SOLEX 40 PII-4
Twin Throat Downdraft Carbureter

General Description

The 1600 S-90 engine in type 356 B cars is equipped with SOLEX 40 PII-4 twin throat downdraft carbureter; the throats measure 1 37/64 in. (40 mm) in diameter. As a result of the low mounting of the carbureters it was possible to omit chokes or similar starting aids.

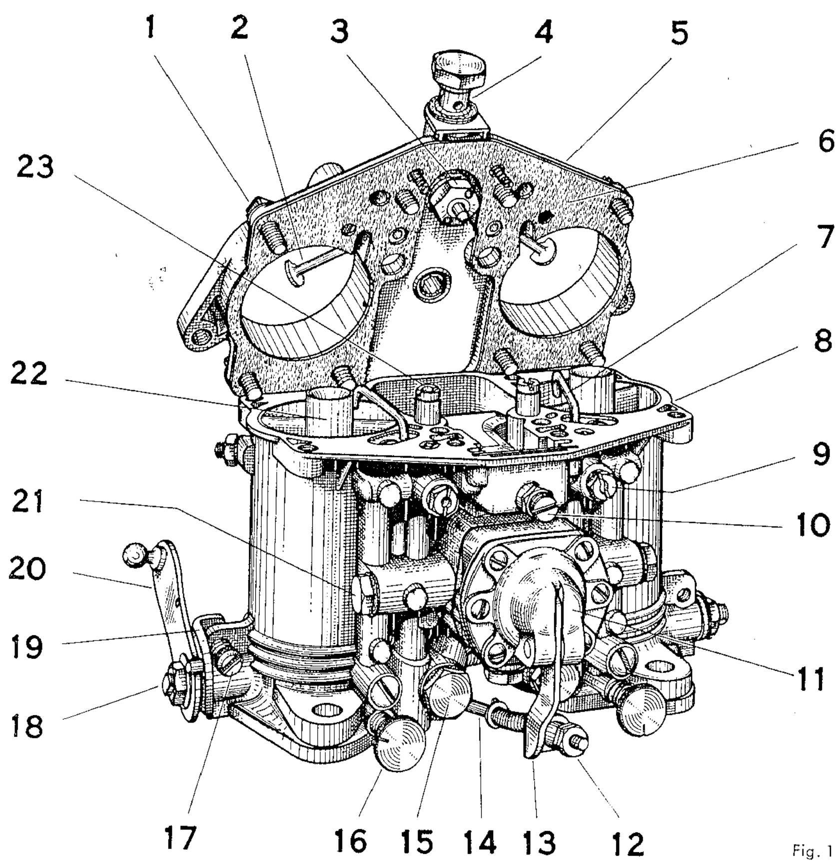


Fig. 1

① Float chamber cover retaining screw
② Power enrichment nozzle
③ Float needle valve assembly
④ Fuel inlet bolt
⑤ Float chamber cover
⑥ Float chamber gasket
⑦ Accelerating pump nozzle
⑧ Carbureter body
⑨ Idle jet
⑩ Float level adjustment
⑪ Accelerating pump
⑫ Accelerating pump adjustment
⑬ Accelerating pump lever
⑭ Accelerating pump rod
⑮ Main jet carrier with jet
⑯ Idle mixture adjustment
⑰ Idle speed adjustment
⑱ Throttle shaft
⑲ Thrust block
⑳ Throttle arm
㉑ Accelerating pump jet
㉒ Primary venturi
㉓ Air correction jet

Operating Principles

The carbureter consists basically of the main body and the float chamber cover, with a gasket separating the two. The main body contains two induction barrels, each having an independent idle speed and power metering system. The throttle shaft, which passes through both barrels, controls two throttle valves and carries a thrust block and a throttle arm.

