Solder Smooths Auto-Body

By E. F. Lindsley

BUMPING out and refinishing will take care of many simple dents and nicks in the body and fenders of an automobile. But often you will encounter damage that demands filling and shaping with solder, perhaps in addition to straightening.

Unless the damage is extensive, both kinds of repairs can easily be handled by a careful amateur. Tips on the straightening type of job are given in "Bump 'Em Out Yourself" (page 152).

You must resort to solder in several fairly common situations. Dents inaccessible from the inside are most easily repaired with solder. Also, solder is a "must" when you want to hide weld beads in conspicuous spots, when you are repairing metal stretched too badly to be blended out, or if the metal has been filed so thin in previous repairs that it can't be worked.

But before deciding that solder fits your case, give some consideration to the place where it's to be used. Always try to avoid placing it in large quantities on an extensive flat surface, a fender skirt for instance. Since such parts generally are subjected to considerable flexing and vibration, a thick slab of rigid solder may eventually loosen. Areas with ample curvature to resist vibration are not so critical.

Tools and materials required for a body-soldering job in your back yard are not particularly extensive. Ordinary bar solder can be used if it has a reasonable tin content.

You'll need a wood paddle to smooth off the solder. Such paddles usually are made of a hard, close-grained wood. To prevent sticking while in use, the wood must be well soaked in paddle oil. This oil is available at an auto-body supply shop. If desired, tallow can be used in place of the oil.

Body putty also may come in handy. In fact, there are times when you may find it possible to take care of some body and fender repairs entirely with this rather than solder.

How to Do the Job

To see how an experienced body repairman works, let's tackle an actual soldering job and follow it through step by step. The example chosen, and illustrated in the drawings below, was a very sharp gouge in the upper front surface of a rear fender. This dent was inaccessible from inside and the metal had been stretched to the point where blending would have left a noticeable hump.

Hammer, bumping dolly, and file are used first to restore the general shape of the fender as well as possible. Also, the surrounding lacquered surface must be cut back for a distance of several inches with wet sandpaper to leave a bright, clean working area.

A sharp, deep dent in front part of rear fender is kind of damage requiring solder. For how it is repaired, see drawings at right.

Heated dent is cleaned with steel wool dipped in soldering fluid. Paint is first sanded off. Sheet asbestos protects finish.

Good tinning is essential. A thin tinning coat is first flowed on and then scoured with steel wool to provide an anchor for the solder.

Softened end of solder bar is now jabbed into the dent at several points, leaving enough blobs of solder to fill the dent.

Dents

Car scars that can't be fixed with a hammer will vanish under solder. Here's how to do it yourself.

Before starting the actual soldering, cut a sheet of ordinary asbestos paper to match the curve of the fender-body juncture. Tape this to the side of the body. Remove the wheel and protect the brake drum and adjoining parts with cardboard to guard against accidental splashing with acid flux and solder.

Once you have begun the soldering process, you should complete the job as rapidly as possible, not allowing the metal to cool between steps. Therefore, it pays to have all necessary materials within easy reach.

A good tinning job is the most vital step in successful body soldering. Haphazard tinning may cause solder to loosen. Using a gas or gasoline-torch, apply heat over the entire work area. If the torch has a relatively small and concentrated flame, be sure to move it about constantly to get even heating. When the metal has been well warmed, grip a wad of medium-cut steel wool in a pair of pliers and dip it into a jar of acid-type soldering fluid.

Continuing to apply heat, thoroughly scour the work area with the flux-soaked wool. Repeat this operation until no traces of paint, rust, or welding scale remain.

Still keeping the torch on the work area, hold a bar of solder near the flame so the fender and solder reach soldering temperature about the same time. Smear the fluxed surface with ample solder and then use the steel wool and pliers to spread it in a smooth, even tinning coat. Dip the wool in the flux as required. Because of the cooling action of the fluid, it will probably be necessary to apply more heat to hold the solder in a liquid state.

Consider the tinning job satisfactory only when the smallest area is completely wetted with solder. Remember this is the foundation upon which you must build.

Keep Heat on the Work Area

And don't put down the torch. Keep it directed on the dented area and again heat the bar of solder. This time heat the bar for several inches until it has assumed a mushy condition. Just before the solder is ready to flow, jab the softened end of the bar vigorously into the tinned area at several points, leaving behind ample metal to fill the depression.

Manipulate the torch as required to keep the solder soft, but be careful to prevent it from melting and flowing off. At this point, the wood paddle is brought into use.

After the paddle has been covered with oil, use forceful, trowel-like strokes to level the solder lumps to the approximate original contours of the fender. Do not overdo the paddling, but be sure the solder is forced into solid adhesion with all the spots it touches. Remember it is easier to work down

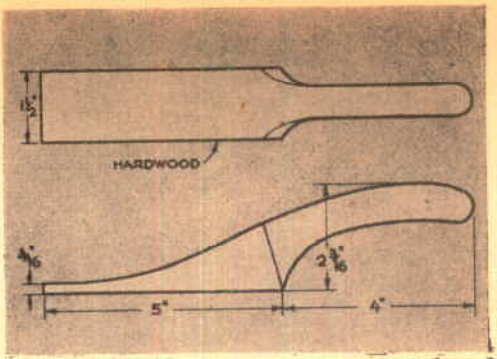
Kept mushy by the flame the solder is then leveled off to the contour desired. A wood paddle soaked in oil is used for this job.

When cool, soldered area is dressed off with coarse file or abrasive disk. As final step the surface is cleaned up with fine file.

As first step in applying a new finish, area is washed with soda to neutralize flux. It is also gone over with pre-priming cleanser.

