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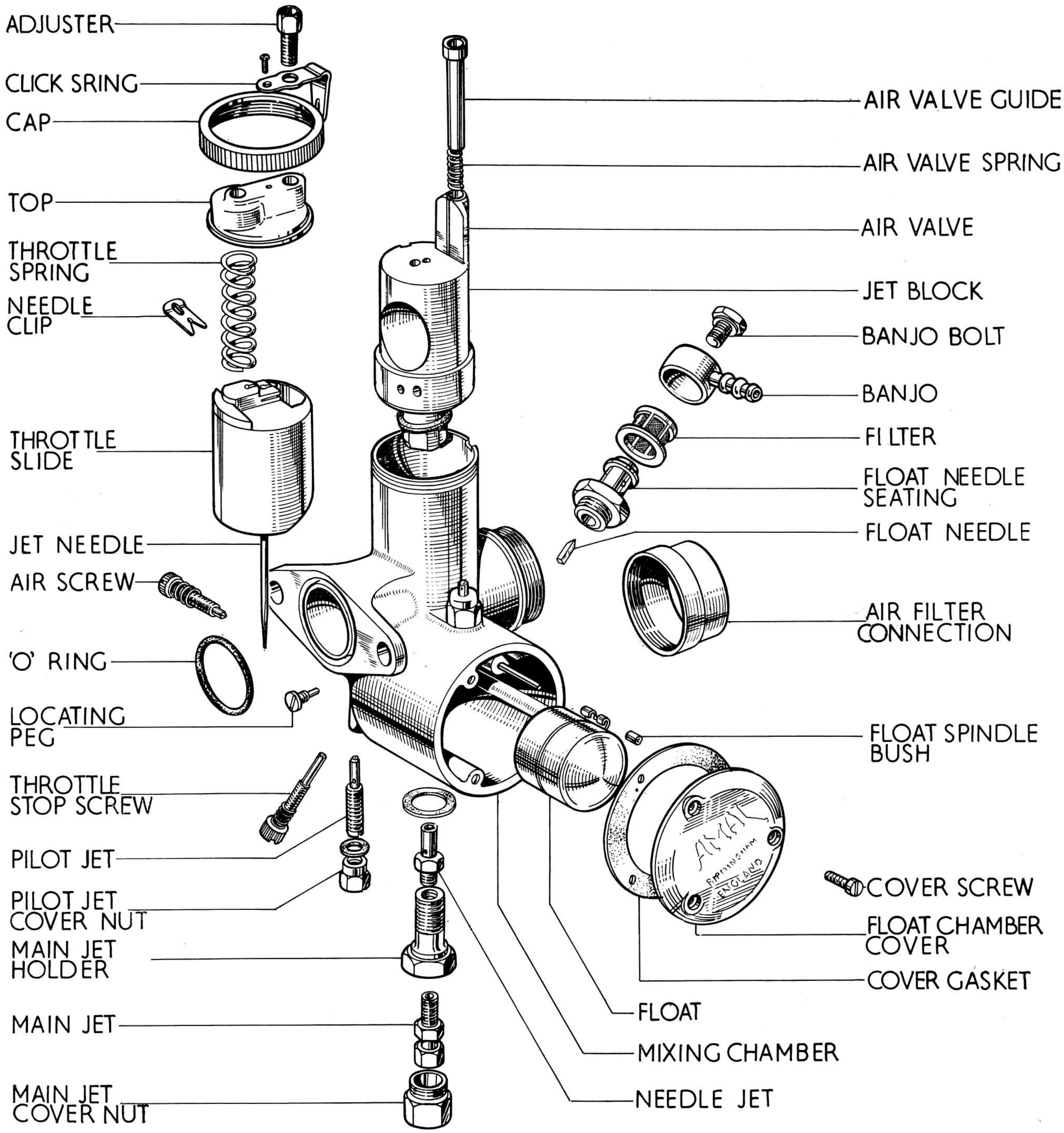


FIG. C.1. *Carburetter exploded.*

DESCRIPTION

All but one of the 500 c.c. (A50) and 650 c.c. (A65) models are fitted with the Amal monobloc, the only variation being on the A65 Spitfire Mk. II Special models which have twin G.P.2 carburetters.

The monobloc carburetters both single and twin are as Fig. C.1 except that the twin carburetters now have the float chambers left or right-hand providing access to the throttle stops and pilot air screws.

The model A65 Spitfire Mk. II Special is fitted with two T10G.P.2 carburetters using a single remote float chamber.

The carburetter, because of its jets and choke bore, proportions and atomises just the right amount of petrol with the air that is drawn into the engine and provides a highly inflamable mixture which is ultimately burnt inside the cylinder head, hence the term "combustion chamber."

The float chamber maintains a constant level of fuel at the jets and incoporates a valve which cuts off the supply when the engine stops.

The throttle, being operated from the handlebar twist-grip, controls the volume of mixture and therefore the power.

At tick-over the mixture supply is from the pilot jet system, then as the throttle is opened via the pilot by-pass, the mixture is augmented from the main jet, the earlier stages of which action is controlled by the needle in the needle jet.

The pilot system is supplied by a jet which is detachable for cleaning puposes and which, when assembled in the carburetter body, is sealed by a cover nut.

The carburetter also has a separately operated mixture control known as an air valve, for use when starting from cold, and until the engine is thoroughly warm. This control partially blocks the passage of air through the main choke and is operated from the handlebar.

The design of the carburetter is such that it provides quite simple and effective tuning facilities.

The main jet does not spray directly into the mixing chamber, but discharges through the needle jet into the primary air chamber, and goes from there as a rich petrol/air mixture, through the primary air choke, into the main air choke. This primary air choke has a compensating action in conjunction with bleed holes in the needle jet, which serve the double purpose of compensating the mixture from the needle jet and allowing the fuel to provide a well outside and around the needle jet, which is available for snap acceleration.

DISMANTLING AND REASSEMBLING THE MONOBLOC CARBURETTER

After removing the carburetter from the cylinder as described on page B.5 the procedure for dismantling is the same whether for single or twin except that twin carburetter air cables are connected to a junction box. Removal of the cable nipples from the junction box is quite simple and straight forward after the single cables have been disconnected from the lever.

First remove the throttle and air slides from the body by unscrewing the mixing chamber top cap, then withdraw the slides and throttle needle.

Remove the needle retaining spring clip, compress the slide return spring, then push the cable nipple down and out of the slide.

To release the air slide, compress the spring and slip the nipple out of the bottom of the slide.

Unscrew three slotted screws and withdraw the float chamber cover and remove the float spindle bush, the float, then withdraw the triangular section float needle.