Schematic View of Carbureter

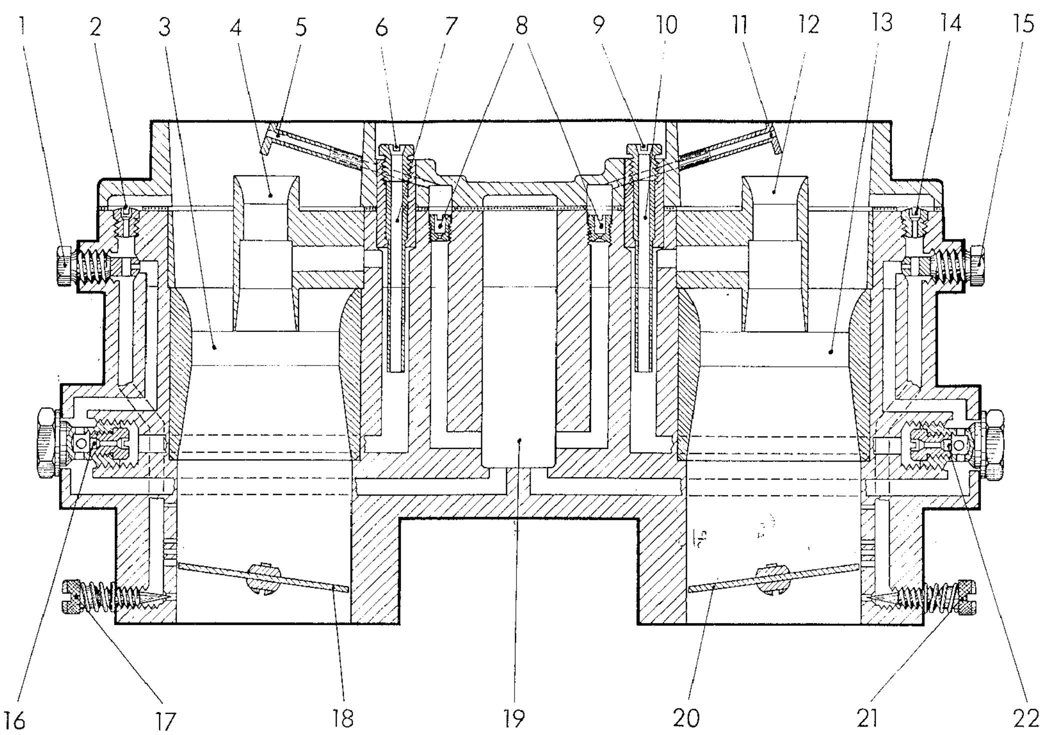


Fig. 2

For reasons of schematic clarity the throttle shaft is purposely shown in an untrue, transverse arrangement.

① Idle metering jet
② Idle air bleed
③ Main venturi
④ Primary venturi
⑤ Power enrichment nozzle
⑥ Air correction jet
⑦ Emulsion tube
⑧ Power enrichment jets
⑨ Air correction jet
⑩ Emulsion tube
⑪ Power enrichment nozzle
⑫ Primary venturi
⑬ Main venturi
⑭ Idle air bleed
⑮ Idle metering jet
⑯ Main jet carrier
⑰ Idle mixture adjustment
⑱ Throttle valve
⑲ Float chamber
⑳ Throttle valve
㉑ Idle mixture adjustment
㉒ Main jet carrier

The accelerating pump is located on the broad side of the carbureter; it is actuated through an adjustable rod and supplies fuel to both induction barrels.