Small blemishes are filled with body putty after priming coat has been smoothed by wet-sanding. Finish in usual manner.

Tools and materials used in a body soldering job include these. A flexible shaft and abrasive disks are convenient but not essential.



Wood paddle for smoothing down the softened solder can be made to these dimensions. Shape it from hardwood. It must be oiled before use.

a high spot with the paddle than to file it down later.

These steps conclude the actual soldering. Before going further, it is best to give the solder plenty of time to cool completely. Use your waiting time to wipe up any acid and spattered solder.

Actual finishing of such a filled area must be done with extreme care. Otherwise, you may leave ridges and flat spots that will stand out in the completed job.

Rock the File to Prevent Flat Spots

When roughing down the solder, you can do the quickest job with a flexible shaft and a coarse abrasive disk with a flexible back. But in a home job, where time is no great factor, you can use an ordinary coarse file. Stop occasionally and clean the solder from the file. When you have approached the final contours, switch to a mill-cut file to smooth off any deep file scratches that you have left. Remember to rock the file along the curved surface to avoid leaving any flat spots.

Before the area is primed, it must be neutralized to remove any traces of the acid soldering flux. Ordinary baking soda in water will accomplish this. Follow by wiping with the commercial cleansing agent recommended by the manufacturer of the primer you have chosen. This step is important.

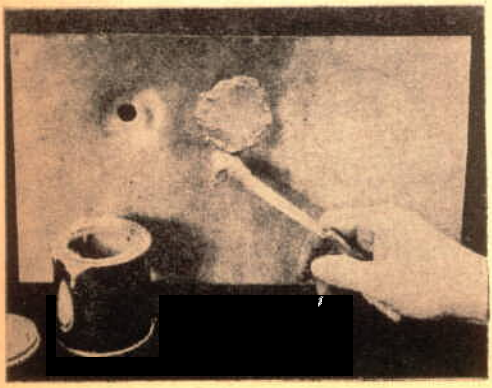
From here on, the repair job follows standard refinishing technique. It probably will be best to repaint the entire fender or panel on which you have worked.

Remove the old wax and any oil with a commercial cleanser, sand down to bare metal, clean again, and mask any parts that will be in line with the overspray.

After spraying with primer-surfacer, fill any small imperfections or file marks with body putty. Apply with a scraping action of a stiff piece of cardboard. When the putty is hard, wet-sand the entire area and spray with a finish coat or two.

When the final coat has dried at least a day, go to work with rubbing compound. Follow this with wax. END

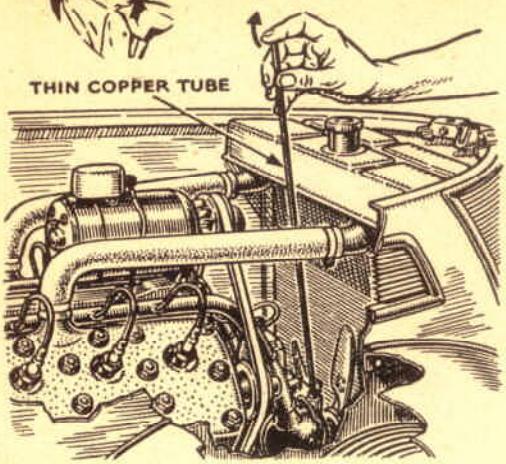
Powdered-Aluminum Paste Fills Dents in Cars



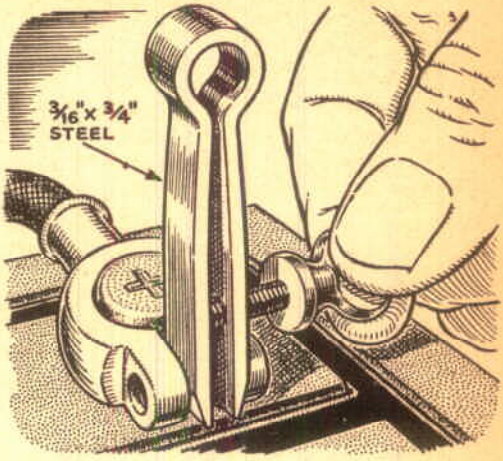
NEW powdered-aluminum products with a doughlike consistency are now being marketed as a substitute for solder in repairing damaged auto bodies and fenders.

These are applied cold with a spatula or similar tool, as seen at left. As the solvent evaporates, the metal hardens and can be filed or sanded smooth. The material is said to adhere well to a properly cleaned surface and to provide a good base for refinishing. Successive applications will build up thicknesses of as much as an inch. Reynolds Metals Company, Louisville, Ky., aided in developing the products.

