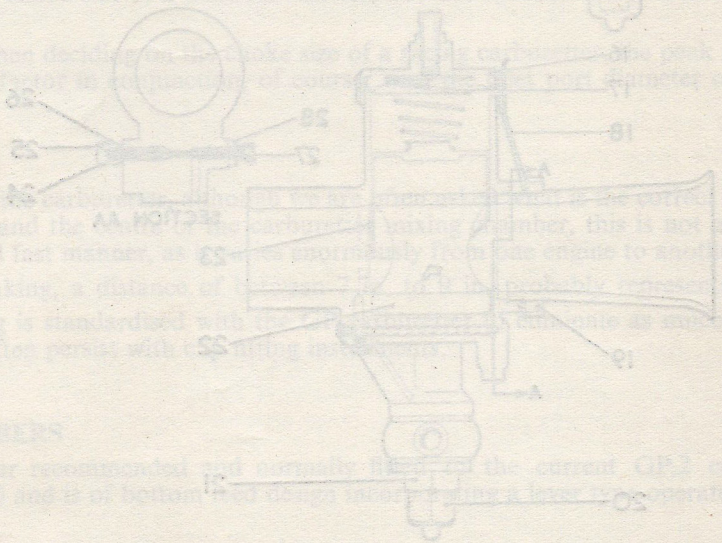
DESCRIPTION OF AND TUNING INSTRUCTIONS FOR

Amal GP.2 Racing Carburetter (Series 516)

