Does Your Car Look Its Best?

YOU CAN GET RID OF DENTS, SCRATCHES, AND SQUEAKS IN YOUR OWN GARAGE BY FOLLOWING A FEW SIMPLE STEPS

DAMAGED body and door panels and bent fenders can spoil the appearance of your car even when they are thought to be too small for a professional shop-repair job. Usually where there is a dent, the paint will be cracked and will soon begin to peel, making a spot that can be attacked by rust. All small repairs can be done in your own garage, and many more serious ones, including straightening and welding of actual breaks, are not too difficult for the driver-mechanic if he follows a few simple rules.

The driver who takes pride in the appearance of his car will also want to touch up thin spots in the finish even when the metal has not been damaged. And he will be wise to take a few elementary precautions to keep an original finish or a new paint job looking its best for a long time.

Before an attempt is made to straighten a panel or fender, the damaged place should be examined carefully to determine from what direction the damaging force came, at what point it first made contact, and where it continued its line of travel across or into the metal. This is important, for if an expert repair is to be made, the metal must be pushed back in just the opposite sequence to that in which it was caved in. The place to start the repair is the place where the damage stopped.

High spots, where the metal buckled out after an impact pushed it in, are always hammered down first; then the low spots are hammered up. Never start by hammering the low spots because this will stretch the metal out of shape, causing additional work to bring it into line and making it necessary to repaint an entire panel.

Be sure also to clean the undersurface with a wire brush, putty knife, or scraper to keep hardened dirt from pitting and blistering the metal and from scarring the dolly and hammer. A thin coating of oil on the finished side will show up defects that might not otherwise be seen, will protect the finish during hammering, and on small jobs may even save repainting. If it is more comfortable to work with a wheel or bumper removed, do so, for plenty of room is needed to handle the tools properly. Torn metal should be straightened first and then welded.

Drawings below show a system of unlocking and unrolling the damaged metal in an auto panel as suggested by a tool and forging company of Cleveland. The panel was struck at *B* (Fig. 1) with force moving in the direction of the arrow. *B* was pushed in, and the flange at *C* and the point at *A* bulged out. *A* was the last to buckle and is the first point to be unlocked, a dinging spoon and hammer being used, as in Fig. 2. *C* is dinged down next; then the low metal is bumped up from below with a dolly block, starting at *B* and working to *E* (Fig. 3) and completing the job by working from *B* to *C*. The contour on finishing these simple steps will be exactly the same as before the accident, as shown in Fig. 4. Fenders are straightened similarly.

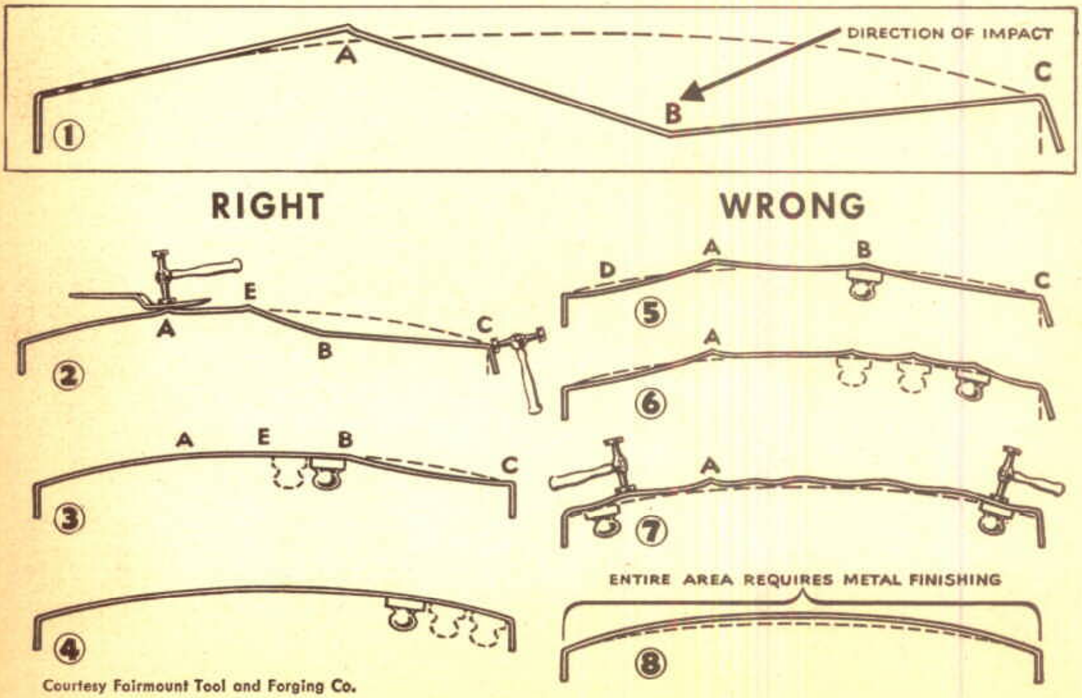
Figures 5 to 8 illustrate a wrong way to straighten the same panel. When *B*, the low point, is roughed out first (Fig. 5), *A* remains locked and acts as a fulcrum to depress *D*. Further roughing from the underside raises a series of humps (Fig. 6) that must be smoothed out with hammer and dolly (Fig. 7) and will leave the metal stretched beyond its original contour (Fig. 8).

Use the same finish as the original when touching up spots or painting a panel, for while enamel and lacquer may match perfectly in color, they react differently to weather and the patch will soon be noticeable. Dry enamel with a heating lamp, if possible, to approximate factory procedure; then allow a little time for seasoning before applying polish. Lacquer can be treated with liquid polish as soon as it dries. Wait about two weeks before using wax on either to let new and old finishes blend.

Original finishes and new paint jobs can be made to last longer if the car owner realizes that even the new synthetic lacquers, rustproofing undercoats, and better enamels of the last decade or so need some care. Few realize, for instance, that the ultraviolet rays of sunlight are destructive to the binder carrying lacquer or enamel pigment or that, if a car remains outdoors overnight, dew and fog assist the action of the ultraviolet rays when the morning sun gets in its work. Fortunately this deterioration takes place only on the surface, and a suitable polish will remove the dead film and restore the gloss.