① Primary venturi

② Accelerating pump nozzle

③ Accelerating pump jet

④ Accelerating pump diaphragm spring

⑤ Accelerating pump diaphragm

⑥ Fuel inlet from float chamber to check valve

⑦ Check valve with return flow port

⑧ Pump rod spring

⑨ Pump lever

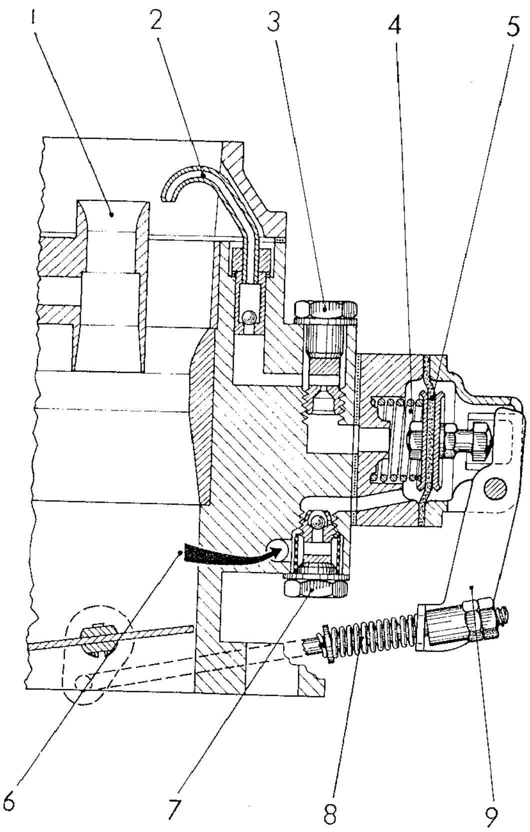


Fig. 3

The float chamber is situated between both induction barrels. The fuel level in the float chamber is controlled through the buoyancy of the float whose toggle causes the float needle valve to open or shut. The float level can be raised or lowered by a screw which controls the height of the intermediate swivel joint, which makes it possible to easily adjust the fuel level in the float chamber to suit the particular grade of fuel used. The fuel level may be checked by removing the plug in the inspection port.

① Float chamber vent

② Float needle valve

③ Float chamber cover

④ Threads for fuel inlet bolt

⑤ Inspection port plug

⑥ Float

⑦ Float level adjustment

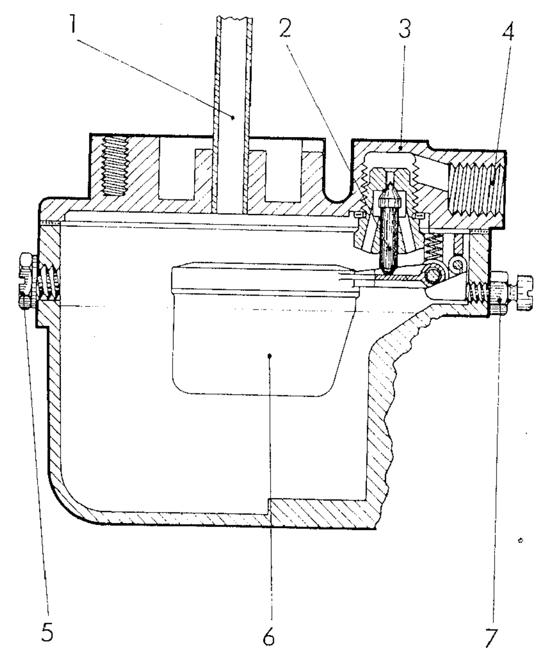


Fig. 4

Located in the float chamber cover is the fuel inlet, the float chamber vent, and the float needle valve assembly — the latter being situated inside the float chamber cover. In addition, two power enrichment nozzles are pressed into the float chamber cover.

Idle Metering

The fuel passes through the idle metering jet (g) where it mixes with air entering through the idle air bleed (u) and converts into an emulsion. The emulsion is channelled to four small orifices located near the throttle valve. The amount of emulsion which is discharged through the lowest orifice is controlled by the idle mixture screw (w). Emulsion drawn into the induction barrel through the idle mixture orifice combines with induction air entering through the partly open throttle valve whereupon it atomizes into an idle mixture.

The idle mixture can be leaned out by turning the adjustment screws in, and enriched by turning the screws out. Both screws should always be equally set.

The idle speed adjustment controls the idle rpm; that is, by turning the idle speed adjustment clockwise the rpm are increased, by turning the adjustment counter-clockwise the rpm are decreased.

The idle system incorporated in this carbureter is known as an independent system. This is because the fuel is drawn from a point short of the main jet (y). As a result, negative pressure occuring in the induction barrels brings about a continuous response from the idle metering system. Due to this arrangement certain amount of the idle mixture continues to enter the induction barrels during normal power settings as well.