With remotely mounted Type 510 Float Chamber

SUITABLE FOR USE WITH ALL GRADES OF RACING FUELS



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

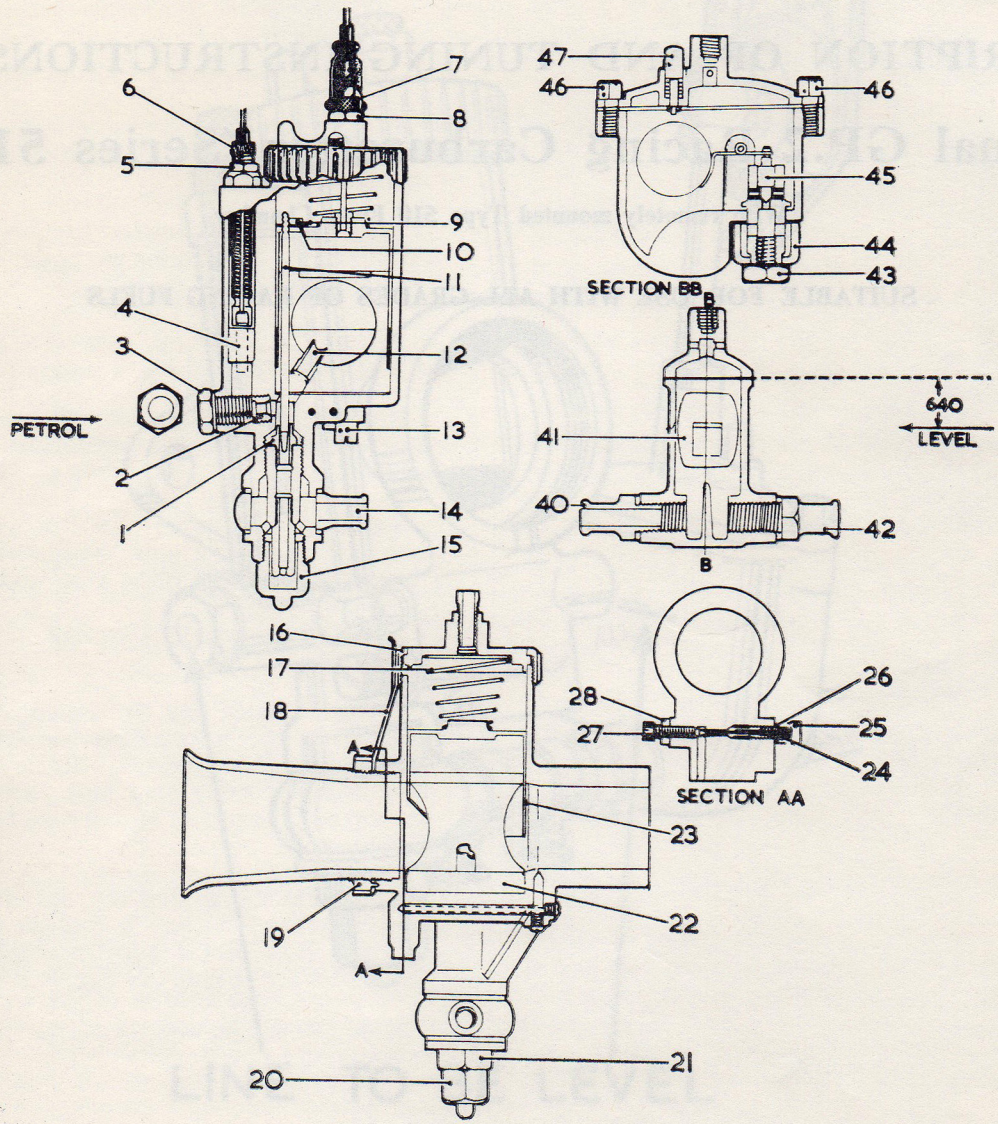

FIG. 2

GENERAL OPERATION

DESIGN FEATURES

The GP.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 GP.2 carburetter, as distinct from the GP 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 than was previously possible.

CHOKE BORE DIAMETERS

Except in the maximum choke sizes of the four types of GP.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 GP.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 GP carburetter to eliminate as much as possible the worry of air leaks which often persist with clip fitting instruments.

FLOAT CHAMBERS

The float chamber recommended and normally fitted to the current GP.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 GP.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. diameter air jet for choke sizes of up to $1\frac{1}{16}$ in. and .125 in. diameter 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 GP needle will be found to number five instead of seven as previously on the TT instruments, due to the fact that the needle control of the GP 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 GP needle: the weaker taper needle is known as the GP.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 affection 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 GP, $1\frac{1}{16}$ in. choke—jet 210; 10 GP, 1-7/32 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-awy 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 best for all-round usage on petrol or petrol benzole to require a diameter of .107 in. for choke sizes in the type T.15.GP.2 range, over this a needle jet of .109 in. diameter is necessary. For alcohol fuel, of course, larger needle jets are necessary. This is dealt with on page 6.

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 GP.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 asumed 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 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 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 settled, a perfectly progressive mixture will be obtainable from tick-over to full throttle. The jet *needles* are interchangeable in 10 GP.2 carburetters.

ALCOHOL FUELS

Concerning alcohol fuels, the GP.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 10 GP.2 a needle marked GP 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 of jet 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.

Calculate this way:—

$$\left(\frac{\%\text{ increase} - \text{original jet size}}{100}\right) + \text{original jet size} \quad \text{namely} \quad \left(\frac{150-300}{100}\right) + 300 = 450 + 300 = 750$$

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., Holford Road, Witton, Birmingham 6, England, they will be able to give 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 GP range of instruments, no alteration will be necessary to the air jets fitted.