Salt and calcium chloride, used sometimes to melt ice and snow, make solutions that

REPAIRING DENTS IN YOUR CAR is simplified by the process shown below. The buckle that occurred last is the key to a perfect job of straightening. The panel below was hit at *B*, which caved in, C buckled next, and then A. Dinging A down unlocks the damage so bumping can unroll the bent metal



Courtesy Fairmount Tool and Forging Co.

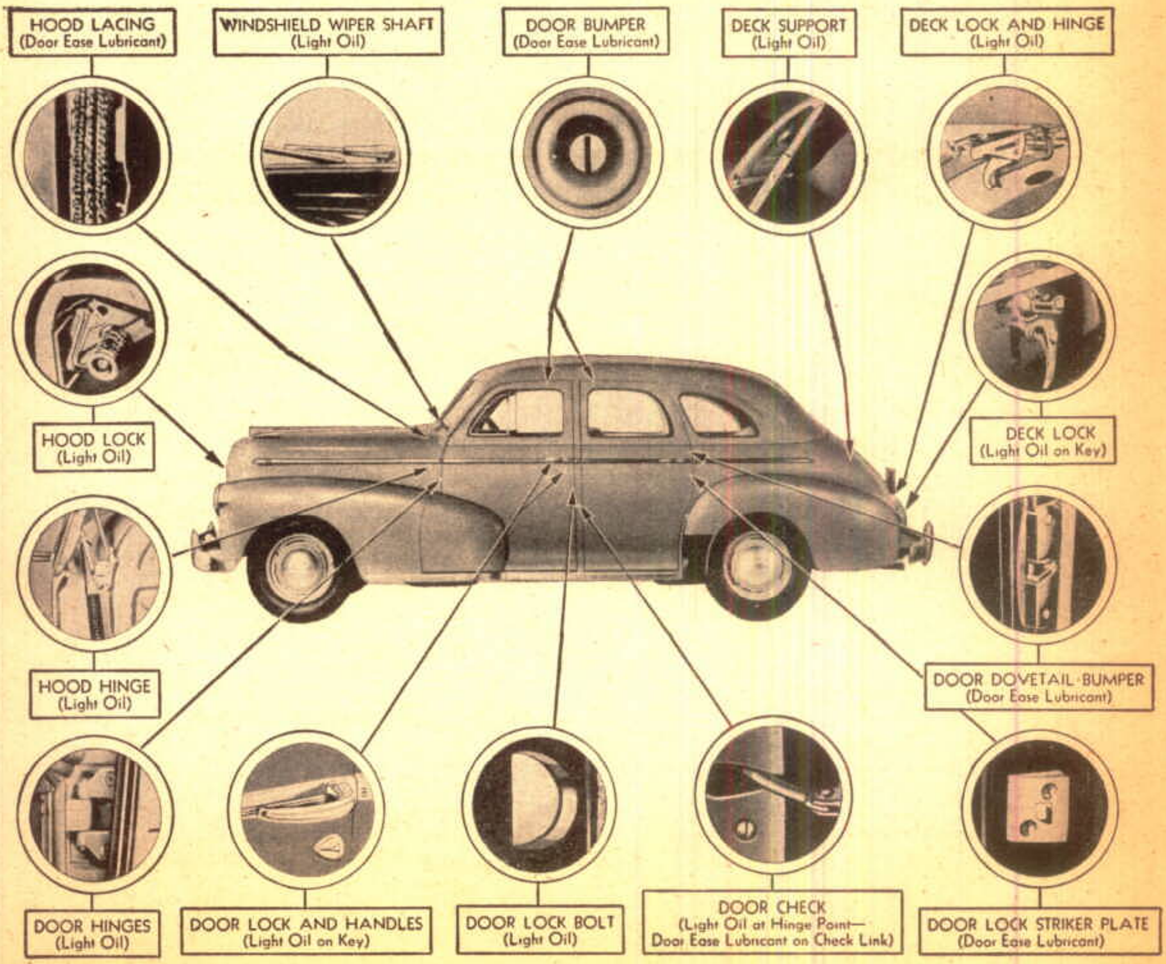
may splash on a car with harmful effects to lacquered and enameled finishes and to chromium plate. The air near the seacoast is salty and humid, and its damaging action is increased by high temperatures.

Even without these hazards, when a car becomes covered with a film of dust, it should be washed with plenty of clear, cold water and a sponge. Avoid rubbing until all grit has been removed. Any soap should be mild and should be thoroughly rinsed off because it can make difficult spots when it dries. Never wash a car in direct sunlight, and always allow the metal to cool if it has become heated. When washing won't suffice, liquid polish cleans well. A light abrasive paste cleaner, used sparingly to avoid wearing the finish thin, will help if the car has been neglected for a long time. Complete this job with liquid polish or wax. A good brand of tar remover is also useful. Hardened tar may be softened first with lard, butter, kerosene, or gasoline containing no coloring matter or ethyl.

Chromium-plated parts require occasional wiping with light oil or kerosene. They can be protected with a coating of clear lacquer or wax. Scuffed or worn places should be cleaned with a mild kitchen scouring compound, such as is used on porcelain, or a standard chromium-plate cleaner, and then protected with wax, clear lacquer, or a thin film of oil. Repeat the process occasionally on spots worn through to the metal. Stainless steel can be cleaned effectively with a light abrasive polish.

Care of the auto body should always include judicious lubrication that will correct or prevent annoying squeaks. The chart below shows the parts that need attention and the kind of lubrication recommended by a well-known automobile manufacturer.

BODY LUBRICATION CHART



Courtesy General Motors

How to Pick Out a

Gus suggests ways to identify disguised and how to estimate mileage

Dear Bill:

You asked me about buying a used car. If I were doing it, I would buy only from a dealer with a good reputation. I would also inspect the car very carefully. I wish I could help you do this. But since I can't, I am attaching to this letter a few notes about things to look for.

