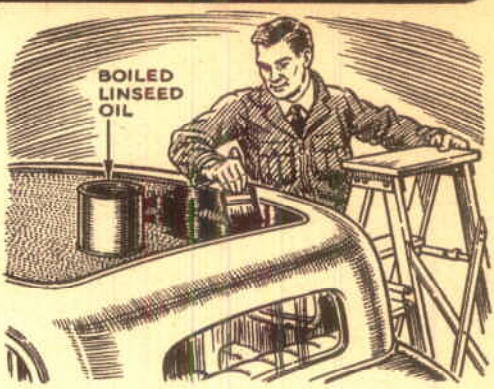
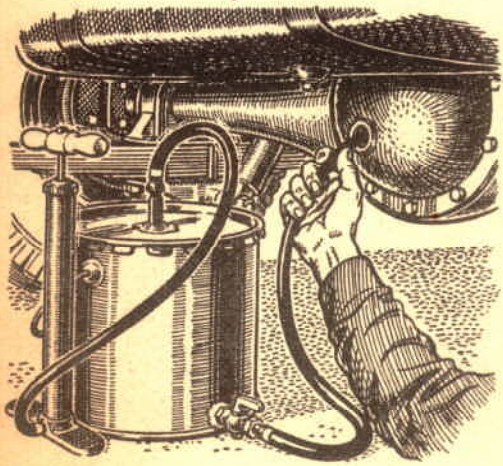
Hints from the Model Garage

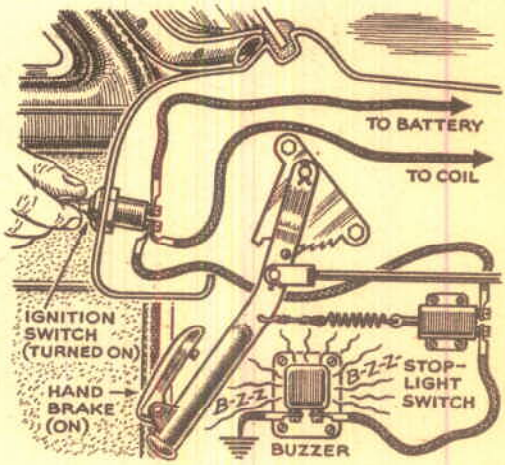
Shaving Cream Removes Grease. I carry a tube of brushless shaving cream in the glove compartment and find that it is fine for cleaning grease from my hands after a tire change or minor engine adjustment. The cream doesn't require water, and comes off with the dirt as you wipe your hands.—*Donald P. Greiner, Dundee, Fla.*



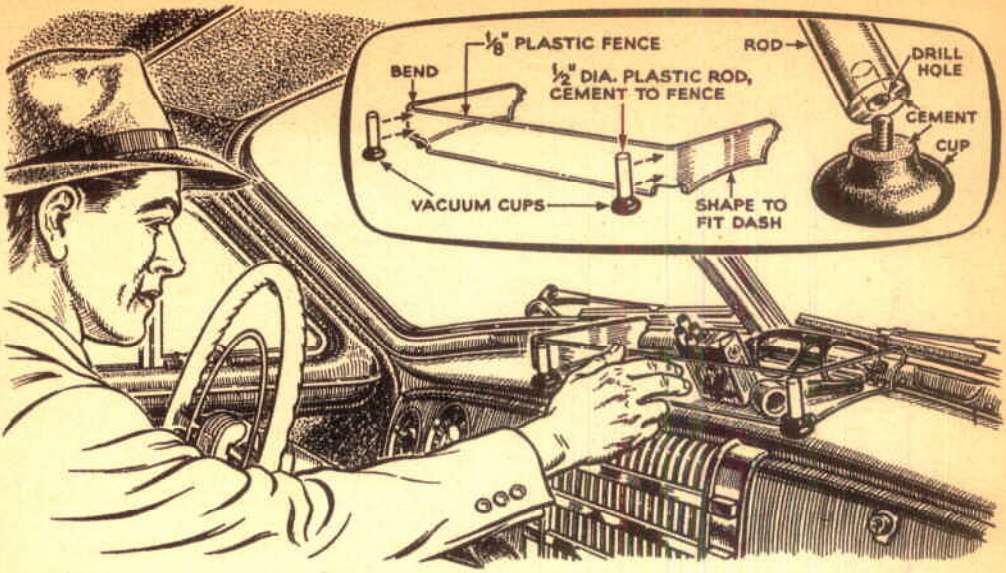
Linseed Oil Dresses Fabric Top. I have found that a good dressing for fabric tops is boiled (not raw) linseed oil. It even seals small leaks in the top, and does not crack because it is flexible. However, it requires considerable time to dry. Any paint store has it, but be sure it is boiled linseed oil.—*G. E. Boyd, Youngstown, Ohio.*



