The Practical Point of View—

CARBURATION

A Comparison of Three Interesting Carburetters that Depart from Principles Regarded by Many Present-day Motorcyclists as Orthodox

by

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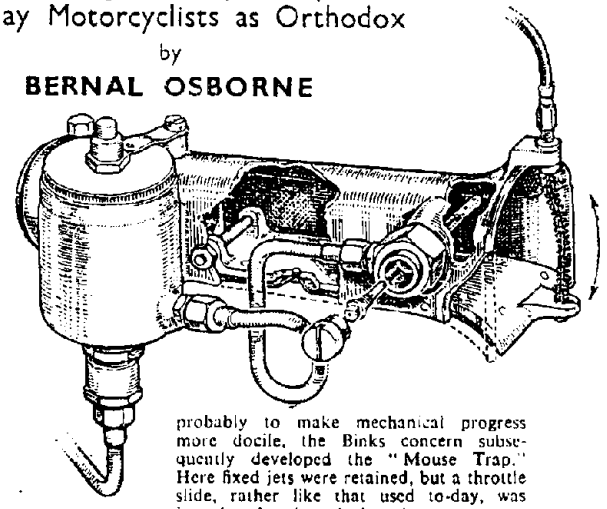
BECAUSE the conventional type of Amal carburetter, with its cut-away air slide and taper-needle mixture control, adjustable for varying conditions, enjoys very wide use on British motorcycles, and on many foreign machines, too, there is sometimes a tendency to regard any alternative type of instrument as being highly unconventional and, therefore, a trifle "mysterious."

It is true, of course, that the "works" of the Amal are nearly all open to view and that a couple of minutes with a spanner will usually suffice to remove the carburetter and reduce it to components, so disposing of any "mystery." Nor, if the instrument is reassembled faithfully, will careful "tinkering" of this nature lead to impaired performance. On the contrary, the owner will have had an opportunity of clearing any sludge which may have formed in the small petrol passages and, whilst so doing, he will have gained a practical understanding of how, with the taper needle, his jet size becomes almost infinitely variable and why, to compensate for mixture richness at wide throttle openings, a slide is arranged to admit varying quantities of air, keeping the mixture proportions constant.



A forerunner of the modern carburetter, the Binks "Rat-trap," giving good acceleration, was a firm favourite with hill-climb and sprint enthusiasts in the early days of motorcycling sport.

Early Development

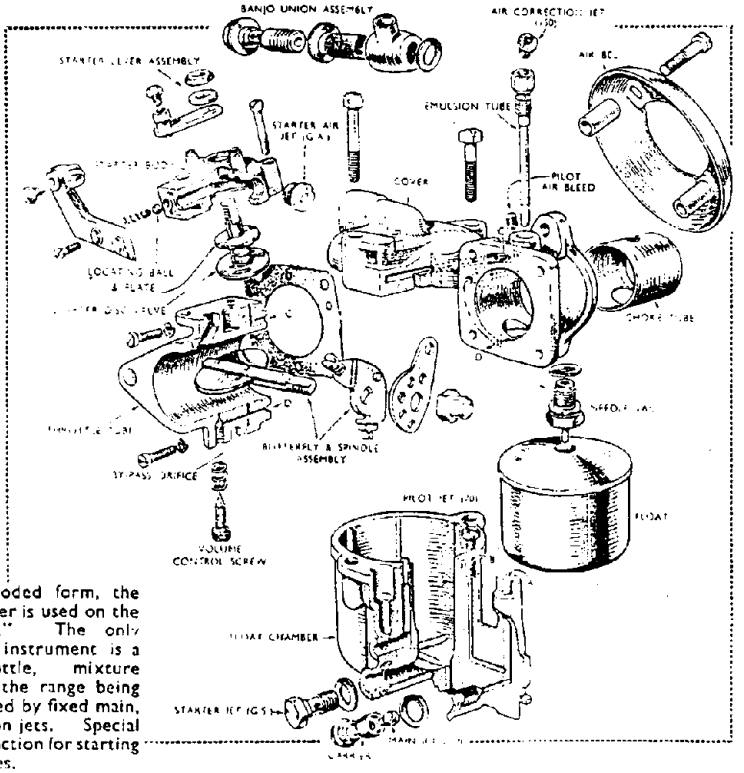
It was not always so. Hardly within living memory of this generation but certainly within that of our fathers, such finely graduated, automatic and foolproof carburation as this was not always so easily obtainable. Textbooks printed in dad's day referred to: "The multitude of carburetters now on the market . . . ." Now we have only three or four, but it is from the "multitude" that most of them have developed.

