

Aug. 8, 1944.

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2,355,346

CARBURETOR ACCELERATING PUMP

Filed March 13, 1942

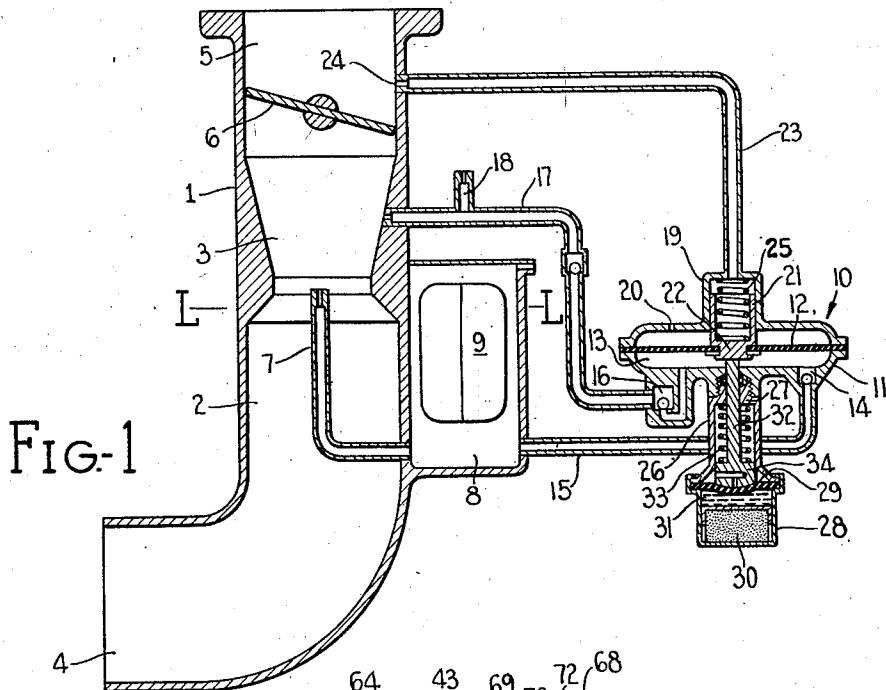
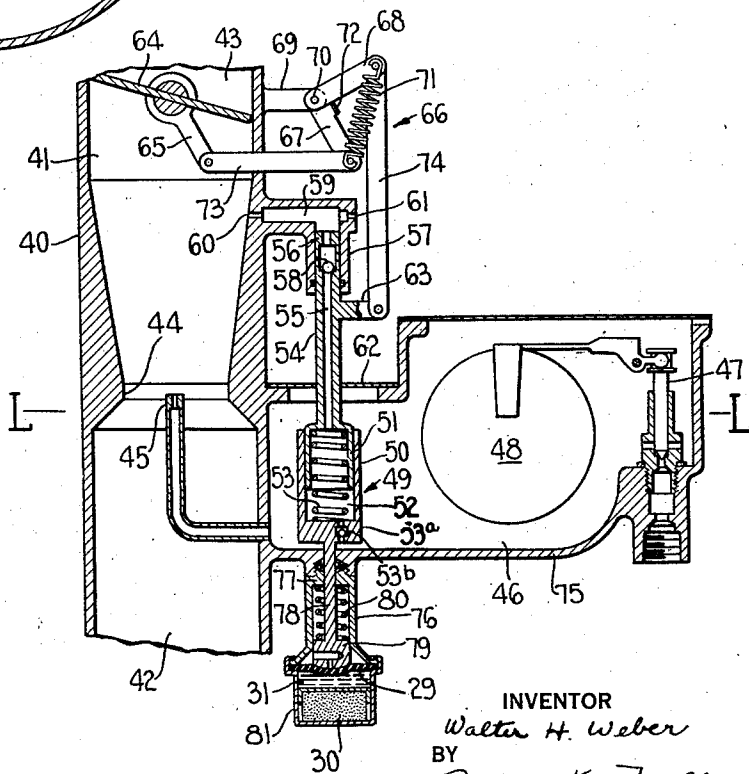


FIG-2



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2,355,346

CARBURETOR ACCELERATING PUMP

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Application March 13, 1942, Serial No. 434,485

2 Claims. (Cl. 261—34)

This invention relates to new and useful improvements in carburetor pumps for supplying supplemental fuel to an internal combustion engine and, more particularly, to thermostatic means for controlling the quantity of supplemental fuel.