If you go to a used-car lot, remember that many established dealers wholesale some used cars to the lots because it would cost too much to recondition them for sale with a guarantee. If a lot operator offers a guarantee, check it carefully. Also, ask him where the shop is that would make good any repairs for him.

There are two types of second-hand cars that you'd be smart to avoid - cars that have been in major crack-ups and former taxis. The wrecked car may look like new, but still have serious mechanical faults. The ex-taxi, even though a recent model, may have the life hacked out of it.

Don't trust the salesman or speedometer on mileage. Instead - as a rough estimate - multiply the car's age by 10,000. That's the average distance the average car goes a year. Don't let the car's looks influence you too much. Many shops buy used-car reconditioning kits that make old cars look like a million bucks. I heard of one the other day that even includes something to make a car smell new.

Don't just drive the car around the block. If you can, give it a real road test of 50 miles or so, including all kinds of road - level, rough, smooth, and some good hills. In New York, salesmen used to take prospects for a ride under the elevated tracks. The noise helped many a sale.

Unless you know the dealer, watch out for tricks! An over-full crankcase and extra heavy oil will often quiet a noisy engine. So pull out the dip stick and measure the oil

Good Used Car

wrecks or former taxicabs, and use the "book" price.

level. If it's too high, ask that it be lowered, and if the oil is heavier than #30, ask that a lighter grade be put in. A fast idle is another way of smoothing out a worn engine, so if the engine idles too fast, ask that it be set back to normal. Get out your gauge and check the tires, too, because soft tires can hide a lot of flaws.

After finding out what's wrong with a car, find out what repairs will cost. An engine overhaul is about the most expensive job you can run into. Fixing up a bad transmission or rear end or a loose steering gear or slipping clutch is also likely to cost real money.

Quite often a salesman will use the term "book price." The "book" is a pamphlet issued by the National Automobile Dealers Association, listing the average retail prices of all makes and models. These recently have been put out monthly. Regional variations in demand and supply sometimes make the book a poor reflection of a local market. But if the price quoted to you differs greatly from the book price, it's a good idea to find out why.

The book can help you in another way, too. It lists serial numbers by model years. By checking it, you can be positive of the age of the car you're considering.

Finally, before closing the deal, make sure that the numbers on the car agree with the numbers on the legal papers your state requires. And watch out if the numbers have been defaced. That may mean the car has been stolen.

Good luck!

Your friend,

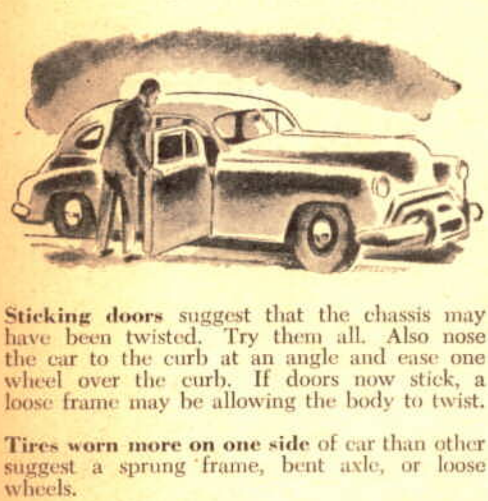
Gus Wilson

Was It Wrecked?

New Parts Are a Tip-Off. Throughout your inspection, be alert for parts that are obviously new. New hood, grille, fenders, wheels, radiator core, bumpers, or frame-to-bumper members may indicate the car has been in a wreck.

Do the wheels track? Rear wheels should follow front ones squarely. You can tell by riding behind the car or watching as it is driven off. Also note whether the wheels wobble, which can be a sign of a bent axle.

Welding or heat marks on the frame mean it has been repaired or straightened. Check for this by crawling under or putting car on lift.



Sticking doors suggest that the chassis may have been twisted. Try them all. Also nose the car to the curb at an angle and ease one wheel over the curb. If doors now stick, a loose frame may be allowing the body to twist.

Tires worn more on one side of car than other suggest a sprung frame, bent axle, or loose wheels.

Body or fender repairs are another sign. Be suspicious of marks indicating a roll-over. Drum on body panels with your knuckles. If there has been extensive filling, the solder will cause the metal to give off a dead sound.

Was It a Taxi?

Badly worn upholstery in a model only two or three years old indicates more than average use. If the car has seat covers, try to get a look at what's underneath.

Roof patches or worn paint may suggest that a taxicab roof light has been removed.

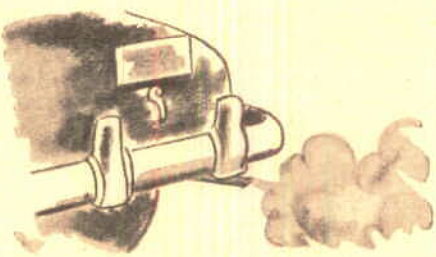
New paint may hide a former bright taxi color. Pry up the windshield seal or scratch down to bare metal on an inconspicuous part of the body to see if there's paint of another color. Has lettering on the doors been painted over?

New pedal pads or floor mat on a recent model may hide the hard usage of a taxicab.

How's the Engine?

Visual checks. Examine the head and block carefully for indications of a crack or a welding bead. Any such sign is usually sufficient reason for turning your attention to another car. Are there rust spots on the radiator core? Such spots would come from a leak. Check the block for the same thing. A good fan belt normally lasts about 20,000 miles. Its condition, therefore, offers a rough guide to the car's mileage.

Does it accelerate smoothly? After dropping down to about 10 m.p.h. in high gear, accelerate quickly with full throttle. Observe whether the car gains speed smoothly and quickly without choking, sputtering, or bucking. If it does, the carburetion, valves, valve guides, and ignition are probably okay.



