Ford Service Bulletin

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Cylinder Block Rebabbitting Equipment

An improvement has recently been made in the design of the Hempy-Cooper Rebabbitting outfit which makes it practicable for both large and small service stations to rebabbitt both Ford and Fordson Cylinder Blocks. This new equipment has shown such satisfactory results under tests at this factory that we feel warranted in drawing the matter to the attention of all Ford and Fordson Dealers.

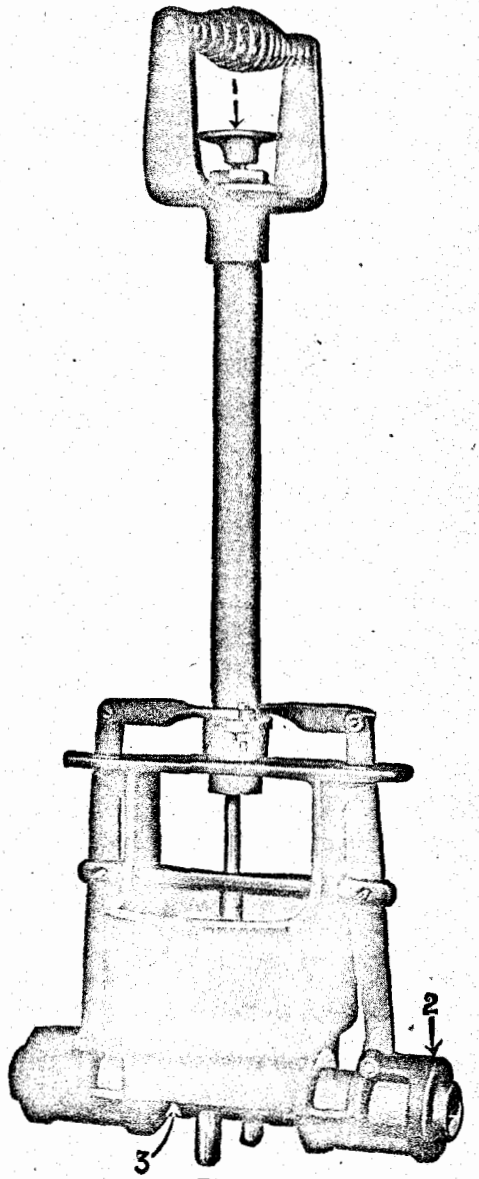


Fig. 197

In Fig. 197 is shown the Ladle-Jig used for pouring babbitt in the bearings. This jig is a combination of the pouring ladles and babbitting fixture and is operated by raising and lowering the plunger which opens and

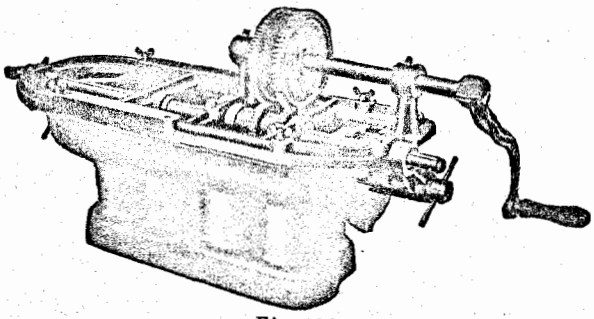


Fig. 198

closes the valves, allowing the babbitt to rush into the bearings from both sides. This method does away with the possibility of air holes in the bearings due to the babbitt not spreading properly when the old method of pouring from hand ladles is used. Furthermore, it is not necessary to preheat the bearing surfaces in the cylinder block, and by flowing the babbitt from the bottom of the Ladle-Jig only pure babbitt is used, as the scum rises to the top. In Fig. 199 the Ladle-Jig is shown applied to the cylinder block center bearing. Fig. 198 shows the fixture used for line boring the bearings attached to the block.

