Z

WORKING DESCRIPTION

AND

HINTS ON ADJUSTING

ZENITH

CARBURETTER

TYPE 36 VH

Ref. V10. 1st February, 1936 Price ... 3d.

ZENITH CARBURETTER TYPE 36 VH

THE illustration on page 4 shows the special horizontal model of the "V" type carburetter cut-away to enable the flow of petrol to be traced from it entering as fluid until it leaves the carburetter and enters the engine as a correctly proportioned mixture of petrol and air.

Similarly on page 6 the bowl of the carburetter is shown complete with float, and the pump and economy device.

DESCRIPTION

Petrol enters the carburetter at the union 39, and passing through a gauze filter 1, reaches the needle and seating 38. Unless the float 42 (illustration 2) is already lifted against the needle by petrol in the float chamber 34, the petrol will continue its course, pass the needle into the float chamber. It will continue to flow until the various passages are filled, and the petrol reaches a predetermined level, which causes the float to lift against the needle, pushing it on to its seating. This prevents more petrol entering and causing the carburetter to flood.

Petrol will have entered the passage 30 in the base of the bowl by passing through the outlet 33, and economy jet 32. It will then have passed through the main jet 26 along the passage 35 into the main channel 20 in the emulsion block 8. Here it will remain at the predetermined height, which is just below the emulsion block outlet.

This petrol will have also passed through 28 and 27 to the compensating jet 25 and starting jet 22 respectively. From the compensating jet, the fuel passes along the passage 24 above it, and joins the petrol from the main jet in the common channel 20. Petrol will also rise in the channel 21 above the jets.

From the main channel in the emulsion block petrol will pass into the slow running jet drilling via the passage 37.

Similarly, the well of the capacity tube 36 will be filled to the petrol level by the fuel flowing from the emulsion block through passage 23.

It has now been observed how the petrol reaches the jets and channels. The fuel will occupy the positions described all the time the engine is stationery, and there is a supply of petrol from the tank or pump.

Let it now be imagined that the car is to be started from cold. The starting device on the dash is operated which will result in the main valve 12 being pulled off its seating into the position shown in the drawing on page 4. The engine should now be turned over a few times either by starter or by hand, with the ignition switched off. Now switch on the ignition and turn the engine over again. During this time the throttle 16 is closed to the idling position, i.e., just cracked open. Consequently, upon the engine being rotated a strong suction or depression will be created at the outlet 13 on the engine side of the throttle. This will result in petrol being drawn from the passage 21, and air from the venturi 11. The passage

of the petrol from the starting jet to the venturi can be traced up the channel 21 to the air valve 19 along the communication tube 17 into the venturi by means of the holes 11. Here the petrol will be met by air entering the venturi, and will be broken up to form a rich starting mixture. This mixture will then be drawn into the engine via the channel 13. The size of starting jet and venturi are such that this mixture of petrol and air is correct to ensure the engine will now fire. Immediately it does so the suction or depression at 13 will increase. This extra depression is apparent throughout the channels of the starting device, and will result in the air valve 19 being drawn off its seating. The stem of the air valve is "stepped" so that when it is drawn into its housing, there will be a space around the end of the stem. Air will be drawn through this space with the result that a certain amount of the depression on the starting jet 22 is released. Consequently, less petrol will be drawn through this jet, the starting mixture is at once weakened, and the engine will turn at a speed considerably in excess of normal idling. These are ideal conditions for starting an engine from cold. At no time is neat petrol entering the engine, a very rich mixture is only necessary to obtain the first fire, and a fast revving cold engine is less liable to cylinder wear.

