available in all models

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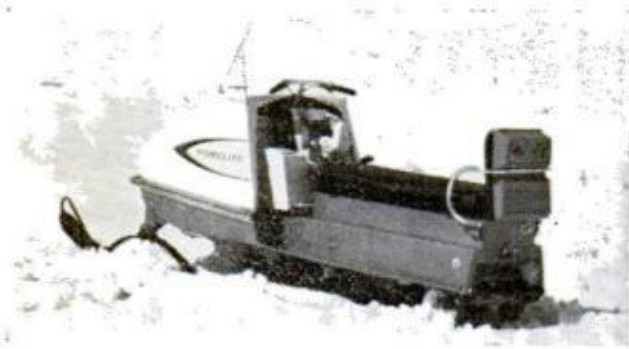
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SNOWMOBILES '69

(Continued from page 133)



HOMELITE has three new machines: the mini-model with 10 hp, and two regular models with 18 and 20 hp

track aimed at the youngsters. With a 10-hp Polaris engine, it weighs 212 pounds and costs approximately \$595.

Big news at Johnson this year is the introduction of three 25-hp models of Skee-Horse. The first is a Light Trac model with a 15-inch track. The second is a manual-start, 20-inch track, and the third is an electric start with a 20-inch track. Both 20-inch models have reverse as standard.

Johnson is also introducing the Challenger line. These light machines come with 19.5-hp and 23-hp JLO engines.

Three other models in the Skee-Horse line are equipped with 16-hp engines. You can get these models in electric start with reverse, and with 20 or 15-inch tracks.

Evinrude has come up with a surprise—by adding something new to its regular line. Besides the three models equipped with 25-hp engines, and the three 16-hp models, Evinrude has the Bob Cat series in addition to its Skeeter line. This new Bob Cat is a lightweight machine which uses either 19.5-hp or 23-hp JLO engine. The Bob Cats will run on 15½-inch tracks, have Salisbury clutch transmissions and sell for \$910 and \$1075.

AMF's Ski-Daddlers have two new running mates—the 600-cc Super Twin and the 20-hp Lloyd 386-cc Wide Track 18. The popular Sno-Scout model has more power with either the 12½-hp JLO or 15½-hp JLO. Though most Ski-Daddlers are 30½ inches wide, the Wide Track 18 is 33½ inches running on a 15-inch track. The Super Scout Mark III also has more power this year—22½ hp.

A big service surprise from Trail-A-Sled, maker of Scorpions: Starting this fall, you can take your new machine back to the dealer for a free check after 10 hours' operation. The company pays for this service.

Scorpions come in three models—the Mark II with 15-inch track weighing 290 pounds; the Mark III with 18-inch track



SPRINT, new Bolens machine, has regular snowmobile design. This 17-hp model weighs 355 pounds

weighing 340; the new Mark IV with 23-inch track weighing 415. Engine options run from the 297-cc Sachs to the 634-cc Hirth. New clutch bearings eliminate creeping and freeze-up.

Arctic Cat this year is concentrating on its Panther series. These light, fast machines are available with engines from 246 cc to 600 cc. Arctic Cat also has a 300-cc Wankel engine model, and a 12-hp, four-cycle model. Weights of machines in the entire eight-machine line vary only from 290 pounds to 345 pounds. Panthers run on 17-inch tracks, are 30 inches wide. Most can be adapted to electric start.

Another surprise this year is the purchase of Sno-Jet by the Glastron Corp.—builder of Glastron boats and Nauta-Line houseboats. Sno-Jet is offering four new engine sizes and eight new models priced from \$750 to \$1295.

Running on a 16-inch track and weighing about 270 pounds, Sno-Jets have Hirth engines that develop 15, 17½, 19, 23 and 35 hp. Some have electric start available.

Yukon King is adding the Super Grizzly. This machine is powered by an 18-hp JLO and runs on a 15-inch track.

Boatel is adding a 20-inch track model to its line of Ski-Birds, which come with engines running from 300 to 634 cc.

Rupps' Sno-Sport line has five models with engines that develop 12 to 20 hp. Models weigh from 280 to 330 pounds.

Fox Trac's series features machines with engines from 227 cc to 450 cc. Six models have 15-inch tracks; four, 20-inch.