An object of the invention is to provide thermostatic means which will positively limit the quantity of supplemental fuel discharged by the pump.

The invention consists in the improved construction and combination of parts to be more fully described hereinafter and the novelty of which will be particularly pointed out and distinctly claimed.

In the accompanying drawing to be taken as a part of this specification there are fully and clearly illustrated several preferred embodiments of the invention, in which drawing:

Figure 1 is a diagrammatic view in vertical section of a carburetor and fuel supply pump embodying the invention, and

Fig. 2 is a diagrammatic view in section of another form of carburetor and fuel supply pump.

Referring to the drawing by characters of reference, the carburetor of Fig. 1 has a casing 1 with a mixture passageway 2 therethrough in which is positioned a converging diverging throat member 3, such as a Venturi tube. The passageway 2 has a main air inlet 4 and a mixture outlet 5 and flow therethrough is controlled by a throttle valve 6. Discharging into the passageway 2 adjacent the throat of the Venturi tube there is a main fuel nozzle 7 which is supplied with fuel from the usual constant level chamber or reservoir 8 containing the usual float operated inlet mechanism 9 which serves to maintain the fuel level substantially constant at the line L—L.

Positioned adjacent the carburetor and supported in any suitable manner as from the casing 1 there is a fuel supply pump 10 having a casing 11 containing a fluid displacement member 12 supported for suction and pressure or discharge strokes. The casing 11 has base and cover members which clamp therebetween the periphery of the member 12 which is a flexible resilient diaphragm of any suitable oil resisting rubber-like material. The member 12 cooperates with the casing base member to provide a pump chamber 13 having a check valve controlled inlet 14 communicating through a conduit 15 with the float chamber 8 below the liquid level therein. The pump chamber 13 has a check valve controlled

outlet 16 which discharges into the mixture passageway 2 through a conduit 17. A calibrated air inlet 18 is preferably provided for supplying air to the conduit 17 to break the suction in the passageway 2 on the conduit 17 which might draw fuel from the pump chamber 13. In the pump casing cover member there is a power cylinder 19 and an atmospheric air bleed 20 to supply atmospheric pressure to the opposite side of piston 12 from the chamber 13. In the cylinder 19 there is a plunger 21 having its lower end 22 extending through and sealed in a central aperture through the member 12. The interior of the cylinder 19 is in communication with the passageway 2 on the outlet side of the throttle valve 6 by means of a conduit 23 having a calibrated control port 24. Within the cylinder 19 there is a helical coil spring 25 under compression and serving to force the member 12 downward through its discharged stroke upon opening movement of the throttle valve but which is of such resilience that it will be compressed to permit the suction stroke of the member 12 by subatmospheric pressure on the outlet side of the throttle valve 6.

Extending down from the bottom wall of the pump casing 11 there is a supporting member 26 having an upper end wall 27 through which there is a guide aperture aligned with a guide aperture through the casing bottom wall and in alignment with the plunger 21. Carried by the supporting member 26 there is a temperature responsive element or thermostat 28 preferably having a pressure responsive diaphragm 29 forming with the thermostat casing an expandable collapsible chamber in which there is a crystalline temperature responsive material 30 and a force conveying liquid 31. The material 30 may be any of the known crystalline materials which undergoes a change of state in the desired operating range such that it exerts a large positive force and has a high degree of expansion and contraction, such for example as is described in the patent to Vernet, 2,115,501, dated April 26, 1938. Interposed between the diaphragm 29 and the end plunger wall 22 and seating on the diaphragm 29 there is a rigid thrust rod 32 which has sliding fit through the openings in the end wall 27 and the bottom casing wall and packing material inserted therebetween. A helical coil spring 33 within the supporting member 26 is held under compression between the end wall 27 and a head 34 on the rod 32 and serves to retract the rod 32 upon contraction of the thermostat 28 and to

maintain the rod in engagement with the thermostat diaphragm 20.