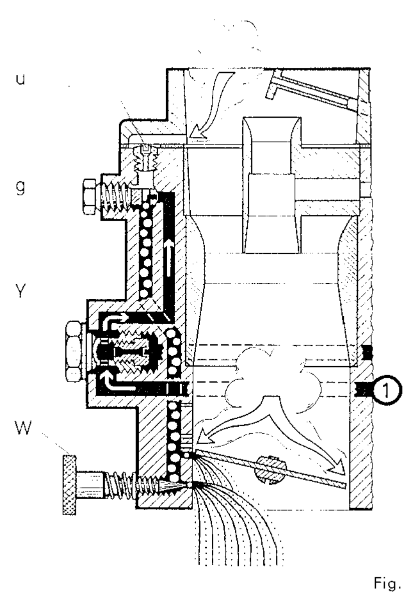


Fig. 5

Intermediate Metering

The three by-pass ports located above the idle mixture discharge orifice serve the purpose of intermediate metering but have varying functions. The lowest port, situated at the throttle crack and above the idle orifice, discharges idle mixture when the throttle is set for idling. The two upper ports begin to discharge the fuel mixture only after the throttle has been slightly opened. This system was devised to provide smooth transition from idle speeds to power settings.

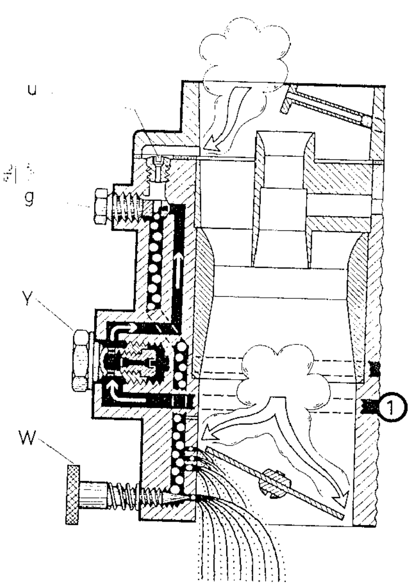


Fig. 6

Power Metering (normal operation)

The fuel flows through the main jet carrier (y) and the therein located main jet (Gg) into a well which connects with the primary venturi (x) and, thus, with the induction barrel. Placed into the well is the emulsion tube (s) together with the air correction jet (a) which is located directly above it. Vaccum in the induction barrel draws the fuel into the primary venturi where it is mixed with air; the fuel/air mixture then passes through the main venturi (k) where it is fully atomized. As the increasing vaccum effect causes the fuel level in the well to drop, air passes through the air correction jet and through calibrated orifices in the emulsion tube to mix with fuel metered by the main jet, thus emulsifying and effecting a derichment of the fuel/air mixture.

As long as the engine operates in the lower RPM range under partial or full load, only the main metering system is supplying the fuel. However, as the engine RPM increase, the vaccum effect at the power enrichment nozzle becomes so intense that it begins to draw fuel from the power enrichment system. The power enrichment system consists of a discharge nozzle and a metering jet; the fuel is drawn directly from the float chamber. This system feeds supplemental fuel into the primary venturi when the engine operates under full-power conditions at high RPM.