Alouette Div. of Featherweight Corp. of Canada will have six major models with Sachs engines from 277 cc to 368 cc. Weight runs from 294 pounds to 389 pounds. Five models have 15-inch tracks, while the sixth has an 18-inch track.

Homelite is entering three new machines: 10-hp Ranger, 18-hp Forester, 20-hp Explorer. Tracks run 12, 15 and 18 inches. ★★★

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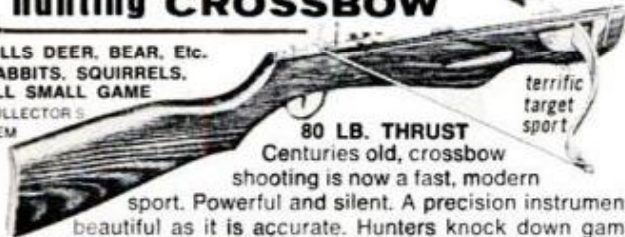
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THAT NEW PATENT LAW

(Continued from page 135)

the first applicant? Nothing for the well-heeled corporation, plenty for the independent. For the latter, it would involve a huge increase in paper work, legal expense, and Patent Office fees, with the added risk of losing a deserved patent in the end.

Robert W. Fulwider, chairman of the Patent Section of the American Bar Assn., predicts that "it would create a stampede to the Patent Office to file hastily prepared applications."

'True' inventor protected now

Compare this to the present method. After you get an idea for an invention, you immediately start keeping records and having them properly witnessed. You have a search made to see if there are comparable inventions. If your search encourages you, you continue your development work. When, in good time, you're satisfied that your invention is ready for practical application, you seek a patent. Up to that time, you have incurred no legal expenses other than for the patent search, and you have paid no fees to the Patent Office. Yet all the time you've been protected by the law, which considers you the "true" inventor.

Now look how things would work out under the new bill. You'd feel compelled to make your application as soon as possible. You'd either file it on the basis of inadequate research, which would require making many amended applications later, or you'd have to rush your development work faster than you could probably afford to.

Either way you're in trouble. Filing a series of amended applications involves much higher legal fees. One attorney told me that this and other provisions of the new bill would require him to raise his fees as much as 100 percent.

Pay now, cry later

If you hurry your work in the hope of not having to file a lot of amended applications, you'll be hit with all the expenses of development, plus the legal fees, plus the filing fees, at a time when you probably can least afford to put in all the time and money required.

None of this presents any problem to corporations with plenty of money and large engineering and legal staffs. Big "invention factories" can afford to make numerous amended applications if needed.

Even at that, it might not be so bad for the independent if he could be sure of coming out of it all with a patent on a

profitable invention. But what if you run into unexpected difficulties and your invention flops? Under the present law, you just let it die a natural death. All you're out of pocket is the cost of materials used in development and the fee for the patent search. But under the new bill your rude awakening would come *after* you'd shelled out the money for the legal costs, application fees and all the rest.

Another clause in the new bill takes away an inventor's right to test out an invention. It declares that you cannot get a patent if you let anybody use your invention before you have applied for a patent! The bill puts it this way: "A person shall not be entitled to a patent if . . . prior to the filing date of the application, the subject matter sought to be patented . . . was made available to the public by means of disclosure in tangible form."

Tests can make the difference

The present law says you have a whole year to consumer-test your invention. Such tests can make the difference between a successful invention and a failure. Loss of the right to carry out these tests hurts only the independent, not the big-lab inventor. The big companies have plenty of test facilities—lab researchers, consumer surveys and market information sources—that enable them to size up an invention before they apply for a patent.

Another drastic change proposed in the new bill calls for publication of patent applications. Under the present law, patent applications are never published—they're kept secret in the files of the Patent Office. Publishing a patent application before a patent has been granted to him will hurt the independent inventor in several ways.

One is that he'll be robbed of a second chance. Let me show you how this works. After you've made your application, circumstances arise that cause you to change your mind. Maybe you find there's no one interested in buying your invention at the moment. Maybe the invention is ahead of its time, or maybe it needs more development.

