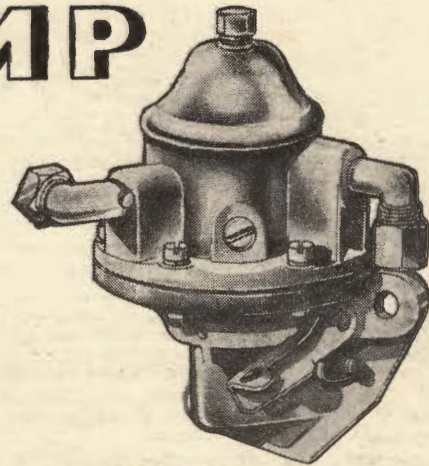


# The A.C. FUEL PUMP

Detailed Instructions for Dismantling, Overhauling and Rebuilding the A.C. Instrument

By L. D. ATKIN



On some older vehicles a thick distance piece is found between the pump flange and the engine, and this must always be retained to keep the rocker arm at its correct position in relation to the engine cam.

Take particular notice of this gasket thickness as incorrect refitting can result in a bent rocker arm, rendering the pump useless, or a shortening of the stroke resulting in fuel starvation.

## Dismantling Procedure

Before attempting to dismantle, hold the pump with the outlet union pointing away from you (note that the inlet only is marked—"in") and operate the rocker arm a few times to clear any free petrol in the fuel chamber. Then firmly press one finger over the inlet to prevent air entering and attempt to operate the rocker again. If the inlet valve and the diaphragm are in good condition and working correctly, it will not be possible to complete a full stroke of the rocker arm, and there will be a distinct pop as the finger is lifted and the vacuum broken. Repeat the same test with a finger firmly on the outlet pipe and if the pump is functioning normally, after one full stroke of the rocker arm there should be no resistance to its free idling movement. With the finger kept firmly over the outlet it should take the rocker arm three or four seconds to return slowly to rest. If the result of these two quick tests indicate faults the pump definitely needs to be dismantled and overhauled.

The manufacturers offer what they call a First Aid Repair Kit, which includes all gaskets which need replacing if the pump is dismantled, new valves and valve springs, and the complete diaphragm assembly with the pull rod. These vary in price between 2s. 7d. and 7s. 3d., according to the type of pump. The kit for the "T" type pump costs 5s., but note that no metal parts are included with any of the kits. Before proceeding any further it must be emphasised that if either of the top or bottom castings are broken, or that there is excessive wear in any of the moving metal parts, it is advisable to obtain a service replacement pump on the grounds of reliability and overall economy.

## Removing the Diaphragm

Before starting to take the pump apart make two file marks close together across the flanges of the top and bottom castings as locating marks; these ensure that on re-assembly the top is in the correct position for the pipes to be easily reconnected. Now remove all the cover screws holding the two castings together. When separated, the bottom half contains all the moving mechanical

fibre washer is put back under the fixing screw.

## Symptoms of Wear

Indications of trouble or wear in the pump are difficulty in starting, shortage of fuel at high engine speeds, complete lack of petrol at the carburetter, and leakage round the diaphragm edges or from the drain hole in its base. Most of these symptoms can occur through one or more loose connections in the fuel system, and before deciding to replace or overhaul a pump, simple checks on the unions are recommended. Far too many pumps have been renewed unnecessarily when a few minutes with a spanner on all the pipe unions would have avoided the trouble and expense.

Having inspected all the pipes and connections in a suspected pump before deciding to remove it from the engine for further examination, switch off the ignition and disconnect at the carburetter end the feed pipe from the pump. Turn the engine over by hand, and at every second revolution an obvious spurt of petrol should flow from the pipe if the pump is in good working order, and there are no blockages in the supply lines. If a meagre trickle or no fuel at all is delivered (the wavy will have already checked the tank) disconnect the pipe line from the tank at the pump end and blow through it to ensure a free passage. Being satisfied that there are no obstructions and having disconnected both pipes at the pump unions, unscrew the two bolts holding the pump to the crankcase, loosening both together. With the two bolts withdrawn the pump should come away quite easily, but should it defy normal hand pressure, care must be taken not to burr or chip the flange when prising it free. When lifting away, if possible note the number and thickness of the gaskets previously used and when refitting use the same thickness.