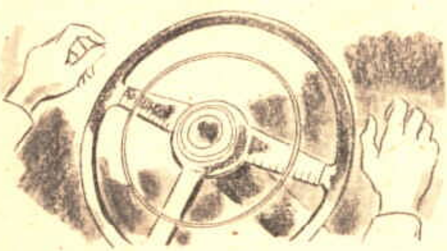
Does it need an overhaul? After the engine has warmed up, race it with short, heavy thrusts on the foot throttle and watch for clouds of bluish-white smoke from the exhaust. This indicates the need for new rings—or perhaps new pistons, bearings, or a cylinder rebore. Black smoke is a sign of a badly adjusted carburetor. If the smoke is black, have the adjustment made and check again. As a further check, look for oil around the spark plugs. Remove a plug and note its color. If it's black instead of a normal brown, the engine probably burns oil. If the oil pressure remains low, the engine is worn or the oil pump out of order.

An engine overhaul is one of the most expensive car-repair jobs.

Are the bearings faulty? While moving at about 15 m.p.h., slowly apply the brakes with your left foot, and simultaneously feed an increasing amount of gas with your right to maintain speed. Don't stop the car with the brakes until the throttle is clear down. Disregarding the carbon or spark pinging, listen for a muffled, hollow knocking. If the muffled knocks are even, the bearings are all in the same condition, probably okay. A loose bearing will knock more loudly.

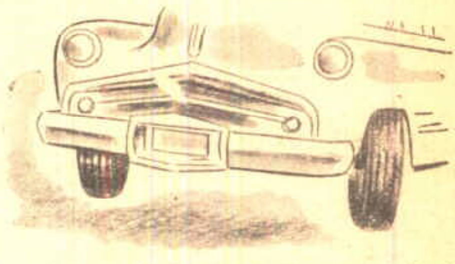
Steering?

Are the wheels loose? Grab a front wheel at the top with both hands and try to move it back and forth in the vertical plane. Can you feel any play, even the slightest? Do you hear a faint sucking noise? The first is a sign of a worn kingpin bushing, the second of a loose wheel bearing. (A damaged wheel bearing makes a clicking sound while the car is in motion. This click becomes more noticeable while you are passing a concrete retaining wall.)

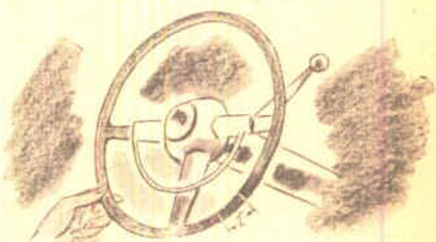


Does the car veer to the side? On a straight flat road, without noticeable cross wind, speed up to about 25 m.p.h. and take your hands from the steering wheel. The car should travel 100 yards or so without any tendency to turn. Try this several times. If the car turns to the same side on each test, the wheels may be out of alignment. A sagging spring or bent axle or frame (also wreck signs), however, can have the same effect. Should the car veer sometimes to one side and sometimes to the other, loose steering connections or worn kingpins may be to blame. Have a mechanic find the cause.

Do the wheels shimmy? Drive over a rough pavement, the rougher the better. If the wheels shimmy, it may come from at least a half-dozen causes. Repairs are liable to be troublesome and can be costly.



Do the wheels bind? Driving very slowly, turn the car sharply right and sharply left to the full limit. If the steering gear binds, someone probably has attempted adjustment to compensate for wear. Such a car can be dangerous to drive.



Too much steering-wheel play? With the tires evenly inflated, point the front wheels straight ahead and grasp the steering wheel with the thumb and forefinger. How far can you turn it without moving the front wheels? If the play exceeds two inches, the steering mechanism is too worn or loose for safe driving. Adjustment may be possible, but replacement is expensive.

Are the tires unevenly worn? Spotty wear on the front tires often comes from wheels out of alignment. So does "feathering"—a thin projection of rubber on the edges of the tread ➡

blocks. Check all tires, including the spare. Improper camber and toe-in cause such wear.

Brakes Good?

Does the hand brake hold? Try it on a steep hill. If it doesn't, a simple adjustment of the linkage may overcome the difficulty.

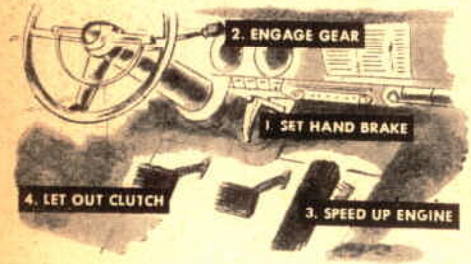
Does the pedal soften? With the car at a standstill, depress the brake pedal as far as possible and hold it that way at least half a minute. (It should not go closer than 2" to the floor.) If the pedal tends to sink, the cylinder pistons are probably worn, permitting hydraulic fluid to leak past.

Is the pedal spongy? Apply and release it several times to find out. If so, there is air in the lines or the cylinders are bad.

Does braking swerve the car? On a straight, level road, apply the foot brake hard several times and note whether the car has any tendency to swerve. If it does, one possibility is a defective oil seal, permitting linings to become saturated. Get an estimate from a brake shop.

Power Train?

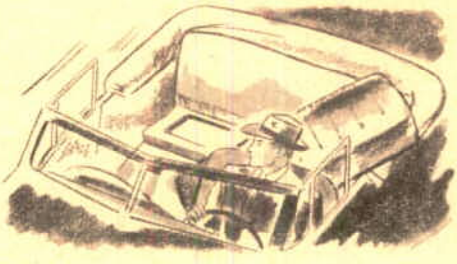
Clicks in the drive shaft? Jerk the car a little by taking your foot off the gas pedal and then jabbing it back while moving at 10 to 15 m.p.h. Do you hear clicks or the sound of slack being taken up? It may indicate looseness in the universal joint, differential, or rear-axle shafts.



Does the clutch slip? A clutch pedal should have at least half an inch free play at the top. Check it with your hand. If you can detect no play, the clutch is probably slipping. Check by setting the hand brake hard, putting it in second gear, speeding up the engine to a fast idle, and slowly letting out the clutch pedal. The clutch is slipping if the engine does not stall promptly. The slipping is certain to become worse, finally demanding a complete clutch overhaul. Also try the clutch in normal driving. If it grabs—takes hold so quickly that the car jerks or shudders—the facing probably is badly worn.

