AMAL

LIST No. 618/3 (Issue No. 1).
(Supersedes List No. 420)

HINTS & TIPS

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for Two Types of SMALL ENGINE SINGLE LEVER CONTROL CARBURETTERS

that have almost the same external appearance.

THE FORM OF AIR INTAKE STRANGLER MAY VARY OR BE THE SAME IN BOTH TYPES.

THE INTERNAL DISTINCTION IS :

(A) WITH A NEEDLE IN THE THROTTLE AND ONLY ONE JET UNDER JET CAP. Carburetter Types 259, 359; 261, 361; 265, 223.

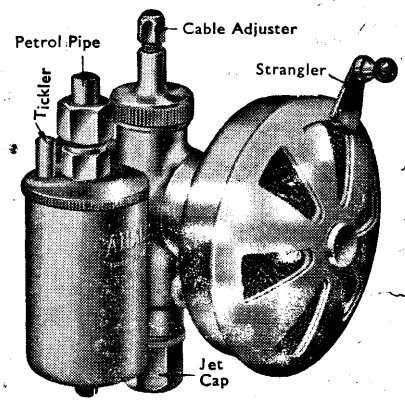
The type Nos. are stamped on the Carburetters.

READ PAGES A2, A3, A4, A5, AND A & B6.

(B) WITHOUT NEEDLE IN THROTTLE BUT WITH TWO JETS UNDER JET CAP. Carburetter Types 52 352 53, 353; 93, 393; 103, 143.

The type Nos. are stamped on the Carburetters

READ PAGES A & B6, ALSO B7 AND B8.



Alternatively to the above illustration :—The float chamber lid may be secured by two screws when the type number begins with 3 (example 359).

4,000/9/62. W. *Printed in England.*

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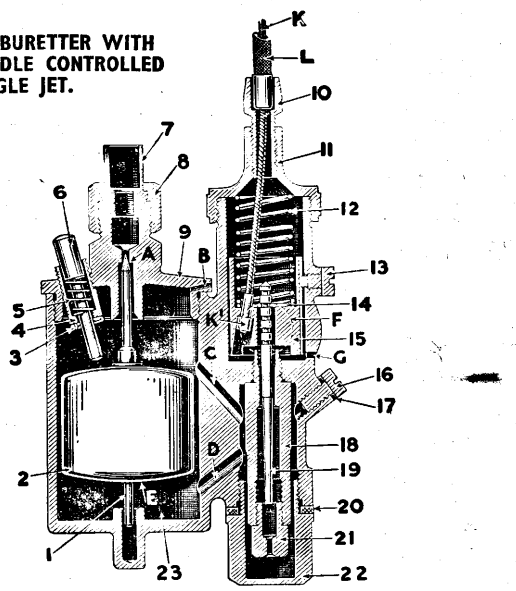
AMAL

A2

CARBURETTER WITH NEEDLE CONTROLLED SINGLE JET.



This sectioned diagram is taken through the centre of the mixing chamber and float chamber, showing the float and jet and throttle mechanism. The float and needle are shown as one piece as for types 259 and 261, but in type 223 the float needle (1) is separate from the float (2), but is attached thereto by a spring bow fastened to the float at the place marked (E). The cable (K) and its anchoring (K1) are diagrammatic as in practice the cable anchoring is in front of the jet.

The above illustration shows the lid (9) of the top feed float chamber screwed into the float chamber, alternatively the lid may be held down by two screws ; also the feed to the float chamber may be from underneath.

How it works.

This Carburetter is designed to suit small engines and to eliminate any difficulty arising out of the use of very small jets. The control is automatic, the hand lever on the bar operating the throttle (15), which in its turn controls the mixture according to the engine speed.

The full power control of the mixture is by the main jet (fig. 21) feeding the engine through a needle-jet (fig. 18), in which there is a needle (fig. 19). The taper on the needle controls the mixture at lesser throttle openings, and the position of the taper in the needle jet, providing a means for richening or weakening the mixture at various throttle positions. The needle is located in the throttle (fig. 15) by a circular spring clip (fig. 14) held down by the throttle spring (fig. 12) and the needle itself is positioned by the particular groove that the clip (fig. 14) is fixed to.