In any case, you may wisely decide to call it quits for the time being. If so, all you have to do is temporarily abandon your efforts to get a patent. The matter contained in the application will be sealed and kept secret. Then, later, when you decide that the situation is right for the success of your invention, you can go ahead and file a new application.

Under the new bill it wouldn't work that way at all. If you withdrew your application, you'd lose all chance of getting a

patent. The contents of your application would be published within 24 months of the time you filed. The bill states that if an invention description has been published any place, it can't be patented. So if you come back and try to file a new application on your invention, the Patent Office would say, in effect, "Sorry. Details of this invention have already been published." Your own work would thus be used against you!

How come such a disastrous law could be considered? Like many controversial proposals, its basic intent is good. The first-come-first-served provision is aimed at getting inventions developed and into use faster by making it unprofitable for an inventor to "sit" on an idea for years. It's also designed to put an end to long and costly legal squabbles over who invented what when. The first to file an application would get the patent, and that would be that. Another reason for the law is to bring U. S. patent practices into line with those of foreign countries. Major differences in requirements have made it hard for the U. S. to negotiate patent treaties with other nations.

All of these aims are fine in theory, but they must be judged in terms of other needs as well. Fortunately for the independent inventor, the Patent Reform Act has not sailed through Congress as its advocates thought it would. Since its introduction, it has been challenged by the American Bar Assn., the American Patent Law Assn., and numerous inventors, engineers and scientists.

A better bill

A new bill, offered as an alternative to the Administration's reform law, has been drawn up by members of the American Bar Assn. It eliminates the most harmful provisions of the Administration version. This bill (S.2597) was introduced in the Senate by Sen. Everett M. Dirksen.

The two proposals are expected to come up for consideration some time next year. According to Patent Commissioner Edward J. Brenner, possible compromises are already being weighed. One such modification might be to grant a patent to the first filer, *provided* no one else comes along and proves prior rights within a specified time.

If you wish to support the cause of the independent inventor, you can help by expressing your opinion personally. Write to your senators and representatives indicating that you favor the Bar Association bill over the Administration-sponsored reform bill. It's just good common sense to fight for a law that will help, not hurt, the independent inventor. ★★ ★



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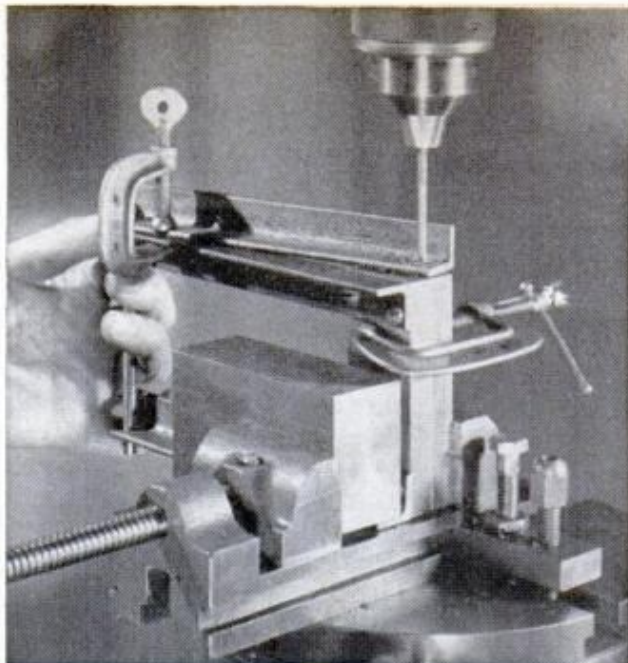
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ANGLE-IRON ARMS are clamped to the blocks before being drilled for bolts. This assures right alignment

SELF-EJECTING DOWEL MAKER

(Continued from page 184)

have to bend them slightly and perhaps file a little clearance on the ones that are close to dowel size.

Make the punch holes enough smaller than the punches to permit tight drive fits. The knockout holes will enable you to remove the punches easily in case you should ever have to replace them. You might prefer to make the punches slightly shorter than the thickness of the dowel plate so that the dowels will not be pushed completely clear of the holes. This way, you can pull them clear with your fingers instead of having to retrieve them when they drop free.

Incidentally, don't forget that the dowel maker must be clamped in a vise in order to use it. Thus, the plate should be long enough to project beyond the edges of the jaws.

