April 10, 1934. A. M. PRENTISS 1,954,536

CARBURETOR

Filed Jan. 13, 1932

Fig. 1.

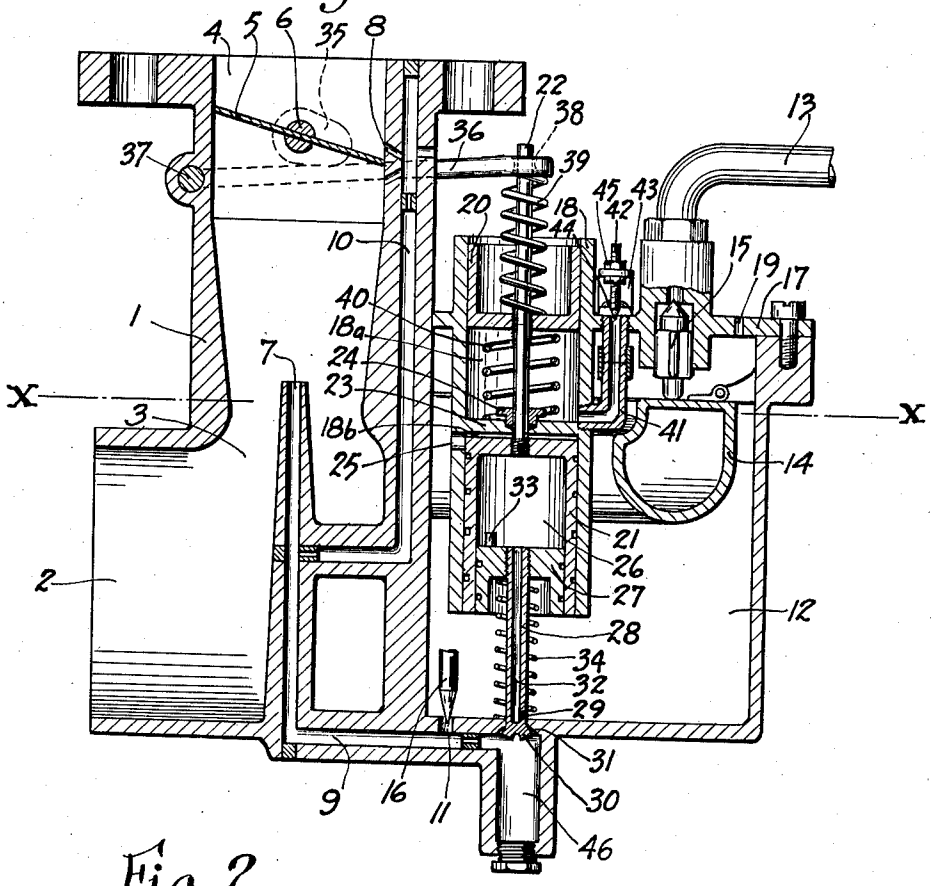
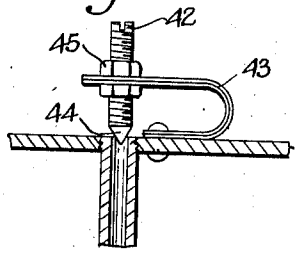


Fig. 2.



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Patented Apr. 10, 1934 1,954,536

UNITED STATES PATENT OFFICE

1,954,536

CARBURETOR

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Application January 13, 1932, Serial No. 586,408

14 Claims. (Cl. 261—34)

This invention pertains to carburetors and more particularly has reference to temperature controlled acceleration pumps therefor.

The desirability of regulating the accelerating charge of a carburetor in accordance with the temperature of the carburetor has long been recognized in the art and various devices have been proposed for this purpose, but, so far as I am aware, no one as yet has devised a system of temperature control of acceleration pumps by regulating the stroke of the pump with a compressed air dash-pot fitted with a thermostatically controlled air relief valve.

The object of this invention is to devise a carburetor in which the output of the acceleration pump is regulated in accordance with the temperature of the carburetor by means of a compressed air dash-pot fitted with a thermostatic air relief valve.

Another object of this invention is to provide a carburetor in which the acceleration pump is regulated in accordance with the temperature by a dashpot which develops a maximum resistance when the carburetor is at its highest working temperature and a minimum resistance when the carburetor is at its lowest working temperature.

