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CARBURETOR ACCELERATING PUMP

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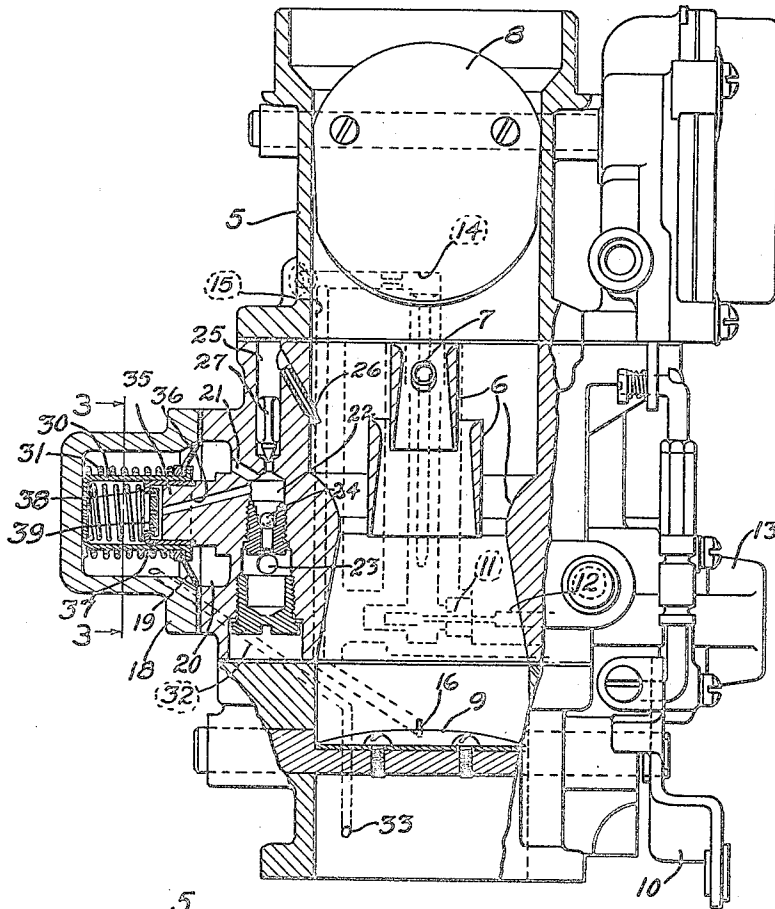


FIG. 1.

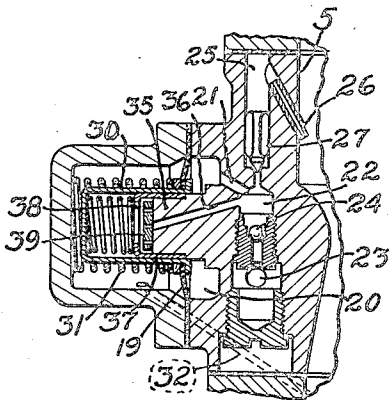


FIG. 2.

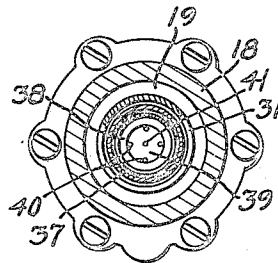


FIG. 3.

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## CARBURETOR ACCELERATING PUMP

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4 Claims. (Cl. 261-34)

1

This invention relates to carburetors for internal combustion engines and consists particularly in a novel accelerating pump device therefor.

Carburetors for automotive engines are customarily supplied with accelerating pumps which inject an extra charge of fuel into the engine intake manifold as the throttle valve is opened or as the intake manifold suction drops. The purpose of the pump is to insure the supply of an adequate fuel charge to the engine cylinders during the interval when the discharge from the main nozzle becomes inadequate to form the proper mixture with the increased air component due to the inertia of the liquid fuel. It would be desirable for the pump to supply a substantial initial charge and a reduced charge for an extended period until the main nozzle fuel flow reaches its normal rate. However, accelerating pumps as at present constructed provide a uniform charge throughout the movement of the pumping member. The difficulty is aggravated where the pumping is produced by a spring and suction operated diaphragm because of the tendency thereof to make a full stroke rapidly during each operation.