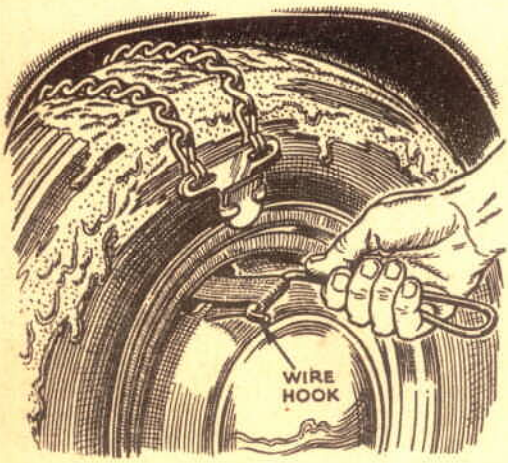
Can Makes Pressure Filler. A 2- or 5-gal. can, with a tire valve soldered in the top and a petcock soldered in the side near the bottom, makes a pressure filler for auto differentials and transmissions. Attach a flexible hose to the petcock and put a few pounds of air through the valve with a hand pump or air line and the filler is ready for use. The same idea works on a 55-gal. drum for dispensing bulk liquids.



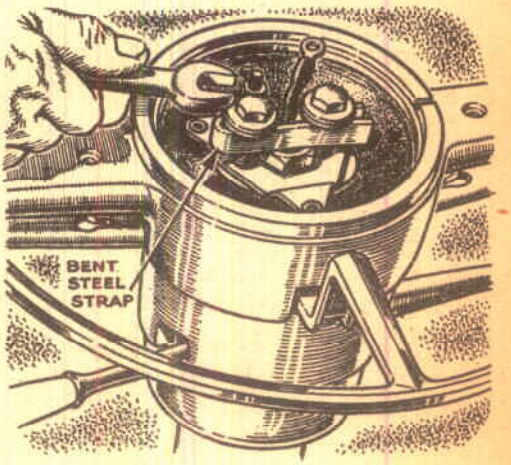
Buzzer Warns Hand Brake Is On. After catching my wife driving with the hand brake on for the third time, I devised this simple warning gadget that is similar to those found on newer cars. I connected a doorbell buzzer through a stoplight switch to the ignition switch, as shown in the drawing. Turning the key sounds the buzzer until the brake lever is released. The buzzer is under the dash.—*W. M. Dierks, Chicago.*



Dashboard Fence of Plastic. A strip of ⅛" plastic, bent and cemented to two posts, forms a dashboard fence that will hold a lot of those miscellaneous items you frequently need while driving. Small vacuum cups cemented and threaded to the rods will hold the fence but will not scratch the finish. Use ¼" diameter rods for the posts. Shape the sidepieces to the curve of the dash, either by cutting or by molding the hot plastic against the metal. Cigarettes, matches, pencils, and other items are kept in easy reach.

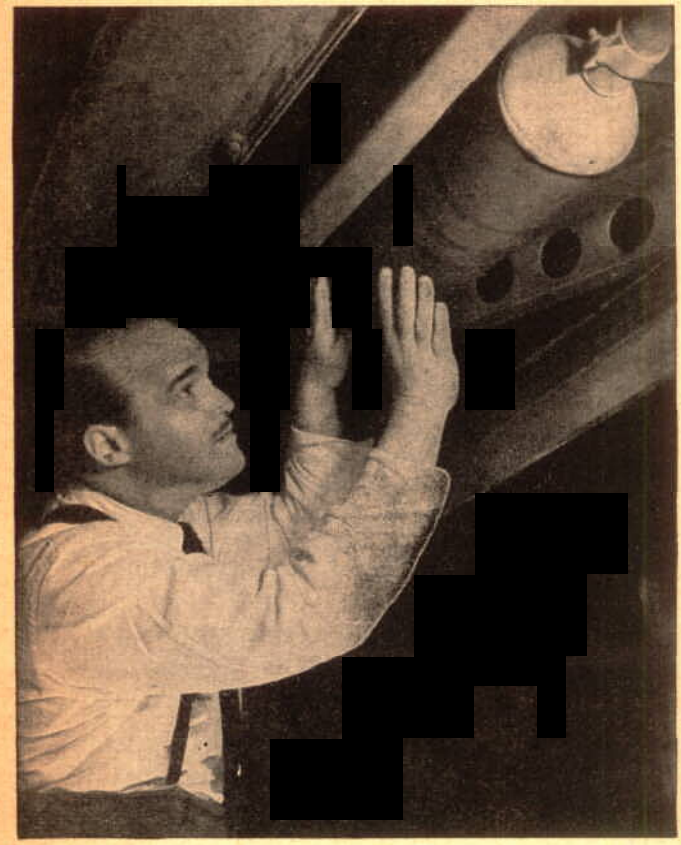


Hook Aids in Attaching Chains. Putting on strap-on chains—sometimes called mud hooks—usually is a messy and difficult job. To save my fingers and time, I use a stiff piece of wire bent to an L-shape. Most wheels have a rather small opening through which the webbed strap must pass. Run the hook through the opening and use it to pull the strap through.—*John Wright, Middleboro, Mass.*



Steering Wheel Puller. Removing the steering wheel of a Frazer without damaging the wire to the horn button was a problem until I hit on the simple puller illustrated here. It is a piece of ⅛" by ½" steel strap bent to a U-shape. Two bolts, supported by washers, were used to pull the wheel. Of course, the nut on the steering post was loosened, but not removed, to provide a bearing surface for the U-bracket.