Is the transmission worn? Shift into low gear and speed up quickly to about 20 m.p.h. If the gears are badly worn or the teeth burred, the transmission will howl or grind. (This same test will also show up bad engine bearings.) As a further test, go down hill in high and second gear with your foot off the gas; a worn transmission may clatter. Repairs come high.

Automatic transmission noisy? Many of the automatic or semiautomatic transmissions have now been on the road long enough to reach the used-car class. If you encounter one, give it a thorough trial at all speeds. A high-pitched singing sound is often a tip-off to coming trouble.



Noise in the differential? To check the rear-axle assembly, ride in the rear seat or, better still, remove the rear-seat cushion. On a smooth road (preferably a smooth blacktop to lessen tire noise), pick up speed slowly and evenly to about 50 m.p.h. with your ear cocked to the rear. Then shift into neutral and coast to a stop. Should you hear any grinding, knocking, or hum from the rear end, a heavy repair bill may be in the offing.

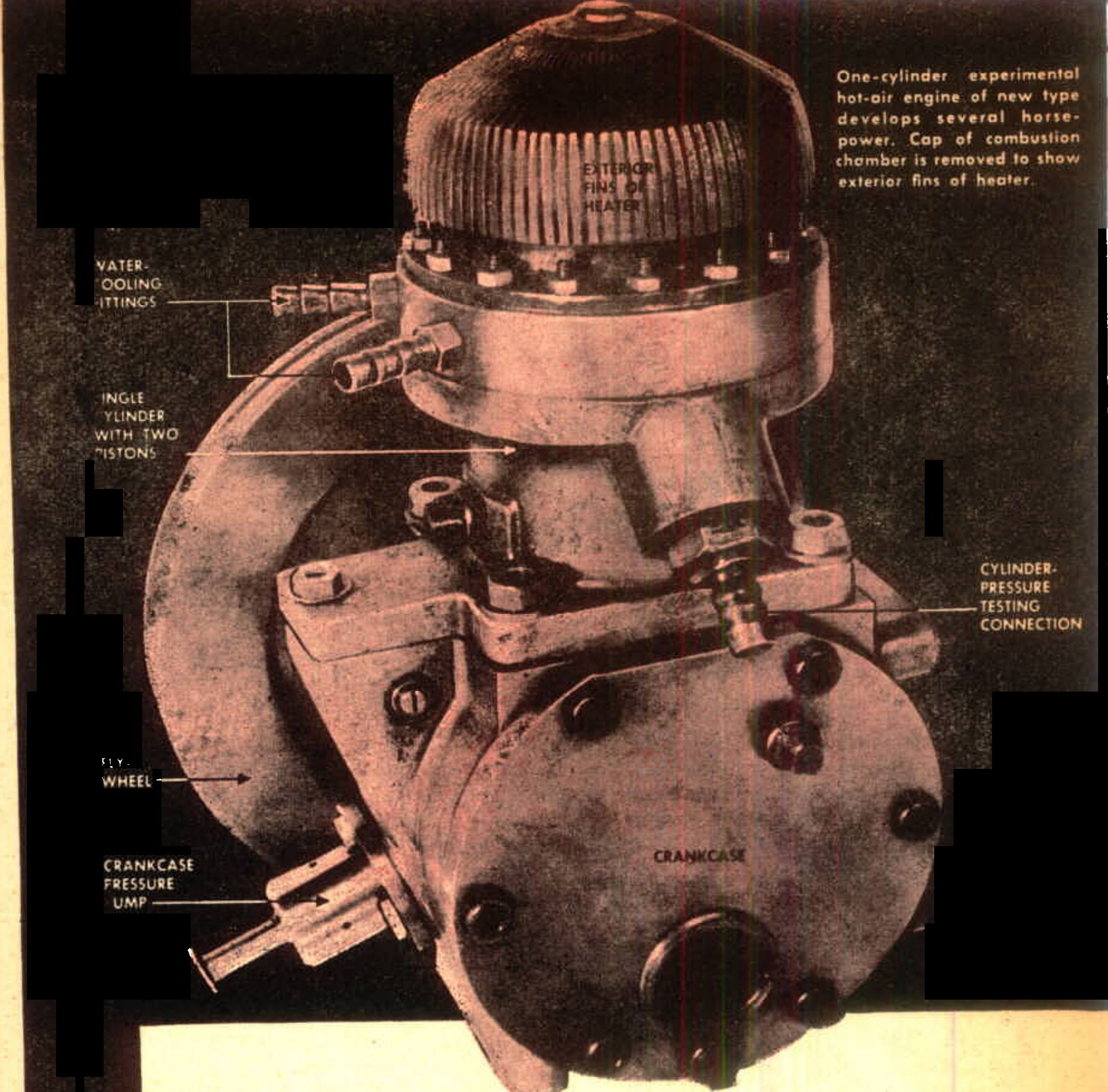
Don't Forget...

Test the starter. With the ignition off, press the starter button for about ten seconds. Repeat several times. Any pronounced grinding or clashing means that teeth in the flywheel starter gear are broken, burred, or badly worn.

Test the shocks. Jounce on the front and rear bumpers. If the car continues to bounce after you jump off, the shocks need repair, or perhaps replacement. (This also tests the bumpers themselves for tightness.)

Test the ammeter. When you speed up the engine, does the needle move at least a little to the charge side? If not, the generator, regulator, or battery is defective.

Test the lights. Depress the brake to check the stoplight. Step on the gas and notice whether the lights brighten considerably. If so, the battery may have been spiked with acid.



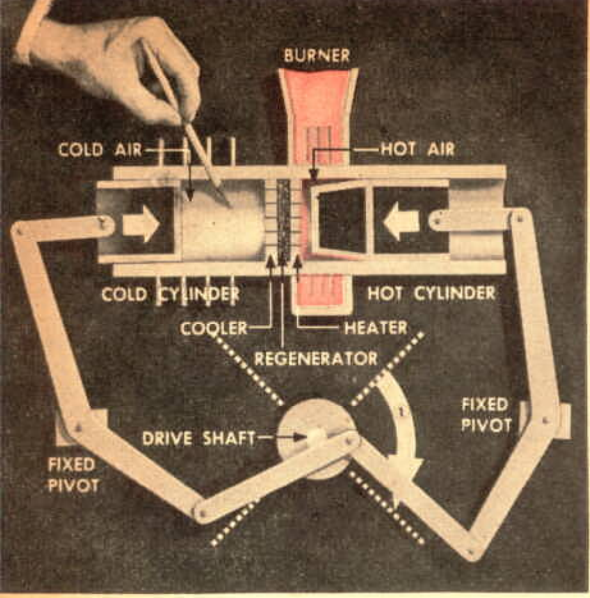
One-cylinder experimental hot-air engine of new type develops several horsepower. Cap of combustion chamber is removed to show exterior fins of heater.