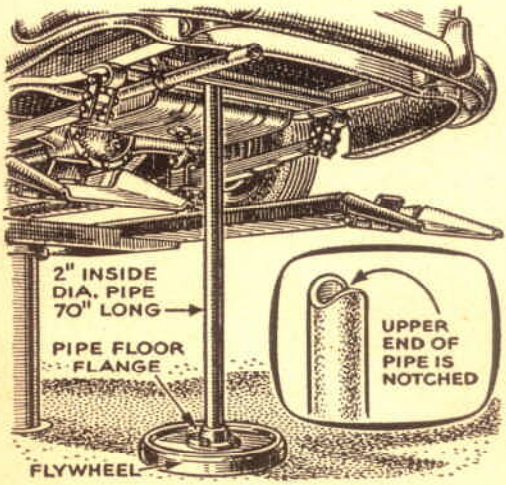
Hints from the Model Garage



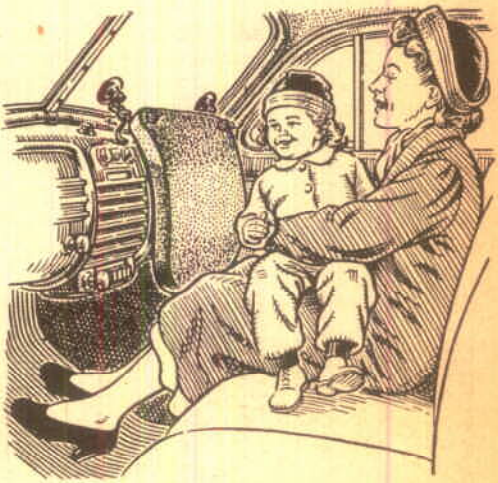
Copper Tube Makes Oiler. To get at those hard-to-reach oil fittings, try this: dip some copper tubing about an inch into oil. Trap the oil in the tube by pressing your finger over the upper end. Removing your finger releases the oil in the fitting.



Wedge Loosens Battery Clamp. T. E. Waters, of Atlantic, Iowa, made this wedge to open up stuck battery clamps. The chisel-shaped end is tapped between the clamp's ears. Then the thumbscrew is turned to spread the clamp apart.

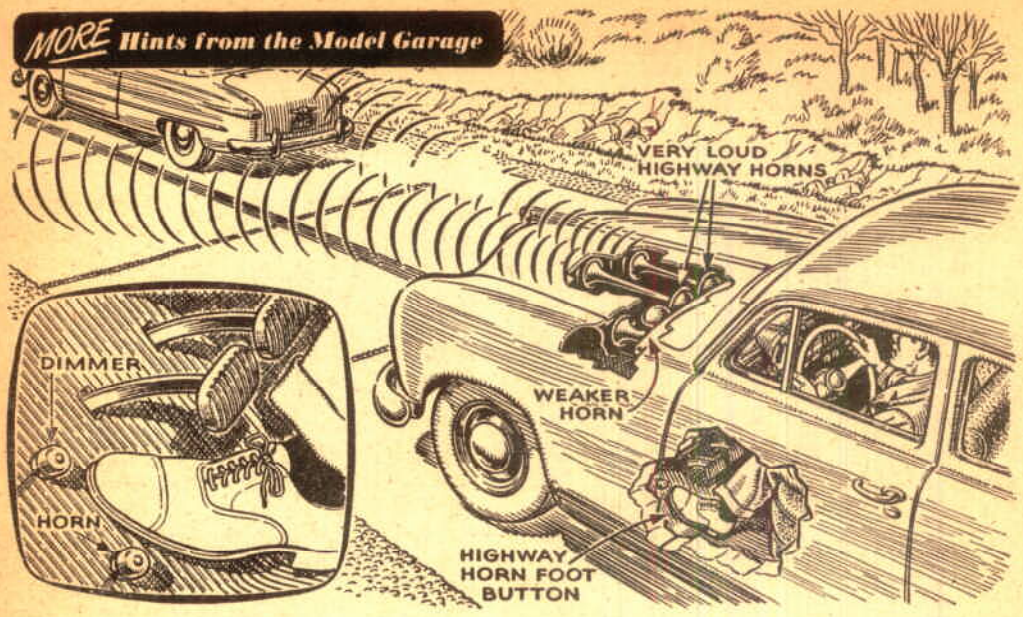


Stanchion Opens Springs. I really get oil between spring leaves with this stanchion. After the notched upper end is placed under a frame cross member, I lower the lift a couple of inches. This takes some of the load off the springs and the leaves open. You can almost pour oil between the leaves.—*Marion Rhodes, Knightstown, Ind.*

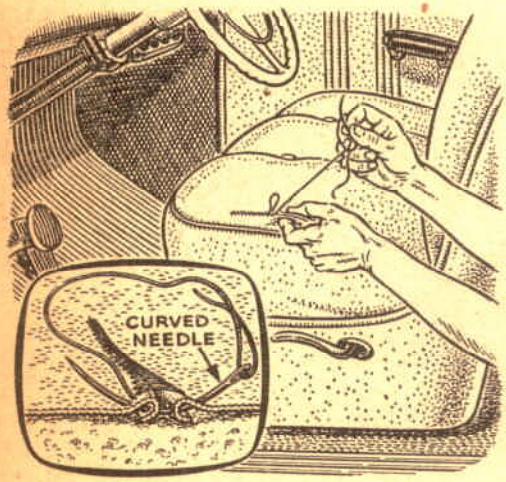


Rubber Pad Protects Kids. Sudden stops often result in bumped heads. A foam-rubber seat pad and two suction cups, mounted as shown, makes a practical dashboard guard. At the upper corners of the pad, punch holes with an ice pick. Tie heavy cord to each cup and run the cord through the holes. Large knots will hold the pad in place.

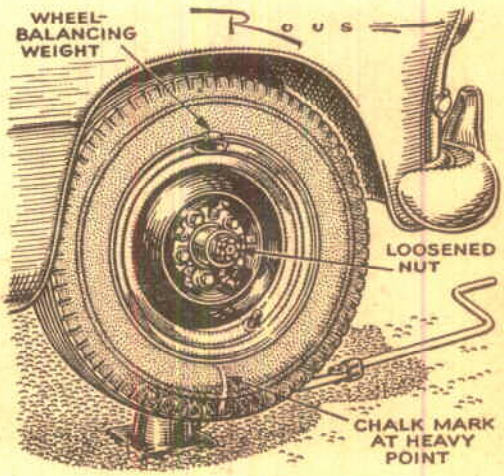
Turn the Page for Three More Hints



Horn Button on Floor. As a safety measure—so I can keep both hands on the wheel when I'm driving fast—I mounted an auxiliary horn button on the floor of my car. For this button, I used a floor-type starter switch. I located the switch near the dimmer switch but far enough away so there's no interference in the operation of either one. The floor button is connected to a couple of loud highway horns. A weaker horn, for city driving, is connected to the center button on the steering wheel.—*J. H. Carll, Hempstead, N. Y.*



Curved Needle Mends Rips. Henry Zave, of Chicago, offers this hint for keeping your car's seat covers and upholstery in repair. Use a curved upholsterer's needle for easier sewing. You'll find this type of needle lots simpler to handle. It's especially good when you have to work from only one side of the material.