How Safe Is Your



When your car is next on a grease rack, inspect the exhaust system carefully—its failure can ruin your engine or even take your life

PROBABLY no parts of an automobile receive less attention, even from conscientious motorists, than those in the exhaust system. And yet, far from being free from wear because of its lack of moving elements, the exhaust line is subject to deterioration unequaled by that of any other unit.

Faults are not readily discernible, and the average driver is apt to remain falsely assured as long as the exhaust is muffled. This is doubly unfortunate for, aside from the mechanical failures that can be traced directly to faulty exhaust, the carbon monoxide discharged from an automobile motor is a relentless killer. Even small amounts of this odorless, hard-to-detect gas produce drowsiness, and this in turn can lead to serious accident. The danger is lessened in summer, for carbon monoxide dissipates quickly in fresh air; but in the winter, with windows tightly closed, leaks in the exhaust system can fill a car in a short time.

There are several sources from which carbon monoxide can seep into the body of a car, the most common being from a leaking exhaust manifold. This unit is under the hood directly in front of the dashboard through which the engine fan can force fumes. Holes for wiring are not often sealed, nor are the spaces around a steering post, clutch, brake, and accelerator, and these offer a ready entrance for the deadly gas. Badly fitting floor boards extend the same invitation to gas from leaks in a muffler or in exhaust pipes. These parts are in the open, but forced drafts created by the movement of the vehicle can send much of the exhaust from them into the car.

An easy method of testing for exhaust and muffler leaks is to disconnect the windshield-wiper hose and introduce a small amount of light oil into it while the engine is running. Any light crankcase oil will serve the purpose, and it is a good idea to speed the engine to about a quarter throttle to avoid stalling. The vacuum in the intake manifold will suck all the oil from the container used, and an extremely heavy exhaust smoke will result. Two or three ounces of oil will produce smoke for several minutes, long enough for a thorough inspection.

Have an assistant partially restrict the exhaust at the tail outlet by holding a board or a wad of rags over the opening. This will cause excess pressure in the exhaust system and force the smoke through any openings or cracks that are present. If you have no helper, the exhaust can be restricted by temporarily jamming a wedge-shaped (not round) piece of wood into the outlet.

Most leaks will be found around the

Car's Exhaust System?

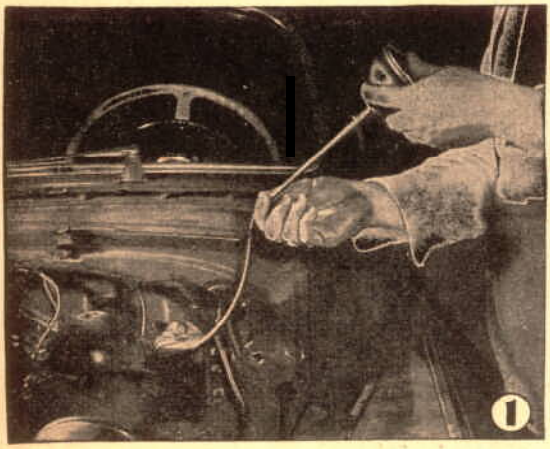
manifold gaskets or at the muffler where it is connected to the pipes. Manifold leaks can frequently be stopped by tightening the bolts that hold the unit to the engine. If this fails, a new set of gaskets is needed. Leaks at the muffler connections are usually the result of pipes working loose because of vibration. Pull the pipes from the muffler, clean the ends with penetrating oil and steel wool, and reinsert them firmly.

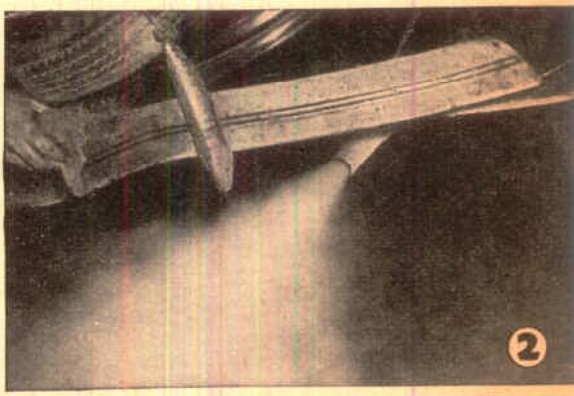
Cracks in the muffler housing and exhaust pipes are a different problem, resulting most often from inside corrosion. Patching is poor practice when this is the case, and a new unit should be installed. In the rare instance, however, where a muffler has been punctured from the outside, stovepipe will make an effective patch. Split the stovepipe lengthwise with a hacksaw, wrap the muffler with two layers of heavy sheet asbestos, put the stovepipe around this, overlapping the ends a few inches, and clamp it tight with strap-iron clamps.

