Aug. 27, 1968 D. D. STOLTMAN 3,398,937

CARBURETOR

Filed July 8, 1966 2 Sheets-Sheet 1

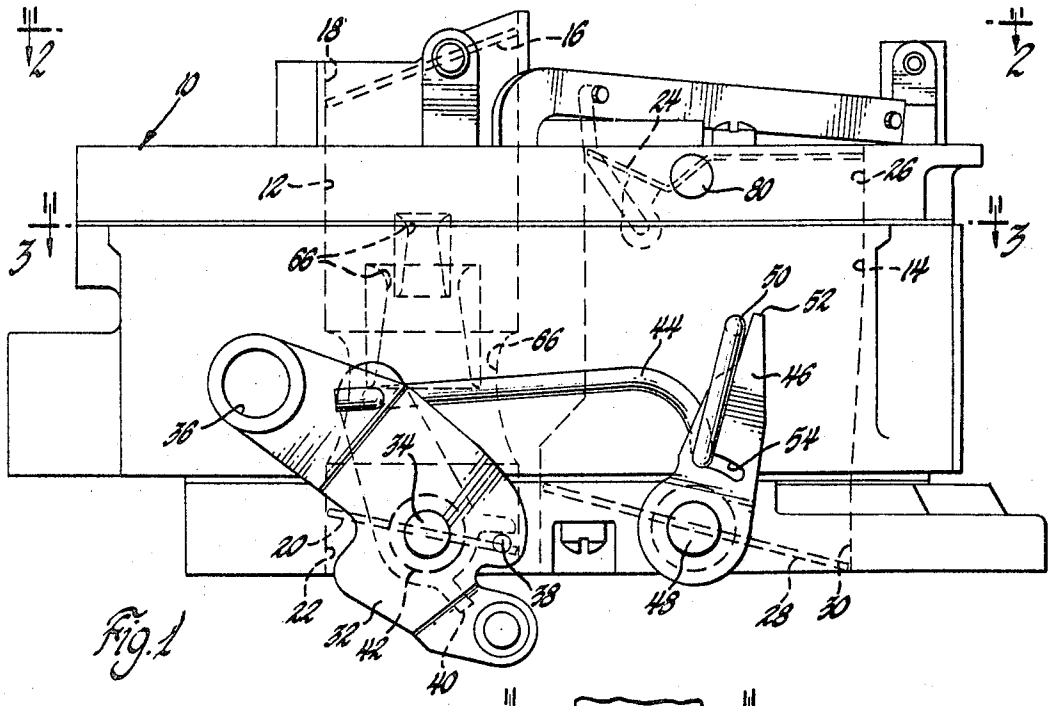


Fig. 1