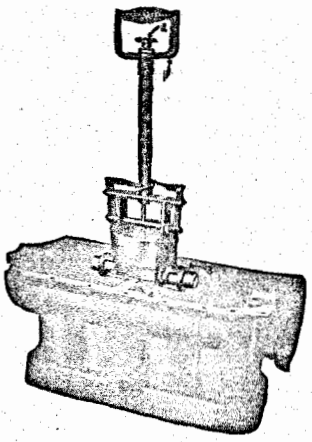


Fig. 199

In order to secure a first-class rebabbitting job dealers and service stations should use only babbitt purchased from our Branches. Complete instructions for operating will be furnished with each outfit. This complete rebabbitting equipment is manufactured by the Hempy-Cooper Manufacturing Co., Firestone Building, Kansas City, Mo.

She's a Polar Bear

The following is a letter we received from an owner in Winnipeg, Manitoba:—

"The writer's car was laid up from Saturday evening until this morning in a cold garage, and the thermometer has hovered between 20 and 32 below since Saturday night, which is plenty cold enough to test the starter.

"On going out to start the car this morning about a quart of hot water was poured over the manifold and immediately on stepping on the starter the car started. The fact that the writer has been very careful to leave the brake lever forward and to press the pedals sufficiently to squeeze the oil out must be taken into consideration, also that the ignition has been kept in A-1 shape.

"Provided the ignition system is in proper adjustment and the battery fully charged, am fully convinced that the Ford starter will spin the motor sufficiently to start the car at as low as *40 degrees below zero*. It is absolutely necessary, however, to heat up the manifold to some extent before a start can be made."

This shows the efficiency of the Ford Starting and Lighting Outfit. It also gives some very good suggestions for the starting of cars in cold weather.

Battery Service

Dealers and service stations undertaking battery service should handle repairs or replacements with the nearest authorized service depot of the battery manufacturers. Batteries for stock purposes should be purchased from the manufacturers. Excepting in cases of emergency, we will only supply batteries as part of the original equipment of our starting and lighting system.

Radiator Hose Connections

Some of our dealers have called attention to the comparative purchase price of the radiator hose which we supply as against that sold by other concerns. The difference in price is exactly proportionate to the difference in quality. We are using the highest grade hose on the market and have found by experience that anything inferior will not give proper service. The inner tube of the hose that we furnish is of the highest grade steam hose compound semi-vulcanized. It is furnished in this state so that the curing of the rubber will be completed by the heat from the engine. This permits the hose to set in position as required. The outer tube of the hose is of the best grade of compounded hose stock. Tests have been made of different brands of cheap hose with very unsatisfactory results.

It would be absolutely unfair to supply Ford owners with cheap hose at our retail price, which is based on quality material. The upper radiator hose is supplied in 4″ lengths, and there is no need for supplying anything longer. All dealers will be expected to furnish their trade with material of the quality sold by this Company.

Stand for Testing Starting Motors and Generators

The F. B. Test Stand, shown in Fig. 187, and as demonstrated at our recent convention, has been approved by our electrical engineering department as suitable for service station work in testing and repairing our starting and lighting system. This stand is manufactured

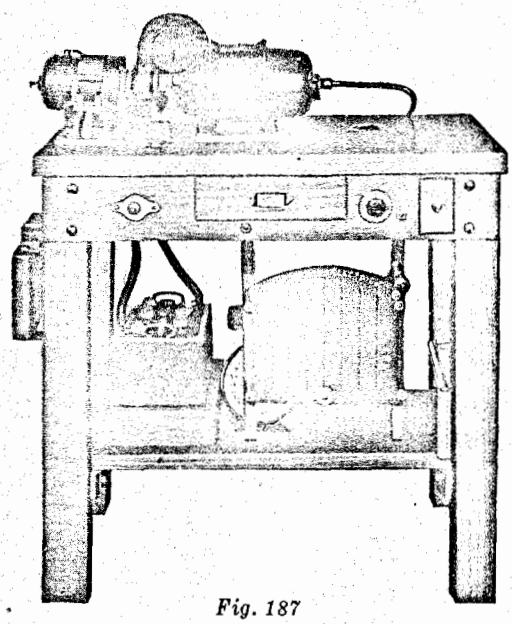


Fig. 187

by the F. B. Electric and Manufacturing Company, of Detroit, and sold by The Canadian Fairbanks-Morse Company. Full directions for operating will be furnished with each stand.