Most mechanical damage caused by a faulty exhaust can be laid to back pressure —an abnormal pressure built up in the exhaust circuit by restriction resulting ordinarily from a bent or crushed exhaust pipe. Driving on high-crowned country roads or in heavy snow can damage a pipe or muffler, as can flying stones or a rear-end collision in which the bumper of the other car hits the tail pipe and buckles the line.

Back pressure is also caused internally by corrosion. For every gallon of gasoline burned, a gallon of water is produced by heat and condensation, and this passes into the exhaust circuit, tending to rust the iron and steel walls. Most gasoline also contains sulphur and bromine which combine to form a corrosive exhaust acid. These corrosive elements build up scales that in time fill the pipes and the baffle plates or perforated tubes in the muffler, collecting natural exhaust soot that further adds to the stoppage. Corrosion often is sufficient to dislodge baffle plates or tubes and form greater restrictions.

A sure way of retarding corrosion is not to start your motor unless you intend to let it warm up thoroughly. Short runs deteriorate mufflers rapidly, for during them

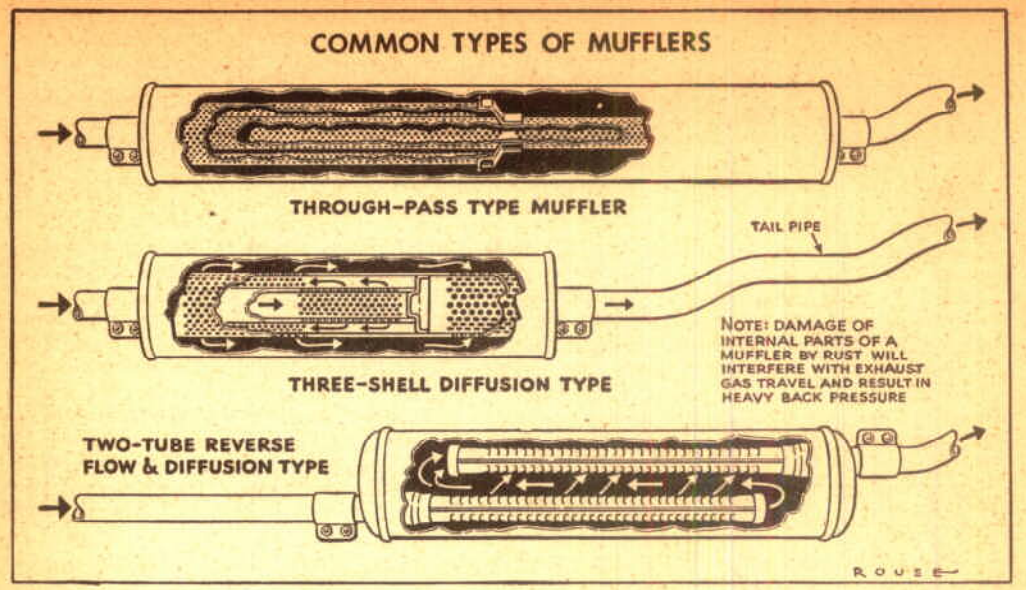




1 Leaks in the muffler or exhaust pipes can be spotted by disconnecting the windshield-wiper hose and allowing it to suck up a little light oil

2 Two or three ounces of oil will produce heavy smoke in the exhaust for several minutes—long enough for you to make a thorough inspection

3 Have a helper partially restrict the exhaust by holding a wad of rags over the outlet as you watch for smoke leaking at cracks and joints

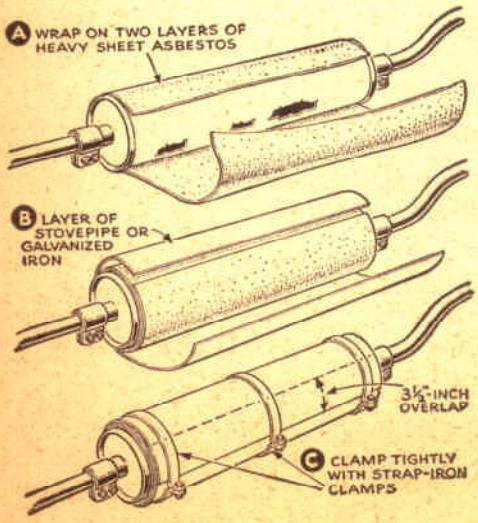


the exhaust system does not have a chance to heat to a point where moisture is vaporized. Some mufflers are plated inside with lead or a tin alloy, and this tends to prolong their life, but heat and acids from a long run at high speed may melt the plating away and expose the bare metal.

Among the most annoying failures traced to back pressure are burned-out exhaust valves. Exhaust temperatures reach extreme heights and, unless this heat is carried away swiftly, the valves may burn out in a matter of a few miles.

Crankcase oil often becomes contaminated by gases that are present in the crankcase in greatly increased volume when back pressure exists, and contaminated oil can ruin bearings and wall surfaces.

Sometimes one of the most difficult breakdowns to trace is a boiling radiator. Automobile servicemen have treated a supposedly defective radiator, boiling it out and blasting its cooling walls with steam repeatedly without results, only to learn the cause of the trouble when a break occurred in the exhaust line and released the pressure. Each automobile cooling unit is designed to handle a given heat in a given time, and when back pressure raises the internal heat in the combustion chambers and around the exhaust ports, the cooling system is often unable to take care of the excessive load.