GP.2 REMOTE FLOAT CHAMBER AND MOUNTING

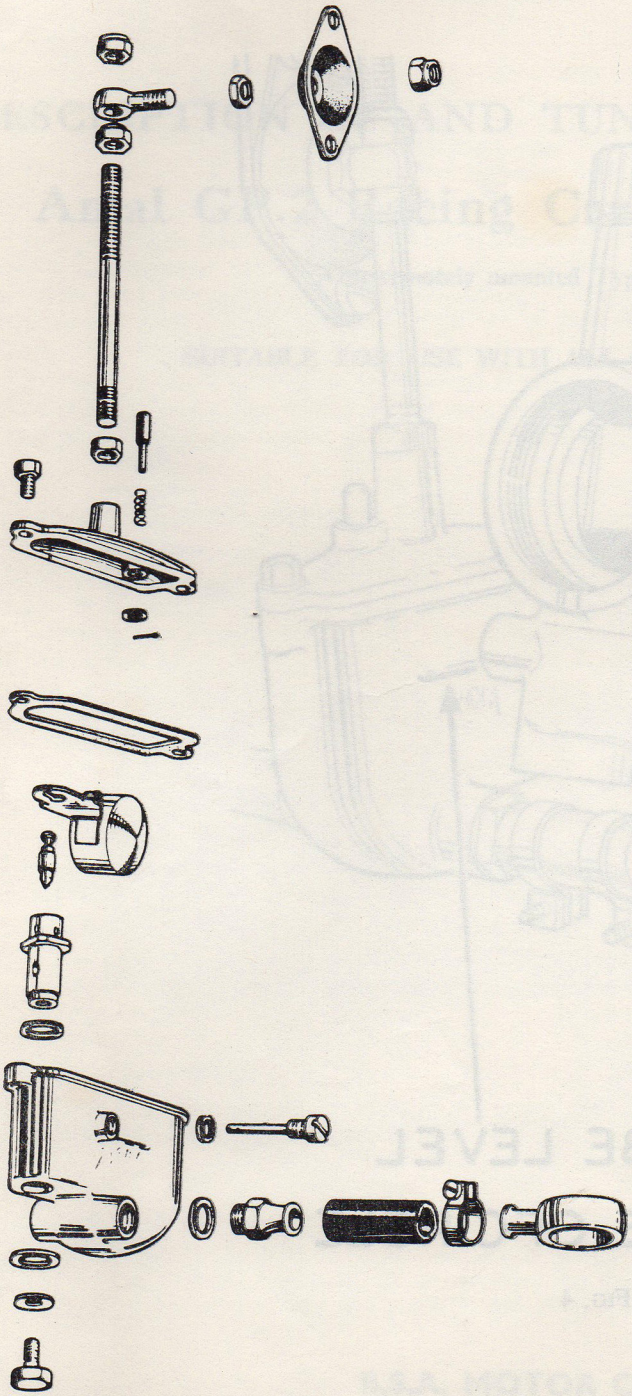

FIG. 3.

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. 4).

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

FLOAT CHAMBER SETTING (See page 7)

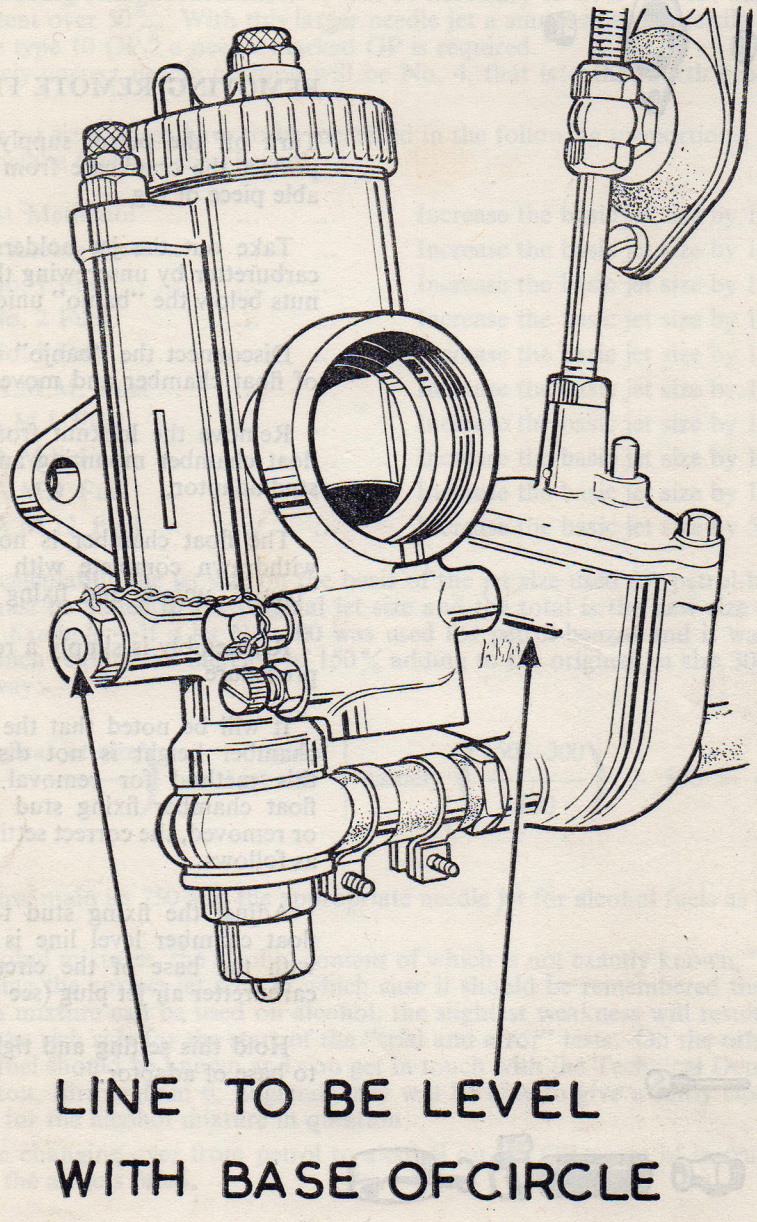

FIG. 4