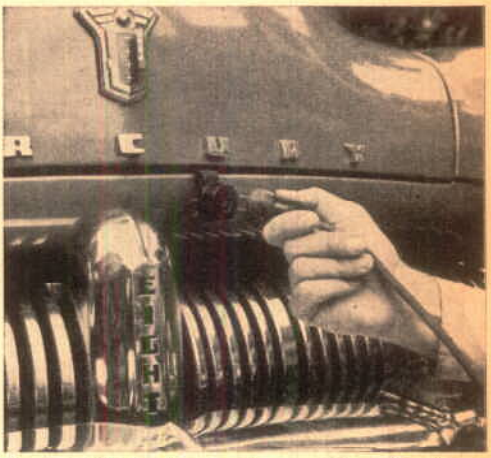


Balancing Auto Wheels. Mount the wheel on the front axle. Back off the bearing nut. Spin the wheel and mark with chalk the bottom point when it stops. Repeat for accuracy. Opposite the mark, mount a wheel-balancing weight. Continue to spin it, using lighter or heavier weights until the wheel has no heavy point.—*W. M. Dierks, Chicago.*

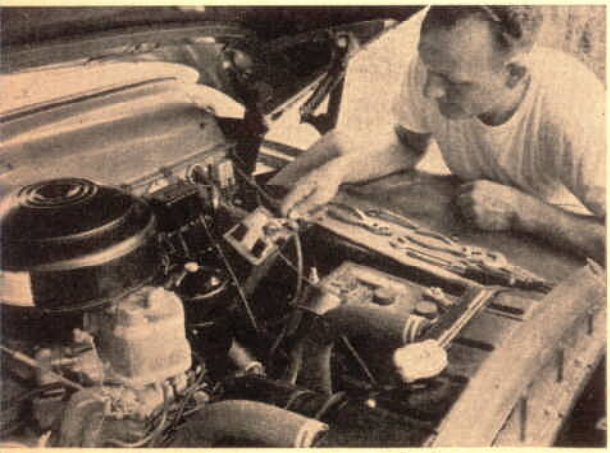
Here's How I Start My Car in the Morning

By Victor Dettling

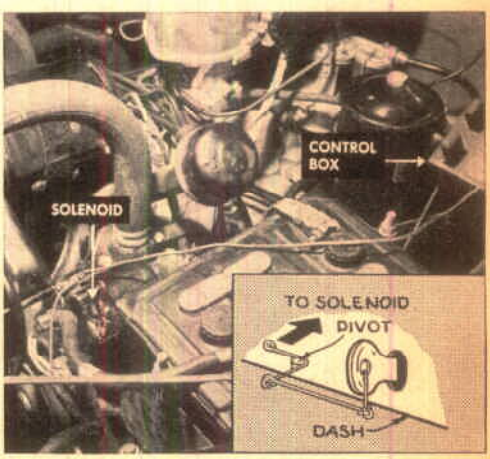
Before breakfast I press a switch near the window in the dining room. This closes a circuit leading to my car out in the garage. The object is to start the engine and have it at operating temperature before I set out for my job at an automobile plant in Manchester, Mich. The line leading from house to garage is a heavily insulated, two-conductor electric cord.



Each night I plug in the cord from the house after putting the car in the garage. The plug and socket are the type you would use in ordinary electrical wiring around the house. The socket is permanently mounted above the grille as shown. One terminal is grounded to the car body. The other is connected to a control box developed especially for my starting system.



Here's the control box. The two pegs projecting from the end are part of my safety system. Free to move lengthwise through the box, these rest against the gear-shift control rods. The engine can start only if car is in neutral. If a gear is engaged, the bars move, breaking an electrical contact. The box has another job, too, but I'll explain that later. From the box, a wire runs to a powerful solenoid starting switch installed in place of the original one.

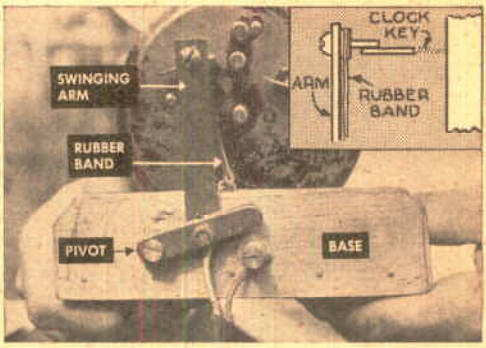


The solenoid does two things. When energized, it completes the starting-motor circuit. At the same time, by magnetic action, it exerts a pull on a wire linked to the ignition key by a bell crank as shown in the drawing. This turns the key. After the engine starts, increasing manifold vacuum acts on a diaphragm in the control box, breaking the starting circuit.