Will the Old Hot-Air Engine Drive the New Cars?

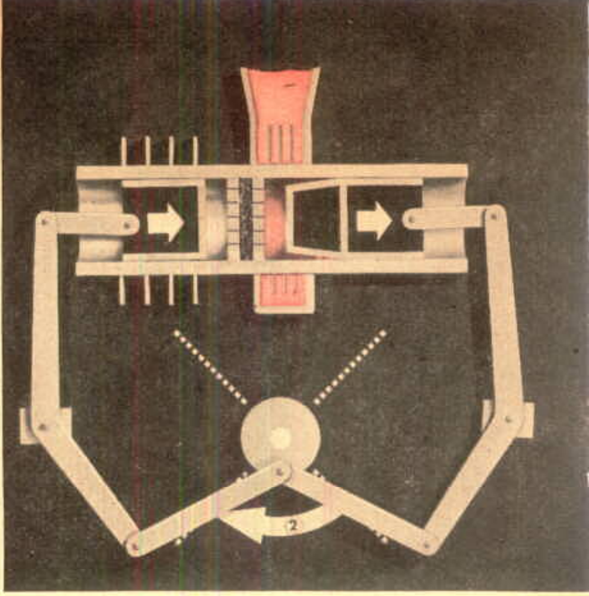
By Alden P. Armagnac

ARE hot-air engines, unsuccessful rivals of steam power a century ago, ready for a comeback? A streamline, new version of an engine driven by expanding air, just announced by the Philips electrical works of Eindhoven, Holland, foreshadows that startling possibility.

A Scotch clergyman, Robert Stirling, devised its ancestors in the early 1800s. Thousands of hot-air engines came into use, in America as well as in England and France, for pumping water and other light tasks. Designs and available materials of those years, however, made the engines inefficient, slow, and bulky, and other forms of power eventually outmoded them. They seemed destined to remain a forgotten chapter in the history of mechanical progress. Then,

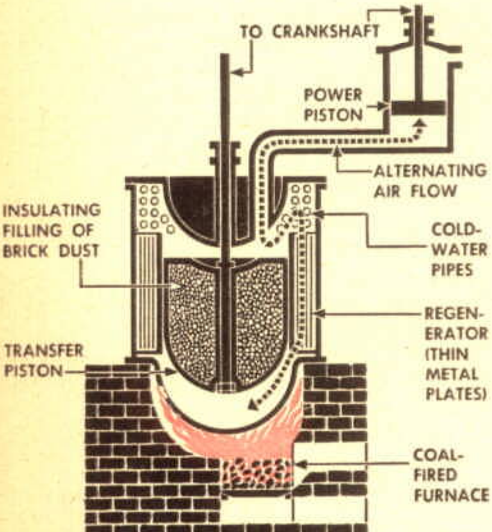


1. Compression stroke is first shown of four movements of Philips hot-air engine, demonstrated here by cutaway model. Short arrows show both pistons moving inward, compressing air mostly in "cold" space indicated, during travel of crankpin marked by curved arrow.



2. Transfer stroke now moves compressed air from cold cylinder to hot cylinder without change in volume, and air picks up heat from regenerator and heater. During this stage, both pistons travel from left to right, as will be seen by study of ingenious W-shaped linkage.

seeking a convenient source of power for radio sets in rural districts without electricity, Philips engineers became interested in the possibility of bringing the hot-air engine up to date—and fascinated by what



Pioneer hot-air engine, Stirling type of early 1800s, was this ponderous machine. Thousands of hot-air engines were built in the nineteenth century, but were superseded by other forms of power. Lightweight and efficient high-speed design now foreshadows their comeback.

they found modern design could do for it.

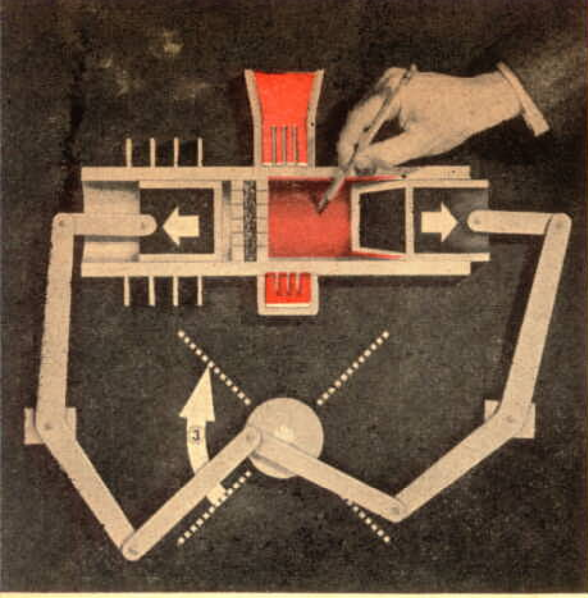
Today they have built and successfully tested models ranging from two to 15 horsepower, and plans for others up to several hundred horsepower are ready. Laboratory trials of the new types give performance figures that the producers themselves, at first, could hardly believe. For the modern hot-air engines, careful tests show, surpass gasoline engines and even approach Diesel engines in efficiency!

Hot-air engines for automobiles are made practicable by the new design, its sponsors declare. The smooth, cushioned power, in contrast to the impact of explosions in an internal-combustion engine, would simplify or perhaps dispense altogether with transmission gears. Another advantage would be long life, since absence of corrosive gases and extreme, high temperatures would minimize wear between pistons and cylinders.

