THE
ZENITH D.B.V.C. 42
CARBURETTER

Leaflet S.B./4/52.

The "Zenith" Carburetter (Action).

The carburetter is a single choke down-draught model incorporating:—

1. An automatic control of the choke by means of a manifold heated thermostat, which renders it possible to start off with a cold engine without adjustment of a mixture control.

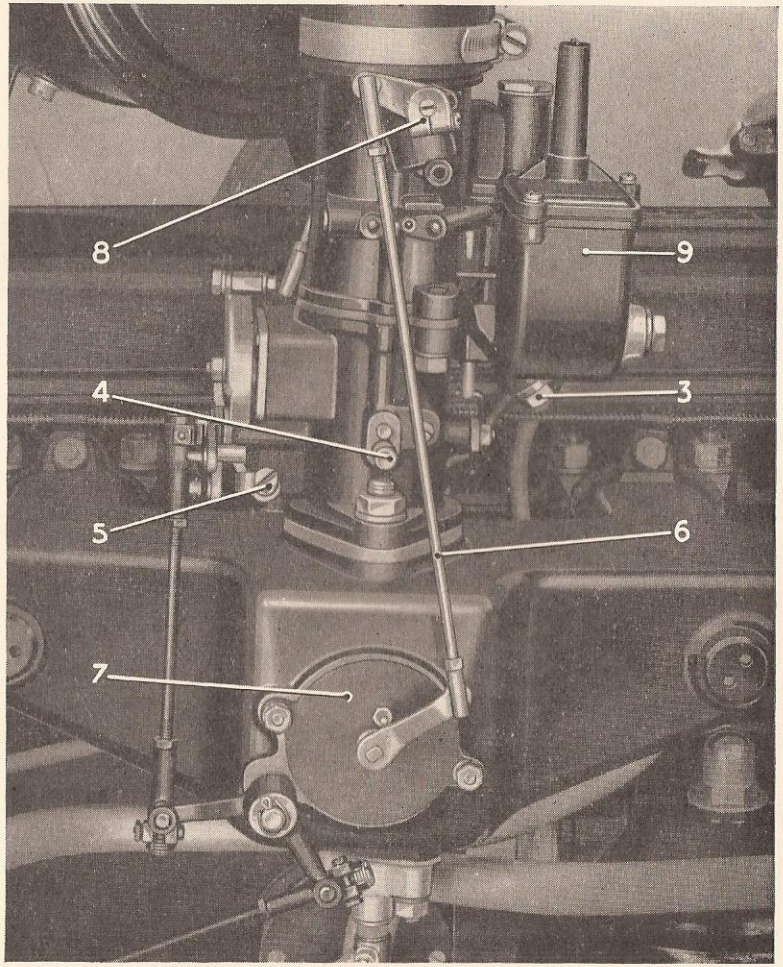

Fig. 1.—THE CARBURETTER—RIGHT-HAND SIDE.

3. Main Jet Plug.
4. Slow Running Adjustment.
5. Throttle Stop Screw.
6. Thermostat Choke Rod.
7. Thermostat.
8. Choke.
9. Float Chamber.

2. A fast idling device, brought in automatically by the same mechanism as that controlling the choke.
3. An accelerator pump which injects extra fuel for acceleration purposes.
4. A vacuum operated by-pass valve, which is brought into operation for maximum power demands at full throttle.

From the fuel supply the petrol enters the carburetter at the union (1) passing through a gauze filter (2), reaches the needle valve, and so to the float chamber.

From the float chamber, the fuel flows through the main metering jet (3), and so into the main discharge jet, which protrudes into the throat of the small or inner venturi. The petrol level will stand at the same height in the main discharge jet and the idle tube as that attained in the float chamber.

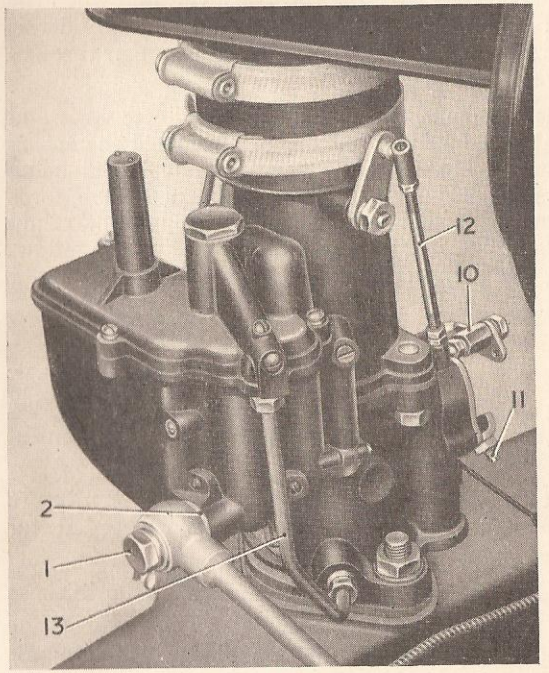

Fig. 2.—THE CARBURETTER—LEFT-HAND SIDE.