The main object of the present invention is to provide a carburetor accelerating pump which can be adjusted to supply the proper discharge both initially and during an extended period.

A more detailed object is to provide an accelerating pump which will have a strong initial discharge and thereafter a reduced discharge for an extended period.

These objects and other more detailed objects hereafter appearing are attained by the device illustrated in the accompanying drawing in which Fig. 1 is a side view, partly sectioned, illustrating an automotive carburetor embodying the invention.

Fig. 2 is a detail section illustrating the accelerating pump during the initial discharge.

Fig. 3 is a section taken on line 3-3 of Fig. 1.

The carburetor in Fig. 1 comprises a downdraft mixture conduit 5 having a series of Venturi tubes 6 into the smallest of which main nozzle 7 discharges. The entry of air to the upper end of the conduit is controlled by a butterfly choke valve 8 and the discharge of mixture from the lower end thereof is controlled by a throttle valve 9. An arm 10 secured to one end of the throttle shaft provides for manual operation of this valve.

A supply of fuel is stored in the constant level bowl of the usual type formed on the rear side of the carburetor. In the lower part of this bowl there is provided a main metering orifice ele-

2

ment, indicated at 11, controlled by a metering rod 12 which is operated by a diaphragm contained in a housing 13. Detail construction of this metering rod control is illustrated in application Serial No. 333,759, filed May 7, 1940, now Patent No. 2,328,604 issued Sept. 7, 1943 in the name of George M. Bicknell and assigned to the assignee of the present invention. Idling fuel is supplied through passages 14 and 15 to a port 16 located adjacent the edge of the throttle valve when closed.

Attached to the carburetor body opposite diaphragm housing 13 is a second diaphragm housing 18 which secures in position a diaphragm 19. A hollowed space 20 on the inside of this diaphragm forms the accelerating pump pressure chamber which communicates with the constant level chamber through passages 21, 22, and 23. Passage 22 receives an inlet check valve 24. Fuel is discharged into the mixture conduit through an outlet passage 25 and restricted nozzle 26. Passage 25 receives an outlet check valve 27.

Diaphragm 19 has a central orifice in which is secured a cylinder 30 surrounded by a coiled compression spring 31. The space between cylinder 30 and casing 18 is connected by a passage 32 to a port 33 located in the outlet of the carburetor mixture conduit posterior to the throttle valve. The arrangement is such that the suction transmitted through port 33 and passage 32 tends to draw diaphragm 19 to the left against coiled spring 31 so as to draw a charge of fuel past check 24 into the pressure chamber. When the suction drops, as occurs when the throttle valve is opened or when the speed of the engine is reduced, spring 31 moves diaphragm 19 to the right to force a charge of liquid fuel past check 27 through nozzle 26 into the mixture conduit.

A boss-like structure 35 projects outwardly from the carburetor body through the aforementioned central orifice in diaphragm 19 and is received in cylinder 30. This structure forms a stationary plunger which cooperates with cylinder 30 to form a dash pot. A passage 36 connects the dash pot chamber, between structure 35 and the interior of cylinder 30, and pump inlet passage 22. A cup 37 secured to the end of the plunger structure has an annular shoulder 38 between which and the end of structure 35 is movably positioned a perforated check valve 39. As best shown in Fig. 3, the check valve has an outer series of perforations 40 and a central perforation 41. During the inward movement of cylinder 30 and diaphragm 19, valve 39 is moved to the right so as to seat against the end of

3

plunger structure 35, closing outer perforations 46. Thereafter, liquid fuel on the interior of cylinder 30 is forced through single central hole 41 of the check valve and passages 36 and 25 into the carburetor. This results in a restraining action upon the discharging movement of the diaphragm under the influence of spring 31. However, the initial movement of the diaphragm from the fully charged position shown in Fig. 1, while this check is moving from collar 38 against the plunger structure, is substantially free of the restraining influence of the dash pot. During the charging movement the diaphragm and cylinder move leftwardly and disk check 39 is forced against collar 38 which forms its leftward seat. During this movement liquid is drawn into the interior of cylinder 30 through all of the openings 40 and 41 so that the charging stroke is substantially unrestrained.