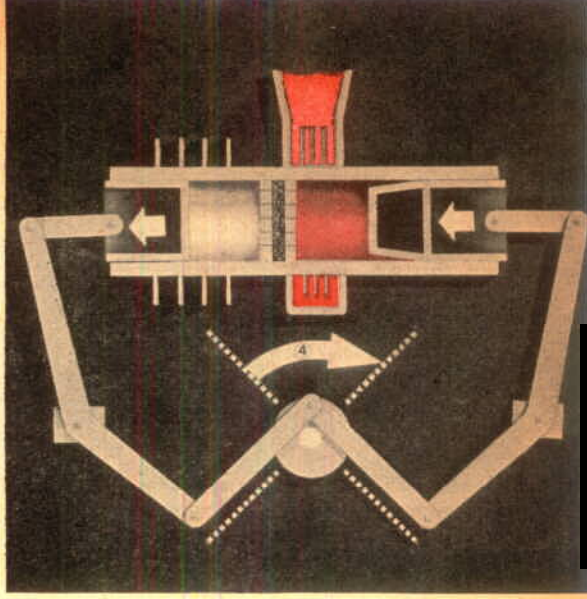
Other applications foreseen include electric generating plants for homes and perhaps for larger-scale power production.

To those who have watched it run, one of the most remarkable features of the Philips hot-air engine is its silence. It has no exhaust, no valves, no explosions in its cylinders. Hence a 15-horsepower hot-air engine, large enough to drive a small car, makes no more noise than a sewing machine.

Since it uses an external burner, instead



3. During power stroke, heated air expands, mostly in "hot" space indicated, driving both pistons outward. Amount of power delivered exceeds the amount consumed in other three movements of complete cycle, and the surplus represents the useful output of the hot-air engine.



4. Transfer stroke now moves expanded air, without change in volume, back to cold cylinder. Air gives up most of its heat to regenerator, rest to cooler. Then whole cycle begins again. First Philips engine was patterned after this model and ran successfully.

of igniting an explosive vapor in a cylinder, a hot-air engine isn't choosy about its fuel. It can run on gasoline, oil, gas, wood alcohol —practically anything that will burn.

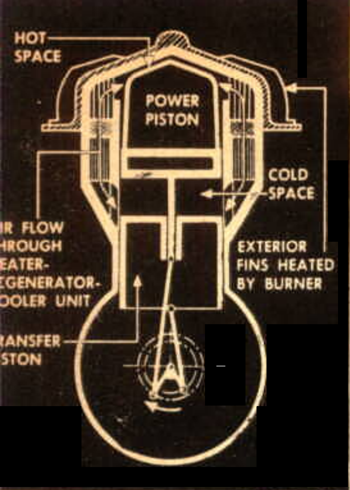
Just as new heat-resisting alloys made possible the development of jet engines for planes, they have been the principal factor in making hot-air engines practical. The elevated cylinder temperatures they permit have transformed the sluggish and ponderous hot-air engine of the nineteenth century into a compact, high-pressure, high-speed design turning up 3,000 revolutions per minute or more. With reduced size, heat losses can be more easily countered by insulation, lighter moving parts decrease friction, and efficiency improves all along the line.

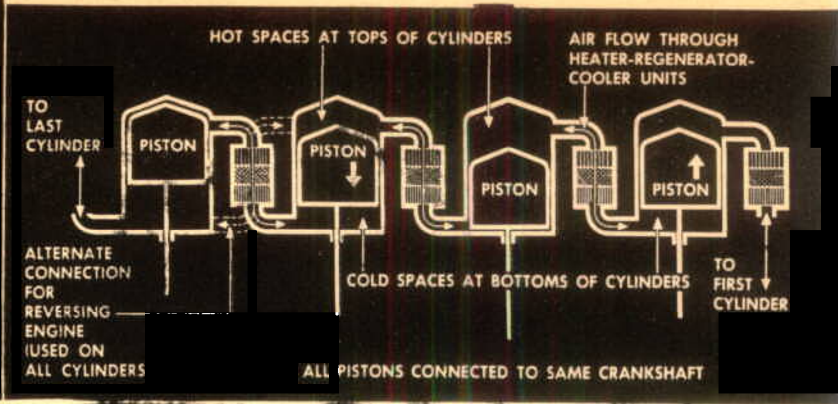
How Hot-Air Engine Works

Like steam engines, hot-air engines apply the fact that a heated gas will expand and furnish power. A steam engine uses heat to turn water to a gas, steam, and the expanding steam then drives a piston. Simplest of all prime movers, the hot-air engine uses heat directly to expand air, the gas that drives its piston.

In an ideal arrangement, heated air would be allowed to expand in a "hot cylinder," driving a piston and furnishing power to a flywheel and drive shaft. Next, the expanded air would be transferred to a "cold cylinder." Here another piston, driven by the flywheel, would compress the air to its original volume. Finally this air would be returned, without change in volume, to the hot cylinder and the cycle would start all over again. Because the pressure of the hot, expanding air is greater than that of the cooler air being compressed, the expansion stroke would yield more power than the compression stroke uses up. This net gain, resulting from heat input turned into mechanical energy, is the useful power delivered by the engine. No heat is lost in an exhaust, since the same air is used over and over again, shuttling back and forth between the two cylinders.