Unscrew the banjo bolt which secures the fuel pipe banjo connector to the float needle seating block and withdraw the banjo, filter and junction washers. Unscrew the needle seating block. Unscrew the tickler body then withdraw the tickler and spring.

Remove the air screw and throttle stop screw, then the main jet cover nut from the bottom of the body. Unscrew the main jet, main jet holder and needle jet. To release the jet block re-insert the main jet holder, until a few threads are engaged then tap it with a hide mallet. This will release the jet block through the carburetter body.

Unscrew the pilot jet cover, and unscrew the pilot jet. All that remains to be removed then is the hexagonal locating peg, the end of which can be seen protruding within the mixing chamber.

Thoroughly clean all parts in petrol (gasoline). Deposits on the carburetter body are best removed by a light grade wire brush. It is advisable to wash the parts several times each in a clean quantity of petrol, to avoid particles of dirt remaining. Allow the parts to drain, preferably using a jet of compressed air from such as a hand pump to ensure that all holes and drillings are free from blockage.

Inspect the component parts for wear and check that the jets are in accordance with the recommended sizes given in GENERAL DATA.

Apart from one or two points that are mentioned below, reassembly is a reversal of the above instructions, referring to Fig. C.1 for guidance.

Do not replace any fibre washer that looks unserviceable. It is advisable to purchase replacement washers before removing the carburetter.

When replacing the jet block, ensure that the fibre washer is in position; align the location slot in the jet block with the locating peg in the carburettor housing and drive the block home.

Finally, note that the float spindle bush fits on the outside end of the spindle, and that the float pressure pad is uppermost so that the float needle rests on it.

INSPECTING THE CARBURETTER COMPONENTS

The parts liable to show wear after considerable mileage are the throttle valve slide, mixing chamber and the air slide.

(1) Inspect the throttle valve slide for excessive scoring to the front area and check the extent of wear on the rear slide face. If wear is apparent the slide should be renewed. In this case, be sure to replace the slide with the correct degree of cut-away (see GENERAL DATA).

(2) Examine the air valve for excessive wear and check that it is not actually worn through at any part. Check the fit of the air valve in the jet block. Ensure that the air valve spring is serviceable by inspecting the coils for wear (see page GD.6).

(3) Inspect the throttle return spring for efficiency and check that it has not lost compressive strength by measuring its length and comparing it to the figure given in page GD.6.

(4) Check the needle jet for wear or possible scoring and carefully examine the tapered end of the needle for similar signs.

(5) Examine the float needle for efficiency by inserting it into the inverted float needle seating block, pouring a small amount of petrol (gasolene) into the aperture surrounding the needle and checking it for leakage.

(6) Ensure that the float does not leak by shaking it to see if it contains any fuel. Do not attempt to repair a damaged float. A new one can be purchased for a small cost.

(7) Check the petrol filter, which fits over the the needle seating block, for any possible damage to the mesh. Ensure that the filter has not parted from its supporting structure, thus enabling the petrol (gasolene) to by-pass it unfiltered.

HINTS AND TIPS

Cable Controls.
See that there is a minimum of backlash when the controls are set back and that any movement of the handlebar does not cause the throttle to open; this is done by the adjusters on the top of the carburetter. See that the throttle shuts down freely.

Petrol Feed.
All models are fitted with a filter gauze at the inlet to the float chamber. To remove the filter gauze unscrew the banjo bolt, the banjo can then be removed and the filter gauze withdrawn from the needle seating.

Ensure that the filter gauze is undamaged and free from all foreign matter. To check fuel flow, before replacing the banjo, turn on petrol tap momentarily and see that fuel gushes out.

Flooding.
May be due to a worn needle or a leaky float, but is more likely due to impurities (grit, fluff, etc.) in the tank, so clean out the float chamber periodically till the trouble ceases. If the trouble persists, the tank must be drained and swilled out.

On model A65 Spitfire Mk. II Special, fitted with a single remote float chamber, flooding may also be caused by incorrect setting of the float chamber height in relation to the carburetters (see page C.20 for details of adjustment).

Fixing Carburetter and Air Leaks.
Erratic slow running is often caused by air leaks, so verify there are none at the point of attachment to the cylinder or inlet pipe, check by means of an oilcan and eliminate by new washers and the equal tightening up of flange nuts. On later models a sealing ring is fitted into the attachment flange of the carburetter. In old machines look out for air leaks caused by a worn throttle or worn inlet valve guides.

Banging in Exhaust.
May be caused by too weak a pilot mixture when the throttle is closed or nearly closed, also it may be caused by too rich a pilot mixture and an air leak in the exhaust system: the reason in either case is that the mixture has not fired in the cylinder and has fired in the hot silencer. If the banging happens when the throttle is fairly wide open the trouble will be ignition, not carburation.

Bad Petrol Consumption.
Which cannot be corrected by normal adjustment, may be due to flooding, caused by impurities from the petrol tank lodging on the float needle seat so preventing its valve from closing.

It may also be caused by a worn float needle valve. High consumption will be apparent if the needle jet has worn; it may be remedied or improved by lowering the needle in the throttle, but if it cannot be—then the only remedy is to get a new needle jet.

There are many other causes of high fuel consumption not connected with the carburetter.

Air Filters.
These may affect the jet setting. If a carburetter is set with an air filter and the engine is run without, take care not to overheat the engine due to too weak a mixture; testing with the air valve will indicate if a larger main jet and higher needle position are required.

Effect of Altitude on Carburetter.
Increased altitude tends to produce a rich mixture. The greater the altitude, the smaller the main jet required. Carburetters ex-works are set suitable for altitudes up to 3,000 feet approximately. Carburetters used constantly at altitudes 3,000 to 6,000 feet should have a reduction in main jet size of 5%, and thereafter for every 3,000 feet in excess of 6,000 feet altitude further reductions of 4% should be made.

No adjustment can compensate for lost power due to rarified air.

REASSEMBLING THE CARBURETTER (see page C.4)

TRACING FAULTS

There are two possible faults in carburation, either richness or weakness of mixture.

Indications of Richness

Black smoke in exhaust.
Petrol spraying out of carburetter.
Four-strokes, eight-stroking.
Two-strokes, four-stroking.
Heavy, lumpy running.
Sparking plug sooty.

Indications of Weakness

Spitting back in carburetter.
Erratic slow-running.
Overheating.

Engine goes better if: throttle is not wide open or air valve is partially closed.

If richness or weakness is present check if caused by:—

(1) Petrol feed—check that jets and passages are clear, that filter gauze in float chamber banjo connection is not choked with foreign matter, and that there is ample flow of fuel. Check there is no flooding.

(2) Air leaks—at the connection to the engine or due to leaky inlet valve stems.