Back pressure greatly decreases gas mileage and kills acceleration by preventing scavenging of the burned gases and thus much reducing the volumetric efficiency of the fresh charges in the cylinders. Spark plugs can be ruined by the heat of back pressure which is sometimes sufficient to crack the porcelain.

Testing for back pressure is difficult, but there are several symptoms that can be easily recognized. The engine runs warmer than usual, acceleration falls off, and the motor is rough at idling speeds. A volumetric-efficiency tester is used at the factory to determine back pressure, but service stations and garages rely chiefly on experience and judgment.

Where back pressure is suspected, it is a **good idea to attach a vacuum gauge to the intake manifold and note the reading at idling** speed. Then disconnect the muffler from the pipe leading from the exhaust manifold. If there is an immediate rise in vacuum, you can be sure that back pressure existed in one of the disconnected parts, for the efficiency of an engine can be measured by the vacuum on a set throttle. In cases where back pressure is severe, the improvement on disconnecting the muffler should be noticeable even without a gauge.

Grownups Put This Toy to Work

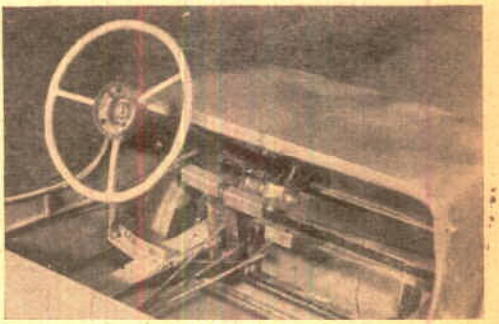
The tiny car is a natural for daily shopping chores and short trips. Seat has room for a passenger, laundry bag, or parcels. Car has motor-scooter wheels.

IT COSTS you gasoline when your wife runs an errand in the family bus. As an economy substitute, she might go for a midget car like this one, built by Paul E. Matous, of Orangeburg, N. Y. With it, a gallon of gas would cover a week of gadding around.

Actually, Matous built the midget for a friend's 10-year-old son. But the grownups soon took it back. It proved too speedy and tricky for the youngster.

Built on a 41" wheelbase, the car is 60" long and 37" wide—small for an adult, but you can cram yourself in.

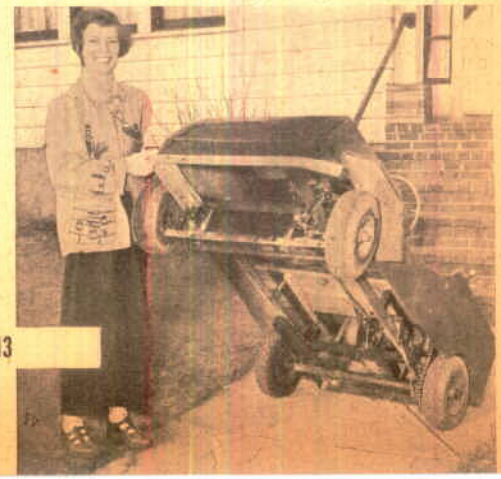
Motor-scooter engine is coupled to Indian motorcycle transmission. A chain drives one rear wheel. You shift gears with lever behind you.

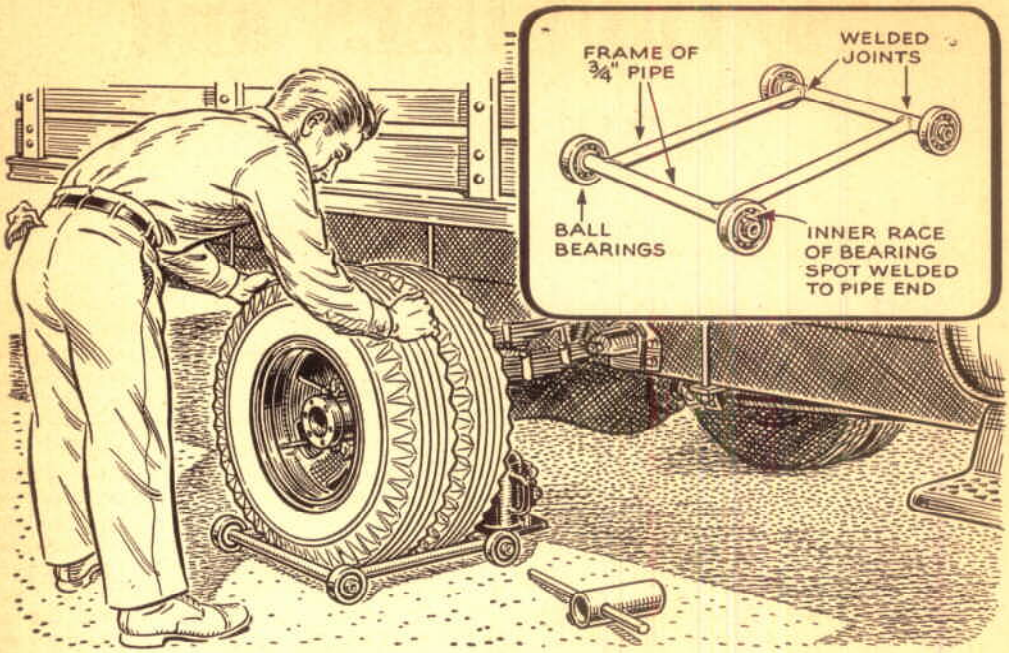


The pedals work like those of big car. Brake operates mechanically on a rear wheel. Steering gear is from a Ford. Frame is angle iron.

