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Float System — Cont.

Some applications use an atmospheric idle vent valve. This vent valve is located on the air horn just above the float bowl (See Fig. 2). It is operated by the tang on the pump lever. When the throttle lever is in the idle position, the idle vent valve is open to allow any fuel vapor pressure built up in the float bowl during periods of hot engine idle and hot soak, to escape to the outside. The vent valve closes when the throttle valves are opened, returning the carburetor to internal balance by venting the fuel bowl through the internal vents inside the air horn.

Idle System (Fig. 4)

At small throttle openings the vacuum created by the main venturi is not sufficient to cause fuel to flow from the nozzles. Therefore, an additional system has been provided to furnish the proper mixture ratios required throughout the low speed range.

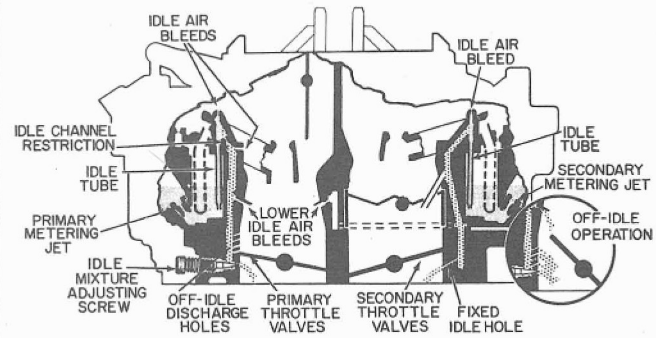

FIGURE 4

An adjustable idle system is used in the primary side of the carburetor which supplies the fuel required for normal curb idle, as well as that required for operation in the off idle and low speed range. The idle fuel passes from the float bowl through the main metering jets into the main well area. The fuel then travels up the idle tube, past an air bleed, through the idle restriction, and past another air bleed. The mixture then travels down through a passage in the bowl, past the lower idle air bleed, (where used) and then past the off idle ports where additional air is bled into the mixture. The mixture is then discharged into the throttle bores from the idle needle holes.

Some applications have a fixed idle system on the secondary side. The quantity of air/fuel mixture is controlled by the size of the discharge hole located below the throttle valves on the secondary side.

Off-idle operation: (See Inset)

As the throttle valves are opened from the curb idle position, the air entering the off-idle discharge holes gradually diminishes. When these holes become exposed to manifold vacuum, they then become fuel discharge holes.

Further opening of the throttle valves increases the air velocity through the carburetor sufficiently to cause the air to strike the end of the extended lower idle air bleeds, thus creating a low pressure within the bleed tube. As a result, fuel begins to discharge from the lower idle air bleed tubes and continues to do so through the part throttle and wide open throttle ranges supplementing the main discharge nozzle delivery.

Idle Air By-Pass System (Fig. 5)

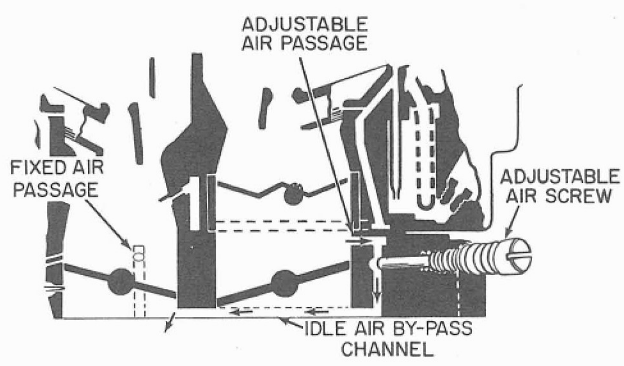

FIGURE 5

Some Model 4GC carburetors use an idle air by-pass system. The purpose of this system is to allow the primary throttle valves to be completely closed during curb idle operation. This design prevents carbon and gum formations which may form around the throttle valves from disrupting engine idle speed.