1. Petrol Inlet.
2. Filter.
10. Fast Idle Lever.
11. Fast Idle Screw.
12. Fast Idle Rod.
13. Vacuum Tube.

Slow Running.

The fuel for slow running is supplied from the idle tube, the petrol being emulsified by the air entering via the idle bleed, the mixture proceeding along the drilling down the barrel of the carburetter to an outlet on the engine side of the throttle.

Progressive Mixture Control.

To increase the speed of the engine the throttle is now opened and to ensure a progressive action, a second discharge hole for the idling mixture higher up the barrel is uncovered by the throttle valve.

Normal Cruising Speeds.

Depression at the small venturi will now have the effect of drawing out the petrol standing in the main discharge tube, which will be atomised by the inrushing air from the air cleaner and silencer.

When the petrol standing in the main discharge jet has been utilised, the supply will be direct from the float chamber via the metering jet (**3**). The falling of the petrol level in the discharge tube will have uncovered a series of holes that are in communication with atmosphere through the high speed bleed. Consequently the petrol from the main discharge tube will be partly atomised by the air from these holes and will be completely emulsified when entering the small venturi to pass through the large venturi into the induction system.

Accelerator Pump.

To ensure immediate engine response when the throttle is suddenly opened, a small quantity of metered fuel is ejected into the air stream by the accelerator pump.

The pump piston rod is linked with the throttle lever, and when the throttle is closed the pump piston is drawn up and the cylinder is charged with fuel by petrol being drawn from the float chamber through the pump suction valve.

Opening the throttle suddenly, the pump piston rod descends and compresses the spring above the pump piston; expansion of the spring will force down the pump piston and the fuel in the cylinder being under pressure will close the disc in the suction non-return valve, force down the ball in the pump discharge valve, pass through the pump reducer, and so to the pump discharge jet. The function of the follow-up spring is to prolong the pump discharge the desired amount after the throttle is fully opened.

The Power Jet.

For normal cruising speeds at part closed throttle, fuel is provided by the main jet, a mixture on the lean side consistent with economical cruising and smooth running.

It is well known that there is a considerable difference in the mixture strengths necessary for economical running and that needed for maximum power.

The enrichment provided by the power jet enables both these conditions to be met.

The power jet is operated by the induction pipe depression; for normal part throttle running the depression on the engine side of the throttle is high, and a normal lean mixture is supplied. When maximum power is demanded with the throttle wide open, the depression is comparatively low, and a richer mixture is required.

On the engine side of the throttle, a hole is drilled to which is attached one end of the suction pipe (**13**), the other end being connected to the upper side of the by-pass piston. When the depression is high it will have the effect of overcoming the tension of the by-pass piston spring, and lifting the piston clear of the by-pass valve stem. When

the depression falls below a predetermined degree, the spring is no longer overcome and it forces down the by-pass piston, which in turn depresses the stem of the by-pass valve. The valve then operates to allow an extra supply of fuel through the by-pass jet direct to base of the main discharge tube.

Automatic Choke Control.

A thermostatic spring unit (**7**) is mounted in a suitable recess in the water jacketing of the induction manifold, and linked by the connection (**6**) to the strangler butterfly. When the engine is cold this connection is forced upwards by the tension of the thermostatic spring, thus closing the strangler. It is necessary however, to depress the accelerator pedal once, to release the fast idle cam mechanism to allow the choke butterfly to fully close. An additional rod connects the strangler butterfly to a relay lever and a fast idle cam mounted on the side of the carburetter. A vacuum operated piston is connected through to the relay lever by means of the vacuum kick lever.

As soon as the engine starts, the depression in the manifold is communicated to the vacuum piston, which opens the choke to a predetermined degree and thus the engine runs at a fast idle position with the choke partly open.

Owing to the offset of the choke butterfly, the air passing down the carburetter tends further to open the butterfly, which is resisted by the thermostatic spring. As the thermostatic spring warms up, however, it loses tension and this diminishes the pressure on the linkage so that the choke is gradually opened as the engine warms up.

Fast Idle.

As previously stated, the fast idle cam is incorporated on the pivot of the relay lever. This cam incorporates three steps, and an adjustable screw on the throttle lever operates on one or other of these three steps. For starting purposes, it should be on the second step; while warming up, it should be on the first step; and when warm and the choke fully opened, it will be found that the screw comes past the cam altogether.