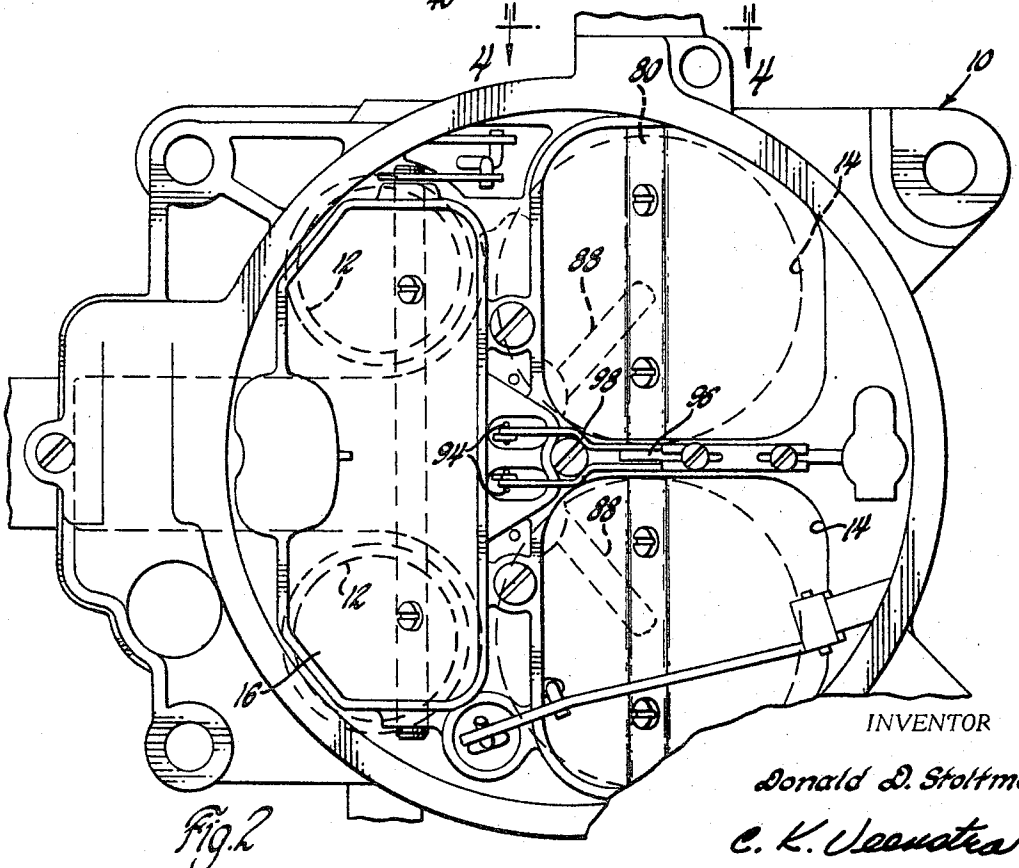


Fig. 2

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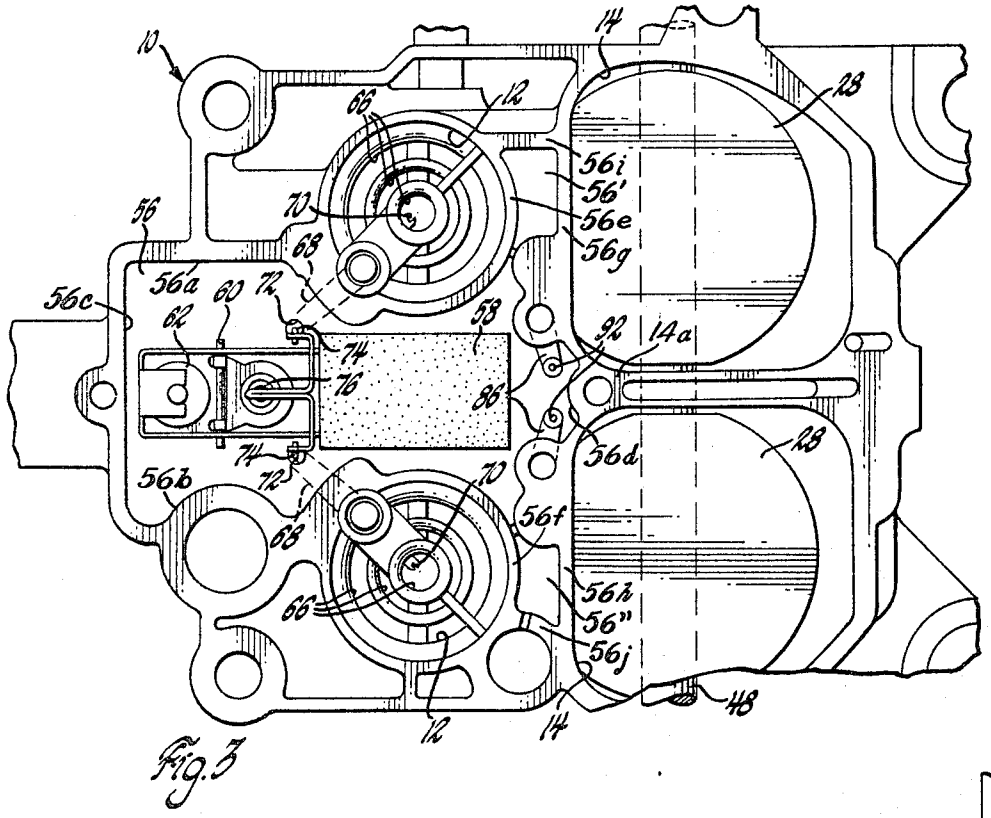