The fuel flow in this system is basically the same as in the standard idle system described previously. However, the idle air which normally passes by the slightly open throttle valve is passed around the throttle valves through an idle air by-pass channel.

In this system, idle air is taken from the carburetor bore above the throttle valves, by-passes around the closed throttle valves, through an air channel and enters the carburetor bore just below the throttle valves. The amount of idle air which is supplied to the engine is regulated by an idle air adjustment screw located in the idle air passage. The adjustment screw is located on most models at the left rear of the carburetor as mounted on the engine. Turning the screw inward (clockwise) lowers the engine idle speed and turning it outward (counter-clockwise) increases the engine speed.

In order to obtain sufficient idle air for stable idle speed adjustment, a supplementary or fixed idle air bleed is used in addition to the adjustable idle air screw. The fixed air bleed can either be a calibrated hole drilled through each primary throttle valve or a calibrated fixed idle air channel which leads from above the primary throttle valve to below the valve. The type used is dependent upon which is acceptable to the particular engine design.

Idle Air By-Pass — Cont.

When adjusting engine idle speed with the idle air by-pass system, use the following procedure:

1. Start and warm up the engine thoroughly. Make sure choke is completely open and both throttle valves are completely closed.
2. Connect a tachometer to the engine and turn the idle air by-pass screw in or out until the specified idle RPM is reached.
3. Adjust the two idle mixture screws to obtain the highest RPM and a smooth idle.
4. Recheck and reset idle RPM with adjustable air screw, if necessary.
5. If after setting the mixture screws the idle RPM changed and it was necessary to readjust the air screw, recheck the idle mixture adjustment.

The idle mixture must always be rechecked after changing the idle air screw position, otherwise poor off-idle operation will result.

Idle Compensator (Fig. 6)

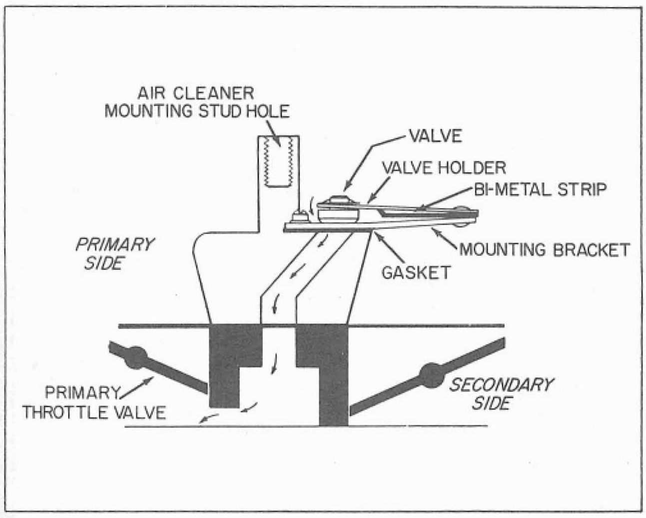

FIGURE 6

Shown in Fig. 6 is an idle compensator valve which is used on some standard and air conditioned models. A thermostatic valve mounted on the secondary side of the float bowl between the secondary venturi, allows additional air to enter the primary bores under extreme "hot idle" conditions.

This valve, called the "idle compensator" is operated by a bi-metal strip which senses temperature. During prolonged hot engine idle the bi-metal strip bends raising the valve which uncovers a hole leading to the underside of the primary throttle valves. The additional air drawn into the engine in this manner is sufficient to offset the enrichening effects of fuel vapors caused by high temperatures and prevents engine stalling. When underhood temperatures are lowered, the valve closes and operation returns to normal. This valve cannot be repaired; a defective valve must be replaced. *Caution: Always make sure valve is closed when adjusting initial idle speed and mixture.*

Main Metering System (Fig. 7)