The Power of Suggestion

The stock clerk has the enviable opportunity of developing into an expert salesman. To this end he should acquaint himself with the methods of repair, so that he may advise the customer intelligently, both as to making his own repairs and as to the work that should be brought to the shop.

A point of salesmanship which should not be neglected is to sell the customer all the parts necessary to complete his repair. The stock clerk with the repair foreman's help should make a list of all parts which are necessary when replacing any other. As for example, if a customer is replacing an old style commutator brush remind him of the short pin now used. If he purchases a hub, remind him that the hub bolts have been peened over and that he will save time by shearing them off, using new bolts in replacing them. If it is a front hub make sure he has the grease to fill the hub bearings. If he buys a new valve, suggest a compound to grind it in, also a valve grinder. Advise him as to the wear and the two sizes of valve stems. If he buys bolts, inquire as to whether he needs cotter pins, etc.

By doing this, the clerk will not only increase the sale of parts but will be doing the customer a great favor, as the little reminder may save him a long trip after the parts he neglected to purchase. His good will must necessarily result in an increase in the parts and repair business and its influence will be noted in the sale of cars.

Safety First—The Upturned Nail

All rusty nails swarm with little bugs so small that a million can sit on the head of a pin at one time.

When you step on a nail, the bugs get into the blood and in 24 hours may go to the heart and cause lockjaw and death.

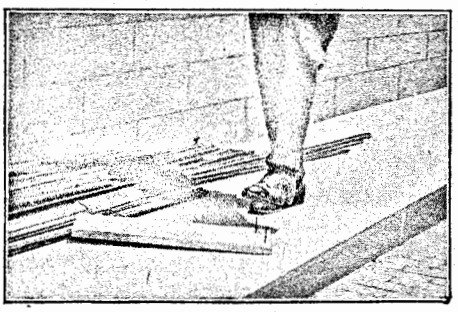


Fig. 188

There is just one thing to do when you step on a nail—*Go to a Doctor at Once.*

The best remedy of all, however, is to keep a tidy shop—*Keep Loose Boards Off the Floor.*

Attaching Additional Electrical Equipment

Unless one knows exactly what he is doing when attaching additional electrical equipment, he is likely to cause a heavy drain on the battery and may discharge the magneto.

Do not try to attach additional equipment to the terminal block or the switch, but run an independent circuit from the terminal on the ammeter so that all discharging of the battery on these new circuits may be noticed. Nothing smaller than number 16 (Brown & Sharp) wire should be used, and it should be well insulated. Wherever possible, terminal lugs, such as used on the standard wiring, should be soldered to the ends of the wire. Where the terminal lugs are impossible a neat connection should be made by laying the wire around the screw in the direction of rotation when tightening. If the wire is pieced the joints should be soldered and well insulated to prevent a ground. Wires should be laid and fastened in such a way as to avoid chafing due to the motion of the car. The ground wires should be secured to some part of the frame. A body ground is a source of fire, as well as a heavy drain on the battery and generator.

Improvised Radiator Plugs

The radiator plug shown in Fig. 189 is made from two scrap valves and a solid rubber ball. The stem of one valve is cut off about $2\frac{1}{2}''$ and threaded to fit a wing nut. The stem is drilled out of the other valve head so that it may be slipped over