The dowel maker detailed on page 185 was designed for making rather short dowels and intended to be mounted in a medium-size bench vise. For longer dowels, use a vise having more clearance under the jaws or mount the unit permanently on a stand assembled from lengths of angle irons.

The dowel plate shown was rabbeted along its lower edges to form shoulders that rest on top of the vise jaws and prevent the plate from settling under repeated hammer blows. As an alternative to this, you might install a few pins near the upper edges of the plate, setting them in blind holes so that they project $\frac{1}{8}$ in. or so.

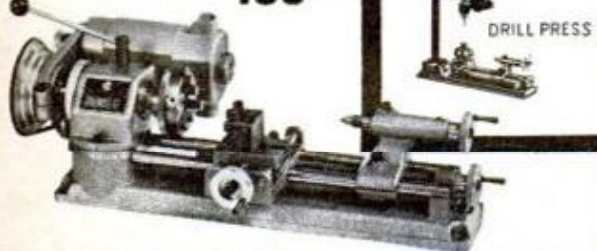
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CHECK FOR A SAFE CAR

(Continued from page 151)

the steering wheel has to be removed to get at it. As mentioned before, it's a rough job usually requiring a steering wheel puller.

When testing brakes, look for:

- Low or excessive pedal travel (to test a power brake, have the engine running). If the pedal gets within an inch of the floor or if it takes more than an inch of travel before braking action starts, you've got a problem in the brake system.
- Pulling to one side when braking.
- Insufficient braking power.

Each of these problems has a multitude of possible causes. Check for low fluid level, leaky wheel cylinders, worn linings, damaged brake drums, bad master cylinder and so on until the trouble is found.

Steering is an extension of the suspension system. In order for your car to steer properly, the tire pressure and wheel alignment must be within specification and ball joints have to be in good shape. There's also a matter of good steering system parts, such as idler arm and gear box.

If your car has power steering, the drive belt has to be in good shape, fluid level up to the line, and linkage tight.

As for tires—and this includes snow tires at this time of year—look for cuts, breaks and bruises in the sidewall and tread; excessive or uneven tread wear; and make sure that pressure is as specified.

While you're down on the ground checking tires, take a look at your exhaust system. (It could have been discussed under equipment that let's you see since carbon monoxide leaking into the passenger compartment will quickly make you drowsy and impair your vision.) Start the engine and look under the car for wisps of gray-white smoke, and probe areas that look almost rusted through. Rusted mufflers have been known to blow out simply by added exhaust pressure when shifting to passing gear.

One last, miscellaneous part not used for seeing, stopping, steering or communicating should conclude your checklist: seat belts. Many used for several years may be approaching the end of their life.

Examine belt-buckle operation first. See that they all fasten easily, and give them a quick, firm pull to make sure they hold.

Inspect the entire length of each belt for broken or frayed fiber strands. This is the first sign of belt failure. A belt in such condition should be replaced.

Finally, give each belt a hard pull as you examine belt anchors. If an anchor bolt is loose, tighten it up. The life you save may be your own! ★ ★ ★

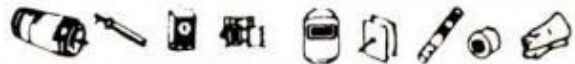
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SHOOTING A PORTRAIT

(Continued from page 155)

flatter, lower-ratio lighting is kinder to elderly people, women and children.

Watch your background, too. One of the most common mistakes in portrait photography is to place the subject too close to the background—often right smack up against it. This causes the subject to cast ugly multiple shadows all over the background. Also, your lights will wash out the background, especially if you're deliberately trying to keep it dark. Light falling on a black background will actually make it look light gray or almost white in the picture.

Keep your subject well in front of the background—as much as five to six feet. If you want the background to go dark, don't put a light on it. In general, a dark background looks more dramatic, especially against a light-haired subject. However, dark-haired subjects generally photograph better against a light background.

Keep the background plain and uncluttered. A bare wall will often do, or you can hang up a sheet or blanket. At six feet, small wrinkles usually won't show. For a convertible backdrop, paint a sheet of thin plywood or hardboard white on one side and black on the other. Then a quick flip of the board will give you a choice of a light or dark background depending on the type of subject you're shooting at the moment.