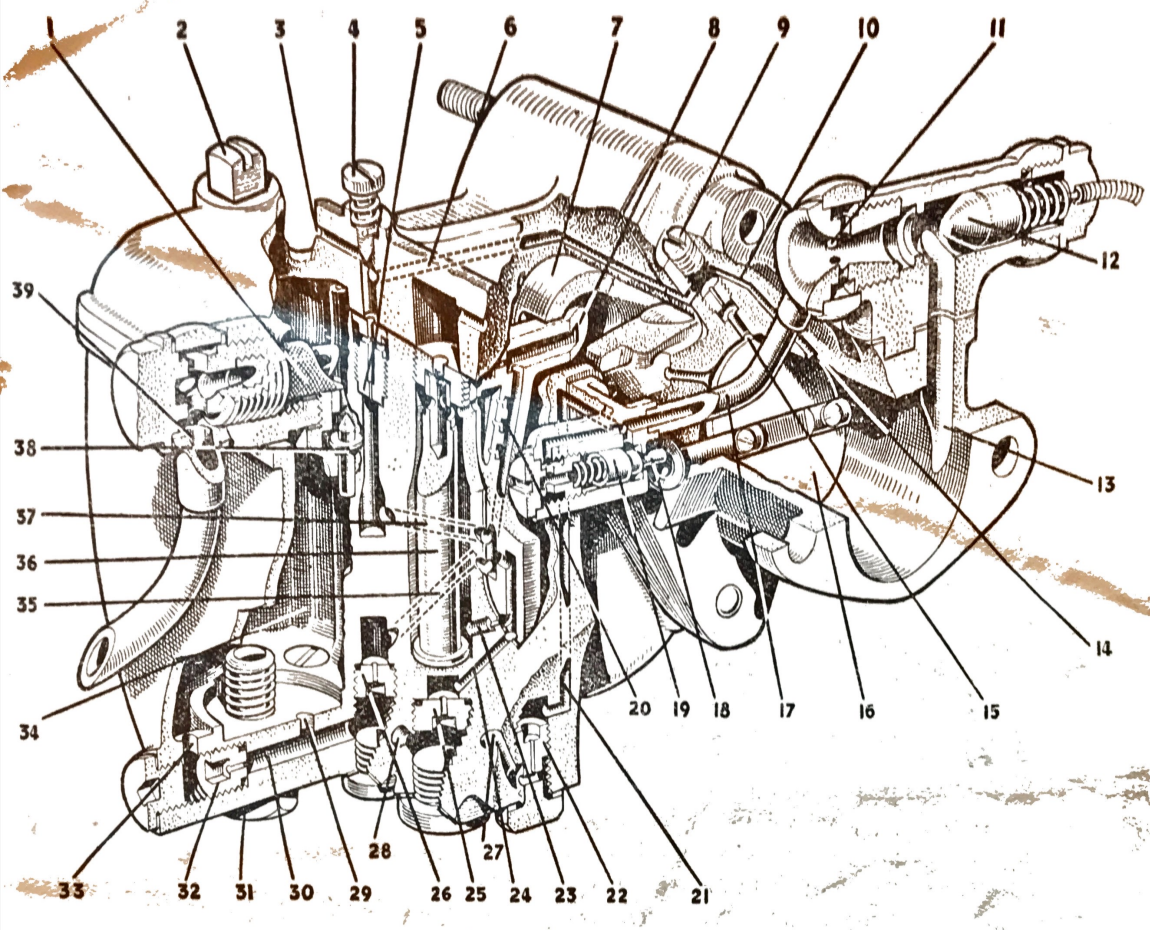
If necessary the car can now be driven away immediately with the starting device still in action. As soon as the engine is warm, it will be found that the starting control can be released. The valve 12 will then return to its seating, and the device will be inoperative.

The car is now working on the main carburetter only. With the throttle closed down to the idling position, the mixture will be supplied from the slow running jet 5 with the starting device valve 12 closed, and the throttle 16 only just open, the depression will be concentrated on the outlet 14. This will be directed on to the slow running jet via the passage 10. Consequently, petrol will be drawn from the well beneath the jet, measured on passing through, and meet air entering the carburetter at 3. The amount of air mixing with the petrol from the slow running jet is controlled by the air adjustment screw 4.

At the throttle edge there is a further outlet 15, which breaks into the slow running passage 10. Upon the throttle being opened from the idling position, this will give an additional mixture to ensure progressive get-away from slow running. This explains the title of progression jet for that part situated at passage 15.

Upon the throttle being opened still further, the depression will be concentrated on the nozzle 8 of the emulsion block, which projects into the narrowest part of the choke tube. This will first result in the petrol being drawn from the passages 20, 23, 24, 35 and 37, so that the source of petrol supply is eventually through the main and compensating jets 26 and 25. It will be observed that the petrol in the well of the capacity tube 36 has been consumed, and as the top of the well is open to the atmosphere the compensating jet is now under atmospheric pressure. As a result petrol drawn from the jet will be broken up by air from the capacity tube.