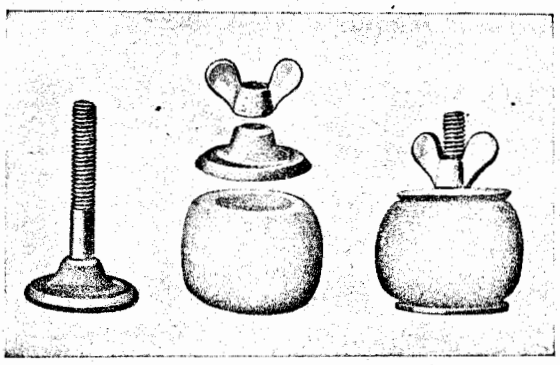


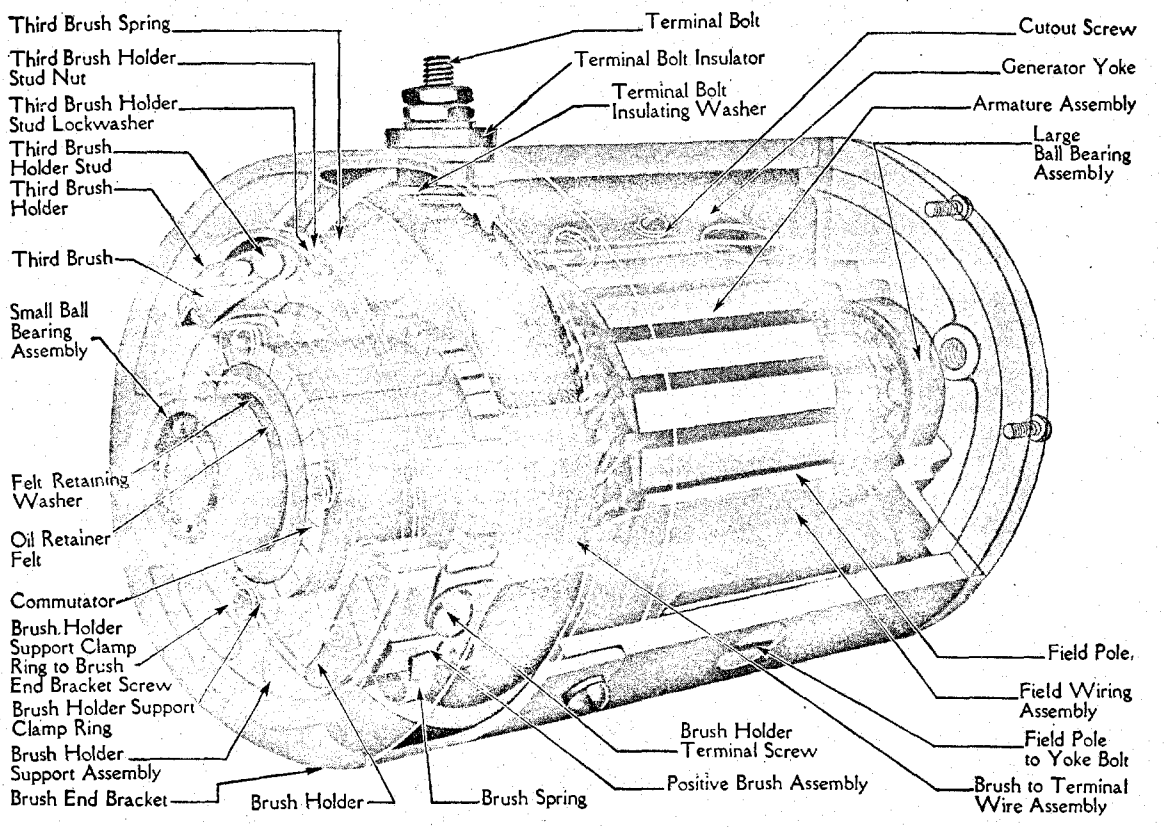
Fig. 189

the stem of the first. The ball is cut flat on the two ends, and a hole, tapered at the end, is cut through it. As the wing nut is tightened the valve seats are forced into the taper, causing the ball to expand filling the opening of the radiator.

Imitation Connecting Rod Trade Mark

DREADNOUGHT } Opposite
KRAEUTER & CO., INC. } Sides

Practical Methods of Repairing Ford Cars



Generator Phantom View

Fig. 190

The Starting and Lighting System

320. There are three distinct types of starting systems: the single unit, combined unit, and the two-unit.

321. The Ford Starting and Lighting System is of the two-unit type, that is, starting the engine is performed by a unit entirely separate from the one which generates the current. The system consists of the following: a generator, cutout, ammeter or charging gauge, battery, starting switch, starting motor, Bendix drive, lamps, the light and ignition switch, together with the wires and terminal block.