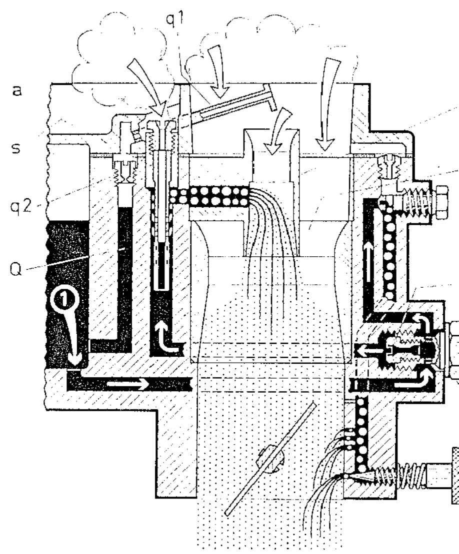


Fig. 7

Partial Load

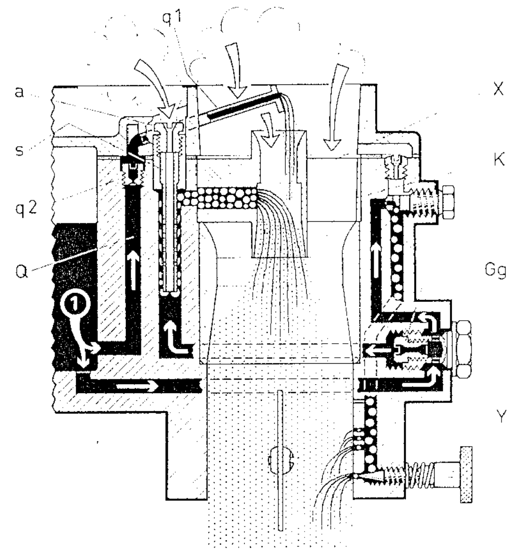


Fig. 8

Full Power with Enrichment

Incorporation of the fuel enrichment system into the main metering system makes it possible to finely balance and properly dose the fuel/air mixture with due regard to the desired fuel economy as well as to highest maximum performance upon demand.

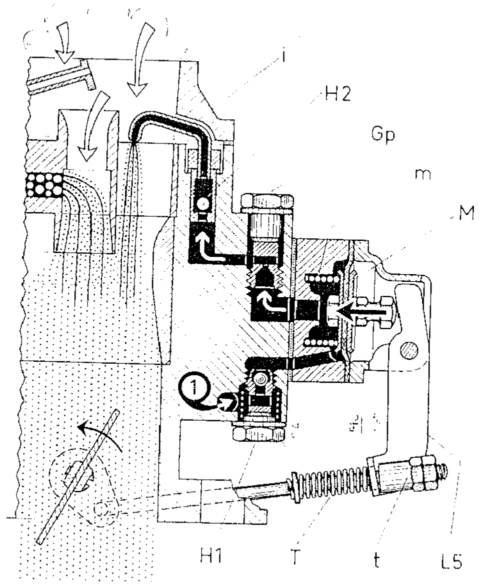
Acceleration

A mechanically actuated diaphragm-type accelerating pump (R) is utilized. The pump is flooded with fuel supplied directly from the float chamber. When the pump is at rest, the diaphragm (M) is forced outward by the diaphragm spring (m). When the throttle valve is opened, the pump is acted upon over the pump rod (T) and the pump lever (L 5) which push the diaphragm inward, thus forcing the fuel to pass through the pump jet (Gp) and the calibrated injection nozzle (i) into the main venturi; this enrichment of the fuel/air mixture provides a smooth acceleration.

The check valve (H 1) located in the pump inlet prevents the fuel from flowing back into the float chamber. A second check valve (H 2), located at the base of the injection nozzle, keeps air from entering the pump through the injection nozzle when the pump is on the inlet stroke.

Quantity of fuel injected during acceleration is adjustable and depends upon the length of the pump stroke. The pump adjustment (t) affects the pump stroke and, thus, determines the quantity of fuel to be injected during acceleration. The pump jet together with the calibrated injection nozzle controls only the duration of injection.

The check valve assembly (H 1) is provided with a return flow port measuring .0142" (0.36 mm) in diameter. The return flow port serves the purpose of preventing excessive enrichment of the fuel/air mixture during acceleration; that is, depending upon the stroke velocity of the pump plunger, larger or smaller amounts of fuel are permitted to escape through the return flow port.



Acceleration

Fig. 9

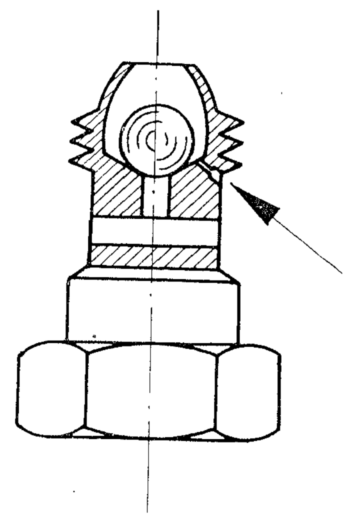


Fig. 10