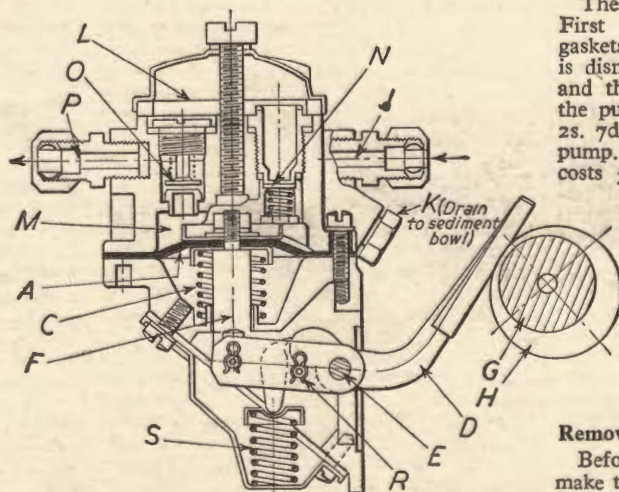


Fig. 1.—The "M" type pump. Key to the working parts is: A, the diaphragm; C, diaphragm spring; D, rocker arm; E, rocker-arm pivot; F, pull-rod; G, revolving shaft; H, driving cam; J, fuel inlet pipe; L, strainer; M, pump chamber; N, suction valve; S, spring to hold rocker arm against cam to eliminate noise.

THE A.C. mechanical fuel pump is a fairly simple but highly efficient unit which is used in the fuel supply system by the majority of car and light commercial vehicle manufacturers. Its sole function is to draw fuel from the petrol tank wherever it is placed and feed it in the required quantity to the carburetter.

Discounting the three types which were in common use up to 1934 and which are now considered obsolete, there are three types only in general use to-day, and apart from differences in design they operate on basically the same lines. The "Y" type has been fitted since 1933, and is still fitted on low horse-power cars; the "T" type was generally fitted from 1934 to 1947, and the "U" series from 1948 onwards. As the "T" series are in most general use to-day, the following information refers specifically to this type, but no difficulty should be experienced in applying the instructions to the others.

## Principles of the Pump

Without it being necessary to describe in detail the function of each of the forty odd parts that go into the average pump, some knowledge of the basic design is essential before attempting any repairs or servicing. Petrol is drawn or sucked up into the pump by creating a partial vacuum, with the action of a pulsating diaphragm, and is expelled by the same diaphragm action to the carburetter. Non-return valves maintain the flow of fuel in one direction only. The pump is driven from the engine by a cam operating a rocker arm, through a series of linkages to the diaphragm spindle or pull rod. Although the rocker arm is in motion all the time the engine is turning over, it "freewheels" or idles when the carburetter bowl is full. This is made possible by the rocker arm assembly being in two pieces, permitting the back pressure on the diaphragm to disengage the drive from the rocker head until the pressure is released by the demand for more fuel from the carburetter. Not being called upon to operate at exceptionally high speeds, and being well splash lubricated from the sump, the mechanical wear is usually slight and the pump is rarely the cause of sudden breakdowns.

It can be expected to give about 25,000 miles of trouble-free running, and the only regular service or maintenance required in that time is the checking and cleaning of the filter and trap which is in the top or upper cover. Every two to three thousand miles take out the filter gauze by removing the screw holding the domed cap, which when lifted leaves the filter exposed. Lift it out gently and wash it with clean petrol, then clean out the dirt and sediment which will be lying in the trap under the filter. As an effective seal is essential, before replacing the domed cap, check the cork washer on which it seats, replace it if it is cracked or deeply indented, and ensure that the small



parts with the diaphragm assembly, and the top section holds the valves, valve springs, etc. Remove the diaphragm assembly by depressing it slightly against the return spring and turning it a quarter turn to free the pull rod from the rocker arm linkage, then lift it out. It is better to replace the diaphragm assembly as a whole, as although the leaves are obtainable separately it is a very difficult operation to unthread the pull rod and leave sufficient metal on the end to re-riquet when reassembling with the new discs. Apart from this, the job of re-aligning the screw holes in relation to the castings, and making a positive pressure tight seal round the pull rod is a chancy operation without the necessary assembly jig. On some pre-1934 pumps the pull rod is threaded with a nut which can be removed to replace the diaphragm leaves only; it can be appreciated that reassembling without being absolutely sure of the correct position of the stud holes can cause twisting and strain on the diaphragm when built back into the pump.