The fuel from the main jet is restricted by flowing first through the economy jet 32, and along the passage 30. It will then be drawn through the main



jet 26 along channel 35, and meet the emulsified petrol from the compensating jet in the common channel 20. This will tend to break up the petrol from the main jet also. The supply from both sources will then be drawn from the emulsion block nozzle into the choke tube. It is essential that this mixture should be distributed completely across the choke tube in all directions. To obtain this even distribution, a small circular bar has been placed across the choke at right angles to the emulsion block nozzle. Horizontal to the nozzle another bar is placed (actually an extension of the screw holding the choke tube). Now air rushing from the intake will strike these two bars and create a vacuum on their sides facing the engine. The petrol-air mixture leaving the emulsion block will run along these bars filling up the vacuum, and then proceed past the throttle valve into the induction pipe.

PUMP AND ECONOMY DEVICE

To ensure powerful acceleration without detrimental effect to consumption figures, an ingenious pump and economy device is included in the bowl of the carburetter. This device is operated by an inter-connection between the throttle movement and a plunger in the pump. As the throttle is opened so will the pump be operated automatically. The movement of the throttle is transferred by means of the inter-connection mechanism to

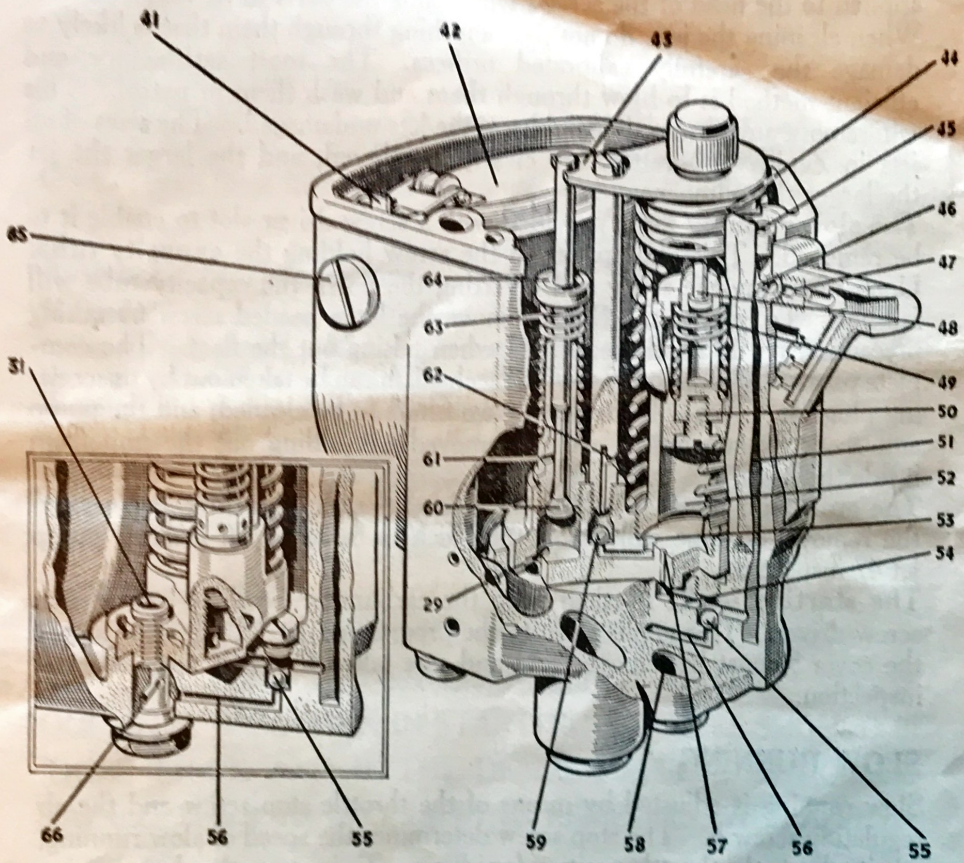
the top of the pump piston. The arm forces down the pump against the action of the outer spring 44. This will depress the inner piston 48, and the plunger will be forced down by the inside spring 49. The petrol in the chamber 52 will be forced through the outlet 57, along the passage 54, up channel 51, through the pump jet 47, and so from the emulsion block nozzle into the choke tube. A leak is provided for any excessive petrol from the pump. The outlet for this from the pump chamber is at 53. It will then pass the ball valve 59 and return to the float chamber of the carburetter by outlet 62. Now upon the throttle being closed, the outer spring 44 will force the piston back to its top or inoperative position. This will cause petrol to be drawn into the top of the fixing stud 31, where a small dome filter is placed, and through the outlet holes 66 at the stud base. Here the petrol passes through another filter, and along the passage 56. The ball valve 55 will be lifted, and the petrol will continue its course round the valve and along the channel 54, through 57 into the pump chamber 52. It will be realised that the ball valve 55 will fall back to its seating by reason of its own weight, and thus prevent petrol returning to the bowl through the inlet passages. Similarly, ball valve 59 prevents the pump leak becoming an inlet channel. A further ball valve is situated at 46 near the pump jet. When petrol is pumped up the channel 51 it will push the ball valve against the air inlet 45 and prevent petrol escaping through this.