Actually, designers must compromise between an ideal form and a practical one. It is more feasible mechanically to let most, but not all, of the expansion take place in the hot cylinder; and to compress most, but not all, of the cool air in the cold cylinder. This can be done by arranging a pair of pistons so that the motion of one follows that of the other with a time lag or "phase difference" corresponding to about a quarter-revolution of the flywheel; it may vary a little, and need not be exactly 90°. With an experimental engine patterned after the model illustrated above, Philips engineers found that high efficiency could still be realized. The pictures show the four movements of



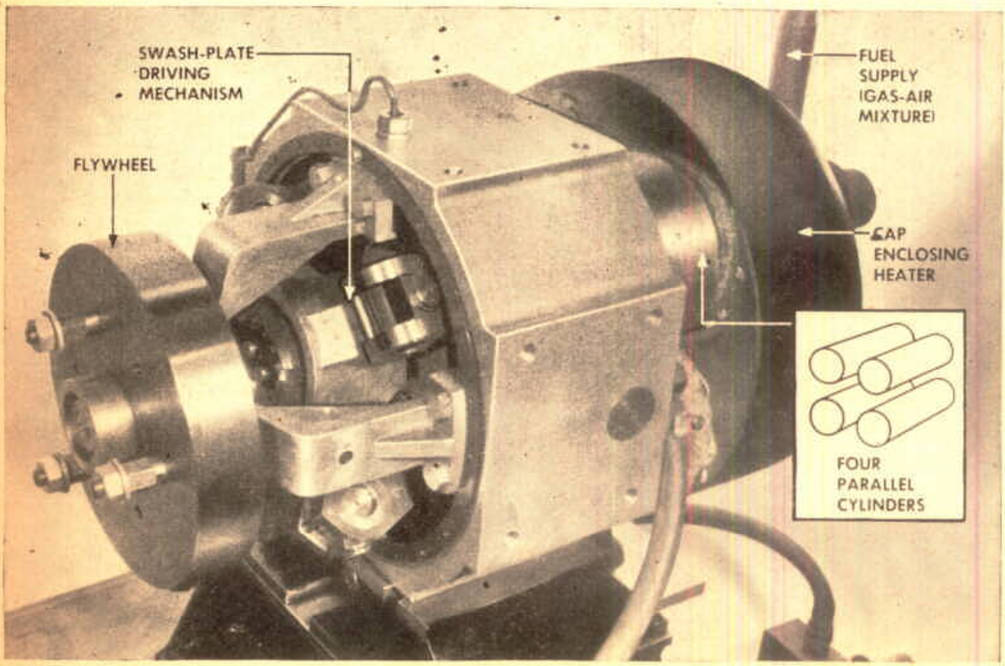


Simplified diagram at left, above, shows practical adaptation of hot-air principle in modern single-cylinder Philips engine. Two pistons operate within the same cylinder. Adding more cylinders actually makes the design simpler, as shown at right. One double-acting piston suffices in each of four cylinders, which may be grouped radially, in two Vs or in a square.

this elementary type of engine, beginning with the compression stroke.

Passing freely between hot and cold cylinders, air moved by the pistons alternately flows in opposite directions through the same passages of an assembly consisting of a heater, a cooler, and a regenerator.

The heater is a piece of aluminum bronze, an alloy that conducts heat well. It has exterior fins to pick up heat from the burner; and interior fins, forming a honeycombed passageway, that transmit this heat to air passing between them. The cooler is built almost exactly like the heater, with fins on the inside that remove heat from the air, and fins on the outside to be cooled either by air or by a water jacket. The regenerator, a thermal storage device designed to absorb heat almost instantaneously and give it up as quickly, is a porous mass of thin metal



Four-cylinder Philips hot-air engine, only 19 inches long over-all, develops 15 horsepower, enough to drive a small car. It turns up 3,000 r.p.m. and runs as quietly as a sewing machine.

wire between the heater and the cooler.

This "heat reservoir" has the important job of taking most of the heat out of the air as it passes from the hot cylinder to the cold cylinder, holding this heat momentarily, and then restoring the heat to the air as it returns from the cold cylinder to the hot cylinder. That leaves the cooler with much less work to do and prevents serious heat loss. A temperature of about 1,200° F. is maintained in the hot cylinder and 175° F. in the cold cylinder.

Following successful tests of their first engine, Philips experts have applied the same principle in improved designs.

A little one-cylinder model develops several horsepower. Its two pistons work in the same cylinder, part of which serves as the hot space and part as the cold space. An added refinement, not shown in the simplified diagram on the opposite page, is a pump that keeps air in the crankcase under the same pressure as that in the cylinder. This counterpressure obviates need for a tight-fitting piston to prevent air leakage past it, and also reduces bearing load. The effect on efficiency is so great that the engine's power can be controlled by an adjustment that varies the pumping rate.

Multicylinder Models

Multicylinder hot-air engines, instead of complicating the design, actually simplify it. When four cylinders using single pistons are suitably interconnected as shown in another diagram, a hot space at the top of each cylinder constantly exchanges the air it contains with a cold space at the bottom of the next cylinder. Each piston delivers power on its downstroke and acts as a compressor on its upstroke. The pistons have a 90° "phase difference." When No. 1 is at the top of its stroke, No. 2 is descending and delivering power, No. 3 is at the bottom of its stroke, and No. 4 is rising and compressing air.

For a good arrangement with short interconnecting passages, four cylinders may be arranged in radial fashion, grouped in two Vs, or set in a square. In the last type, suitable for up to 30 horsepower, pistons drive plungers acting against an inclined disk, called a swash plate, that turns the shaft.

The wide range of available designs emphasizes the variety of purposes to which the new engines may be adapted. Robert Stirling may yet take place with Robert Watt as a prophet of the Age of Power. END

By applying the principle of a hot-air engine in miniature, Joseph Tracy, a New York automotive engineer, provides the actual motive power for a model of a Diesel engine, above, that he has built. When a ring-shaped alcohol burner is attached as shown and lit, a pair of pistons begin operating, and the tiny flywheel spins merrily. A handsome example of precision craftsmanship, the model has a power cylinder of half-inch diameter and a one-inch stroke.

Applications of hot-air engines in recent years have been limited to driving models and toys and to stirring chemicals in laboratories, because of their low efficiency, slow speed, and bulkiness. "Even with these drawbacks," model-maker Tracy commented, "this principle is worth serious study. Possibly by the use of modern materials and scientific design, this type of engine might be vastly improved." As if to confirm his words, news of the efficient new hot-air engines described in the preceding article reached this country almost simultaneously.

Chemical Prevents Stocking Runs

NYLON runs will become less frequent when stockings are treated with Syton, a run preventive developed by the Monsanto Chemical Co. Syton also removes the shine from the surface of cotton, wool, and rayon fabrics, and makes them more durable and hard-wearing.