Fig. 2 shows cylinder 30 moved slightly to the right or in the discharging direction through about the distance necessary to transfer the disk check from its left hand seat on collar 38 to its right hand seat on plunger structure 35. Therefore, the indicated movement of cylinder 30 and diaphragm 19 is substantially free of the restraining influence of the dash pot and, consequently, a maximum pump discharge is supplied to the carburetor mixture conduit. The remainder of the discharge stroke is substantially slower because of the dash pot action so that a reduced accelerating discharge is supplied for an extended period.

The principles of the invention may be embodied in an accelerating pump having a movable piston instead of a diaphragm and the dash pot parts may be reversed if desired so that the plunger moves with the pump diaphragm or piston and the dash pot cylinder is stationary. The invention may be modified in these and other respects as will occur to those skilled in the art and the exclusive use of all modifications as come within the scope of the appended claims is contemplated.

I claim:

1. In a carburetor, a fuel supply chamber, a mixture conduit, and an accelerating pump comprising a pressure chamber, a diaphragm forming a movable wall therefor, said diaphragm having a central orifice, a cylinder secured in said orifice, a stationary plunger received in said cylinder and forming a dash pot therewith, fluid connections between said supply chamber and the pump pressure and dash pot chambers, a check valve in one of said dash pot connections, and opposing substantially spaced valve seats for said valve, said valve being apertured and one of said seats being constructed relative thereto so that the passage of fluid in said last connection is substantially unrestricted when said valve engages said last seat, the other valve seat being constructed and arranged to substantially restrict fluid flow in said last connection when said valve is seated thereagainst, and there being substantial clearance past said valve when free of both of said seats whereby said diaphragm and cylinder are permitted initial movement in one direction substantially free of restriction from said dash pot and subsequent movement of said

diaphragm in said direction is restricted by said dash pot.

2. In a carburetor, a mixture conduit, a fuel supply chamber, and an accelerating pump comprising a pressure chamber having a movable wall, yielding means for urging said wall in the discharging direction, means to move said wall in the charging direction, and a dash pot device having a movable element operatively connected to said pump movable wall for effecting the movement thereof, a fluid connection for the dash pot chamber, an apertured check valve in said connection, and substantially spaced seats for said valve whereby initial movement of said pump wall during transfer of said check valve between said seats is effected substantially free of the restraining influence of said dash pot.

3. A carburetor accelerating pump comprising a pressure chamber having a movable wall and check valve controlled inlet and outlet ducts, a dash pot device operatively connected to said wall for effecting the movement thereof, a fluid connection for said dash pot, and an apertured check valve in said connection having stops spaced axially of the valve movement, said valve being urged against a first of said stops for constituting a maximum restriction during discharge movement of said movable wall and being urged against the other stop during charging movement of said wall for constituting a minimum restriction, said dash pot resisting movement of said pump wall when said check valve is against said first stop, said stops being substantially spaced so as to permit initial movement of said pump wall in the discharge direction free of said dash pot.

4. A carburetor accelerating pump comprising a pressure chamber having a movable wall, a separate dash pot device operatively connected to said wall for effecting the movement thereof, fluid inlet and outlet connections for said dash pot, and an apertured check valve in said outlet connection having spaced seats, said valve being urged against a first of said seats for constituting a maximum restriction during discharge movement of said movable wall and being urged against the other seat during charging movement of said wall for constituting a minimum restriction, said valve seats being spaced sufficiently so that said pump wall is permitted slight initial movement in the discharge direction substantially free of restriction by said dash pot device for causing a strong initial pump discharge and a weaker discharge thereafter.

OTTO HENNING.

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