It was pointed out in the main carburetter section that a restriction in the form of an economy jet is placed on the main jet. The full effect of the main is only required during the last part of the throttle movement, consequently the main is restricted until the economy device is brought into action. An extension on the top plate 43 of the pump strikes the shoulder 64 on the last part of the downward stroke. This causes the valve 60 to be moved off its seating and petrol will enter immediately from the float chamber at 61, flow past the valve 60, through the opening 29, and so into the main jet channel 58. Thus the economy jet is by-passed, and the full effect of the main jet is obtained.

As soon as the throttle commences to close, the top plate 43 will rise and the valve 60 will return to its seat against the action of the spring 63. Consequently, the supply of petrol to the main jet is once more regulated by passing through the economy jet first.

ADJUSTMENTS

The carburetter is delivered with the setting that has been found by extensive experimental work to be most suitable for the engine to which it is fitted. Consequently, very little adjustment to the carburetter should be needed. Indeed, the user will find that greater service will be obtained from the carburetter if adjustments are made only when absolutely necessary. When you have trouble with your engine, do not assume that it is always due to the carburetter. If you are satisfied that the carburetter is completely free from dirt (*i.e.*, jets, needle seating, pump, etc.), do not be tempted to alter the carburetter until you have gone over all other possible causes of trouble, such as sparking plugs, timing of ignition, valves, etc.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DISMANTLING THE CARBURETTER

The bowl of the carburetter can be removed by taking out the holding down screws 2. The hand should be placed beneath the bowl during this operation, so that when the screws are removed the bowl will drop into the hand.

The petrol in the bowl can then be emptied back into the tank.

The jets should be removed occasionally and thoroughly cleaned. One of the holding down screws 2 is squared at the end to fit into the jet covers and jets. When the bottom end is placed in the squared recesses a spanner applied to the head of the screws will enable the parts to be removed.

When cleaning the jets, do not pass anything through them that is likely to damage the carefully calibrated orifices. The most satisfactory and efficient method is to blow through them and wash them in petrol. This will remove any obstruction and leave the jets undamaged. The sizes of all jets in Zenith carburetters are clearly numbered, and the larger the jet the larger the number.

The slow running jet is provided with a screw driver slot to enable it to be removed. This also applies to the screw holding the **capacity tube.** Upon removing the screw and inverting the bowl, the capacity tube will fall out. To remove the **float,** remove the large headed screw 65 taking precaution not to bend the arm 41 when taking out the float. The complete **pump** and **economy device** mechanism can be taken out by unscrewing plug 31. This will enable the two filters to be cleaned, and the pump and economy attachment can be removed by pulling out the unit from inside the bowl.

The emulsion block is held to the side of the bowl by three screws, and the removal of these will enable the block to be taken off and the pump jet 47 inspected.

The starting jet 22 is taken from the carburetter bowl by means of a screw driver. This applies also to the progression jet 15, but in this case the cover 9 must be removed first and care taken that it is replaced after inspection.

SLOW RUNNING

Slow running is adjusted by means of the throttle stop screw and the air regulating screw 4. The stop screw determines the speed of slow running, i.e., it adjusts the throttle position for idling. To increase the slow running speed, the stop screw must be turned in a clockwise direction. If turned in the opposite direction a slower tick-over will be given.

The richness of the slow running mixture is adjusted by the air regulating screw 4. Should the engine refuse to tick-over for any length of time or stall on deceleration, it is a sign that the slow running mixture is weak. To overcome this it is only necessary to enrich the mixture by turning the regulating screw in a clockwise direction. If the engine is inclined to "hunt" when running slowly the mixture is too rich, and must be weakened by turning the air regulating screw in an anti-clockwise direction. The best position of the slow running screw from the point of view of pick-up

is within one turn of the " home " position. A size of slow running must be decided upon that will permit even tick-over with this close setting of the screw.