Still another object of my invention is to devise a mechanically operated acceleration pump in which the stroke of the pump is regulated by varying the resistance of a compressed air dashpot in accordance with the temperature of the carburetor.

With these and other objects in view which may be incident to my improvements, my invention consists in the combination and arrangement of elements hereinafter described and illustrated in the accompanying drawing in which Figure 1 shows in central longitudinal section a carburetor embodying my improvements, and Figure 2 is a detail view of the thermostat shown in Figure 1.

In the drawing, the reference numeral 1 indicates the body of a conventional carburetor having the usual air intake 2, mixing chamber 3, and mixture outlet 4 controlled by a throttle 5 mounted upon a shaft 6, journalled in the walls of the body 1. A main nozzle 7 and idle feed 8 communicate through passageways 9 and 10 and port 11 with a float reservoir 12, which is supplied with liquid fuel through inlet 13 from the main fuel tank (not shown). Float 14 and valve 15 maintain the liquid fuel at a constant level indicated by the line X—X in the well known manner, while a valve 16, seating in port 11 controls the main flow of fuel to nozzle 7 and idle ports 8. The float reservoir 12 is closed by a cover 17 to which is integrally attached a cylinder 18, which extends partly into the reservoir 12, and partly above the cover 17 as clearly shown in the drawing. The cover 17 is provided with a vent 19 which permits atmospheric pressure to apply at all times to the surface of the liquid fuel in reservoir 12.

Slidably mounted in cylinder 18 is a pair of pistons 20 and 21 which are adjustably connected together by a piston rod 22 which passes through piston 20 and extends above the top thereof as shown in the drawing. An integral transverse wall 23 divides cylinder 18 into an upper chamber 18*a* and a lower chamber 18*b*, and piston rod 22 passes through a central aperture in wall 23, which is made air-tight by a packing gland 24. The distance between pistons 20 and 21 may be varied by the screw threaded relation between piston 20 and rod 22. Chamber 18*b* is provided near its upper end with one or more ports 25, through which liquid fuel above piston 21 escapes back into reservoir 12. The lower end of piston 21 is in the form of a cup 26 and contains a smaller piston 27 adapted to reciprocate therein. Depending from piston 27 is a hollow stem 28 provided at its lower end with a port 29 and an enlarged head 30 which latter forms a valve controlling a port 31 which establishes communication between reservoir 12 and passageway 9 to nozzle 7. Within the stem 28 is a passageway 32, which, with port 29, establishes communication between reservoir 12 and the interior of cup 26. A lug 33 on the upper face of piston 27 prevents the top of cup 26 from closing the end of passageway 32 when piston 21 is at the bottom of its stroke. A helical spring 34 surrounds stem 28 and bears against the under side of piston 27, thus returning it to the top of its stroke after piston 21 returns to its uppermost position.

Fixed to the throttle shaft 6 is a cam 35 which bears against a lever 36 pivoted at 37 to the wall of body 1. The free end of lever 37 is provided with an aperture 38 through which projects the end of piston rod 22. Interposed between lever 36 and piston 20 is a helical spring 39 which surrounds rod 22 and transmits the downward thrust of lever 36 to the piston 20 whenever the cam 35 depresses said lever upon the opening of throttle 5. A third spring 40 is interposed between the under side of piston 20 and wall 23. This spring is very much weaker than spring 39 and yields whenever spring 39 is compressed by lever 36, thus permitting piston 20 to descend with

little opposition insofar as concerns the reaction from spring 40. Spring 40 is however of sufficient strength to return piston 20 to its uppermost position whenever the thrust from spring 39 is relieved. In order to permit the air in chamber 18a to escape as desired, whenever piston 20 descends, I have provided a vent pipe 41 which connects the lower part of said chamber with the outside of the carburetor. The outer end of pipe 41 is controlled by a thermostatic valve comprising a stem 42 having its lower end tapered to fit into the end of pipe 41 and open and close same as said stem is raised or lowered by a thermal responsive element 43. This element is U-shaped and is secured by its lower limb to the top of reservoir cover 17 by means of a screw, or the like, 44. The upper limb of element 43 is adjustably connected to stem 42 by a pair of threaded lock nuts 45 so that the relative position of stem 42 and element 43 may be suitably fixed. Element 43 is so arranged and calibrated that it moves valve stem 42 by a certain predetermined amount for each degree change in temperature of the carburetor and stem 42 is so adjusted that it just closes the end of pipe 41 when the carburetor is at its highest working temperature and fully opens said pipe when the carburetor is at its lowest working temperature.