### Examination of Components

With the lower assembly, carefully examine all bearing surfaces, particularly in the rocker pin area, and if there are any signs of excessive wear the offending parts must be replaced. Pay close attention to the holes where the rocker pin passes through the casting, and if too badly worn the casting will need replacing. Normal wear can be taken up by burring over the outside edges of the holes, so that the pin needs firmly tapping through on reassembly. The small circlips on the ends of the rocker pin want careful handling; prise them up slightly with a sharp screwdriver and draw off with pliers. Fit them carefully when rebuilding as their omission permits the rocker pin to drift out, which can wreck the mechanical action of the pump or allow the rocker arm to fall into the engine sump.

Check the rocker arm cam face and if necessary smooth it off with a fine stone, taking care not to remove too much metal. Inspect for wear at the spindle hole and on the linkage driving face. It is essential that the rocker arm is not distorted or bent to alter its angle, but this can only be ascertained by checking against another arm of identical pattern, or by reference to the manufacturer's master prints. Similarly, check the rocker linkage for wear at the spindle holes and more particularly where it is forked to receive the diaphragm pull rod. Replace any of these parts if they are seriously worn or distorted.

The diaphragm return spring, if corroded or losing its tension, must be replaced by another of the correct type and size. These springs are colour coded and if the colour is no longer distinguishable it is imperative to refer to the manufacturer's specification for the particular vehicle as the working tension is governed by fairly close limits. Finally, check the engine mounting flange and, if uneven or distorted, restore to perfect flatness with a file or by rubbing down on a sheet of emery cloth held on a flat surface. Clean away all filings or abrasive dust most carefully.

### Reassembling the Unit

Reassemble in the reverse order of dismantling, and when putting back the diaphragm assembly make sure that the oil seal washers are not overlooked, as they have an awkward habit of being omitted, with troublesome results. Hold the bottom casting firmly in the left hand, or if available in a vice with protected jaws, with the engine mounting flange away from you; insert the pull rod with the tab or pip on the diaphragm leaves a little to the left of top dead centre, depress the assembly against the return spring and then turn it anti-clockwise through about 90 deg., when the slots in the pull rod

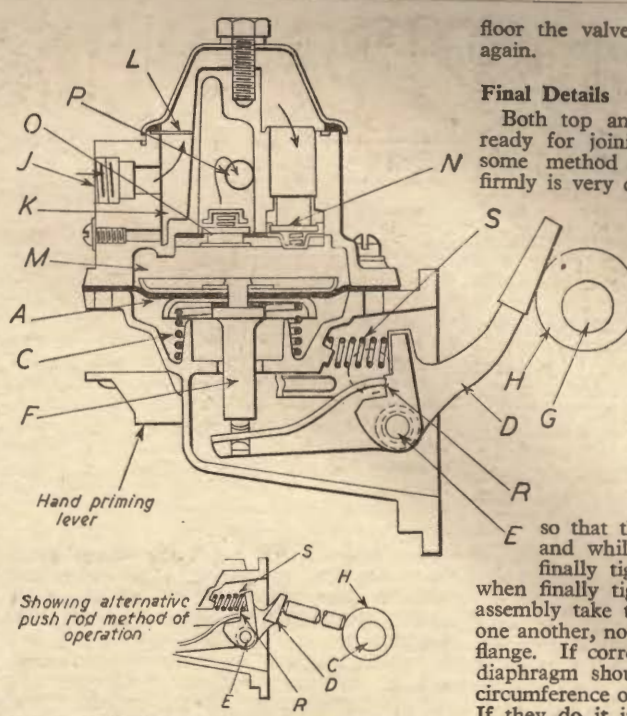


Fig. 2.—The "T" type pump. Working parts are substantially the same as for the "M" pump. This pump is one of the most popular used, but all the various types have a great deal in common, and the two diagrams will enable most A.C. instruments to be understood.

will engage in their correct position in the fork in the linkage. This movement also ensures that the stud holes in the diaphragm line up correctly for rejoining the upper and lower castings. The bottom section is now ready for refitting.