For idling, the fuel supply is controlled by the parallel portion of the needle (fig. 19) entering the bore of the needle jet (fig. 18), the difference in diameter being the jet orifice, which is small—although in case of obstruction or gumming up due to the petrol and oil system, it can be instantly cleared by opening the throttle.

The petrol feed is into the top of the float chamber (fig. 7) where constant levels are maintained, and the petrol at these levels flows to the main jet (fig. 21) through a passage D, and air locks are liberated through the passage C, back into the float chamber at the top.

The jets (figs. 21 and 18) can be got at by undoing jet plug (fig. 22). The throttle (fig. 15) and adjustable needle (fig. 19) can be removed by unscrewing the mixing chamber top (fig. 11). The throttle is guided by screw (fig. 13) working in a groove in the throttle, and the slot in the throttle itself enables the cable K to be quickly detached.

The intake of the carburetter may have an air cleaner and a strangler for closing off the air only for starting when cold.

The Carburetter of

A3

Carburetter with Needle controlled single Jet.

NAMES OF PARTS.

Fig.
1. Float Needle.
2. Float.
3. Tickler Cotter.
4. Tickler Bush.
5. Tickler Spring.
6. Tickler.
7. Petrol Pipe Union Nipple.
8. Petrol Pipe Union Nut.
9. Float Chamber Cover (Top Feed)
10. Cable Adjuster.
11. Mixing Chamber Top.
12. Throttle Spring.

Fig.
13. Throttle Valve Location Screw.
14. Jet Needle Clip.
15. Throttle Valve.
16. Feed Hole Screw.
17. Feed Hole Washer.
18. Needle-Jet.
19. Jet Needle.
20. Jet Plug Washer.
21. Main Jet.
22. Jet Plug.
23. Float Chamber.

NOTE :—Alternatively this float chamber lid may be held down by two screws or that the float chamber may have bottom feed.

A. Petrol Feed Needle Seat.
B. Air Vent Hole in Float Chamber Cover.
C. Air Release Passage from Jet Chamber into Float Chamber.
D. Petrol Feed Passage from Float Chamber to Main Jet (21).
E. The illustration shows the float and needle as one piece, but if the needle is separate, the float has a spring bow at this point to hold the needle in a groove.
F. The choke bore of the Carburetter, the size of which is specified according to engine size and maximum revs.
G. Drain hole from mixing chamber to liberate any excess petrol due to flooding.
H. Guide groove in the throttle to prevent incorrect assembly. See page A5.
J. Cutaway of the throttle. There are various cutaways, which are numbered and marked on the bottom of the throttle. The cut-away affects the mixture up to half throttle position. See A5.
K. Throttle cable.
K1. Throttle cable nipple.
L. Throttle cable outer cover.

General Maintenance Instructions.

Keep the float chamber free from impurities, which are the commonest cause of flooding. Otherwise, if flooding takes place, remove the petrol pipe connection from the lid and clean out all the passages. See that the float needle is not bent, nor the float petrol logged. If the needle seating is at fault, rub the needle lightly in by twisting it between the finger and thumb. (Never use any grinding compound). If the needle itself has a deep groove in it on the taper end, a new needle (and float) may be necessary. Also see that the tickler works freely and springs back, and that the air hole in the rim of the lid is clear. If the float chamber is top feed, clean out impurities that may have accumulated in the needle guide at the bottom of the float chamber. Before replacing the float chamber lid see that a blunt end of the float needle is in the guide hole at the foot of the float chamber and then guide the lid over the taper end of the needle before screwing down.

If the carburetter is ever removed from the induction pipe, see that it is pushed right home on to the pipe, before locking the ring clip. Never fit the carburetter to a pipe on which it is slack, nor ever drive it on to a tight one. A carburetter should be a good push fit on to the inlet pipe, and should be pushed on true with a screwing motion after having put a little oil on the pipe.

Keep the air intake or gauze free from obstructions and see that the air strangler, if of the knife type fitted into the intake of a carburetter, remains firmly open when opened. If it is inclined to be slack, bend it slightly to stiffen the movement.