But that's not all: Turn the page and see

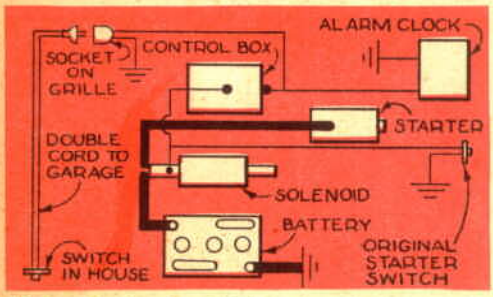
Just Before Quitting Time An Alarm Clock Starts Up Engine

During the day I leave the car in an outdoor lot near the plant. After parking, I set my alarm-clock switch, timing it a few minutes before quitting time. When the alarm rings, the engine starts automatically. This gives it a chance to warm up before I start home. I keep the clock switch in the glove compartment.

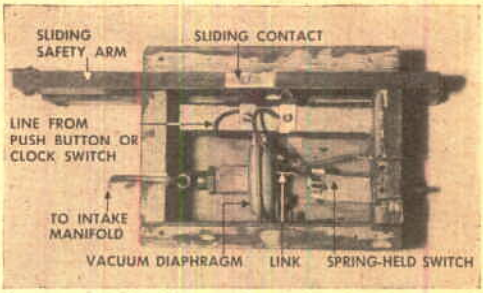


The switch works like this. After the alarm has been wound, a bolt through the swinging arm is hooked over the winding key, as shown in the drawing. When the alarm goes off, the key releases the arm, permitting the rubber band to pull it down and close the circuit. This does the same job as dining-room switch.

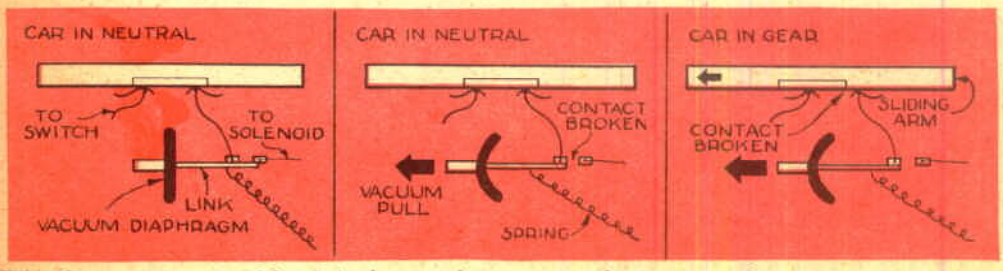
Here Are the Details of the System



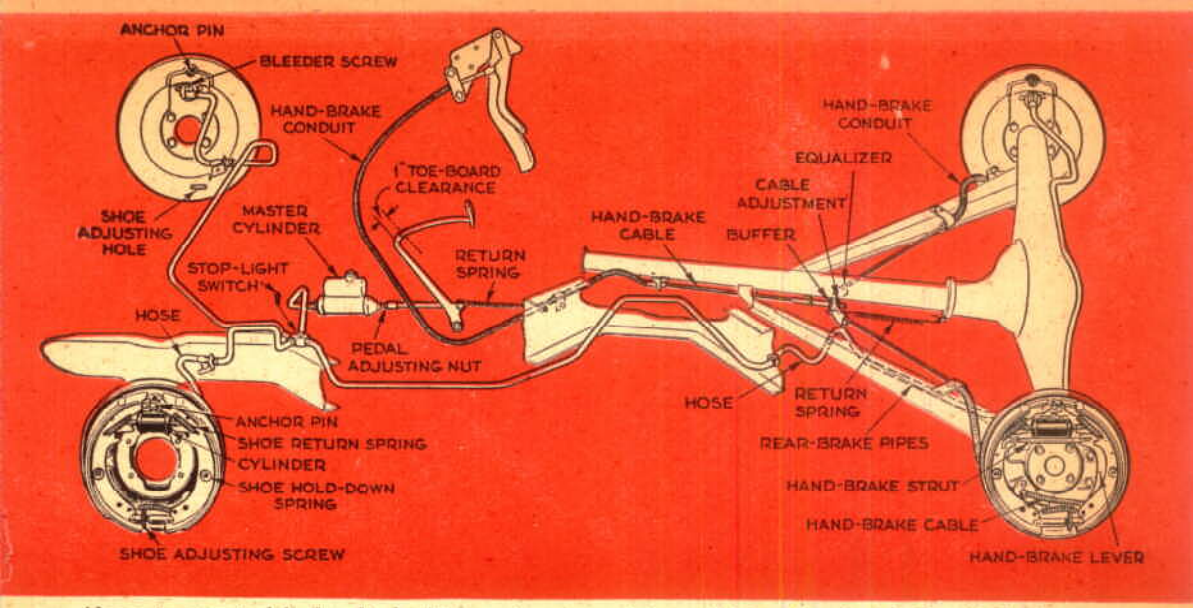
Wiring is simple. Notice that the automatic system operates independently of the original starter switch. The wire and parts required to set up my system cost me about $23.



A vacuum diaphragm is an important part of the control box. When the engine starts, rapidly increasing manifold vacuum moves the diaphragm and link, breaking the starting circuit.



What happens in control box? At the time the alarm clock goes off, or I press the dining-room switch, you have the situation in Fig. 1. Since there's no vacuum, the spring can keep the vacuum switch closed. When engine starts, vacuum overpowers the spring, breaking the circuit as in Fig. 2. This disengages starter. If the engine stalls, the vacuum disappears, permitting the spring to close circuit again. If it's the clock switch that has set off the system, current flows again—and again—until the engine catches or the battery runs down. While I'm driving the car, the vacuum and—when it's in gear—the sliding arm cut out the automatic system (Fig. 3). Moreover, the leads from the clock or the house are disconnected then. END



Above is a typical hydraulic braking system on a late-model car fitted with Bendix brakes.