The Generator

322. The generator is of the series wound armature shunt field type. It is located on the righthand side of the engine attached to the gear case by means of three cap screws which extend through the case into the threaded holes in the bracket (front end cover) of the generator. A paper washer between the case and bracket prevents oil leaking by the joint. The spiral gear on the end of the armature shaft meshes with the large time gear, the relation being such as to give the armature a speed one and a half times the speed of the crankshaft. The speed of the engine is such that for every two hundred revolutions, the car is driven at five miles per hour. Therefore, at the average driving speed of 20 miles per hour, the generator is running at 1200 revolutions per minute. The amount of current generated is controlled by the third brush. The current which excites the field is drawn from this brush. By its movement the field is distorted to give the proper amount of current.

323. The generator is of the simplest possible construction. Fig. 191 shows the parts in their relative assembling position.

324. The yoke is made of a piece of seamless tubing. It supports the coils and field poles and acts as a housing for the generator.

325. The coils (Field wiring assembly) are held in position by means of the field poles which are held to the frame by flathead machine screws. When these screws have been drawn tight, a punch mark is made in the yoke, forcing metal into the slot of the screw, thus preventing it from working loose.

326. Before tightening the field poles, fish paper is placed between the coils and yoke at the head end, thus providing insulation for the exposed ends of the coils. The terminal bolt extends through the slot in the yoke and is insulated from it by means of a fibre washer and a specially designed insulator. The leads from the field coils are attached to the third and the ground brush holders.

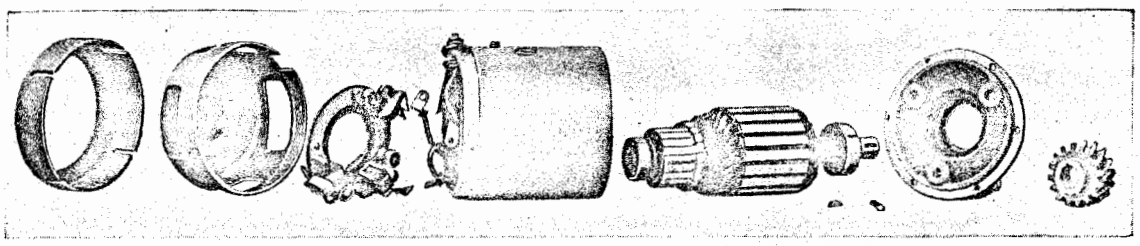


Fig. 191

327. Fastened to the shoulder end of the yoke by means of four screws is the brush end bracket. The purpose of this bracket is to support the brush holder support assembly and one end of the armature shaft. It also acts as part of the housing of the generator.

328. The brush holder support is held to the bracket by means of four screws which pass through the bracket and slots in the support, screwing into the threaded holes of the clamp ring. The mortise in the support, under the clamp ring, has four slots cut into it. These slots allow it to be advanced or retarded sufficiently to obtain the correct setting of the external current brushes. The ground or negative (—) brush holder is riveted directly to the ring, while the positive (+) brush is riveted through two fibre pieces which insulate it from the ring.

329. The third or the field brush holder is assembled to the ring but insulated from it by two fibre strips in which a radical slot allows the holder to be advanced or retarded so that the brush may be brought to bear at the proper point on the circumference of the commutator. The third brush holder is not riveted but is held in position by means of a lug and threaded post which pass through the slot. A clamp nut and lock washer on the stud secure the holder to the support. The nut is tightened when the mechanic has found the proper position of the brush, as will be explained later.

330. The brushes, which are of the carbon type, are self-lubricating. (*Never oil the commutator.*) The brushes which are free to work up and down in the holders, are held against the commutator by means of a coil spring which fits into a slot in the post of the holder. When the spring has been properly positioned in the slot, the end of the post is pinched together, closing the slot, thus preventing it from slipping out. The current collected by the brush is carried away by a wire (pigtail), one end of which is set into the brush either with solder or with a screw, while the other end is secured to a lug which is clamped to the holder by means of a screw.