In the top section of the type of pump under examination, the outlet valve seating being removable can be refaced on a fairly smooth oil stone—all indentations and signs of wear must be removed to obtain perfect valve action. The valves, valve springs, and valve plate gaskets are supplied with the repair kits and should be replaced as a matter of course. Steep the actual fibre valve plates in clean paraffin and put back while still wet. This ensures a good seal between the valve and its seating, as well as cleaning. The inlet valve seating is an integral part of the top casting and if seriously worn can be rectified only by renewing the entire casting. In the latest types of pumps the inlet and outlet valve assemblies are complete with valve spring and seat, and are both replaceable.

### Rebuilding Top Assembly

When rebuilding the top assembly, invert the casting and replace the parts in the following order; first insert the small tripod which is the outlet valve spring retainer (check the legs for wear or distortion), put in the valve-plate gasket, follow with the valve spring and then the fibre valve disc. Now place the inlet valve disc on its seating, and (here is the tricky part) put the inlet valve spring in the centre of the valve and then replace the outlet valve seating which is also recessed to take the inlet valve spring. Take good care that the inlet valve spring is correctly located before inserting and tightening up the three screws. The valve springs are very fine and soft, but do not attempt to stretch them, as their tension is quite sufficient for the work they perform. In carrying out the above procedure, work over a cardboard box on the bench because it can be guaranteed that if dropped on the

floor the valve springs will never be seen again.

### Final Details

Both top and bottom sections are now ready for joining together, and a vice or some method of holding the lower half firmly is very desirable to leave both hands free. Press the rocker arm towards the pump until the diaphragm is brought level with the lower casting flange, and then put on the top section in its correct position according to the locating file marks. Insert the small flange studs, screwing them up until the spring washers are holding, but do not take them right up at this stage.

Now push the rocker arm away from the pump, so that the diaphragm is fully flexed, and while holding it in this position finally tighten the flange screws. As when finally tightening up on any circular assembly take the studs diagonally opposite one another, not in rotation round the pump flange. If correctly rebuilt the edges of the diaphragm should not protrude beyond the circumference of the top and bottom casting. If they do it indicates that the rocker arm was not held fully depressed away from the pump to get the maximum flexing of the diaphragm when finally tightening up.

Make the same tests used when the pump was first removed from the engine, and if the results are satisfactory refit, not forgetting the gaskets or distance pieces. Tighten up the flange bolts together to avoid distortion. Reconnect the supply pipe from the tank, and if a hand primer is fitted pump with easy strokes (do not use force) until fuel spurts from the outlet union. If no primer is fitted turn the engine over by hand unless the starter can be used with the ignition switched off. Reconnect the pipe to the carburettor and wipe away any free petrol before starting the engine.

### Trouble Tracing Summary

If the filter bowl is not screwed up tightly an air leak will occur. Make certain, therefore, that the thumb-nut at the bottom of the bowl is really tight and that the cork washer between the top of the bowl and the pump body is making a good seal.

There is a filter gauze at the top of the filter bowl which can be reached by removing the filter bowl. If this gauze is dirty it should be removed and cleaned in petrol, using a stiff brush.

Over each of the valves there is a hexagon-headed plug. If that over the valve on the inlet side of the pump is loose trouble will occur. The washers underneath the heads of the plugs should be replaced if they do not make a satisfactory seal.

It is essential that the valves should make good contact with their seats. In order to examine them the plugs previously referred to should be removed, when it will be found possible to withdraw the valves themselves. They should be washed in clean petrol, and, if either is found to be damaged or warped, it should be replaced. When refitting care must be taken to see that they are replaced with the polished side downward.

An indication of leakage of fuel at the diaphragm is shown by petrol seeping out at the flange securing the diaphragm. The trouble is usually due to loose screws. The screws should be tightened alternatively and securely.