As the engine cools down the end of the adjustable screw will catch on the steps of the cam and so prevent the choke closing, hence the necessity to *depress the accelerator pedal once*, before starting the engine.

Adjustment of Controls.

There should be no necessity for any variation of the adjustments of the carburetter as fixed by the makers. Great care is taken during the testing of the car to secure the best settings, and these should not under normal circumstances be altered.

There are certain external adjustments however, which are dealt with in the following paragraph.

Setting of Idling Adjustments.

The idling adjustments should be reset when the engine is well warmed up.

1. The throttle stop should be set, with a hot engine, to give approximately 350 r.p.m.
2. Adjust the slow running mixture screw (**4**), to give the most even running, turning the screw IN weakening the mixture, and turning the screw OUT enriching the mixture. The approximate setting is 1½ turns back from the closed position. It is important to note that this screw should only be operated with the fingers, otherwise the seating may be damaged.

Diagnosis of Faults.

In the event of faulty running or misfiring developing, a systematic investigation of possible causes should be made, e.g. the correct functioning of the ignition system, sufficient fuel in the tank, cleanliness of the fuel strainers and correct operation of the fuel pumps.

NOTE:—

In cases where the engine misfires or fails to start, and that this condition is obviously not due to petrol starvation, it is possible that the ignition condenser is at fault. In such circumstances as the above, it is recommended that the connection to the condenser mounted below the ignition distributor should be removed, and reconnected to the spare.

If such investigations leave the carburetter itself under suspicion, the following points should be investigated:—

For loss of maximum speed.—Check throttle valve for full opening and by-pass jet for stoppage. In order to examine the latter, it is necessary to remove the float chamber cover and screw out the by-pass valve complete. Check also by-pass vacuum piston for sticking in the up position.

Flat spot at small throttle opening.—Adjust idling to give more regular engine rhythm. If flat spot is still evident, examine idle discharge holes and idle tube for stoppage.

Flat spot at half throttle.—Examine main jet for stoppage. Check accelerator pump for stoppage.

High fuel consumption.—Check jet and float level for correct setting, which should be ¾" from float cover facing. If setting correct, check for sticking or leaking by-pass valve, which will allow flow of fuel at part throttle to the detriment of economy. Check economiser valve for stoppage, also, clean and check ball valve at base of pump cylinder, as if not seating, petrol will issue from pump jet at all times.

NOTE:—

Important:—the external vacuum connection unions must be tight, as leakage at this point, with the consequent partial loss of vacuum, will cause the by-pass valve to open too early.

Carburation at High Altitude.

When operating the car at high altitudes, a better performance is obtained with a slightly weaker mixture than that necessary for sea level running.

It is therefore recommended that when the car is to be used mainly at altitudes over 3,000 ft. above sea level, that the standard main jets should be removed and substituted by smaller capacity jets.

It should be noted that jet sizes are also dependent on the type of carburetter air cleaner fitted.

	A.C. AIR CLEANER			OIL BATH AIR CLEANER		
	Sea Level to 3,000 ft.	3,000 ft. to 5,000 ft.	5,000 ft. to 8,000 ft.	Sea Level to 3,000 ft.	3,000 ft. to 5,000 ft.	5,000 ft. to 8,000 ft.
Main Jets	.060	.058	.056	.058	.056	.054

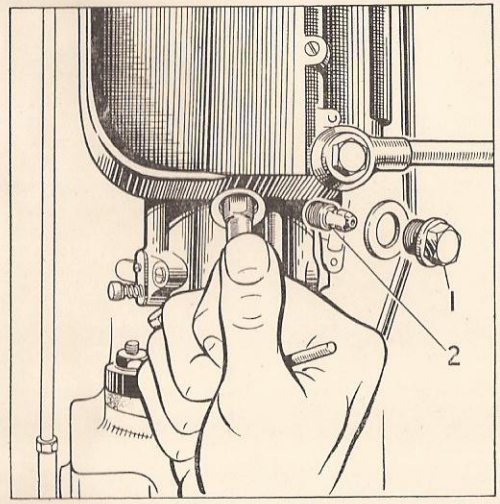

Fig. 3.—CHANGING CARBURETTER JETS.
1. Main Plug Jet. 2. Main Jet.

To remove the jets, first remove the main jet plugs with a suitable spanner, then, using special tool No. L.638, unscrew the main metering jet as illustrated in Fig. 3.

Reverse the operations when fitting the smaller jets.

It should be remembered that if the car is operated at sea level with the smaller jets fitted, the mixture will be on the weak side, and the engine will be subject to "pinking". If possible, therefore, the standard jets should be replaced.