Kick pedal starts 4-hp. Cushman engine. The car gets up to about 45 m.p.h. and will cover around 40 or 50 miles on a gallon of gas.

There's no reverse gear, but don't worry. Anyone can pick this car up and whirl it around. And it can be parked right at your door.

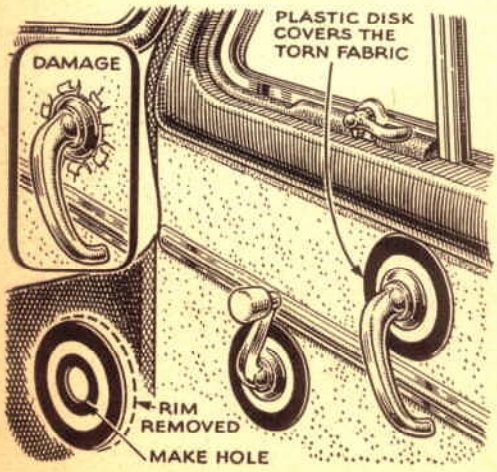




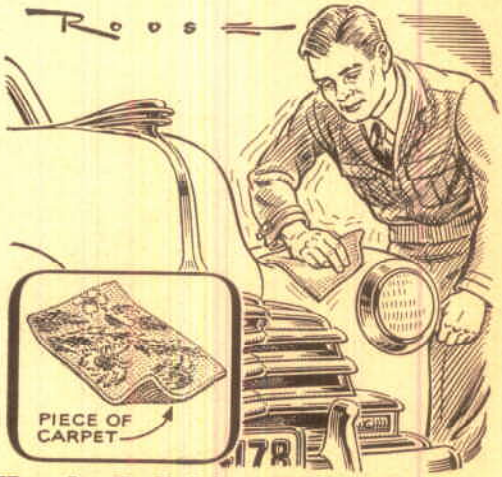
Dolly Handles Dual Tires. For removing and installing dual truck tires as a unit, Charles D. LaRue suggests making up a dolly like this. The original is in use at a shop in Sacramento, Calif.

The dolly is inexpensive to make. Four used ball bearings will serve as the wheels. Adjust the frame dimensions to suit the size of the truck wheels.

To use, lower the jacked-up wheels on the dolly. After removing the retaining nut, you can then pull the wheels away on the dolly.



Repairing Handle Wear. Plastic coasters from the dime store can be used to hide torn fabric around a door handle. Cut the rim from the coaster and make a hole large enough to slip over the handle. Clamp in place with the original flange.



Handy Polishing Pads. Pieces of old carpet run through the washing machine and then dried make convenient pads for polishing cars. If no old carpet is available, your furniture store may be able to supply small remnants.

RING TROUBLES and How to Cure Them

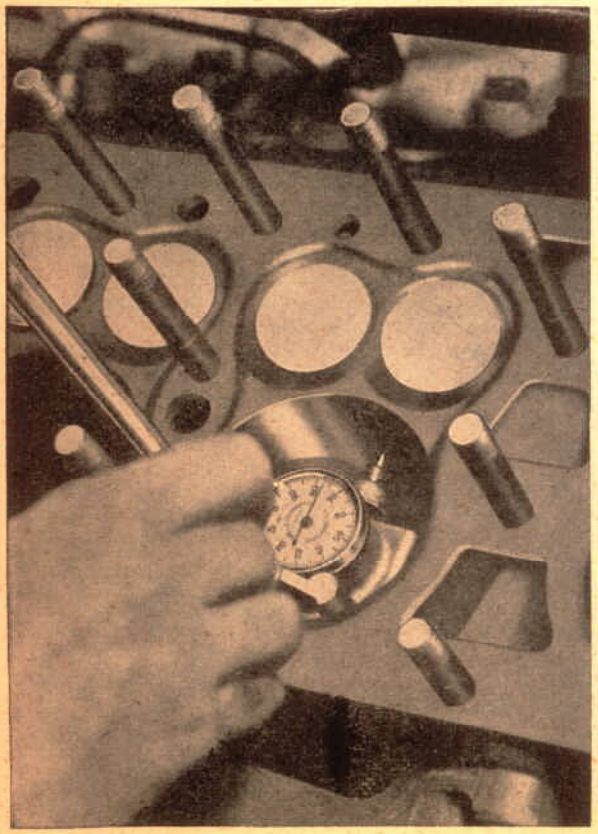
PISTON rings, tailor made by the manufacturers to individual engine design, are precision parts of the modern automobile. They serve to fill up or seal the clearance between a piston and cylinder wall, keep blow-by or burned gases from escaping into the crankcase during the power stroke, and regulate the flow of oil to the walls of the cylinders.