The operation of my device is as follows. When the throttle 5 is opened, lever 36 is depressed by cam 35 and in turn forces pistons 20 and 21 to descend by means of the downward thrust exerted by lever 36 on spring 39. If now valve 42 is open so that the air in the retarding chamber 18a readily escapes through pipe 41, pistons 20 and 21 descend freely, being opposed only by springs 40 and 34 which are relatively weak. As soon as piston 27 is moved down a small distance by the pressure developed in the liquid in cup 26 of piston 21, port 29 passes through port 31 and the liquid fuel in cup 26 escapes through passageway 32 and port 29 into chamber 46 which communicates through passageway 9 with nozzle 7. As piston 21 continues to descend, it carries piston 27 down with it at a somewhat diminishing rate as the liquid fuel escapes from cup 26. As soon as piston 21 reaches the bottom of its stroke, the reaction from compressed spring 34 gradually raises piston 27 until lug 33 engages the under side of piston 21. Then as piston 21 rises on its return stroke (as when throttle 5 is closed) piston 27 follows it up until head 30 engages and closes port 31, as shown in the drawing. Piston 21 continues to rise, then draws fresh liquid fuel into cup 26 and the acceleration pump is ready for another delivery of accelerating fuel. Piston 27 fits into piston 21 with a slight clearance so that as piston 21 descends a certain amount of the liquid fuel in cup 26 escapes back into reservoir 12. There is also a certain amount of liquid fuel returned to reservoir 12 through port 29 until it passes through port 31. These two leaks permit the throttle 5 to be opened slowly without the accelerating pump delivering any additional liquid fuel to the mixing chamber, as the pressure of the liquid fuel in cup 26 does not rise to a value sufficient to move piston 27 and unseat valve 30.

The foregoing operation has been described on the basis of valve 42 being fully open and permitting a free escape of air from retarding chamber 18a, which is only the case at the lowest operating temperature of the carburetor when it is desired that the amount of additional liquid fuel delivered by the accelerating pump be a maximum. As the temperature of the carburetor rises, thermal element 43 lowers valve 42, and thus partially restricts vent pipe 41. The air trapped in chamber 18a by the descent of piston 20 now escapes with some retardation and this in turn retards the downward travel of pistons 20 and 22, depending upon the amount of restriction of pipe 41 by valve 42. As valve 42 further restricts pipe 41, the downward travel of pistons 20 and 21 are further retarded until finally valve 42 is closed when all further movement of said pistons is prevented by the air trapped in chamber 18a. If throttle 5 is opened when valve 42 is closed, pistons 20 and 21 move only very slightly, until the pressure of the air trapped in chamber 18a rises to a value greater than the strength of spring 39. Further opening of the throttle then merely results in compression of spring 39. The small amount pistons 20 and 21 move when valve 42 is closed is insufficient to unseat valve 30 and hence no accelerating fuel is delivered by the pump.

From the foregoing description of the operation of my device, it is obvious that the amount of accelerating fuel delivered by the pump is inversely proportional to the temperature of the carburetor, which is as it should be, for the proper operation of the engine.

While I have shown and described the preferred embodiment of my invention, I desire it to be understood that I do not limit myself to the constructional details shown by way of illustration, as these may be modified in combination and arrangement by those skilled in the art without departing from the spirit of my invention or exceeding the scope of the appended claims.

I claim:

1. In a carburetor having a throttle, a throttle-actuated acceleration pump comprising a piston, an air chamber for retarding the stroke of said piston, temperature responsive means for regulating the escape of air from said chamber, and a fuel displacing member connected to said piston.

2. In a carburetor having a throttle, an acceleration pump comprising a piston actuated by the throttle, an air chamber for regulating the stroke of said piston, temperature responsive means for controlling the escape of air from said chamber, and a fuel displacing member connected to said piston.