Exposure stays the same

It's best to establish your exposure with a light meter, although you'll be surprised to find that it will change very little no matter how many lights you use or how you move them around. The accompanying photos were all shot on Super Pan-chro Press film with an ASA rating of 250. Basic exposure throughout was 1/10th of a second at f/16. On a slightly slower fine-grain portrait film, such as Kodak's Plus-X at ASA 125, this would be equivalent to 1/10th of a second at f/11 or 1/25th of a second at f/8.

For additional information, there are several simplified guides to portrait photography that you'll find helpful. One, entitled *A Word About Portrait Lighting*, is available from Smith-Victor Corp., Griffith, Ind. 46319. Another, entitled *Portrait Photography from the Light Side*, is available from Sylvania Lighting Products, 730 Third Ave., New York, N. Y. 10017. In addition, a Kodak booklet, *Snapshots By Photoflood*, (Customer's Service Pamphlet No. AC-5), can be obtained free at some Kodak dealers. ★★

PREFINISHED SIDINGS

(Continued from page 163)

aluminum siding, a request to the association for this manual might prove fruitful. Although an association spokesman told me the manual is presently distributed to professional applicators only, he said that this policy may change. The manual sells for 15 cents and is an excellent guide.)

I called a number of contractors in my area and found that the going rate for a PVC installation ranges from \$1 to \$1.25 a square foot. However, I did find one contractor who was willing to sell the siding itself for 50 cents. "I'm in business to make a profit," he said, "and I'd just as soon make it selling you the stuff." If PVC strikes your fancy, you may be able to make a similar deal. On the other hand, you might prefer one of the other pre-finished sidings.

Plastic-coated aluminum, for instance, doesn't need painting for a minimum of 15 years. It's guaranteed not to rust, split, peel or chip for 20 years. As shown in the photos on page 161, aluminum siding is available in a number of other designs in addition to the traditional clapboard. Depending upon gauge, the price runs from 40 to 50 cents a square foot. Of course, you can buy less expensive grades. Enamel-coated aluminum siding, for example, costs between 30 and 35 cents a square foot, but it isn't as durable and doesn't carry the same broad guarantee as the plastic-coated material.

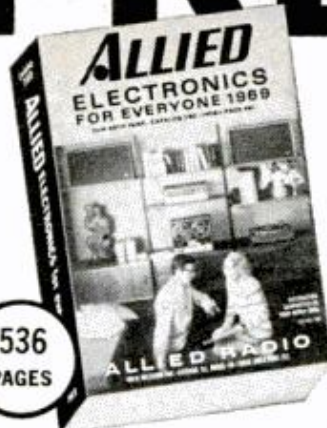
Wood, plywood and hardboard sidings might all be lumped together, in that they are applied more-or-less like conventional uncoated siding. Check the table on page 163 for what's available in each type.

All prefinished sidings are offered in a number of colors. With PVC and aluminum, at least, you can also buy any accessory necessary to finish the job—corner posts, gutters, downspouts and various trim pieces.

As for guarantees, check not only what's mentioned but what isn't mentioned. For example, aluminum isn't guaranteed against lightning, fire, hailstorm or chemicals; PVC seems to be guaranteed against almost everything but scratching; and wood isn't guaranteed against termites or vermin. Most guarantees are on a pro rata basis—that is, replacement of damaged panels will probably cost you a certain amount of money, depending upon how long the material has been in place.

One final point. The term "square" applied to siding means 100 sq. ft., so don't be shocked if you're quoted a price of \$40 a square. It's the same as 40 cents a square foot. ★★