The operation of this form of the invention shown in Fig. 1 is as follows: When the carburetor is connected to an internal combustion engine and the engine is operating at idle or low speed with the throttle valve 6 substantially closed, the subatmospheric pressure on the outlet side of the throttle valve will create a differential of pressure on the opposite ends of the plunger 21 so that the spring 25 will be compressed and the plunger 21 will have been moved from the position shown to its upward or suction stroke position. The diaphragm member 12 will have been moved upward by plunger 21 to the limit of its suction stroke with the plunger end wall 22 out of abutting relation to the end of the thermostat thrust rod 32, the chamber 13 being filled with liquid fuel drawn thereinto from the float chamber through conduit 15. Should the throttle valve 6 now be moved toward open position for engine acceleration, the pressure in conduit 23 will approach atmospheric pressure so that the spring 25 will force plunger 21 and diaphragm member 12 downward through its discharge stroke which will discharge liquid fuel from chamber 13 through the conduit 17 into the mixture passageway 2. When the temperature to which the thermostat 20 is subjected, whether it is under bonnet ambient temperature or the temperature of the engine, reaches a predetermined temperature at which the fuel discharged into the passageway 2 will readily vaporize, the crystalline material 30 will undergo its change of state, thereby positively moving the thrust rod 32 upward. It will be apparent that upward movement of rod 32 will, on the down stroke of the plunger 21, provide a rigid abutment for engagement by the plunger end wall 22, thereby positively limiting and obstructing the discharge stroke of the diaphragm member 12. The crystalline thermostat 20 exerts sufficient resistance so that the spring 25 is ineffective to move the diaphragm member 12 upon engagement of plunger end wall 22 with the thrust rod 32. The crystalline thermostat has an expansion curve which is substantially flat following the change of state of the crystalline material 30 and therefore when the desired operating temperature for the carburetor is reached, the quantity of fuel discharged from the chamber 13 will remain substantially constant irrespective of temperature increases above the desired operating temperature. The thermostat 20 will, of course, not lift the thrust rod 32 sufficiently far to eliminate fuel discharge from the chamber 13 and therefore the member 12 will discharge the desired quantity of fuel into the passageway 2 when the throttle valve 6 is opened after the engine has reached its desired operating temperature.

Referring to Fig. 2, the carburetor has a casing 40 with a mixture passageway 41 therethrough leading from a main air inlet 42 and having a fuel air mixture outlet 43 for connection to the engine cylinders. In the passageway 41 there is a converging diverging throat 44 such as a Venturi tube and discharging substantially at the throat there is a main fuel nozzle 45 fed with fuel from a constant level float chamber 46. Within the float chamber 46 there is a float operated inlet valve 47 controlling the admission of liquid fuel to the float chamber 46 and actuated by the float member 48 to maintain a sub-

stantially constant fuel liquid level, say at the line L—L.

Positioned within the float chamber 46 there is a fuel pump 49 having a tubular cylindrical casing 50 in which there is slidably fitted a reciprocable fluid displacement member 51 in the form of a hollow downward open piston. Positioned within the pump chamber 52 between the piston 51 and casing 50 there is a helical coil spring 53 which tends to move the piston 51 through its suction stroke. Through the end wall 53^a of the casing 50 there is a check valve controlled inlet 53^b leading from the float chamber 46 to the pump chamber 52. A piston rod 54 extends upward from the upper end of piston 51 and has a longitudinally extending discharge conduit 55 therethrough leading from the pump chamber 52. The upper end portion 56 is reciprocally guided and suitably packed in the bore of a fitting 57 which is carried by the casing 40. An outlet check valve 58 is provided in the conduit 55 to prevent back flow through conduit 55 into the pump chamber 52. The fitting 57 has its bore 59 discharging through a calibrated jet 60 into the passageway 41, an air bleed 61 being provided to supply atmospheric air to the bore 59 to break the suction effect from passageway 41 on the pump chamber 52. The air admitted by this bleed 61 also aids in discharging the fuel from bore 59 into the passageway 41. The piston rod 54 extends through an opening in a cover plate 62 on the float chamber 46 and has an operating arm 63 extending laterally therefrom.