331. The armature is supported by two ball bearings. These assemblies are pressed onto the shaft of the armature and are a slip fit in the brackets. The commutator is pressed onto the shaft. The wires from the coils are driven into slots in the segment (two in each one) and are set in solder.

332. There is a specially designed steel washer, working on the centrifugal principle, on the gear side of the front bearing which prevents an excess of oil working through from the gear case into the generator. The rear bearing is fitted with a felt and steel washer to prevent the oil working through to the commutator. This rear bearing is lubricated by a small oiler in the brush bracket. The front bearing is lubricated by the vapor from the time gears.

333. The front bracket, which is attached to the frame yoke by six screws, acts as a support for the front bearing of the armature shaft, as part of the housing of the generator, and is also that part of the assembly which is held to the gear case.

334. The driven gear is keyed to the shaft with a Woodruff key and secured by a pin which extends through the gear and the shaft.

Repairing the Generator

335. Indications of trouble in the generator are first seen in the ammeter on the instrument board. At normal driving speeds (about 20 miles per hour) the instrument should register between 8 and 12 amperes charge. If there is less charge than this or no charge, the trouble lies in the generator the cutout, or the wiring.

336. Trouble in the wiring is due to one of the following causes, which may be found by visible inspection:

(a) Poor or loose connection in the wiring between the generator and the battery.

(b) Dirt or fibre washer under the terminals of the wire.

(c) Broken wire.

(d) Wire ground between the generator and the instrument board.

337. The troubles in the cutouts are found by trying a new cutout, and since the instrument must be set to cut in at a certain voltage, any adjustment on it should be made at the home plant or branch where the necessary equipment is available.

338. To determine whether or not the trouble lies in the generator, attach the positive (+) wire of a direct current (D. C.) meter registering from 0 to 30 volts, to the terminal on the generator, and the negative (—) wire to the yoke (housing) of the generator. With the engine running at a normal speed (20 miles per hour) the instrument should read 7 volts, or better.

Removing the Generator from Engine

339. If the generator tests less than 7 volts disconnect the wire leading to the ammeter and run out the three capscrews which hold the bracket to the gear case. The generator is now free and may be removed by prying it off with a screw driver, forcing the generator out and down until the gears disengage. The generator is then taken to a bench to be tested and inspected.

Testing and Repairing

340. The trouble may be due to one of the following causes: (1) dirty commutator, (2) brush springs weak or binding, (3) brushes not seating properly, (4) brushes not touching commutator, (a) held up by spring, (b) sticking in holder, (c) worn too short, (5) short-circuited in the armature or field, (6) ground in brush, wires, field or armature, (7) open current in field armature or brushes.

341. Besides the electrical trouble, the generator is subject to mechanical wear, as follows: (1) commutator, (a) rough, (b) undersize (brushes rubbing on mica), (2) bearings broken or worn, (3) brush ring shifting, (4) third brush shifting.

342. The elementary equipment for testing and repairing a generator consists of a

6-volt battery,
Vise,
Ammeter,
"Yankee" screw driver,
¼" scrw driver,
Fibre drift made from an 8" piece of ½" fibre bar tapered to ⅛" (taper starting about 3" back)
Brush spring hook,
Medium weight rawhide mallet,
Machinist hammer,
Special wrench 3Z-4137,
Combination knife and saw made from a hack-saw blade.
Test lamp,
Gear puller.

Installing New Universal Joint

343. Remove the axle as described in Pars. 219 and 220. The joint may be removed and replaced, as described in Pars. 232 and 246. If the shaft shows too much play in the bushing, the drive-shaft housing should be removed and a new bushing fitted into the housing as explained in Par. 246. When the assembly has been completed, it is attached to the chassis as explained in Pars. 305 to 309 inclusive.