Long before the days of the Amal, for instance, the sporty boys entering for sprints or hill-climbs pinned considerable faith to a thing called a "Rat Trap." It was made by Binks, whose instruments formed one foundation for the current Amal design. Editor Graham Walker recently brought his "Rat Trap" to the office. I said it looked like a bit of an organ pipe. "Organ pipe my foot!" he exclaimed, or words to that effect. "This thing won me many a speed event."

The "thing" is illustrated on this page and you will see that it dispensed with any form of throttle in the accepted sense of the word. In the main it was simply a venturi pipe having in its centre a fixed, non-adjustable fuel jet fed from a float chamber and, at the bottom of the D-shaped venturi was a hinged "floor" normally held at low level by a spring-loaded cable control. That normal position was fully open. An alternative position was with the "floor," or to use the proper word, "trap," almost fully raised, this latter setting being used for starting. Obviously, with the trap closed, the mixture would be extremely rich and suitable for push starting. Once the engine fired, down went the trap and away went the model like a bomb—although in its heyday people had no need to use the "bomb" analogy so much as we do. . . .

In the literature of that time the Binks "Rat Trap" was said to give acceleration of a "harshly assurgent" nature and, probably to make mechanical progress more docile, the Binks concern subsequently developed the "Mouse Trap." Here fixed jets were retained, but a throttle slide, rather like that used to-day, was introduced and worked, as is current practice, between the venturi and the induction pipe. It was a tubular slide but had no cut-away; air control was still by means of the trap, positioned in this model at the top of the venturi.

In many of these older types of carburetter one sees the shape of things which



Shown here in exploded form, the 26AH Solex carburetter is used on the Ariel "Square Four." The only moving part of this instrument is a butterfly-type throttle, mixture strength throughout the range being automatically controlled by fixed main, auxiliary and correction jets. Special jets are brought into action for starting purposes.

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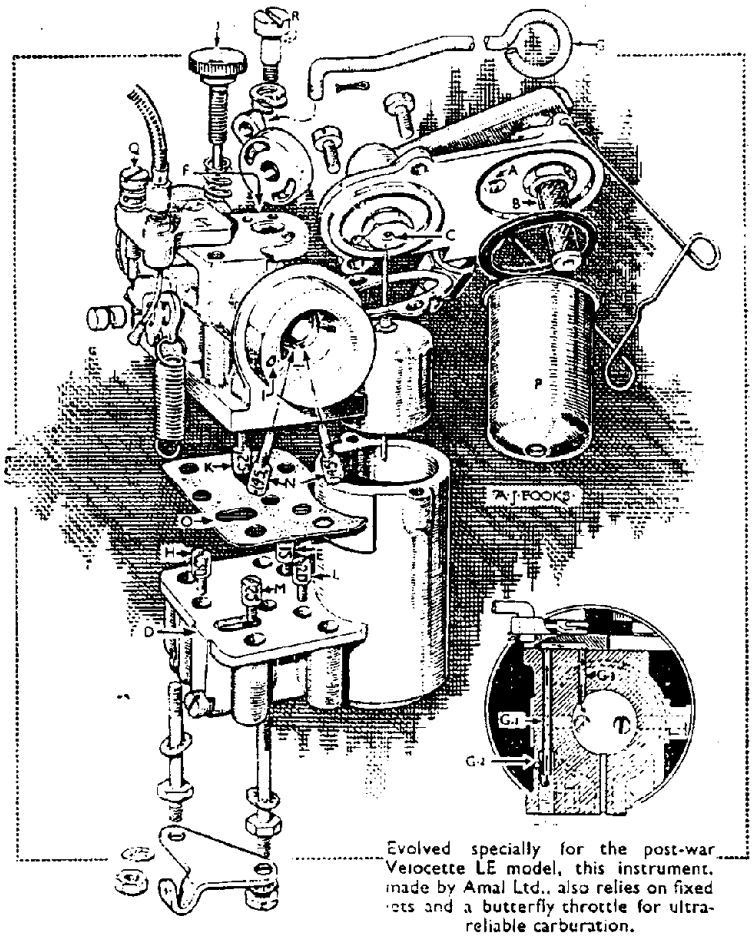
EXTRAORDINARY

were to come. To a great extent they were things destined to oust the fixed jet and, for this reason, it is interesting to reflect that two of Britain's famous modern four-stroke "multis," the big Ariel "Square Four" and the little 149 c.c. Velocette LE, without being either old-fashioned or retrograde, dispense with the now almost universal taper needle and throttle slide.