(3) Defective or worn parts—such as a loose fitting throttle valve, worn needle jet, loose jets.

(4) Air cleaner choked up.

(5) An air cleaner having been removed.

(6) Incorrect setting of float chamber height in relation to carburetters—see page C.20 (model A65 Spitfire Mk. II Special only).

(7) Removal of the silencer or running with a straight-through pipe, this requires a richer setting.

Having verified the correctness of fuel feed and that there are no air leaks, check over ignition, valve operation and timing. Now test to see if mixtures are rich or weak. This is done by partially closing the air valve, and if engine runs better weakness is indicated, but if engine runs worse richness is indicated.

To remedy, proceed as follows:—

To Cure Richness

Position 1. Fit smaller main jet.
Position 2. Screw out pilot air adjusting screw.
Position 3. Fit a throttle with larger cut-away (paragraph E, page C.9.)
Position 4. Lower needle one or two grooves (paragraph D, page C.9).

To Cure Weakness

Position 1. Fit larger main jet.
Position 2. Screw pilot air adjusting screw in.
Position 3. Fit a throttle with smaller cut-away (paragraph E, page C.9).
Position 4. Raise needle one or two grooves (paragraph D, page C.9).

NOTE.—It is not correct to cure a rich mixture at half-throttle by fitting a smaller jet becuase the main jet may be correct for power at full throttle: the proper thing to do is to lower the needle.

VARIABLE SETTINGS AND PARTS

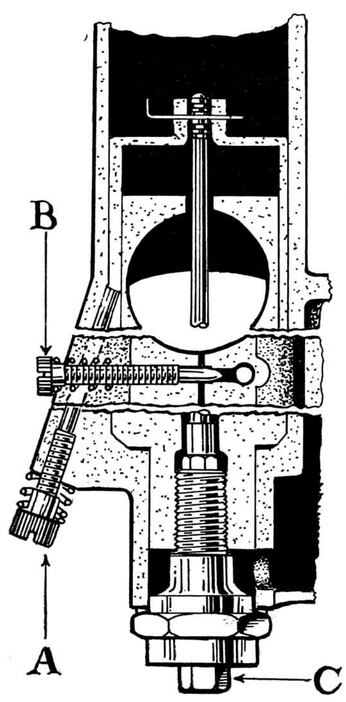


FIG. C.2.

Figure C.2 is a three-section diagıam of the carburetter showing the throttle adjusting screw (A), and the pilot air adjusting screw (B).

(A) THROTTLE ADJUSTING SCREW.
Set this screw to hold the throttle open sufficiently to keep the engine running when the twist-grip is shut off.

(B) PILOT AIR ADJUSTING SCREW.
This screw regulates the strength of the mixture for "idling" and for the initial opening of the throttle. The screw controls the depression on the pilot jet by metering the amount of air that mixes with the petrol.

(c) Main Jet.
The main jet controls the petrol supply when the throttle is more than three-quarters open, but at smaller throttle openings although the supply of fuel goes through the main jet, the amount is diminished by the metering effect of the needle in the needle jet.

Each jet is calibrated and numbered so that its exact discharge is known and two jets of the same number are alike. **Never ream out a jet, get another of the right size.** The bigger the number the bigger the jet.

To remove the main jet unscrew the main jet cover, the exposed main jet can then be unscrewed from the jet holder.

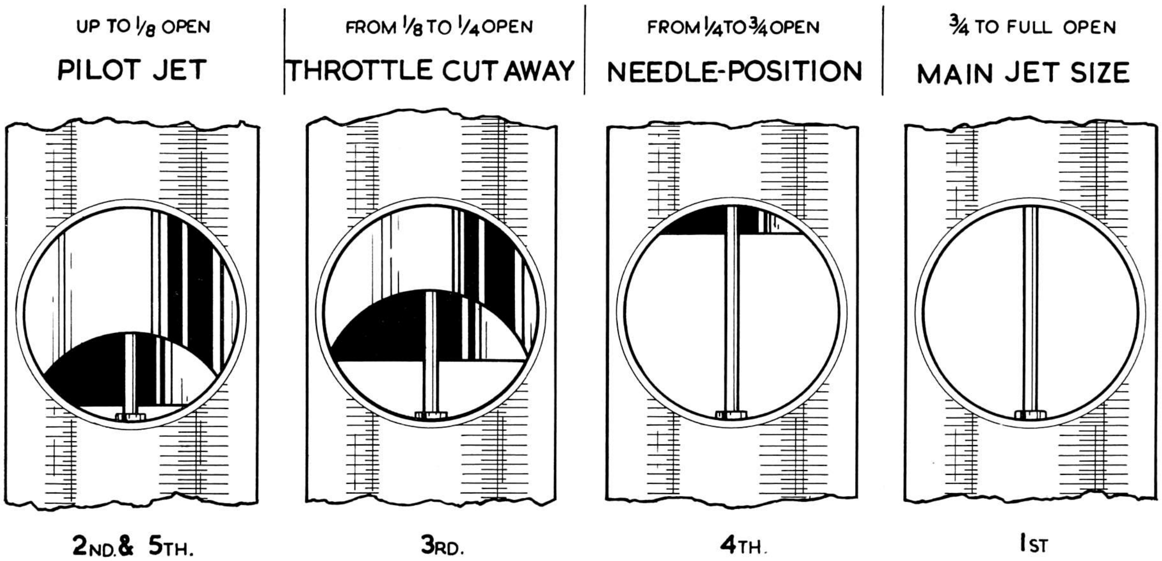
(d) Needle and Needle Jet (Fig. C.1.)
The needle is attached to the throttle valve and being taper—either allows more or less petrol to pass through the needle jet as the throttle is opened or closed throughout the range, except when idling or nearly full throttle. The taper needle position in relation to the throttle opening can be set according to the mixture required by fixing it to the throttle valve with the jet needle clip in a certain groove, thus either raising or lowering it. Raising the needle richens the mixture and lowering it weakens the mixture at throttle openings from quarter- to three-quarters open.

(e) Throttle Valve Cut-away.
The atmospheric side of the throttle is cut away to influence the depression on the main fuel supply and thus gives a means of tuning between the pilot and needle jet range of throttle opening. The amount of cut-away is recorded by a number marked on the throttle valve, viz. 376/3 means throttle valve type 376 with number 3 cut-away; larger cut-aways, say 4 and 5, give weaker mixtures and 2 a richer mixture.

(f) Air Valve.
Is used only for starting and running when cold, and for experimenting with, otherwise run with it wide open.