If the throttle should become slack after years of use, it should be replaced, otherwise the slow running may be interefered with. Also, if a throttle has become badly worn, it may be advisable also to replace the needle-jet, as this might wear slightly large in diameter through the movement of the needle in the same, thus causing a richer mixture than necessary.

Also bad petrol consumption will be apparent if the throttle needle-jet (fig. 18) 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.

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Records & Successes

A4

Tracing Faults. ASSUMING ENGINE IN GOOD ORDER AND EXHAUST SYSTEM NOT CHOKED.

1. Assure yourself of ample petrol supply, good compression, clean sparking plug and good spark at the points. Also rectify if flooding and verify complete closing and opening of throttle and air strangler, and that the air intake gauze or filter are clean.

2. Verify carburetter to be clean internally and that jet and passages are clear and that there is no air leak at the fitting of the carburetter to the engine. Also verify that main jet and needle-jet are screwed up firmly.

3. When the above points are in order, there are only two possible faults in carburation—either the mixture is RICH or WEAK, and *you must determine which of the two is causing inefficient running, and at what throttle opening*, so that the carburetter can be tuned correctly. Indications are as follows :—

For Richness.	For Weakness.
Black sooty smoke in exhaust.	"Spitting" in the carburetter.
Petrol spraying out of carburetter.	Erratic slow running.
Two-stroke engines "four-stroking."	Poor acceleration.
Heavy petrol consumption.	Engine runs better at less than full throttle opening.
Sparking plug sooty.	Overheating.
Heavy lumpy running.	Sparking plug dry grey colour around the points.
Four-stroke engines "eight-stroking."	

4. Some causes for above producing :—

Richness.	Weakness.
Punctured float or bent float needle.	Air leak.
Tickler stuck down.	Petrol supply or jet partially choked.
Needle (fig. 19) raised too much.	Impurities in needle guide under float chamber prevent float from dropping or bent needle.
Main jet (fig. 21) too large or not screwed up.	Too small main jet (fig. 21).
In old machines, needle-jet (18) worn.	Needle (fig. 19) in too low position.
Air filter choked.	Air gauze or filter been removed.
	Using petrol with water in it.

5. If engine "idles" better after tickling the float and gives better power with air shutter partially closed, the mixture is weak. Idling better with petrol turned off temporarily and no suspicion of spitting when opening throttle quickly when engine is cold—the mixture is Rich.

6. Trouble at half to full throttle is most likely to be connected with the main jet (21) supply. Trouble at quarter to three-quarters throttle opening will be due to needle position. If the power is good at full throttle, very poor acceleration is the effect of too low a needle position, which can be remedied. Bad slow running will probably be due to air leaks, see note at foot of page A5.

How to tune up. (READ PARTS TO TUNE UP WITH)

1. Generally speaking : for power at full throttle the main jet is selected and at other lower throttle positions, the needle is either raised or lowered to richen or weaken the mixture.

2. To tune up precisely throughout the throttle range imagine four throttle positions :—
   *Throttle slightly open as for idling.
   **Throttle about quarter open as for running light.
   ***Throttle from ¼ to ¾ open as for general running.
   ****Throttle ¾ to wide open as for full power.

3. From the preceding paragraph start tuning in this order, having read "Parts to tune up with" and with the engine warmed up :—

   1st. **** Use the smallest main jet (21) that will give full power when running under load on the level. If the engine runs slightly better with the throttle not quite wide open, the jet is either just right for economy or on the small side.

   2nd. *** Set the needle (19) position as low as possible in relation to good acceleration and running at half throttle—"spitting" in the carburetter on acceleration means the needle is too low, so try a groove higher.

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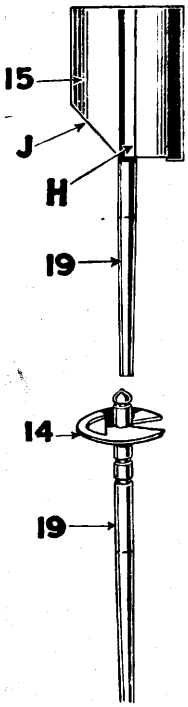
3rd. ** & *. If the idling mixture at * and the take off at ** are weak—the engine spitting and fading out—use a smaller cutaway throttle, or if the engine runs lumpily on a rich mixture use a larger cutaway.