3. In a carburetor having a throttle, an acceleration pump comprising a piston actuated by the throttle, a compressed air chamber in which said piston reciprocates, a thermostatic valve regulating the escape of air from said chamber, and a piston for displacing fuel connected to the first mentioned piston.

4. In a carburetor having a throttle, a throttle-actuated acceleration pump comprising a liquid fuel chamber, a piston adapted to reciprocate in said liquid fuel chamber and expel liquid fuel therefrom, an air chamber, a piston adapted to reciprocate and compress air therein, said pistons being interconnected so that the compressed air in said air chamber retards the reciprocation of said pistons, and a temperature responsive means for regulating the escape of air from said air chamber, whereby the output of said pump is varied inversely as the temperature of the carburetor.

5. In a carburetor having a float reservoir, an acceleration pump in said reservoir comprising a liquid fuel chamber, a piston adapted to reciprocate in said liquid fuel chamber and expel

liquid fuel therefrom, an air chamber, a piston adapted to reciprocate and compress air therein, said pistons being interconnected so that the compressed air in said air chamber retards the reciprocation of said pistons, and a temperature responsive means for regulating the escape of air from said air chamber, whereby the output of said pump is varied inversely as the temperature of the carburetor.

6. In a carburetor having a float reservoir, an acceleration pump comprising a cylinder in the reservoir, a transverse partition wall dividing said cylinder into a liquid fuel chamber and an air chamber, a piston adapted to reciprocate in said liquid fuel chamber and expel liquid fuel therefrom, an air chamber, a piston adapted to reciprocate and compress air therein, said pistons being interconnected so that the compressed air in said air chamber retards the reciprocation of said pistons, and a temperature responsive means for regulating the escape of air from said air chamber, whereby the output of said pump is varied inversely as the temperature of the carburetor.

7. In a carburetor having a throttle, an acceleration pump actuated by said throttle, comprising a liquid fuel cylinder, means for regulating the output of said pump consisting of a retarding air chamber and temperature responsive means for regulating the escape of air from said chamber, and a movable pump member retarded by the pressure of air in said chamber.

8. In a carburetor having a throttle, an acceleration pump mechanically actuated by the throttle, comprising a liquid fuel cylinder, a piston in said cylinder, an air chamber for retarding the stroke of said piston, temperature responsive means for regulating the escape of air from said chamber, whereby the output of said pump varies inversely with the temperature of the carburetor.

9. In a carburetor having a throttle, an acceleration pump comprising a liquid fuel cylinder, a piston in said cylinder mechanically actuated by the throttle, an air chamber for regulating the stroke of said piston, temperature responsive means for controlling the escape of air from said chamber, whereby the output of said pump varies inversely with the temperature of the carburetor.

10. In a carburetor having a throttle, an acceleration pump comprising a liquid fuel cylinder, a piston in said cylinder mechanically actuated by the throttle, a compressed air chamber in which said piston reciprocates, a thermostatic valve regulating the escape of air from said chamber, whereby the stroke of said piston is regulated in accordance with the temperature of the carburetor.

11. In a carburetor having a throttle, an acceleration pump actuated by an elastic connection to said throttle, comprising means for regulating the output of said pump consisting of a retarding air chamber and temperature responsive means for regulating the escape of air from said chamber, and a movable pump member retarded by the pressure of air in said chamber.

12. In a carburetor having a throttle, an acceleration pump mechanically actuated by an elastic connection to the throttle, comprising a piston, an air chamber for retarding the stroke of said piston, temperature responsive means for regulating the escape of air from said chamber, whereby the output of said pump varies inversely with the temperature of the carburetor.

13. In a carburetor having a throttle, an acceleration pump comprising a piston mechanically actuated by an elastic connection to the throttle, an air chamber for regulating the stroke of said piston, temperature responsive means for controlling the escape of air from said chamber, whereby the output of said pump varies inversely with the temperature of the carburetor.

14. In a carburetor having a throttle, an acceleration pump comprising a piston mechanically actuated by an elastic connection to the throttle, a compressed air chamber in which said piston reciprocates, a thermostatic valve regulating the escape of air from said chamber, whereby the stroke of said piston is regulated in accordance with the temperature of the carburetor.

AUGUSTIN M. PRENTISS.