(g) Tickler.
A small plunger spring-loaded, in the float chamber wall. When pressed down on the float, the needle valve is allowed to open and so "flooding" is achieved. Flooding temporarily enriches the mixture until the level of the petrol subsides to normal. This valve is operated on some models through a metal strip immediately in front of the left side cover.

HOW TO TUNE THE CARBURETTER



SEQUENCE OF TUNING

FIG. C.3.

TUNE UP IN THE FOLLOWING ORDER

NOTE:—The carburetter is automatic throughout the throttle range—the air valve should always be wide open except when used for starting or until the engine has warmed up. We assume normal petrols are used.

READ REMARKS ON PAGES C.8–9 for each tuning device and get the motor going perfectly on a quiet road with a slight up gradient so that on test the engine is pulling.

1st MAIN JET with throttle in position 1, Fig. C.3. If at full throttle the engine runs "heavily" the main jet is too large. If at full throttle by slightly closing the throttle or air valve the engine seems to have better power, the main jet is too small.

With a correct sized main jet the engine at full throttle should run evenly and regularly with maximum power.

If testing for speed work ensure that the main jet size is sufficient for the mixture to be rich enough to keep the engine cool, and to verify this examine the sparking plug after taking a fast run, declutching and stopping the engine quickly. If the plug body at its end has a cool appearance the mixture is correct: if sooty, the mixture is rich; if, however there are signs of intense heat, the plug being very white in appearance, the mixture is too weak and a larger main jet is necessary.

2nd Pilot Jet (Fig. C.3) with throttle in positions 2 and 5. With engine idling too fast with the twist-grip shut off and the throttle shut down on to the throttle adjusting screw, and ignition set for best slow-runnng: (1) Screw out throttle adjusting screw until the engine runs slower and begins to falter, then screw pilot air adjusting screw in or out, to make engine run regularly and faster. (2) Now gently lower the throttle adjusting screw until the engine runs slower and just begins to falter, adjust the pilot air adjusting screw to get best slow-running, if this 2nd adjustment leaves the engine running too fast, go over the job again a third time.

3rd Throttle Cut-away with throttle in position 3 (Fig. C.3). If, as you take off from the idling position, there is objectionable spitting from the carburetter, slightly richen the pilot mixture by screwing in the air screw. If this is not effective, screw it back again, and fit a throttle with a smaller cut-away. If the engine jerks under load at this throttle position and there is no spitting, either the jet needle is much too high or a larger throttle cut-away is required to cure richness.

4th Needle with throttle in position 4 (Fig. C.3). The needle controls a wide range of throttle opening and also the acceleration. Try the needle in as low a position as possible, viz. with the clip in a groove as near the top as possible; if acceleration is poor and with air valve partially closed the results are better, raise the needle by two grooves; if very much better try lowering the needle by one groove and leave it where it is best. If mixture is still too rich with clip in groove number 1 nearest the top, the needle jet probably wants replacement because of wear. If the needle itself has had several years' use replace it also.

5th Finally go over the idling again for final touches.

TUNING TWIN CARBURETTERS

First of all, slacken the throttle stop screws and put the twist-grip into the shut off position to allow the throttles to shut off. There should be a slight back-lash in the cables which can be obtained, if necessary, by screwing in the cable adjusting screws on the top of the carburetter. Then with the handlebars in the normal position and with the throttles closed, adjust the cable adjusting screws so that on the slightest opening of the twist-grip, both throttles begin to open simultaneously.

To set the carburetters, follow the procedure as given on previous pages and bear in mind these "hints", which may be useful:—main jet sizes are of course selected by checking the effect of the mixture on the sparking plugs after taking a run at full throttle over a straight piece of road; the smallest pair of jets that give the best maximum speed are usually correct provided that the plugs do not show any signs of excessive heat. It might be that for really critical tuning, one carburetter might require a slightly different jet size from the other. For slow running, set the twist-grip to make the engine run slowly but just faster than a "tick-over"; then gently screw in the throttle stops to just hold the throttles in that position, and return the twist-grip into the shut position, leaving the engine running on the throttle stops. Set each carburetter according to operaiton 2, on previous page.

Regarding the setting of the pilot a fairly satisfactory method is to detach one sparking plug lead, and set the pilot air adjusting screw on the other cylinder, as a single unit, and then reverse the process to the other cylinder. It may be found that when both leads are connected to the sparking plugs, the engine runs slightly quicker than desirable, in which case, a slight re-adjustment of the throttle stop screws will put this right. It is essential that the speed of idling on both cylinders is approximately the same, as this will either make or mar the smoothness of the get-away on the initial opening of the throttle.

It is essential with twin carburetters that the throttle slides are a good fit in the bodies and also that there is no suspicion of air leaks at either of the flange attachments to the cylinder.

The lower end of the throttle range, is always more difficult to set and one can only take extra care to make quite sure that the control cables are perfectly adjusted, without any excessive back-lash or difference in the amount of back-lash between one carburetter and another; otherwise one throttle slide will be out of phase with the other, and so resulting in lumpy running.

To check the opening of the throttles simultaneously, shut the twist-grip back so that the throttles are resting on the throttle stop screws in their final position of adjustment; then insert the fingers into the air intakes and press them on the throttles and ask a friend to gently open the twist-grip and feel that the throttles lift off their stops the at same time.