4th. Finally, if any alteration has been made to the throttle cutaway it may be necessary to alter the needle position again ; putting in a throttle of a smaller cutaway may require the needle lowering by a groove and alternatively a larger cutaway may necessitate raising the needle.

Parts to tune up with.



Main Jet (fig. 21) with seal. This jet does not control the slow running mixture, but it controls the maximum supply of petrol from half to full throttle positions. This jet is interchangeable with other larger Amal carburetters except for the number stamped on it, which indicates the amount of petrol that will flow through. The bigger the number the bigger the jet, and numbers go up and down in fives. Example, 20, 25, 30, etc. These jets should never be reamed out—the seal on the jet you may purchase ; a guarantee of its size.

Fig. 21

Throttle (15). This part is controlled from the handlebar, and from the shut-off to full-open position progressively increases the amount of gas taken into the engine. The slope at J is called the cutaway, and its number is stamped on the bottom. Throttles can be had with different cutaways—the bigger the cutaway and number the weaker the mixture for idling and up to half throttle positions and vice versa. The throttle holds the needle of the needle-jet.

Needle (19) for Needle-Jet (fig. 18). This works up and down with the throttle and the taper end goes into the needle-jet, so controlling the amount of petrol at different throttle openings. It position in the throttle and of its taper in the needle-jet is therefore affected by which groove the clip No. 14 is fixed in : the extreme end groove is No. 1, giving the lowest position and the weakest mixture and vice versa, raising the needle richens the mixture. The spring clip (fig. 14) can be sprung off and on.
The illustration shows clip 14 in position 2.

Needle-Jet (fig. 18), see section. The standard jet is not marked in any way, but can be had in other sized bores on request, which are marked accordingly. If the mixture gets rich at half throttle when the machine is old this needle-jet has probably worn large and should be replaced. (Extreme weakness when idling may be corrected by a larger bore needle-jet which can be obtained on special application).

For Tuning with engine running, but cycle stationary.

Air Shutter on the intake of the carburetter. This is to be closed only for starting from cold to reduce the amount of air and to increase the suction on the jet. When tuning, however, the shutter might be used experimentally to indicate if richening the mixture improves matters.

Tickler (fig. 6), see section. This is for pressing down the float needle off its seat to allow more petrol to come into the float chamber and so raise the petrol level, and consequently richening the mixture.

NOTE. For idling, if excessive richness cannot be cured by a larger cutaway nor will the throttle opening range allow a lower needle position—then change the needle jet for a new one, as the old one may be worn. If weakness prevents idling and cannot be cured by a smaller cutaway throttle and a raised needle position, use a larger bore needle-jet, which will have its bore marked on it.

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A & B6

SPARES SERVICE.

There are many AMAL Service Stockists appointed amongst the motor cycle trade in Great Britain and overseas, who stock parts and retail them at scheduled prices (see list 349). Genuine AMAL Spares are either sealed or packeted under the name AMAL, and these are made with the same care and precision as the parts composing the original carburetter.
Spares and advice can, when necessary, also be obtained from the makers :—

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GENERAL HINTS AND TIPS.

Starting from Cold. Flood the Carburetter by depressing the tickler momentarily three or four times and close the air strangler ; set the ignition, say half retarded, then shut the throttle and open it a little about one-eighth open ; then kick-start.
When started, gradually open the throttle to make the engine run faster and when the engine is warmed up, close down again and open the strangler. Should the engine falter either tickle the float chamber again or partially close the strangler until the engine is warm enough to stand the strangler being opened fully.