How an Expert Repairs Brakes

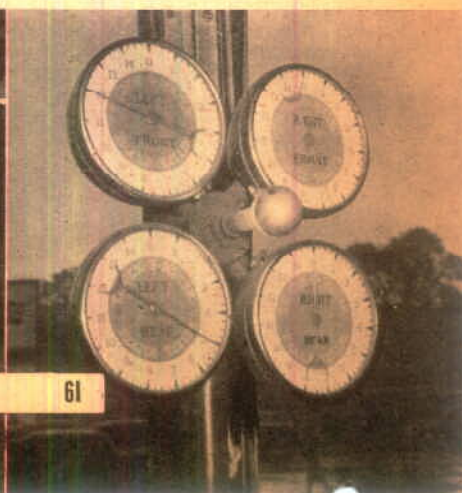
By R. P. Stevenson
PS photos by W. W. Morris

EVERY business has its experts. In any big brake shop, you may find several—mechanics with long experience who are locally known as the "best in the business."

Talk to them, and you'll learn that their abilities go well beyond the instruction-book techniques. They have their own pet shortcuts. They're capable of invention. In the accompanying photos, you'll notice several variations from traditional brake-repair procedure that sprang from this bent.

The photos were taken in one of the ten brake shops run by S. G. Tilden, Inc., in New York, New Jersey, and Connecticut. This company developed the Permafuse

1. Quick check-up. If you should take your car to one of the Tilden shops, it would first go on tester like this. Four dials (in foreground facing mechanic) register the braking power.



2. What's wrong here? When the Lincoln at the left was tested, here's what showed up on the dials. The right rear brake failed to register at all, and the others indicated unbalance.

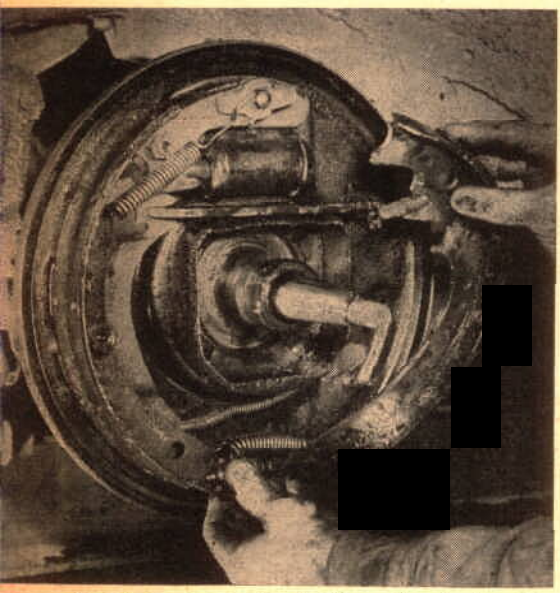
method of bonding brake linings to the shoes (PS, Nov. '47, p. 156). It now has abandoned riveting entirely.

That's why you'll find no riveting operation in this sequence of photos. Even in a shop where riveted linings are the rule, a riveter might not have been in use. Many shops now install shoes already reconditioned and lined by factory or supplier.

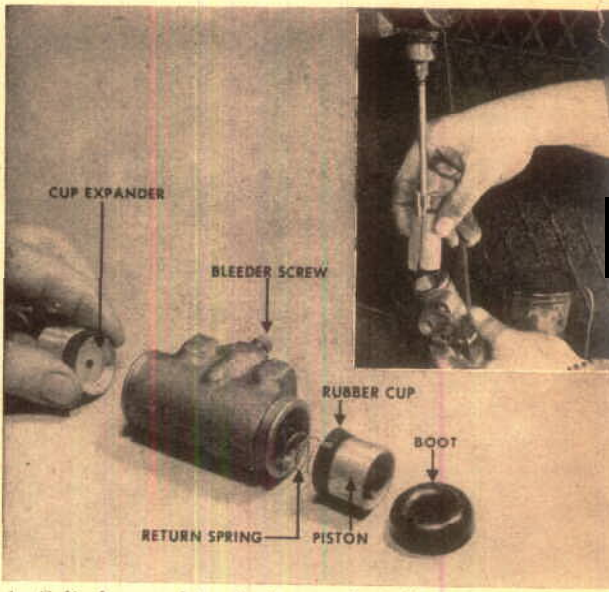
Shown in the photos are typical repair operations that might be performed by any first-class mechanic when your brakes begin to chatter, grab, drag, or otherwise demand attention.

The brakes illustrated are a Bendix product. Brakes of this make are found on the Hudson, Lincoln, Nash, Packard, 1949 Ford and Mercury, and all General Motors cars except Chevrolet, which uses a Huck brake. Studebakers, Jeeps, all Chrysler Corporation cars, and Fords and Mercurys previous to 1949 are equipped with the Lockheed type, but repair operations are generally the same as pictured here.

In a Tilden shop, a complete overhaul of your brake system takes just about two hours. The car goes first to a testing rack for a quick diagnosis of braking efficiency. This tester includes a refinement developed by the Tilden company itself. Torque read-



3. Right rear brake had been knocked out by rear-end grease leaking through the retainer. New linings were in order and springs were replaced because heat had removed the temper.



4. Cylinder on this wheel was rebuilt because fluid was leaking. In such cases, the casing is usually honed (inset) to smooth down any irregularities. Parts go together as shown.

7. Drum is refaced on special lathe if scored or out of round. The normal cut varies from .006" to .008". Cuts up to .020" are sometimes made, but oversize linings are then required.