Replacing the Pull Rod Support

344. The pull rod supports are made in rights and lefts. They are removed by running out the clamp screw and removing the clevis from the end of the rod, thus permitting the support to be withdrawn. The new support is slipped over the pull rod and is clamped to the radius rod at a point about 16 inches from the fork end, after the clevis has been run down. It is advisable to check the brakes for adjustment, as explained in Par. 309.

Replacing a Damaged Radius Rod

345. To replace a damaged radius rod, it is first necessary to remove the wheel on that side of the axle and disconnect the brake pull rod at the cam lever. Loosen the nut on the rear of the ball housing shoulder and run off the castle nut. Run out the bolts which hold the radius rod to the flange. The rod may now be removed by springing it past the brake

cam lever and pulling it out of the shoulder having turned it so it passes beneath the axle. The new rod is installed by reversing the operation. In setting the nuts on the shoulder of the ball housing, first draw the castle nut into place and then tighten the nut on the lock washer, as described in Par. 294. If the axle has received a heavy blow which caused the rod to be bent out of shape, it should be checked as explained in Par. 294, the outer roller bearing having been removed.

Polishing the Rear Spring Leaves

346. Suspend the rear end of the car as was explained in Par. 219. Take off the hangers as was explained in Par. 220 and run the nuts off of the clips. The spring may now be removed by tapping it with a hammer or forcing a chisel between it and the frame. See Fig. 192. Remove the tie bolt which holds the leaves together. The leaves are then polished on a buffing wheel, or are rubbed down with sand paper. Before assembling them, rub a little oil and graphite on the surface of the leaves where they rub together.

347. Assemble the leaves and clamp them together in a vise or with a pair of clamps. Insert the tie bolt and drow the leaves together by tightening the tie bolt nut. When the nut has been drawn down properly, square up the heads of the bolt with the sides of the spring so it will position properly in the square hole in the frame.

348. Replace the spring in the frame, driving it up with a hammer. When it is in position, assemble the clips and draw the spring up tight by means of them. Assemble the hangers to spring and perches and let the weight of the car down onto the spring. Examine the rear end to see that the body sets squarely with the axle. If it is O. K., wipe the oil from the leaves of the spring with a rag moistened with gasoline, and give the spring a coat of paint. If the body is out of line, raise the weight of the chassis off the axle, and make the following adjustment. Par. 350.

Replacing the Rear Spring Tie Bolt

349. The tie bolt may be replaced as explained in an article under the above title on Page 68 of Bulletin No. 9, or as explained in Par. 347.

Padding Rear Spring to Line Up Body

350. The body sagging at one rear corner is usually caused by the padding between the spring and the frame wearing out. To straighten the body up, loosen the clips and force the spring away from the frame by driving a chisel between them. See Fig. 192.

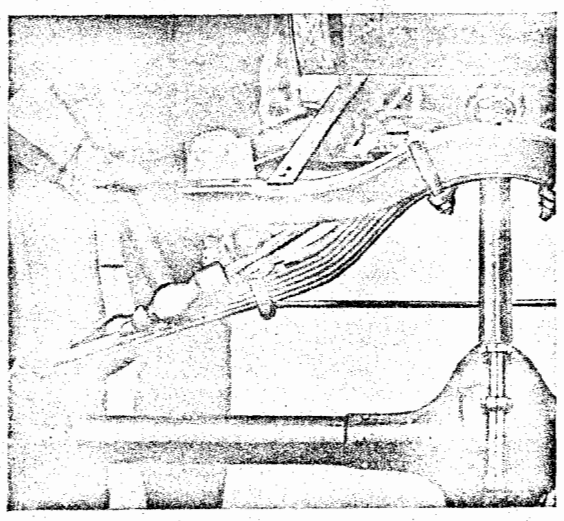


Fig. 192

Insert a new piece of leather between them, forcing it well up toward the tie bolt by means of the chisel or drift. Tighten the clips and examine the job. If it is O. K. insert the cotter pins. If, in drawing the clips up, the cotter pin holes are above the castles, it is advisable to put washers under the nuts as it is important they do not work loose.