Fig. 3

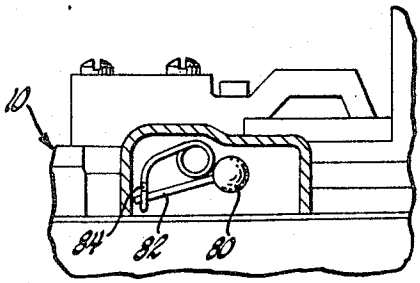


Fig. 4

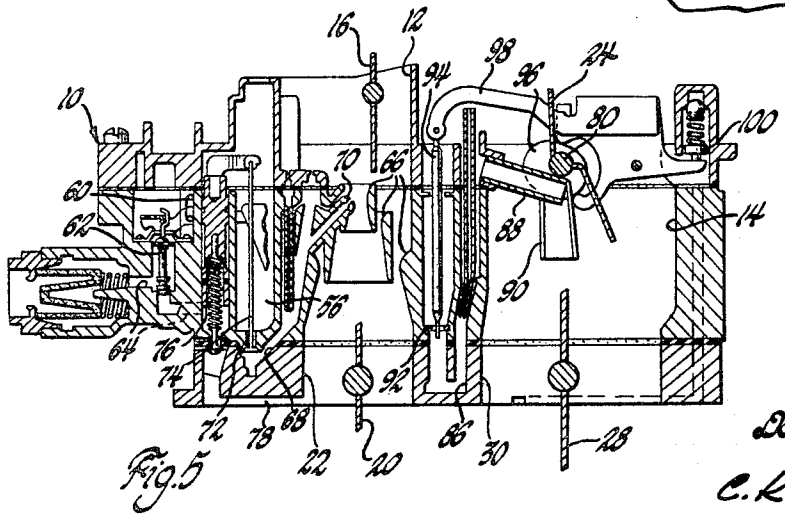


Fig. 5

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3,398,937

CARBURETOR

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Continuation-in-part of application Ser. No. 464,806, June 17, 1965, now Patent No. 3,279,767. Division of application Ser. No. 504,961, Oct. 24, 1965. This application July 8, 1966, Ser. No. 563,735

5 Claims. (Cl. 261—23)

ABSTRACT OF THE DISCLOSURE

A four-barrel, multiple-stage carburetor has a pair of small plain tube primary mixture conduits transversely spaced on opposite sides of a small centrally located fuel bowl and a pair of large air valve secondary mixture conduits transversely spaced across the rear of the fuel bowl.

This application is a continuation-in-part of copending application Ser. No. 464,806 filed June 17, 1965, in the name of D. D. Stoltman, now Patent 3,279,767, and a division of Ser. No. 504,961, filed Oct. 24, 1965, in the names of E. A. Kehoe and D. D. Stoltman.

This invention is directed to a multiple stage carburetor in which the fuel bowl is centrally located to achieve improved operating characteristics.

Heretofore it has been thought necessary that the multiple stage carburetors provided for modern automotive engines of large displacement include fuel bowls of high capacity to satisfy the engines' requirement for fuel flow at high rates. To achieve the capacity thought necessary, such carburetors have been provided with pairs of large fuel bowls spaced outboard of the mixture conduits. These arrangements all require a plurality of fuel level controlling floats and inlet valves. In addition, the wide spacing of the fuel bowls and floats make such carburetors susceptible to inaccurate metering of fuel during conditions causing surging of the fuel in the fuel bowls. Further, if such carburetors are subjected to a long hot soak period, during which the fuel bowls are emptied by evaporation of the fuel, an undesirably long period of time is required to refill the bowls before the carburetors can meter fuel in quantities adequate for proper engine operation.