There are other factors quite apart from the carburetter that have a great influence on the slow running, *i.e.*, slow running when the engine is out of gear, and the car is stationery. These factors include non-airtight joints, worn valve guides, valves not seating, ignition advanced too much, incorrect setting of sparking plug points. Such details must always be taken into consideration. The carburetter only should not be suspected if slow running is unsatisfactory.

DIFFICULT STARTING

It is assumed that the ignition has been verified to be correct, and care taken to see that there is no air leak between the carburetter and the cylinder block. Both these items are very common causes of difficult starting.

Automatic Starting Device

If difficulty in starting is definitely due to carburation, look to the automatic starting device. Make sure that the starting jet 22 is clean, and that the air valve 19 is not sticking, and also when the dash control is operated, the main valve 12 comes completely off its seating and fully uncovers the orifice on the engine side of the throttle. The latter can be checked by finding if it is possible to pull the valve out further when the control on the dash is fully extended.

The Starting Jet 22

THIS PART OF THE DEVICE HAS A CERTAIN BEARING ON ALL THE DIFFICULTIES CHRONICLED BELOW. CONSEQUENTLY, VARIATION IN STARTING JET SIZES SHOULD BE TRIED FIRST, AND IF THE DESIRED EFFECT IS NOT OBTAINED THEN THE FOLLOWING REMEDIES WILL APPLY.

A size of jet should be decided upon that, in conjunction with the correct sleeve and venturi gives an immediate response and steady running from cold.

Unable to Start

If this is experienced, ask an assistant to observe the automatic air valve sleeve 18 while the engine is being rotated. If this draws back immediately, the mixture will not be rich enough to start a cold engine. To overcome this difficulty, fit a size larger venturi 11. The correct movement

of the valve is to remain in position until the engine has fired and commenced to run. It should then draw back and allow air to pass in around it, which will result in the engine continuing to run at a good speed.

Delay in Obtaining Initial Fire

This indicates that the venturi 11 is too large, and should be changed to the next size smaller. An oversize venturi will also give an

Excessively High Engine Speed

and this can also be overcome by changing to a smaller size.

Engine Fires but Fails to Run

When this occurs it is apparent that the automatic weakening off of the mixture is too great, indicating that when the automatic valve is drawn open an excessive quantity of air enters between the stem of the valve 18 and the body of the carburetter. On some carburetters a loose sleeve is mounted on the stem of the valve to measure the amount of air entering, and a larger size must be fitted to avoid the trouble of the engine failing to run after it has fired.

Rich Running Mixture

When the engine fires and continues to run but quickly shows evidence of excessively rich mixture, this indicates that the sleeve on the automatic valve stem is too thick, and must be replaced by one of smaller diameter.

To Change the Sleeve

Withdraw the complete valve by rotating the large screw head at the end of the valve cylinder. It will be seen that the sleeve is held to the stem of the valve by a split pin, and care must be taken to ensure this is firmly replaced when fitting an alternative sleeve.

General

The efficiency of the starting device depends upon the strong suction communicated to the venturi and starting jet when the engine is rotated. Consequently, it is imperative that the throttle is closed right down to the idling position for starting.

It is very essential that the necessary revs. on the starter are obtained during the colder months of the year, and to ensure this a suitable grade of oil in the crank case must be used and the starter battery kept in good condition.

POOR ACCELERATION

The acceleration is controlled mainly by slow running adjustment, compensating jet, capacity tube and accelerating pump mechanism.

Incorrect slow running adjustment will cause a spot when opening up from

the slow running position, and it is often advantageous to set the slow running mixture just on the rich side to avoid this. As pointed out under "Slow Running" the air adjustment screw should be within one turn from the full "home" position.

Where the carburetter is fitted with an accelerating pump (as shown in the drawing on page 6) and rapid progressive accelerating is not obtained, make quite certain that the filters in the plug 31 are free from foreign matter, and that the ball valves 46, 55 and 59 are working freely. The pump jet 47 may need cleaning occasionally, and this is performed by removing the emulsion block and passing a hard bristle from a brush through the jet, thus removing any obstruction.

If the engine does not get away well at slow speeds alternative compensating jets should be tried. When the jet is too small there is generally a pause or spot before the engine responds to the opening of the throttle. Acceleration will be found to be heavy if the compensating jet errs on the large size. If after adjustment to slow running and the compensating jet, the engine still fails to pick up sharply, the effect of fitting one size larger capacity tube should be investigated.