8. Shoe and lining should conform to the drum arc before installation. A quick check is made in this manner. During use, shoes may deform enough to cause uneven wear on the linings.

ings from each wheel are relayed simultaneously to a panel of four dials. This makes it unnecesary to test each wheel individually.

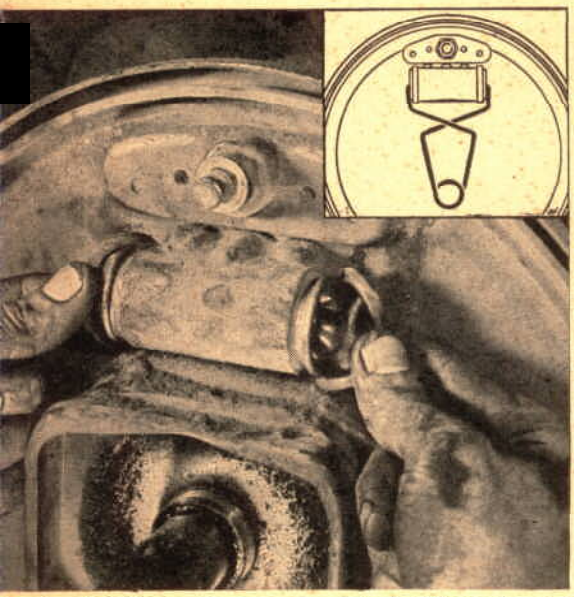
With brake performance measured, the car is moved to a lift and raised high enough for the mechanic to work in comfort.

In Fig. 3, you'll note that every part of this brake had a coating of grease. The linings were impregnated with it.

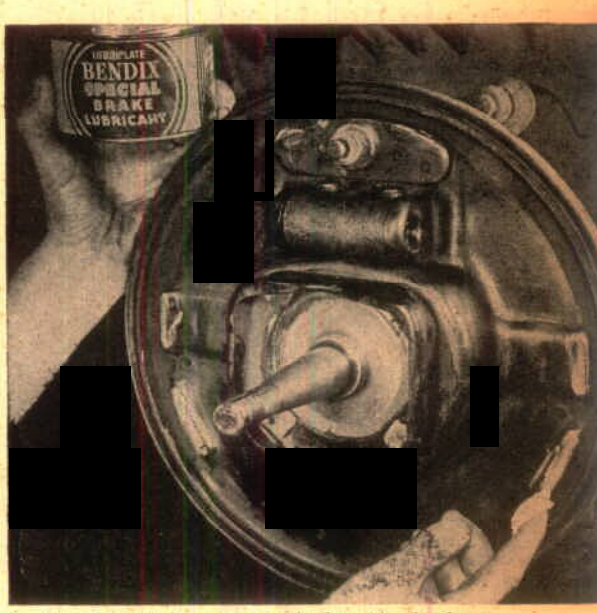
This trouble occurs more often than you may think. As likely as not, it results from the desire of some untrained grease monkey to give you your full money's worth when he fills the differential housing. A good rule to follow is to keep the grease level just a little below the filler opening. Excessive grease in the rear end tends to break through the seals.

This lubricant level is one thing a good brake mechanic will check before releasing the car to you. He'll also take up end play in the rear axle, pack wheel bearings with the proper lubricant, and inspect and tighten the bolts that hold the backing plates to the steering knuckles and rear axle housing.

At Tilden's, the final step is another trip to the testing rack. When braking power satisfies the calculations of the tester, the car is considered ready for you.

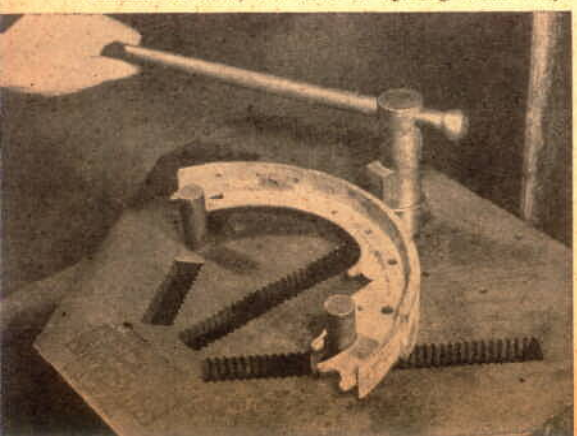


5. Mechanic opens boots to look for leaks, and checks piston action with fingers. Clamp normally used to hold piston against fluid pressure wasn't needed here; lines had drained.

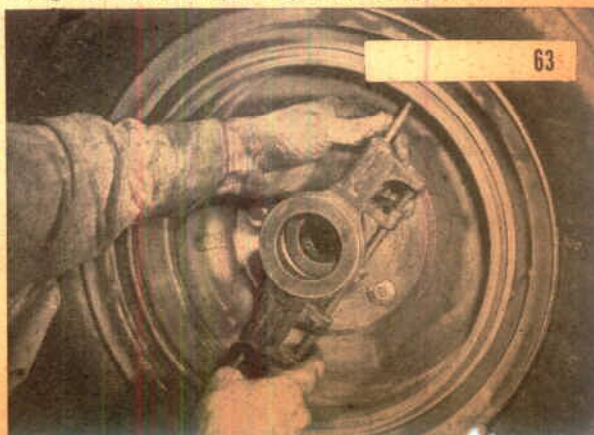


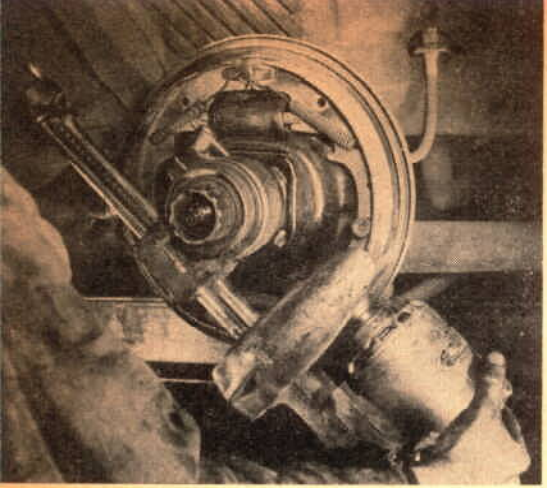
6. Special lubricant is applied to the backing plate at points where shoes will bear against it. Any grease, rust, or dirt is first cleaned from the plate with a wire brush.