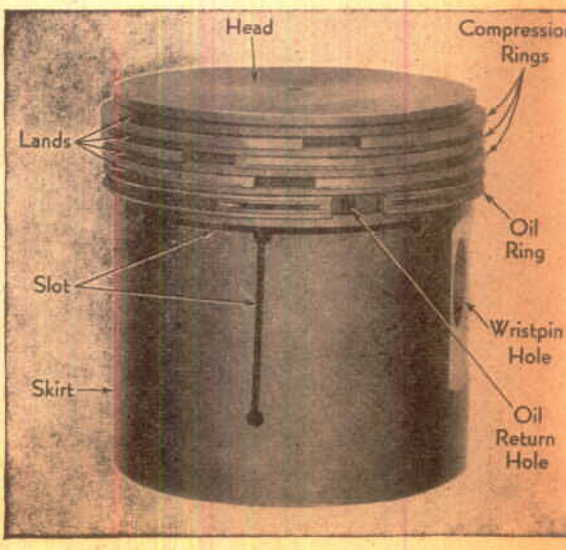
Just why a piston ring must be a precision part may be seen from the figures of one maker who has calculated that the average automobile engine burns three one-thousandths of a drop of oil per explosion. If it burned as much as a tenth of a drop, it would use 90 quarts of oil on a 600-mile trip traveled at 60 m.p.h.

However, there are other parts of a motor that help control oil consumption, so don't jump to conclusions if it seems excessive. Too often an extreme ring setup is installed when it isn't needed with the result that the upper part of the cylinders runs dry and wear and failure are rapid.

Look first for external oil leaks at the valve cover, fuel pump, and oil-pan gaskets; then see that oil lines, pipe plugs, front and rear main-bearing seals, and the crankcase ventilator are not leaking. A thorough inspection can best be made by wiping these parts clean and road-testing the car at various speeds, after each of which an examination should be made for signs of fresh leakage.

Many cars are equipped with combination fuel and vacuum pumps, the vacuum section being used for the operation of windshield wipers and other accessories. A leaky diaphragm will suck oil from the crankcase into the vacuum line from where it will enter the intake manifold and combustion chamber and produce a blue smoke at the exhaust. Watch for sluggish action of the windshield wipers





CHECKING THE CYLINDER BORE will show whether honing is advisable. Here a dial gauge is used. Right, a typical piston with its parts named

SIDE CLEARANCE must be allowed between a new ring and the groove. Measure with a feeler gauge and, if insufficient, lap both sides of the ring on fine emery cloth placed on a flat surface

RINGS ARE INSTALLED or removed with a ring tool or pliers, opening the ends to expand them. Stagger gaps of new rings, except on a Hudson, but put no gap over a wrist-pin hole

during acceleration as an indication of a defective diaphragm.

Two other points should be examined before concluding that the piston rings are at fault. If the intake-valve guide clearances are excessive, the thing to do now is to replace the guides; if the guides are all right, the next thing to do is to check carefully the engine bearings. An average safe clearance for intake-valve guides is .002" to .003", while that between the crankshaft and bearings is .002" to .0025". The manufacturer's directions should be followed if available.

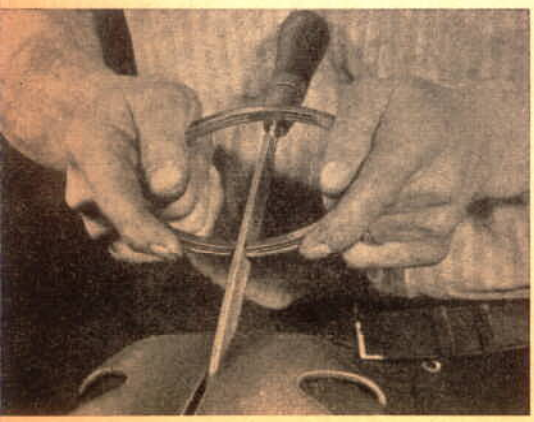
Pistons on all present-day cars are removed through the top of the cylinders, which means that the cylinder head will have to be taken off. In doing a piston job, there are some important precautions to take. After removing the oil pan and cylinder head, but before taking off the connecting-rod caps, examine each cap to see whether it is stamped with the number of the cylinder with which it goes. If there are no markings, number the cylinders yourself on *both the rods and caps* with a sharp punch and a hammer, noting on which side of the engine you place the markings.

Now, before attempting to remove the piston, ream the top of the cylinder bore where a ridge has been formed at the end of the ring travel and thus avoid the possibility of breaking the second ring land and ruining the piston. Use a special ridge reamer, and do not cut down further into the ring-travel area than 1/32" or half the width of the top ring.