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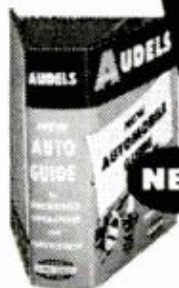
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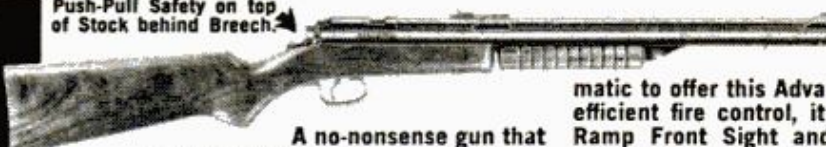
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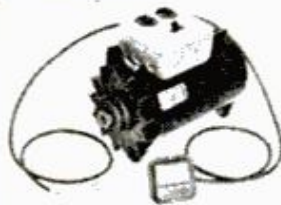
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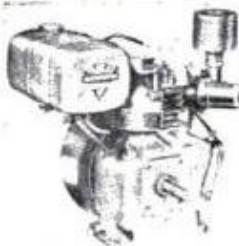
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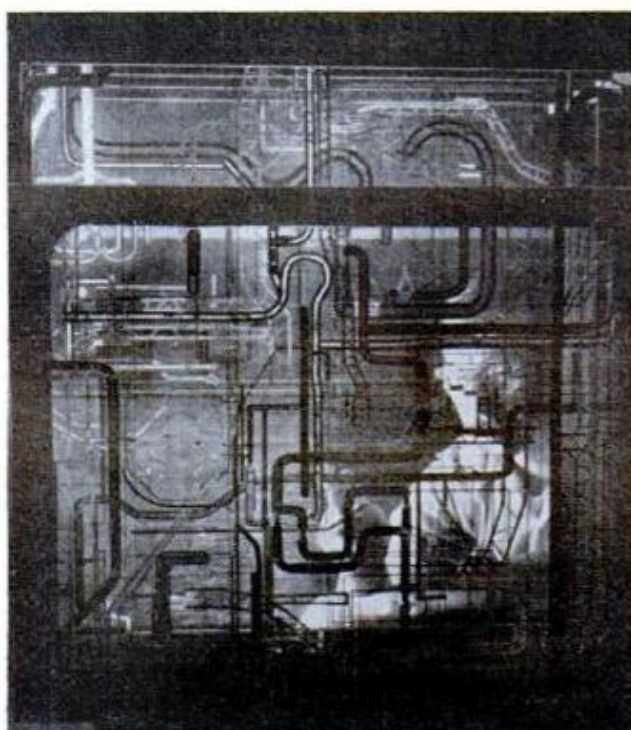
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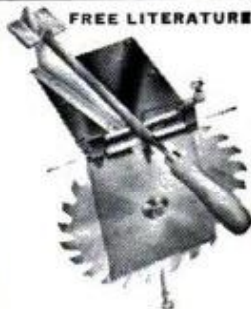
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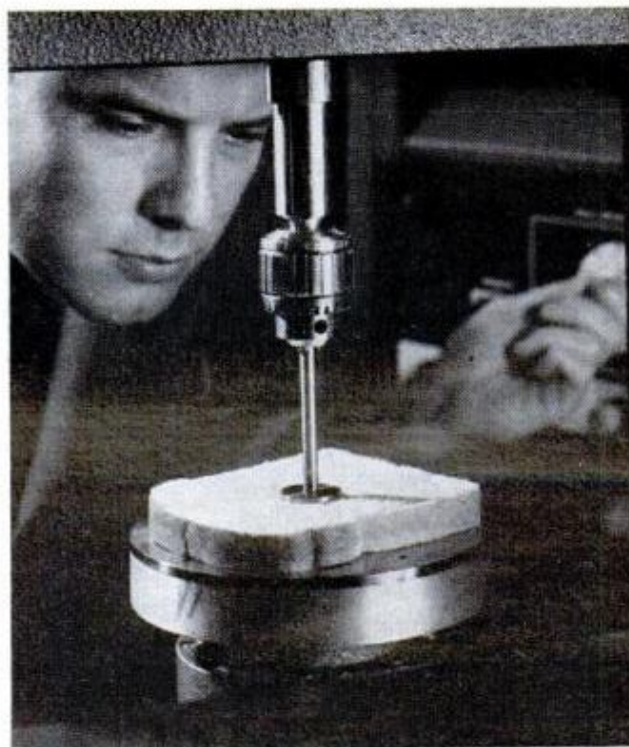
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BACK
GUARANTEE**

You must be fully satisfied. If not, return in 10 days, freight collect. Money promptly refunded in full.



8" TILT ARBOR POWER SAW

DOES WORK OF \$75 BENCH SAW as is. Converts easily to equal any \$300 floor model cabinet units! Crosscuts, rips, mitres, cuts compound angles, dadoes, makes coves and mouldings.