9. If shoe doesn't fit, it's taken to a fixture and sprung so it does. Here fixture is set to remove belly from shoe. When ends touch and middle doesn't, the shoe is sprung other way.

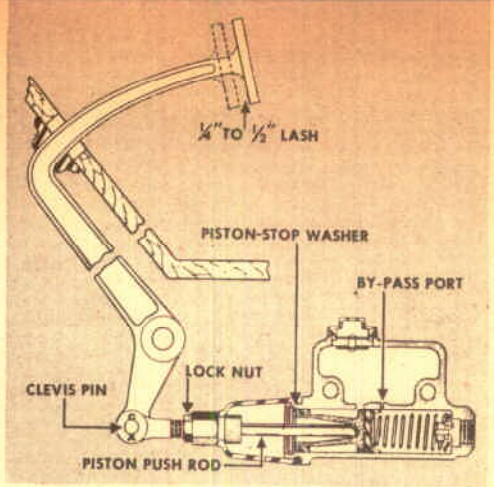


10. Drum is "miked" as first step in grinding new linings. Radius grinder is set about .008" less than this measurement. Slightly oversize linings are used when they're to be ground.

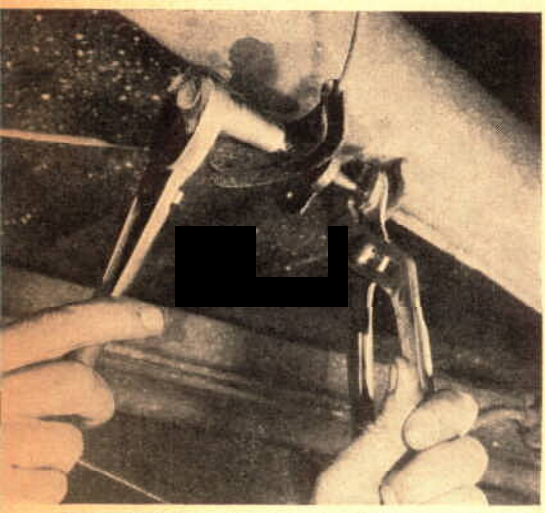




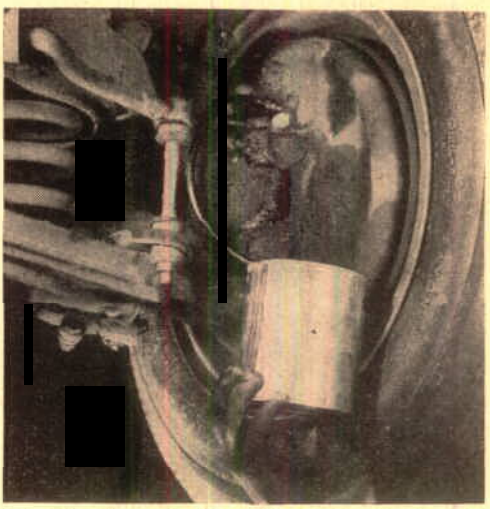
11. Radius grinder pivots on axle. After using it as a guide to set anchor, mechanic grinds .008" from heel and toe and smooths center of lining. This eliminates need for break-in.



12. Master cylinder and brake pedal are also given the once-over. Pedal should have ¼" to ½" play and be set so push rod allows piston to clear by-pass port when brakes are off.

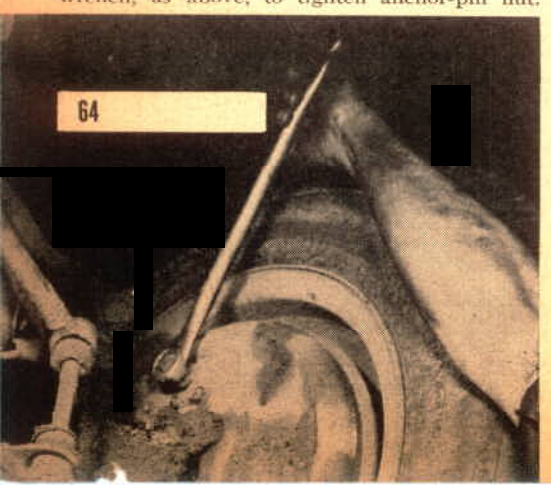


13. Parking-brake system likewise is checked through. When cable requires adjustment, it's done as above. Return spring has been removed here. Equalizer is seen between the wrenches.



14. Bleeding air from the hydraulic lines is final step. A small hose is threaded into the bleeder hole and its end placed in container while fluid is fed into the master cylinder.

15. Anchors are set after the drum's in place if a shop doesn't grind the linings as seen in Fig. 11. In any case, the mechanic uses a 16" wrench, as above, to tighten anchor-pin nut.



16. Adjusting shoes like this is often the only attention brakes need. It compensates for worn linings. Expand shoes until drum just turns by hand. Then back off about 14 notches. END