Starting with Engine Hot. Do no flood the Carburetter nor close the air strangler ; set the ignition and close the throttle, then open it again about one-eighth of its movement and kick-start. If the engine does not start at once, flood slightly or close the strangler and try again. After starting, open the strangler but if this should cause the engine to falter and not respond to opening the throttle, flood the Carburetter momentarily.
Starting Generally. Find out by experiment if and how much it is necessary to flood and also note the best position for the air strangler on the Carburetter intake.
Usually for easy starting a small throttle opening is desirable and the best position is accompanied by a sucking noise when the engine is being turned over. If this noise cannot be heard, the throttle is probably too wide open and there is, consequently, insufficient " pull " on the starting system.
Given a good engine and a fat spark at the plug, if the engine will not start, the mixture is either too rich or too weak.
Over-richness of the mixture, especially with petroil lubrication, may be caused by overflooding or by the machine being left with the petrol tap turned on and the float chamber flooding. To clear this over-richness open the throttle wide, also the strangler, and turn the engine over several times, then close the throttle and start again. If the engine does not start at once, the sparking plug points may have become damp or oiled up, so remove the plug and dry the points, and whilst it is out, swing the engine over several times before replacing it ; then try again without flooding and with strangler open.

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

Petrol Feed, verification. Detach petrol pipe union at the float chamber end ; turn on petrol tap momentarily and see that fuel gushes out. Avoid petrol pipes with vertical loops as they cause air locks. Flooding may be due to a worn or bent needle or a leaky float, but nearly all flooding with new machines is 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 might be drained, swilled out, etc.

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 oil can and eliminate. Also in old machines look out for air leaks caused by a worn throttle (or worn inlet valve guides if a 4-stroke engine).

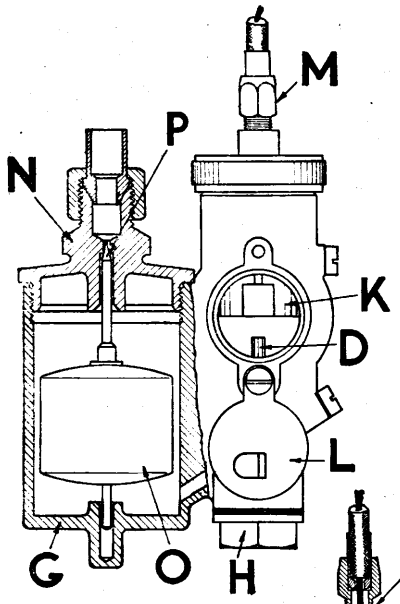
Bad Petrol Consumption of a new machine may be due to flooding caused by impurities from the petrol tank lodging on the float needle seat and so prevent its valve from closing. If the machine has had several years' use, flooding may be caused by a worn float needle valve.

Faults. Read Tracing Faults. The trouble may not be carburation ; if the trouble cannot be remedied by making mixture richer or weaker and you know the petrol feed is good and the carburetter is not flooding, the trouble is elsewhere.

The Carburetter of

B7

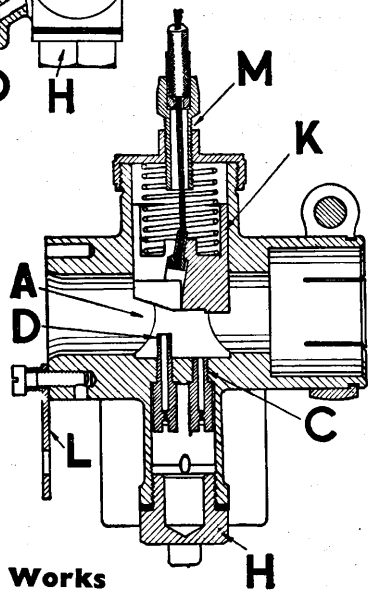
NON-NEEDLE CARBURETTER WITH 2 JETS



Section through Float Chamber.

Alternatively the float chamber may be bottom feed and the lid held down by two screws instead of being screwed into the float chamber.

If Carburetter has no strangler on the air intake, the float chamber cover is fitted with a tickler, which can be used to get excess fuel for starting from cold.



Section through Jet Chamber showing position of jets.

A—Air Intake.
C—Pilot Jet.
D—Main Jet.
G—Float Chamber.
H—Jet Plug.
K—Throttle.
L—Strangler.
M—Throttle Adjusting Screw.
N—Float Chamber Lid.
O—Float.
P—Float Needle.