G.P.2 MIXING CHAMBER

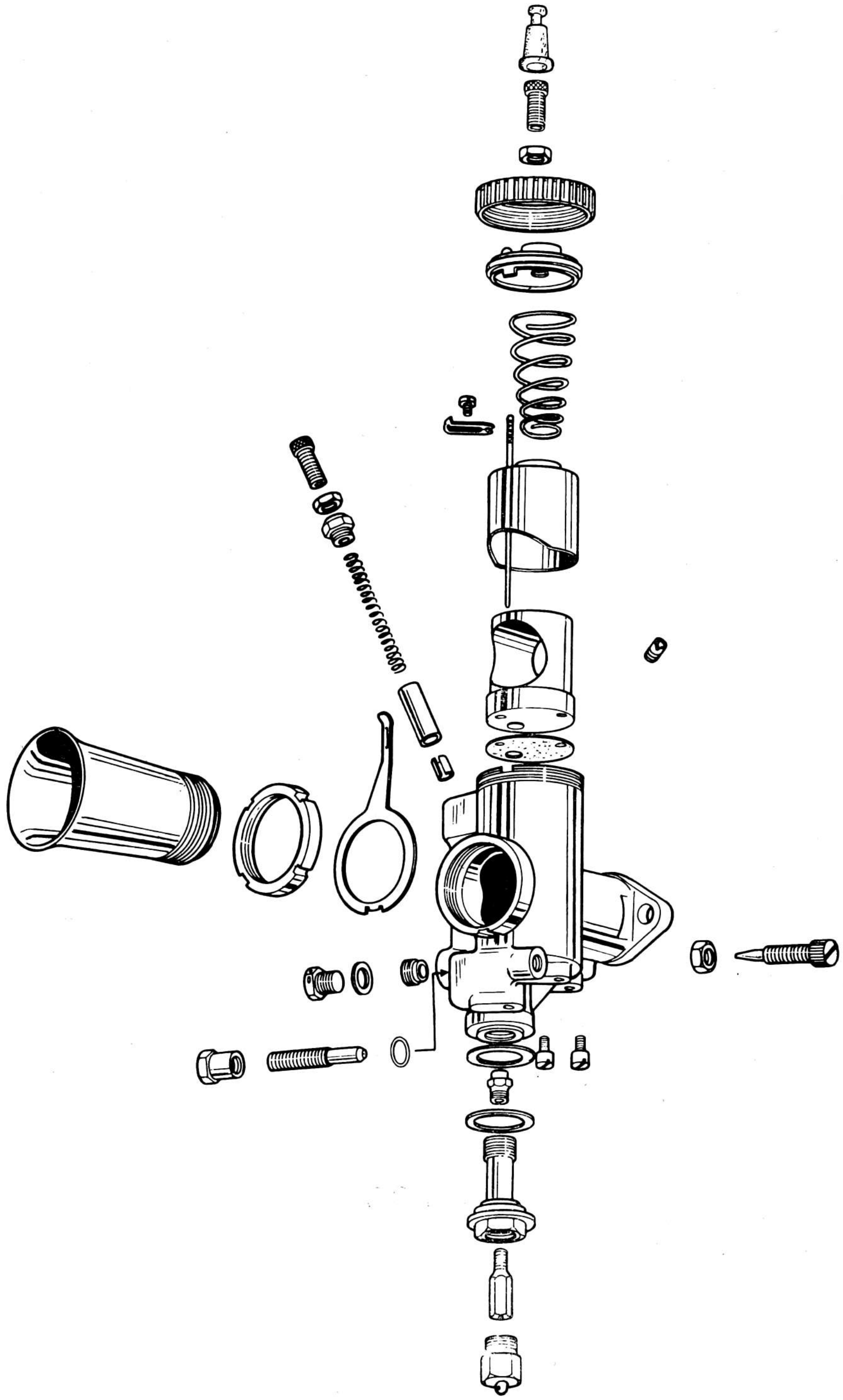


Fig. C.4.

T.10 G.P.2 MODELS
WITH REMOTE FLOAT CHAMBER

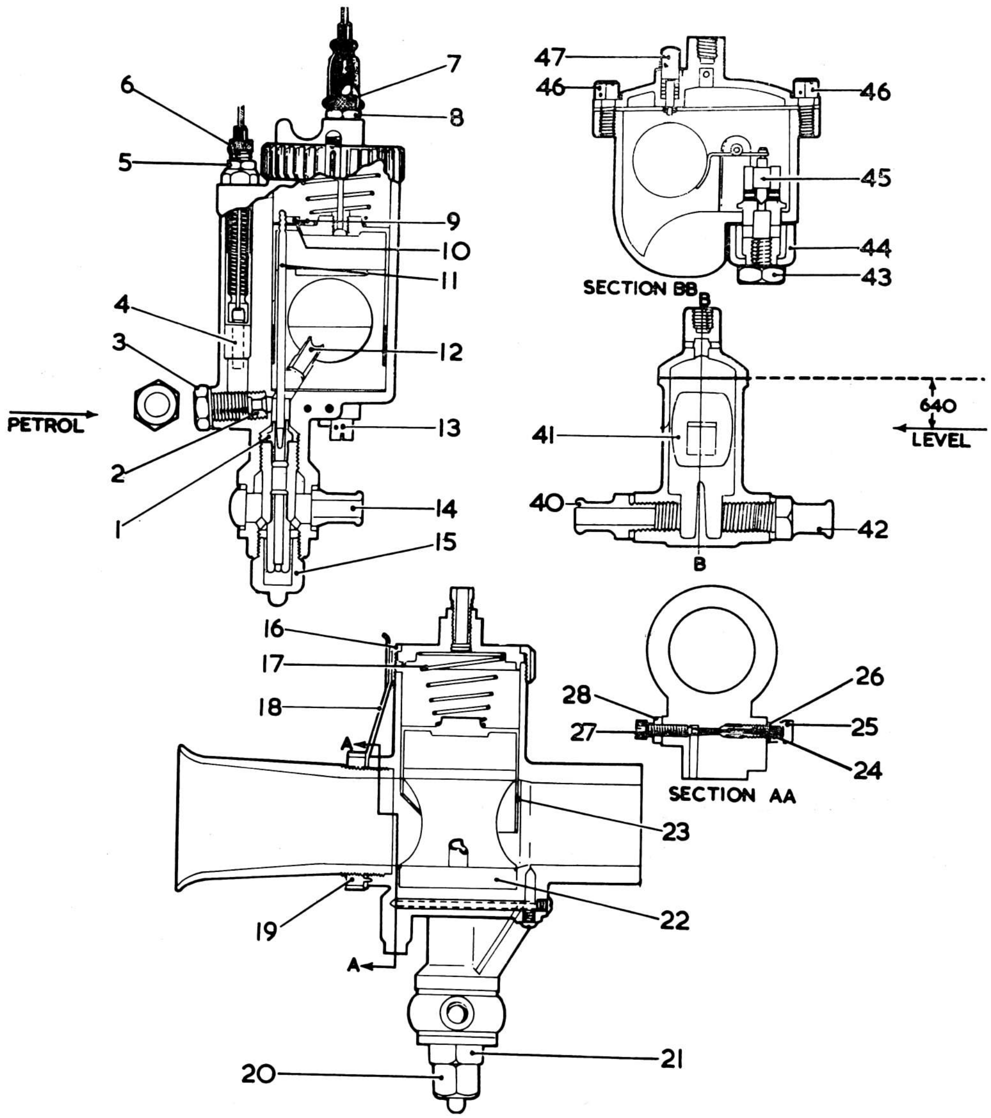


FIG. C.5.

GENERAL OPERATION

Design Features.
The G.P.2 carburetter has been designed with a view to obtaining the maximum possible power from the engine, at the same time maintaining a progressive and consistent acceleration throughout the throttle range.

This has been achieved by embracing the metering needle (11) within the confines of the throttle valve itself (23) which, although leaving an unrestricted bore at full throttle, also leaves a very short tract for the mixture to traverse from the needle jet (1) to the choke.