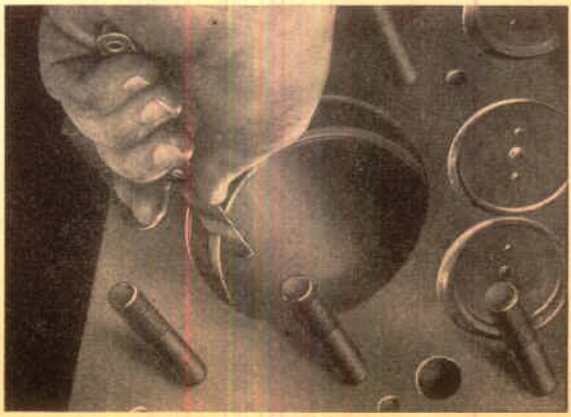
Examine the piston assembly after removing it to see how the rod is attached. In most modern engines, which have a force-feed lubrication system and aluminum pistons, the rod is assembled on the piston with the oil-spurt hole facing the camshaft and the slotted side of the piston facing the other side of the engine. Cast-iron pistons do not have slots, and rods in splash-lubrication systems do not have oil-spurt holes.

Next, check the cylinder bores for wear, taper, and out-of-round, using a dial gauge, an inside micrometer, or a telescope gauge and an outside micrometer. Take measure-

END GAP IS INCREASED by filing lightly. The ring below has a butt joint. File both ends of a ring with a step cut or lap joint



TEST THE RING in the bore, pushing it down with the piston to be sure it isn't cocked. Insufficient end gap will cause heat to buckle it



ments within the ring-travel area near the top and bottom. If the bore is worn more than .003" per inch of cylinder diameter, a full honing or reboring job is advisable and should be done at a shop having the equipment. For example, if the standard diameter of the cylinder is 3", and the wear is .010", a rebore job is indicated. New pistons, of course, will also have to be fitted. They are usually available in oversizes of .010", .020", .030", and larger.

When new rings are to be installed, the old ones must be removed carefully to avoid scarring the piston. One method is to expand the ring with thin-nose, outward-opening pliers, slipping a thin strip of metal between the ring and piston and working it around to the far side; then expand the ring a little further and work in a second and third strip, after which the ring can be slipped off. Take off the top ring first, and in installing new ones, put on the lowest first and work with the same thin metal strips. If special instructions are provided with the new rings, they should be followed. Be sure also to clean the grooves, taking care not to score the metal.

New rings sometimes have to be lapped slightly to allow proper side clearance in the ring grooves, and the ends may have to be filed to obtain the proper end gap. If the specifications of the car manufacturer are not available, it is safe to allow a minimum end gap of .003" per inch of cylinder diameter, that is, .009" for a 3" bore. Minimum side clearance for aluminum pistons should be .0015" to .002" in the top groove and .001" to .0015" in the lower grooves; for cast-iron pistons, .002" to .0025" in the top groove and .0015" to .002" in the others. Do not allow excessive side clearance, for it may cause excessive oil consumption.

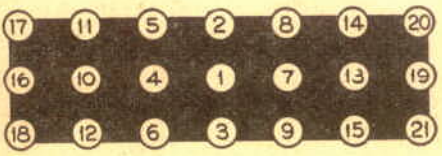
The sides of a ring may be lapped on a piece of plate glass, using a fine lapping compound and rubbing gently with a circular motion on one side and then the other. One photo shows a method of filing ends.

Do not force or drive a piston when returning it to its cylinder. The new rings will have to be compressed sufficiently for them to enter the bore. This can be done either with strong cord or with a sleevelike device that closes the rings as they enter.

When retightening the connecting-rod bolts, use a torque-indicating wrench and follow the manufacturer's recommendations for torque tension. If these are not available, it is safe to use a 12" socket or box wrench. After pulling up a nut tight, if the cotter-pin hole is not visible, bring the nut up further—do not back it—until the cotter pin can be inserted. Never use old cotter pins. Where lock nuts are employed instead of cotter pins, tighten the bolt nuts firmly, put on the lock nuts with the open side out, turn them finger tight, and then give them a half turn with a wrench.

Clean the gasket, cylinder head, and cylinder block of carbon and dirt, and then place the head on the block. The bolts and nuts should be tightened in the order recommended by the manufacturer or, if his instructions are not available, according to the charts shown at the bottom of this page. Use a torque-indicating wrench or one with a 9" handle. Cylinder-head bolts and nuts should be drawn down evenly and gradually with the operation repeated until all are normally tight. Final tightening on iron heads is done after the engine has been run long enough to bring it to operating temperature; on aluminum heads, allow the engine to become cool after running and do the final tightening while it is cool.

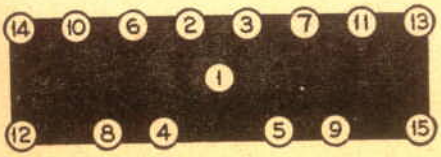
SEQUENCE FOR TIGHTENING CYLINDER-HEAD BOLTS



Six-cylinder L-head engine

Eight-cylinder L-head engine

Six-cylinder overhead-valve engine



Eight-cylinder overhead-valve engine