The Carburetor Float Valve

(Continued from page 128)

351. To test the tightness of the valve turn the carburetor upside down and suck at the elbow with the mouth. If the valve is tight the elbow will stick to the lip or tongue in the same way that a small bottle would.

The Float

352. The flow of gasoline into the carburetor is controlled by ring float which is hinged to two lugs near the float (inlet) valves. There is an arm on the half of the hinge which is bolted to the float. The float valve pin rests on this arm. As the level of the gasoline lowers in the bowl, the float settles, allowing the valve to open. When the level is sufficiently high, pressure is exerted through the arm, forcing the float valve pin against the seats stopping the flow of gasoline.

353. The float is impregnated with a composition to prevent it from becoming gasoline soaked. Sometimes this filler breaks down, destroying the buoyancy of the float, allowing a too rich mixture to enter the cylinders, or in extreme cases, the carburetor to flood. This condition may be noted by lack of lustre on the surface of the cork, when the gasoline has dried from it. The float should be removed, by withdrawing the hinge pin, dried in a warm place, and then dipped into a thin shellac. A heavy coat of shellac will make the float so heavy that it will be impossible for it to control the gasoline supply. While the shellac is drying the float should be suspended by a hook or string passed through the hinge. Nothing should be allowed to touch it until it is thoroughly dry.

Fig. 193

354. A very good composition for impregnating is as follows:

1 lb. of Glue
1 Teaspoon Glycerine
1 Quart of Water

Let this come to a boil and add formaldehyde for quick drying.

Inspect the float to see that the cork is not cracked and that no pieces have been chipped out of it. See that the hinge is tight. If it is not replace the float with a new one. While it is possible to tighten the hinge by peening the rivets the chances of breaking the cork make this repair impractical.

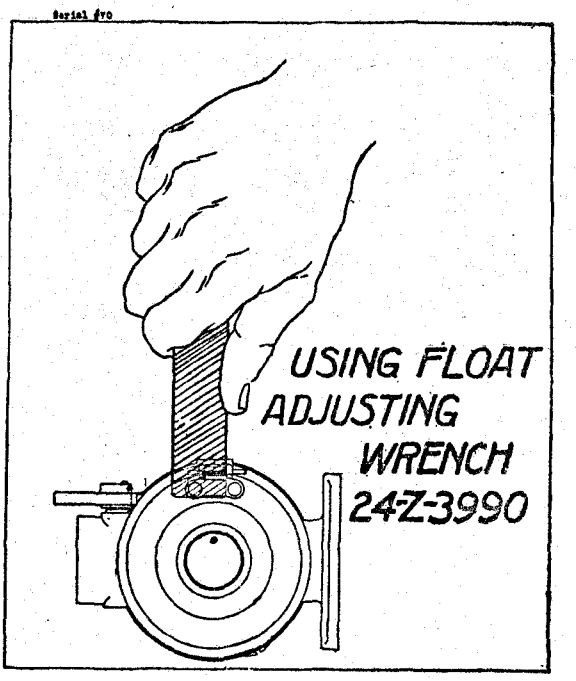


Fig. 194

355. When ready to assemble, replace the float by inserting the pin through the hinge, and check the float as follows. Take care not to crack the coating on the cork. By using the proper methods and tools, the float may be positioned correctly, with no danger of disturbing this coating. The float should be concentric with the chamber plate, to prevent its sticking. Any necessary corrections may be made by means of a 24Z-3990 wrench. This wrench is inserted in the hinge, as shown in Fig. 194, and with the wrench acting as a lever, the hinge may be bent so that the float is brought into the proper position. The other end of this wrench is provided with two height gauges for setting the float. The higher one is for the Holly. The lower is used on the Kingston. The repair man may know which is which by remembering that H is the first letter in both higher and Holly. Fig. 193 shows the check being made. The end of the gauge rests on the chamber plate shoulder of the body, the gasket having been removed, while the top of the arm just clears under the float. This distance is approximately one half of an inch.