The G.P.2 carburetter, as distinct from the G.P. carburetter, now carries an additional feature, inasmuch as the pilot adjuster screw (27) now controls the volume of air and the petrol is metered through a detachable pilot jet (24), giving much more flexible tuning over the pilot range and at the same time this arrangement has been so designed that the carburetter can be used at an increased downdraught angle and if necessary, completely downdraught.

Resulting from these points of design it will be found that in conjunction with the maximum power obtainable, a much smoother throttle control is possible at the lower r.p.m. which has the result where megaphone exhausts are used, of allowing a cleaner entry on to the megaphone then was previously possible.

Choke Bore Diameters.
Except in the maximum **choke sizes** of the four types of G.P.2 instruments, it will be found that the effective choke diameter of the mixing chamber is on the engine side of the throttle slide (23), between it and the outlet of the carburetter, and not in the centre of the choke adaptor (22) as might be expected. Therefore, in referring to the choke size of a G.P.2 carburetter, it is this smallest diameter in the mixing chamber which is of moment.

Naturally, when deciding on the choke size of a racing carburetter, the peak r.p.m. of the engine is the main controlling factor in conjunction, of course, with the inlet port diameter on the engine in question.

Fitting.
Regarding fitting the carburetter, although we are often asked what is the correct distance between the inlet valve centre line and the centre of the carburetter mixing chamber, this is not a figure which can be laid down in hard and fast manner, as it varies enormously from one engine to another. Broadly speaking, a distance of between 7 in. to 9 in. probably represents a fair mean dimension.

Flange fitting is standardised with the G.P. carburetter to eliminate as much as possible the worry of air leaks which may persist with clip fitting instruments.

Float Chambers.
The float chamber recommended and normally fitted to the current G.P.2 carburetter is a remotely mounted type 510 and is of bottom feed design incorporating a lever type operated float.

Petrol Level.
The petrol level in the type 510 float chamber is .640 in. below the cover joint and is marked with a raised line on the outside of the body. In positioning the float chamber this line should be on a level with the lowest point of the circular scribe mark on the air jet plug (3).

Locking Devices.
A spring blade locking device (18) held in place by the air tube lock ring (19) engages with serrations on the mixing chamber cap (16), which positively prevents unscrewing due to vibration. The jet plug (20), banjo bolt (43), plug screw (42), jet block holding screws (13), float chamber cover screws (46), and the float/hinge spindle head (not illustrated) are drilled to enable them to be lockwired up.

Tuning (General).
The tuning sequence of the G.P.2 carburetter follows the well established Amal principles, inasmuch as there is a main jet (15) controlling the fuel supply at full throttle, a needle jet (1), the emission from which is controlled by the position of a taper needle (11), and at the lower throttle openings by the cut-away of the throttle valve (23), a detachable pilot jet (24) and a pilot air adjusting screw (27) controlling the mixture strength for idling; an air jet (2) controls the amount of air which primarily atomises the fuel as it comes out of the needle jet (1) before going into the spray tube (12) and thence to the heart of the choke.

This latter air jet (2) is a form of depression control for the main jet and from normal experiences would appear to require a .1 in. dia. air jet for choke sizes of up to $1\frac{1}{16}$ in. and .125 in. dia. for choke sizes in excess of this figure. Normally speaking, this air jet would be fitted by the factory when the carburetter was supplied and would not be considered a likely component to change, but remembering that the main jet depression can be increased by fitting a smaller air jet, it may sometimes, for special purpose tuning, be found an asset to try a larger or smaller air jet.

The needle control covers a range of the throttle opening from about one-third throttle up to seven-eighths throttle opening. The needle grooves in the G.P. needle will be found to number five instead of seven as previously on the T.T. instruments, due to the fact that the needle control of the G.P. carburetter is rather more sensitive than on other types. Two types of needle (11) are available, a standard taper needle and a much weaker taper needle.

The standard taper needle is known as the G.P. needle: the weaker taper needle is known as the G.P.6 needle.

The weaker needle is usually fitted except where alcohol fuel is concerned.

Main Jet.
Always bear in mind, that whatever the type of needle used, or the position in which it is fitted, there will be no affectation of the main jet (15). This should be arrived at by fitting the jet which gives the best possible power on the bench or, on the other hand, the highest possible r.p.m. on the road, and once this has been obtained, under no circumstances should it be altered.

The main jet (15) can be very readily removed by taking off the hexagon cap (20) at the base of the carburetter mixing chamber. The jet size is marked on the side of these jets, and represents the flow in c.c. per minute on Amal calibrating machines. These jets are made in 10 c.c. increments, that is, for instance—250, 260, 270, etc.—up to and including 600, when, after this, 20 c.c. increments become standard up to 1,000. Over 1,000 increments are of 100 c.c.

For rough guidance, therefore, the following jet sizes should be approximately correct for the choke sizes in question:—

Using 80 octane or petrol benzol fuel
10 G.P., $1\frac{1}{16}$ in. choke—jet 210
10 G.P., $1\frac{7}{32}$ in. choke—jet 260

with of course, the intermediary choke sizes, using a proportionate sized jet.

The rest of the throttle range should then be dealt with absolutely individually in steps by means of the needle adjustment, throttle valve cut-away alteration and pilot adjustment, with a possible check on the air jet fitted.

The throttle valve (23) which surrounds the choke adaptor (22) in the carburetter, controls with its leading edge the velocity of air entering the throttle bore and consequently the depression on the spray tube at lower throttle openings with a diminishing effect up to point where the cut-away disappears from the cross bore.

The trailing edge of the throttle valve, of course, controls the volume of mixture passing to the engine.

These throttle valves can be supplied with various cut-aways from No. 3 up to No. 8, each number varying in its cut-away on the air intake side by $\frac{1}{16}$ in. Low numbers provide richer mixtures than high numbers.

The needle jet (1), which is of stainless steel to prevent wear, has been found for best all-round usage on petrol or petrol benzol to require a diameter of .107 in. for choke sizes in the type T.15.G.P.2 range, over this a needle jet of .109 in. diameter is necessary. For alcohol fuel, of course, larger needle jets are necessary.

Pilot System.
This gives a supply of metered fuel through a detachable pilot jet (24), which mixes with air regulated by the pilot air adjusting screw (27) and passes into the mixing chamber through a small hole on the engine side of the throttle slide.

Compensation on this G.P.2 carburetter is obtained through the medium of the primary air which passes through a slot (4) in the mixing chamber and then, via the air jet (2) previously mentioned, atomises the liquid fuel passing from the needle jet (1).

As the engine supply increases or decreases at a given throttle opening with a varying load, so compensation will take place.