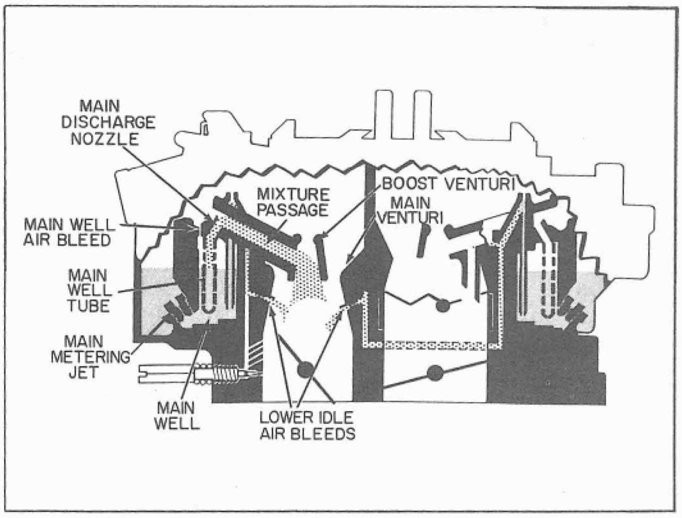

FIGURE 7

The main metering system located in the primary side of the carburetor controls fuel flow between the low speed (idle) and power ranges. Its purpose is to provide efficient fuel metering during the cruising range of the automobile. Its operation is dependent upon air flow through the carburetor venturi which, in turn, creates a low pressure in the venturi, causing fuel to flow in the following manner.

At a point of sufficient throttle opening, the low pressure around the main *venturi* is multiplied many times in the boost venturi. This low pressure is transmitted to the tip of the main well tube or main discharge nozzle. Atmospheric pressure, which is greater, forces fuel from the float bowl through the main metering jets and into the main well. As fuel passes through the main well tubes, it is mixed with air from the main well air bleeds. The fuel mixture then passes from the tip of the discharge nozzle through the mixture passage to the boost venturi, and on into the intake manifold.

As the throttle opening is increased and more fuel is drawn through the main well tubes, the fuel in the main well drops. The calibrated holes in the main tubes are proportionately exposed to the air in the upper well area. When this occurs, they become air bleeds mixing progressively more air with the fuel passing through the main well tubes. Although the nozzle suction is increased by increasing the throttle opening, the air/fuel mixture to the engine remains constant throughout the part throttle range. The calibrated main metering jet orifices plus the main well air bleeds provide the correct air/fuel mixture ratios for efficient combustion during the part throttle and cruising ranges.

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Power System (Fig. 8)

To obtain the proper mixtures required for maximum engine power under heavy loads a vacuum operated power system is used.

The power system is located in the primary side of the carburetor. A vacuum channel from the top of the power piston is exposed to manifold vacuum beneath the throttle valves. The vacuum in this channel varies directly with manifold vacuum which is normally high in the idle and main metering ranges. The vacuum is sufficient to hold the power piston in the up position against the force of a calibrated spring. However, as the throttle valves are opened, the vacuum drops.

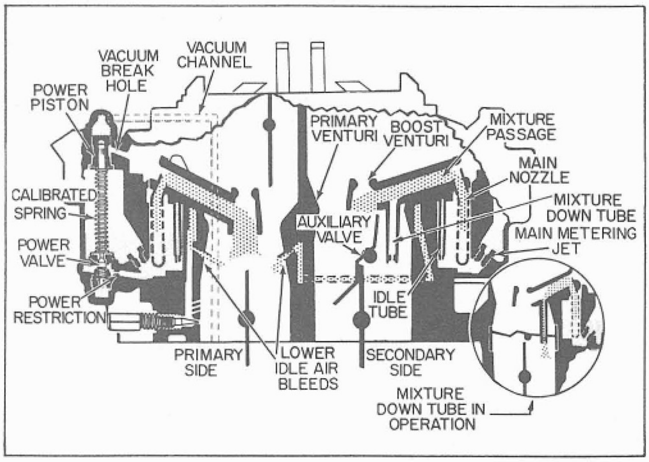

FIGURE 8

When the manifold vacuum drops below approximately 9″ mercury the calibrated power piston spring forces the piston down. When the piston drops down, it unseats the spring loaded power valve. This permits additional fuel to flow from the float bowl through the calibrated power restrictions and into the main well.