How the Carburetter Works

The petrol enters the float chamber through the needle valve port (P) and is kept at a constant level by the float (O) above the calibrated orifices in the base of the jets (C) and (D).
When the throttle is nearly closed the bottom of the throttle forms an air passage over the pilot jet (C) and the suction of the engine causes petrol to flow through this jet and become atomised in the air stream ; the main jet (D) being inoperative as it is masked by the throttle.
As the throttle is opened the main jet (D) becomes unmasked, and is subjected to the suction of the engine according to the effect of the cutaway of the throttle. Eventually, if the throttle is lifted above the main jet, this jet comes fully into operation and its discharge, and the airflow, are controlled by the speed of the engine and the crossbore A) diameter.

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The two-jet action is very simple and is self compensating because when the throttle brings the main jet more fully into operation the intensity of the suction on the pilot jet diminishes.

Tracing Faults.

Read paragraphs 1, 2 and 3, on page A4.

Make sure the strangler will open wide and that there is a good supply of petrol to the jets. Verify this by undoing jet plug (H). See that the jets are clear, the chamber free from impurities and finally the jets are screwed home gently and firmly. Erratic slow running may be caused by a partially choked pilot jet (C), a badly worn throttle slide, or air leaks in the induction pipe system. If the engine running is lumpy the pilot jet might be slack or the float chamber flooded.

Lack of Power. This is a main jet (D) matter, providing there is a good petrol supply. Poor acceleration and spitting in the carburetter as the throttle is opened (if idling and power are good) is affected by the cutaway of the throttle, and by the height of the main jet. There are three main jet heights, the standard being ⅜in. long overall. Weakness of mixture is cured by a smaller cutaway on the throttle and/or shorter main jet.

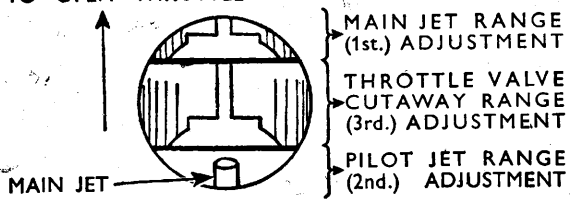
NOTE.—WHEN REFITTING JETS SEE THAT THEY ARE IN THE RIGHT POSITION AND THAT THE THROTTLE CLOSES PROPERLY.

Tuning the Carburetter.

There are three ways in which the quality of the mixture can be varied, and these are given hereunder in the order in which the adjustments should be made.

1. Main jet (affects the mixture from half to full throttle).
2. Pilot jet (affects the mixture from closed to quarter throttle).
3. Throttle valve cutaway (affects mixture from quarter to five-eights throttle).

The following circle indicates diagrammatically the cross bore of a Carburetter and three phases of throttle openings, and what it is that affects the mixture in each of the phases.



RANGE & SEQUENCE OF ADJUSTMENTS ACCORDING TO THROTTLE OPENINGS

1. **Main Jet.** Fit the smallest size main jet which gives maximum speed. For touring conditions we advise a jet size that gives best results with the throttle not quite wide open when pulling up a slight incline.

2. **Pilot Jet.** This affects "slow running" and slow pulling only, and the smallest size should be selected which gives the best "idling." At the same time, care must be taken not to reduce the size of the pilot jet unduly, otherwise difficulty will be experienced in obtaining a correct blend with the main jet.

Blend of Main and Pilot. If any trouble is experienced due to a weak spot between the pilot and main jet, it can usually be cured by increasing the pilot jet one size.

3. **Throttle Valve Cutaway.** Richness at quarter to three-quarters throttle can be rectified by fitting a "cutaway" throttle valve. The standard cutaways are from number "O," which is flat bottom, to number 5, which is cut away five-sixteenths inch.

Starting Up. With a *cold engine*, depress the carburetter tickler, close strangler, open throttle about one-eighth, ignition about three-quarter advanced, when, if the ignition system is in good order, no difficulty should be experienced in obtaining an "easy start."

With a *warm engine* it is unnecessary to flood Carburetter.

If the float chamber is unduly flooded, excessive richness of mixture will prevent the engine starting. Open throttle fully and revolve engine smartly until excess of fuel is exhausted; then proceed as before, without again flooding.

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