KEY TO SECTIONED ILLUSTRATION

Mixing Chamber

1. Needle jet.
2. Air jet.
3. Air jet plug.
4. Primary air slot.
5. Air valve cable adjuster locknut.
6. Air valve cable adjuster.
7. Throttle cable adjuster.
8. Throttle cable adjuster locknut.
9. Needle clip.
10. Needle clip retaining screw.
11. Metering needle.
12. Spray tube.
13. Choke adaptor retaining screws.
14. Petrol inlet banjo.
15. Main jet.
16. Mixing chamber cap.
17. Throttle valve return spring.
18. Mixing chamber cap lock-spring.
19. Air tube lock ring.
20. Jet plug.
21. Jet holder.
22. Choke adaptor.
23. Throttle valve.
24. Pilot jet.
25. Pilot jet cover nut.
26. Pilot jet cover nut washer.
27. Pilot air adjusting screw.
28. Pilot air adjuster locknut.

Float Chamber

40. Petrol outlet connection.
41. Float and hinge.
42. Plug screw.
43. Petrol inlet banjo bolt.
44. Petrol inlet banjo.
45. Float needle.
46. Float chamber cover screws.
47. Tickler.

TUNING SEQUENCE

To get carburation for any stated fuel when the choke bore is correct for the peak revs of the engine and the correct needle jet for the fuel to be used, the procedure is simple. Start off with an assumed setting, and then tune as follows. There are four phases:

(1) Main jet for power at full throttle;
(2) Pilot air adjuster for idling;
(3) Throttle cut-away for "take off" from the pilot jet;
(4) Needle position for snappy mixture at quarter to three-quarter throttle; then final

idling adjustment of the pilot jet.

Always tune in this order, then any alteration will not upset a correct phase.

Sequence of Tuning.

(1) Main jet size.
(2) Pilot adjustment.
(3) Throttle valve cut-away.
(4) Needle position.

(1) Main Jet Size.—This should be determined first: the smallest jet which gives the greatest maximum speed should be selected, keeping in mind the safety factor for cooling. (*The air lever should be fully open during these tests*).

(2) Pilot Adjustment.—Before attempting to set the pilot air adjuster the engine should be at its normal running temperature, otherwise a faulty adjustment is possible, which will upset the correct selection of the throttle valve. The pilot air adjuster is rotated clockwise to richen the mixture, and anti-clockwise to weaken it. Adjust this very gradually until a satisfactory tick-over is obtained, then reset locknut but take care that the achievement of too slow a tick-over—that is, slower than is actually necessary—does not lead to a "spot" which may cause stalling when the throttle is very slightly open.

(3) Throttle Cut-away.—Having set the pilot air adjuster, open up the *throttle* progressively and note positions where, if at all, the exhaust note becomes irregular. If this is noticed, leave the throttle open at this position and close the air lever slightly; this will indicate whether the spot is rich or weak. If it is a rich spot, fit a throttle valve with more *cut-away* on the air intake side (or vice versa if weak).

(4) Jet Needle Position.—Tuning sequence 2 and 3 will affect carburation up to somewhere over one-quarter throttle, after which the jet *needle*, which is suspended from the throttle valve, comes into action and when the throttle is opened further and tests are again made for rich or weak spots, as previously outlined, the needle can be raised to richen or lowered to weaken the mixture, whichever may be found necessary. With these adjustments correctly made, and the main jet size settled, a perfectly progressive mixture will be obtainable from tick-over to full throttle. The jet *needles* are interchangeable in 10G.P.2 carburetters.

ALCOHOL FUELS

Concerning alcohol fuels, the G.P.2 range of carburetters function perfectly satisfactorily on any alcohol blend up to and including straight methanol. It will be necessary to fit a .125 in. diameter needle jet (1) for any alcohol content over 50%. With this larger needle jet a standard taper needle (11) should be used, which means for the type 10G.P.2 a needle marked G.P. is required. An approximately correct needle position will be No. 4 that is: the fourth groove from the top of the needle.

Regarding main jet sizes, these have to be increased in the following proportions, taking the basic size as that used for 80 octane fuel or petrol benzol.

STRAIGHT METHANOL:
Increase the basic jet size by 150%.
J.A.P. RACING FUEL:
Increase the basic jet size by 150%.
ESSO NO. 1 FUEL:
Increase the basic jet size by 150%.
ESSO NO. 2 FUEL:
Increase the basic jet size by 120%.
ESSO NO. 3 FUEL:
Increase the basic jet size by 130%.
SHELL A.M.M. FUEL:
Increase the basic jet size by 150%.
SHELL A.M.1 FUEL:
Increase the basic jet size by 140%.
SHELL A.M.8 FUEL:
Increase the basic jet size by 120%.
SHELL A.M.9 FUEL:
Increase the basic jet size by 100%.
SHELL A.M.12 FUEL:
Increase the basic jet size by 50%.

NOTE:—When calculating the jet size on the basis of the jet size used for petrol-benzol mixtures—the per cent. increase must be added to the original jet size and the total is the new size to be used for the particular fuel. *Example*: if a jet No. 300 was used for petrol-benzol and it was decided to change over to *methanol*, which requires an increase of 150× adding to the original jet size 300.

$$\text{Calculate this way:} \quad \left(\frac{\%\ \text{increase} \times \text{original jet size}}{100}\right) + \begin{matrix}\text{original}\\ \text{jet size}\end{matrix}$$

$$\text{namely} \quad \left(\frac{150 \times 300}{100}\right) + 300 = 450 + 300 = 750$$

The answer is, use main jet 750 and the appropriate needle-jet for alcohol fuels as given in a paragraph above.

When using alcohol mixtures, the alcohol content of which is not exactly known, "trial and error" will be necessary in finding the correct jet size, in which case it should be remembered that although quite an excessively over-rich mixture can be used on alcohol, the slightest weakness will result in trouble. Therefore, always err on the rich side for the start of the "trial and error" tests. On the other hand, if the exact composition of the fuel should be known and you get in touch with the Technical Department, Amal Ltd., Holdford Road, Witton, B'ham 6, they will be able to give you a fairly close approximation of the jet size required for the alcohol mixture in question.

Normally, when changing over from petrol to alcohol on the G.P. range of instruments, no alteration will be necessary to the air jets fitted.