This invention provides a multiple stage carburetor which includes a pair of relatively small primary mixture conduits, a pair of large secondary mixture conduits, and a single small fuel bowl centrally located between the primary mixture conduits and in front of the secondary mixture conduits. A single float controls admission of fuel to the fuel bowl through only one inlet valve. The metering orifices, which open into the fuel wells leading to the mixture conduits, are located in the bottom of the bowl closely adjacent the centrally located float so that proper fuel metering is achieved even under conditions causing fuel surge in the bowl. The capacity of the bowl is small enough that it may be rapidly refilled after hot soak conditions and the engine properly started and operated.

The details as well as other objects and advantages of this invention are disclosed in the following description of a preferred embodiment as shown in the drawings in which:

FIGURE 1 is a side elevational view of a carburetor showing the throttle linkage for sequentially actuating the primary and secondary stages of the carburetor;

FIGURE 2 is a top plan view of the carburetor of FIGURE 1 illustrating the relative sizes and positions of the primary and secondary mixture conduits;

FIGURE 3 is a plan view of the carburetor with the air horn section removed and looking generally along line 3—3 of FIGURE 1, illustrating the configuration of the fuel bowl and the locations of the float and metering orifices;

FIGURE 4 is a sectional view along line 4—4 of FIGURE 2 illustrating the spring which controls the secondary air valve opening movement; and

FIGURE 5 is a schematic sectional view through the metering elements of the primary and secondary stages.

Referring first to FIGURE 1, the carburetor **10** has a pair of primary mixture conduits **12** and a pair of secondary mixture conduits **14**. A choke valve **16**, controlled in the conventional manner, is disposed in the inlet **18** to primary mixture conduits **12**. A throttle valve **20** is disposed in the outlet **22** from each mixture conduit **12**. An air valve **24** is disposed in the inlet **26** to each secondary mixture conduit **14**, and a throttle valve **28** is disposed in the outlet **30** from each secondary mixture conduit **14**.

It will be noted that the diameter of secondary throttle valves **28** is significantly greater than that of primary throttle valves **20**. In operation, it has been found that the pressure drop across secondary throttle valves **28** between atmospheric pressure on the upstream side and manifold vacuum on the downstream side creates a substantial vertical force on the secondary throttle shaft and increases the frictional resistance to initial opening movement of the secondary throttles. The throttle linkage described below overcomes this frictional resistance so that a smooth and gradual increase in the rate of engine air flow may be obtained.

A primary throttle lever **32** is secured to the primary throttle shaft **34** and includes an opening **36** by which connection may be made to an accelerator pedal (not shown). A pin **38** is carried by lever **32** which, after predetermined opening movement of primary throttle lever **32**, contacts a tang **40** on a lever **42** rotatably mounted about shaft **34**. Susbsequent opening movement of primary throttle lever **32** produces a clockwise rotation of lever **42**. A link **44** secured to lever **42** contacts a secondary throttle lever **46** secured to the secondary throttle shaft **48**. Initial clockwise rotation of lever **42** moves link **44** toward the right whereupon the upper portion **50** of link **44** contacts the extended arm **52** of secondary throttle lever **46** to produce initial opening movement of secondary throttles **28**. This initial cracking of secondary throttle valves **28** reduces the pressure drop and overcomes the frictional load on throttle shaft **48**. During this intial opening of secondary throttle valves **28**, link **44** slides through a slot **54** in lever **46**. When the link **44** contacts the end of slot **54**, a shorter lever arm is provided on secondary throttle lever **46** and secondary throttles **28** are opened at an increased rate.

Referring to FIGURE 3, the pair of primary mixture conduits **12** are transversely disposed on opposite sides of a single fuel bowl chamber **56** while secondary mixture conduits **14** are transversely disposed at the end of fuel bowl **56** and separated by a common dividing wall **14***a*. Fuel bowl **56** is defined by side walls **56***a* and **56***b* and end walls **56***c* and **56***d* and includes a pair of lateral extensions **56'** and **56''** defined by boundary walls **56***e* and **56***f* of primary mixture conduits **12**, boundary walls **56***g* and **56***h* of secondary mixture conduits **14**, and side walls **56***i* and **56***j*. A centrally located float pontoon **58** in fuel bowl **56** pivots about a pin **60** to regulate an inlet valve **62** which, as shown in FIGURE 5, controls fuel flow through the inlet **64** to the fuel bowl chamber **56**. The central location of pontoon **58** reduces its response to surges of fuel in bowl **56** so that inlet valve **62** is held on its seat. This arrangement thus maintains a constant level of fuel in bowl **56**.