The additional fuel supplements that already flowing through the main metering jets (on the primary side) providing a richer mixture for power demands. This power mixture continues to be supplied as long as the manifold vacuum remains below approximately 9″ mercury. When the manifold vacuum again increases sufficiently, the force of the power piston spring is overcome and the piston is drawn up, returning the carburetor to normal mixtures.

The power piston cavity in the carburetor air horn is connected to the air horn bore by a vacuum break hole. The purpose of this hole is to prevent the transfer of vacuum acting on the power piston from also acting on the top of the fuel in the float bowl. Any additional vacuum acting on the fuel in the float bowl would affect carburetor calibration.

It is also in this range that the secondary side of the carburetor provides additional air and fuel to the engine for increased power. For high speed or power operation, the throttle linkage engages the secondary throttle valves and opens them completely in the remaining few degrees of primary throttle travel. In this range, manifold vacuum acting on the secondary side of the carburetor is multiplied at the main and boost venturi and draws fuel from the float bowl through the calibrated main metering jets into the main wells. The fuel then passes through the main well tubes and is bled in a manner similar to that described previously in the operation of the primary main well air bleeds. It is then drawn to the tips of the main well tubes (nozzles) and passes through the mixture passage to the boost venturi and is discharged into the intake manifold. The lower idle air bleeds (where used) also supply fuel throughout the power range in a manner similar to that described under the main metering system operation.

The auxiliary valves (Figs. 8) provide a means for controlling secondary bore openings according to air velocity at wide open throttle. During the period in which the secondary throttle valves are opened and air flow is not high enough in the secondary bores to open the auxiliary valves, additional fuel is needed for the air which by-passes around the auxiliary valves. This additional fuel is supplied by down tubes (see inset) (Fig. 8) which extend from the mixture channel in the venturi cluster arm or bowl, to the low pressure point below the closed auxiliary valves.

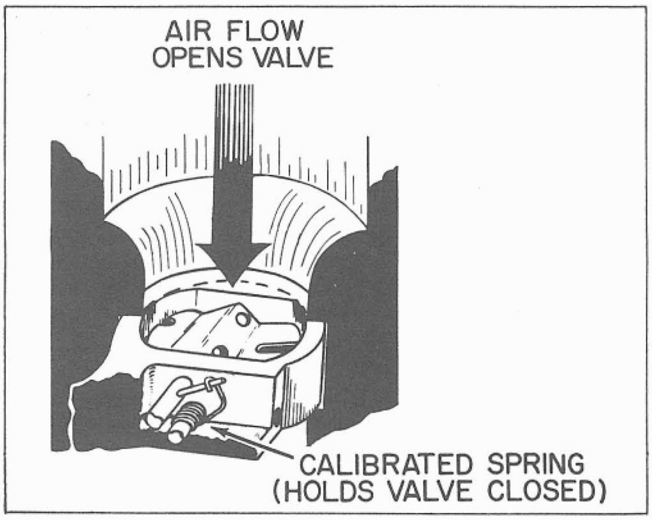

FIGURE 9

When the air flow is high enough to open the auxiliary valves, the down tubes no longer feed fuel as the low pressure point is now in the boost venturi. With this feature, the correct air/fuel mixture can be supplied at any point during secondary throttle valve operation.

The auxiliary valves (Fig. 9) are normally held closed by a calibrated spring. The tension of the spring is set so that the valves will open, only when the engine demands more air and fuel for power operation.

The auxiliary valves are factory calibrated and cannot be adjusted in the field.