LOSS OF POWER ON HILLS

The strength of the mixture when the engine is pulling hard is determined chiefly by the compensator, and if the car lacks power on hills, experiments should be made with larger and smaller sizes until the required power is obtained.

LACK OF SPEED

Care should be taken to make certain that the lack of speed is not due to retarded ignition or restricted supply of petrol from the tank or fuel pump, to faulty ignition or to poor compression due to leaking valves or wrong tappet adjustment. If the lack of speed is definitely due to the carburetter, different sizes of main jets should be tried, as this jet has most influence at high speed. From the description of the economy device it will be observed that the full effect of the main jet is only obtained at full throttle, and if top speeds seems to be restricted, one should look to the economy device to ensure that it is functioning correctly, and that all passages are clear of obstruction. If no improvement is effected, no matter what size main jet is fitted, then a size larger choke tube should be employed and the most suitable main and compensating jets found by trial.

"SPITTING" BACK

When the car gets away badly and "spitting" back occurs in the carburetter when accelerating, weakness at small throttle openings is indicated, and the items mentioned under "Poor Acceleration" should be given attention.

If "spitting" back occurs at irregular intervals and the engine has little power, and cannot drive the car at a high speed, this indicates weakness

in the latter part of the throttle range, the economy or main jet should be enlarged, and the economy device given attention. It should be remembered that " spitting " back is very often due to defective sparking plugs, incorrect setting of plug points or to valves not closing correctly. Popping in the silencer when coasting down hills is generally a sign that the slow running mixture is too weak, and this can be remedied as described earlier.

EXCESSIVE PETROL CONSUMPTION

The carburetter is often blamed for this defect when actually it is due to the engine being in poor condition, or to the ignition being retarded too much. There may be a leak in the petrol system, or the brakes may be binding. Moreover, rough estimates are very misleading, and the consumption should be carefully checked over a hundred miles or so to make sure that it is really excessive. It should be remembered that short journeys and town work mean an increased petrol consumption, and that the average generally stated by the Makers is for country running over give and take roads with normal loads. If, however, it is certain that the consumption is excessive, and various adjustments to the engine have been attended to, then as far as the carburetter is concerned we suggest trying slightly smaller jets. First try one size smaller main and compensating jets. If this does not effect the road performance, then try even smaller jets. However, should the performance deteriorate by fitting smaller sizes in both main and compensating jets, it should be remembered that there is no relation between these two jets, and it is quite in order to alter the size of one and not the other. Consequently, the effect should be tried of reducing one jet at a time. In a similar manner smaller sizes of economy jets should be tested. Consumption will be effected if the ball valve 46 is not seating correctly, and petrol is leaking at the air inlet 45.

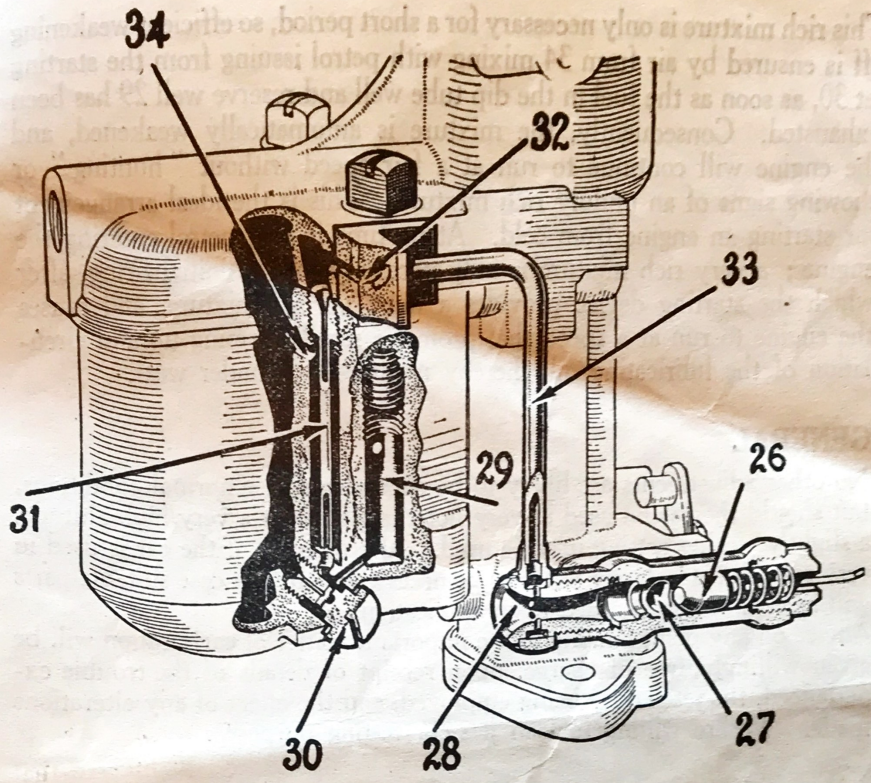
It should be made quite certain that the automatic starting control is working freely, and that the valve 12 is returning completely to its seating when the dash control is released. If this is not so, the starting device will not be out of action, and consequently will be supplying extra petrol to that given by the main carburetter.