G.P.2 REMOTE FLOAT CHAMBER AND MOUNTING

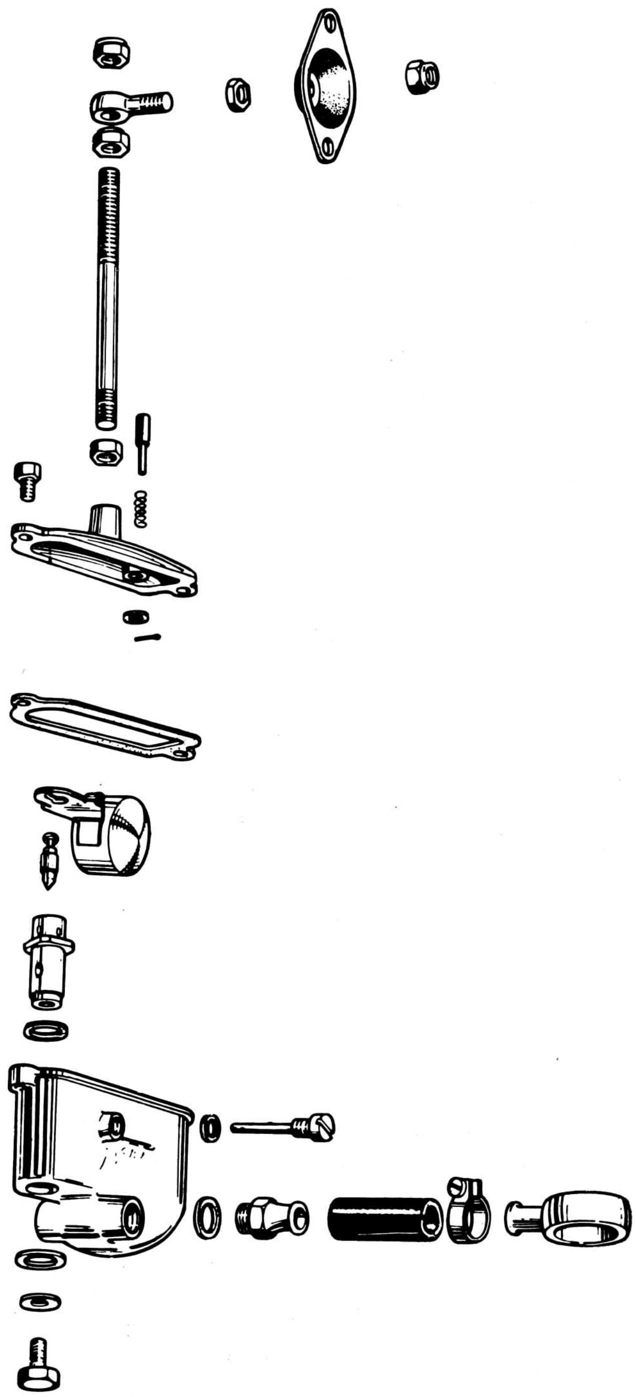


FIG. C.6.

Removing Remote Float Chamber.
Turn off the petrol supply at both taps and protect the crankcase from petrol with a suitable piece of rag.

Take out the jet holders from below each carburetter by unscrewing the larger of the two nuts below the "banjo" unions.

Disconnect the "banjo" union at front base of float chamber and move supply pipes clear.

Remove the locknut from the recess in the float chamber mounting and release the fixing stud adaptor.

The float chamber is now free and can be withdrawn complete with small petrol pipes, "banjo" unions and fixing stud with adaptor.

Reassembly is simply a reversal of the above procedure.

It will be noted that the setting of the float chamber height is not disturbed when using this method for removal. If, however, the float chamber fixing stud nuts were loosened or removed, the correct setting must be obtained as follows.

Adjust the fixing stud top nut so that the float chamber level line is brought horizontal with the base of the circular groove on the carburetter air jet plug (see Fig. C.7, page C.21).

Hold this setting and tighten the locknut on to base of adaptor.

FLOAT CHAMBER SETTING (see page C.20)

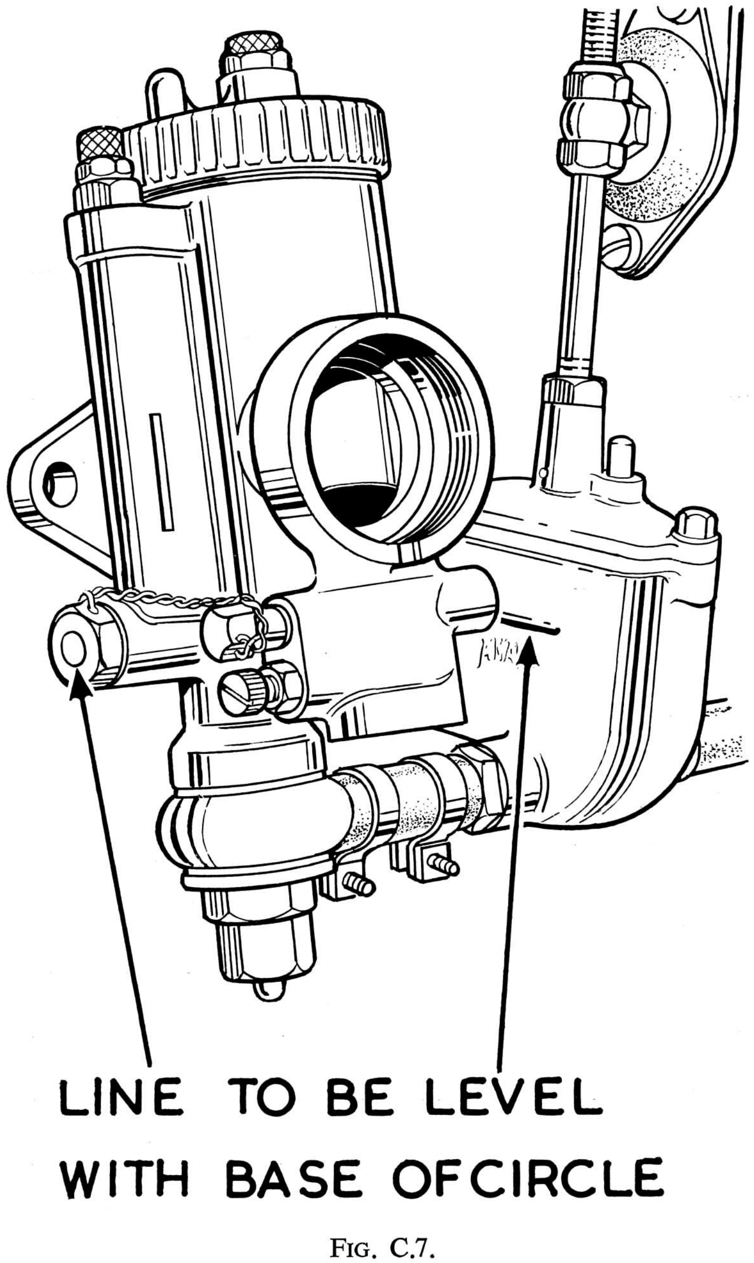


FIG. C.7.