Referring further to FIGURES 3 and 5, a venturi

arrangement 66 is disposed in each primary mixture conduit 12 to provide a pressure signal indicative of the primary air flow. A pair of fuel passages 68 extend from fuel bowl 56 and terminate in nozzles 70 discharging into each of the small venturis 66. The rate of discharge of fuel into venturis 66 is directly controlled by the pressure therein. Additionally, a metering orifice 72 disposed in each passage 68 at the bottom of fuel bowl 56 is regulated by a metering rod 74. Metering rods 74 are positioned by a piston 76 responsive to manifold vacuum applied through a passage 78. Under conditions of low pressure in mixture conduits 14 below throttle valves 20, piston 76 holds metering rods 74 in orifices 72 to restrict the orifice area and provide an economy mixture. At pressures above a predetermined value, piston 76 is raised by a spring to withdraw metering rods 74 from orifices 72 and provide an enriched mixture for power operation.

Still referring to FIGURE 5, it will be noted that air valves 24 and throttle valves 28 provide the only restrictions to secondary air flow through mixture conduits 14. The operation of the secondary stage is fully disclosed and described in Patent 3,279,767 issued October 18, 1966, in the name of D. D. Stoltman. Therefore, its operation will be only briefly described here.

Air valves 24 are secured on a shaft 80 and are opened by vacuum in mixture conduits 14 as throttle valves 28 are opened. As shown in FIGURE 4, shaft 80 carries a pin 82 around which a spring 84 is looped. As air valves 24 are opened, pin 82 pulls against spring 84 to bias the air valves to a closed position. Spring 84 slides along pin 82 so that a constant pressure is created in mixture conduits 14 below air valves 24 throughout the range of air valve opening movement. A pair of fuel passages 86 extend from fuel bowl 56 and terminate in nozzle arrangements 88–90 which discharge fuel in an even dispersion throughout each mixture conduit 14. Flow through fuel passages 86 is controlled by metering orifices 92 and metering rods 94 associated therewith.

A cam 96 mounted on air valve shaft 80 moves a follower 98 which, as air valves 24 open, withdraws metering rods 94 from orifices 92 to increase fuel flow into secondary mixture conduits 14. As described in the above-mentioned Patent 3,279,767, metering cam 96 has an upper economy scheduling portion and a lower power scheduling portion. Follower 98 is positioned by a manifold vacuum responsive piston 100 to control metering rods 94 so that an economy mixture is provided when the pressure in mixture conduits 14 below throttle valves 28 is below a predetermined value and so that an enriched mixture for power operation is provided when the pressure is above a predetermined value.

It will thus be appreciated that this carburetor has a high capacity for air flow and efficiently meters fuel over a wide range of air flow rates and yet is compact and efficiently meters fuel under adverse operating conditions.

I claim:

1. A four-barrel multiple stage internal combustion engine carburetor comprising a single fuel bowl chamber defined by transversely spaced longitudinally extending side walls and interconnecting longitudinally spaced transversely extending end walls, a pair of primary mixture conduits transversely spaced on opposite sides of said fuel bowl chamber and having boundary walls formed in part by said side walls of said fuel bowl chamber, a pair of secondary mixture conduits transversely positioned adjacent one another across one end of said fuel bowl chamber and having boundary walls formed in part by a common dividing wall and formed in part by one end wall of said fuel bowl chamber, inlet valve means positioned in said fuel bowl chamber at the end furthest from said secondary mixture conduits, a single float pivotally mounted in said fuel bowl chamber to control said inlet valve means and maintain a substantially constant level of fuel in said fuel bowl chamber, a pair of primary fuel metering orifices located adjacent the bottom of said bowl chamber and closely adjacent opposite sides of said float and slightly spaced longitudinally from one end of said float, a pair of primary fuel passages each leading from one of said primary fuel metering orifices to discharge fuel into one of said primary mixture conduits, a pair of secondary fuel metering orifices located adjacent the bottom of said bowl chamber and closely adjacent one another and slightly spaced longitudinally outwardly from the opposite end of said float between said opposite end of said float and said one end wall of said fuel bowl chamber, a pair of secondary fuel passages each leading from one of said secondary fuel metering orifices to discharge fuel into one of said secondary mixture conduits, primary and secondary throttle valves respectively disposed in said primary and secondary mixture conduits to control flow therethrough, and means for sequentially opening said primary and secondary throttle valves.

2. The carburetor of claim 1 wherein said float is disposed between said primary mixture conduits.

3. A four-barrel multiple stage internal combustion engine carburetor comprising a single fuel bowl chamber defined by transversely spaced longitudinally extending side walls and interconnecting longitudinally spaced transversely extending end walls, a pair of primary mixture conduits transversely spaced on opposite sides of said fuel bowl chamber and having boundary walls formed in part by said side walls of said fuel bowl chamber, a pair of secondary mixture conduits transversely positioned adjacent one another across one end of said fuel bowl chamber and having boundary walls formed in part by a common dividing wall and formed in part by one end wall of said fuel bowl chamber, said secondary mixture conduits having a larger cross-sectional area than said primary mixture conduits, inlet valve means positioned in said fuel bowl chamber at the end furthest from said secondary mixture conduits, a single float pivotally mounted in said fuel bowl chamber to control said inlet valve means and maintain a substantially constant level of fuel in said fuel bowl chamber, a pair of primary fuel passages each leading from said fuel bowl chamber to discharge fuel into one of said primary mixture conduits, a pair of secondary fuel passages each leading from said fuel bowl chamber to discharge fuel into one of said secondary mixture conduits, said float extending between said primary mixture conduits and between said primary and secondary fuel passages in said fuel bowl chamber, primary and secondary throttle valves respectively disposed in said primary and secondary mixture conduits to control flow therethrough, and means for sequentially opening said primary and secondary throttle valves.

4. A four-barrel multiple stage internal combustion engine carburetor comprising a single fuel bowl chamber defined by transversely spaced longitudinally extending side walls and interconnecting longitudinally spaced transversely extending end walls, a pair of primary mixture conduits transversely spaced on opposite sides of said fuel bowl chamber and having boundary walls formed in part by said side walls of said fuel bowl chamber, a pair of secondary mixture conduits transversely located across one end of said fuel bowl chamber and longitudinally spaced from said primary mixture conduits, said secondary mixture conduits having boundary walls formed in part by a common dividing wall and formed in part by one end wall of said fuel bowl chamber, said fuel bowl chamber having a pair of transversely spaced lateral extensions located between said primary and secondary mixture conduits, said extensions having end walls formed by portions of said boundary walls of said primary and secondary mixture conduits and having side walls located outwardly of the axes of said mixture conduits, inlet valve means positioned in said bowl cham-

ber at the end furthest from said secondary mixture conduits, a single float pivotally mounted in said fuel bowl chamber to control said inlet valve means and maintain a substantially constant level of fuel in said fuel bowl chamber, a pair of primary fuel passages each leading from said fuel bowl chamber to discharge fuel into one of said primary mixture conduits, a pair of secondary fuel passages each leading from said fuel bowl chamber to discharge fuel into one of said secondary mixture conduits, said float extending between said primary mixture conduits and between said primary and secondary fuel passages in said fuel bowl chamber, primary and secondary throttle valves respectively disposed in said primary and secondary mixture conduits to control flow therethrough, and means for sequentially opening said primary and secondary throttle valves.

5. The carburetor of claim 4 wherein the transverse dimensions of said lateral extensions are greater than the longitudinal dimensions thereof.

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