Heavy consumption may be caused by excessive pressure from the fuel pump. This is indicated by the fact that it is impossible to obtain smooth tick-over irrespective of the position of the air screw for slow running and by black smoke from the exhaust. When running down hill, petrol fumes in the car will also be noticeable. In this case regulation to the petrol pump should be effected.

THE FILTER

Petrol is filtered on entering the carburetter, and the filter 1 should be cleaned from time to time. To remove this item unscrew the petrol connection and take the filter out of its seating. The gauze can then be cleaned thoroughly with petrol.

When re-assembling the filter, care should be taken to see that the washers on both sides of the petrol pipe connection are correctly replaced.



DIP TUBE STARTING DEVICE.

Some models of the 36 VH carburetter are fitted with a starting device similar to that shown in the illustration above. Actually, this shows a down draught carburetter, but exactly the same principles apply to the horizontal model.

To start the engine from cold the automatic starting device control on the dashboard is operated, resulting in the main valve 26 being drawn off its seating to the position shown in the drawing. With the ignition switched on, the engine should now be turned over by means of the starter, ensuring at the same time the throttle pedal is not depressed, as it is essential that the throttle should not be opened beyond the normal idling position for starting purposes. With the throttle in this position, when the engine is rotated all the suction or depression created will be concentrated upon the outlet 27 on the engine side of the throttle. This depression will be apparent at the venturi 28, and in the communication tube 33, which will result in air being drawn through the venturi, and petrol from the dip tube 31.

The petrol is drawn up the dip tube across the connection 32, and through the venturi. Here the petrol will be met by air entering the venturi, and will be broken up to form a rich starting mixture. This mixture will then pass into the induction pipe through the drilling 27. The sizes of the dip tube and venturi are such that this mixture of petrol and air is correct to ensure the engine will now fire and continue to run.

This rich mixture is only necessary for a short period, so efficient weakening off is ensured by air from 34 mixing with petrol issuing from the starting jet 30, as soon as the fuel in the dip tube well and reserve well 29 has been exhausted. Consequently, the mixture is automatically weakened, and the engine will continue to run at a fair speed without "hunting" or showing signs of an unduly rich mixture. This is the ideal arrangement for starting an engine from cold. At no time is neat petrol entering the engine; a very rich mixture is only necessary for the initial firing, after which the starting device provides a more normal mixture, and causes the engine to run at a speed that promotes rapid warming up and circulation of the lubricating oil, thereby minimising cylinder wear.

GENERAL

No other adjustments are likely to be necessary under normal conditions, but should the car be used in very hot climates or at a very high altitude, a slightly weaker setting may be used. Alternatively, if the car is used in very cold climates, larger jets may be necessary. In any case suitable parts will be willingly forwarded upon application.

Advice on any point relating to the important matter of carburation will be given willingly, free of charge, upon receipt of details of the trouble experienced, the jet setting being employed, and the effect of any alterations made. We are willing to loan jets for testing purposes.

Other Publications on the 'V' Type Carburetter.

Ref. V.2.	Detailed instruction booklet of 'V' carburation ...	Price 3d.
„ V.3.	Illustrated description of the 'V'	„ 3d.
„ V.7.	Downdraught carburation on Austin Cars	„ 3d.
„ V.8.	Instruction booklet on Vauxhall Carburetters 30 UJ2, 30 VM, 34 VIM	„ 3d.
„ V.10.	Instruction booklet on 36 VH as fitted to Riley 1½ litre	„ 3d.
„ V.13.	Instruction booklet on 26 VF and 30 VM as fitted to Hillman Minx and Standard 9 h.p. Cars	„ 3d.

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