\$14.95 f.o.b. factory. Wt. 25 lbs. Includes completely assembled cast iron and steel 8" saw with ground cast iron table... less blade. **RIP FENCE**, if desired, for easier work alignment, \$3.50 add'l.

SAW BLADE TILTS... TABLE STAYS LEVEL

Locks securely at any angle up to 50°, raises, lowers 0"-2 1/4". Patented tilt mechanism, accurate etched scale. Patented motor mount takes std. 1/4 h.p. or larger motor, keeps belt tight, assures perfect alignment at any angle, transmits full power. Takes std. blade, saw insert removes to take dadoe heads, cutters, etc. (not incl.). Accurate mitre sories available at factory prices. Enclosed steel base. "Compo" bearings. Accur. Std. size (for bench saw) \$3.50; larger fence (for cabinet base, as ill'd.) \$4.50.

FREE CABINET BASE PLANS Use as portable bench saw as received (inset photo) work of floor models costing \$300. **FREE plans...** all you'll need are a sheet of 3/4" plywood and 3-4 hours. Use your AMCO saw for cutting. Plans provide 27" x 24" work surface, 33" height, tool storage compartment.

10-YEAR FULL SERVICE GUARANTEE*

6" SWING 3-FOOT LATHE



Optional faceplate for turning bowls, trays, lamp bases, rosettes, etc. \$2.50. **\$985** f.o.b. factory Wt. 14 lbs.

Set of 3 high speed turning chisels, \$4.95 add'l.

DOES THE WORK OF \$40 UNITS... with same precision and speed. Turns wood, plastic. Sturdy cast iron with tubular steel bed. Ball thrust cup center, spur center, T-rest assembly, lever action tail stock, 2-speed pulley. Fits any motor.

10-YEAR FULL SERVICE GUARANTEE*

PRECISION 4" x 36" BELT SANDER

f.o.b. factory. Wt. 15 lbs.



Mitre gage: \$1.95 add'l.

\$1495 †Disc Sander attachment incl. disc bracket, ground cast table (tilts 0-45°): \$7.95 add'l.

DOES WORK OF \$50 SANDERS... The world's most talented belt sander. Heavy cast sander incl. 4" x 36" sanding belt, V-pulley drive, multi-purpose drive spindle. Changes from horizontal to vertical sanding in secs. Uses 1/2 hp or larger motor.

10-YEAR FULL SERVICE GUARANTEE*

FULL 22" LONG, 4 1/8" JOINTER-PLANER

\$1995



f.o.b. factory. Wt.: 19 lbs. Complete as shown.

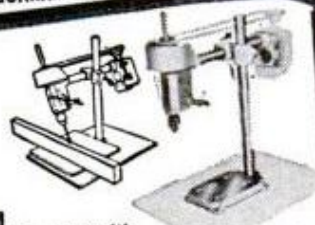
100% precision ground cast iron and steel.

DOES THE WORK OF \$60 UNITS... Professional power planing at a hand tool price. Make faster, more accurate joints, rabbetts, bevells for windows, doors, drawers, square tapered legs—Adjustable precision ground cast iron tables. Patent-pending design holds knife to table clearances at any depth. Rabbett depth 3/8". Fence adjustable 0°-50°. Hardened, ground hi-speed steel knives. Dual cutter guards. Balanced cutter head.

10-YEAR FULL SERVICE GUARANTEE*

32" RADIAL DRILL PRESS

All cast iron and steel
f.o.b. factory **\$2995**
Wt. 30 lbs.
1/2" cap.
Jacob's chuck incl.



DOES WORK OF \$90 UNITS... and much more. Industrial quality precision unit with all standard features, many extras. Head raises, lowers. Depth of throat up to 16". Pre-set to any angle for on-or-off table drilling, even horizontal drilling. **10-YEAR FULL SERVICE GUARANTEE.***

BRAND NEW  MOTOR DEVELOPING FULL 1 HP... **\$18.80** F.O.B. FACTORY / FOR ANY OF ABOVE MACHINES. WT. 17 LBS. PURCHASED SEPARATELY, \$24.85

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