In the mixture passageway 41 there is a throttle valve 64 with an operating arm 65 extending from its shaft and connected by lost-motion linkage 66 to the rod arm 63. The linkage 66 includes a pair of lever arms 67, 68 pivotally connected to each other and to a supporting arm 69 by a common pivot pin 70, the arm 69 extending from the casing 40. The free ends of the levers 67, 68 are connected by a tension spring 71 so that free ends of the levers may move away from each other. A stop 72 on the lever 67 is in the path of movement of lever 68 so that the movement of the levers toward each other by the spring 71 is limited. The free end of lever 67 is connected by a link 73 to the throttle arm 65. A link or thrust member 74 connects the free end of lever 68 to the rod arm 63.

Extending downward from the bottom wall 75 of the float chamber 46 there is a tubular supporting member 76 having an aperture through its upper end wall 77 aligned with an aperture through the bottom wall 75, which apertures are aligned with the piston rod 54 extending through and slidably fitting the aligned apertures and sealed therein against leakage of liquid by packing material there is a rigid thrust rod 78 having one end extending into the float chamber 46 and supporting the casing 50 by engagement with the end wall 53^a. The other end of the rod 78 extends into the supporting member 76 and has, at its lower end, a head 79. Interposed between the end wall 77 and the head 79 there is a helical coil spring 80 tending to move the rod 78 downward. Carried by the lower end of the supporting member 76 there is a temperature responsive member 81 such as a crystalline material thermostat which is similar to that described with respect to Fig. 1. Therefore, further description of the thermostat is unnecessary to an understanding of the operation of the same and the reference characters applied to Fig. 1 designate like parts for this thermostat.

The operation of the form of invention shown in Fig. 2 is as follows: When the engine is operating in a cold condition, the thermostat and pump casing 50 will be in the positions shown so that upon opening movement of the throttle valve 64 discharge of fuel from the chamber 52 will occur. When the temperature to which the thermostat 81 is subjected reaches the desired operating temperature for the engine, the crystalline material 30 will undergo its change of state, thereby moving the thrust rod 78 upward so as to position the casing end wall 53 for abutting relation with the end of the pump piston 51 so as to positively obstruct its complete discharge stroke. The throttle valve 64 is permitted its full travel by reason of the lost-motion linkage 66 due to the stretching of spring 71 as the stop 72 moves away from lever 68. The thermostat 81 as above described with respect to Fig. 1 will only reduce the discharge stroke of the piston 51 when the engine is at its desired operating temperature.

Although the carburetors as shown are of the plain tube posterior throttle type it will be apparent that the invention is equally applicable to the anterior throttle type of carburetor or to the air-fuel proportioned type of carburetor.

Having thus described the invention, what is desired to be secured by Letters Patent of the United States is

1. In a carburetor, a casing having a mixture passageway, a throttle valve controlling flow through said passageway, a pump casing having a power cylinder communicatively connected to said passageway on the outlet side of said throttle valve, a plunger in said cylinder, a resilient diaphragm displacement member in said pump casing and operatively connected to said plunger, said pump casing and said diaphragm member forming a pump chamber having a fuel inlet and having an outlet leading to said pas-

sageway, a spring in said cylinder and operable to move said diaphragm member to discharge fuel from said chamber upon opening movement of said throttle valve, the wall of said pump casing having an opening aligned with said cylinder, a supporting member external of said chamber and extending from said wall, a crystalline material thermostat carried by said supporting member, and a rigid thrust rod operable by said thermostat and extending through said wall opening for engagement with said plunger to limit the discharge stroke of said diaphragm member.

2. A fuel supply pump for carburetors, comprising a pump casing, a reciprocal fuel displacement member in said casing and operable to discharge fuel therefrom, thrust means engaging one side of and operable to move said displacement member through its discharge stroke, a tubular supporting member rigidly secured to said casing and having its bore opening through the wall of said casing on the other side of said displacement member from and in line with said thrust means, a rigid cup member rigidly secured to said supporting member and having its open side facing said bore, means movable by pressure and sealing said open cup member side, expansible thermostatic material in said cup member and operable on expansion to move said sealing means, and a thrust member guided in said bore and seating on said sealing means and extending into said casing for abutting engagement with said displacement member, said thermostatic material variably positioning said thrust member to determine the length of the discharge stroke of said displacement member by said thrust means in accordance with temperature and holding said thrust member against movement by said thrust means.

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