The 26AH "Solex" has a Bi-starter attachment which acts, in effect, as a separate carburetter purely for starting purposes. The Bi-starter has its own little mixing chamber fed from the main fuel supply via drillways in the float chamber cover and through the throttle chamber body to an orifice leading out on the engine side of the butterfly. An air



Evolved specially for the post-war Velocette LE model, this instrument, made by Amal Ltd., also relies on fixed jets and a butterfly throttle for ultra-reliable carburation.

employing instead a series of fixed main, compensating and pilot jets calibrated to obviate "flat spots" and to give fuel strength of a consistent nature throughout the entire range.

The Ariel uses a "Solex" carburetter, a car-type instrument with a butterfly throttle. It is gravity fed from the fuel tank and float chamber.

A needle valve controls the flow to the main jet whence fuel goes to the main choke tube via drillways, receiving air from the air correction jet and emulsion tube "A" for normal running. When idling, however, "A" is by-passed, fuel flowing instead along the drillways "B," "C" and "D" and entering the throttle chamber on the engine side of the butterfly. It is metered by a volume control screw. Clockwise adjustment weakens the mixture, whilst anti-clockwise adjustment enriches it.

bleed and a two-position disc valve, the latter controlled by the choke lever, provide for varying mixture-strength requirements as the engine approaches normal running temperature. With the butterfly throttle open, absence of depression between it and the engine serves to put the Bi-starter out of action, fuel being drawn instead from the main system. The 26AH model has a strangler.

The following forms a guide to the standard settings for "Solex" motorcycle carburetter fitted to the Ariel.

Choke tube	23
Main jet	120
Auxiliary jet	70
Air correction jet	150
Bi-Starter (starter jet)	100
Bi-Starter air jet	3.0

The only moving parts of the "Solex" are the butterfly throttle and its spindle; wear, therefore, is not a big factor to be contended with in overhauling this type of carburetter, the main requirement being an absolutely perfect seal between the flange and the engine.

A New Design

The main reason for the evolution of the LE Velocette carburetter, which contains an air-bled compensating jet system, was to provide more pronounced and efficient compensation—considered to be of paramount importance to a small-capacity engine which, in inexpert hands, might be subjected to unwitting abuse. The silence and smoothness claimed for the machine suggested the possibility of users hanging on to top gear, driving the model virtually to a standstill before dropping to a lower ratio.

Amal, Ltd., who make the "LE" instrument, tell me that a wide range of jet settings tried during the experimental stage have produced a combination calculated to be as near perfect as possible. Like all the other component parts of the "LE," the carburetter is made to "stay put." The worst that can happen is jet blockage, and to show the location of each jet I have had an "exploded" illustration made of the instrument fitted to a "Motor Cycling" staff LE Velocette.

Fuel enters the carburetter via "A" and the filter bowl "P." From where it passes through a special filter element "B," which consists of a very closely wound spiral of gauze with microscopic gaps. Drillways lead thence to the float chamber via the needle and seating "C," a constant level being maintained by the normal type of float. Petrol then feeds from the float chamber to the platform "D," which carries the various jets.

Acting as a starting jet is "E," calibrated at 15 c.c. Flowing through it, fuel reaches a small auxiliary starting chamber "F," put into, or out of, operation by the control lever "G." When this lever is pulled into the "Start" position, fuel goes from the 15 c.c. capacity jet up the passage marked "G1" in the inset sketch. "G2" is an air inlet and the now quite rich mixture goes into the engine via "G3."

A 30-c.c. jet, marked on the sketch as "H," provides pilot, or slow-running, facilities; at this stage air enters via "I" and the mixture is adjusted by the air screw "J"; "K" is the pilot volume jet.

The third phase brings in the main jet system; the main jet reacts to depression and is not bled; the compensating jet is bled to the atmosphere. The former is "L" (20 c.c.) and the latter "M" (25 c.c.). Spray tubes, indicated by "N," have 145 c.c. capacity. You've noted, of course, that all these jet numbers, in keeping with Amal's general practice, indicate the rate of flow in c.c.s per min. and that these 145-c.c. capacity spray tubes largely control mixture volume.

If you dismantle the instrument—few motorcyclists can leave anything alone for long!—take care to replace correctly, and undamaged, the gasket "O." The filter bowl "P" can be and, indeed, should be, removed periodically for cleaning.

Possibly, at the conclusion of maintenance operations, it may seem that a degree of re-tuning is necessary. Usually that impression is confined to slow-running performance and you will find that adjustment made very carefully to the throttle-stop screw "Q" fixes your tick-over for you. But use it in conjunction with the air-adjusting screw "J." Periodic inspection of screw "R," ascertaining that it is tightened right down, completes normal routine maintenance to an extremely simple instrument, where the old school of thought dating from dad's day has, to a great extent, approached perfection.