Oct. 22, 1935. C. F. ROBBINS 2,017,919

CARBURETOR

Filed Aug. 2, 1933 2 Sheets-Sheet 1

Fig. 1.

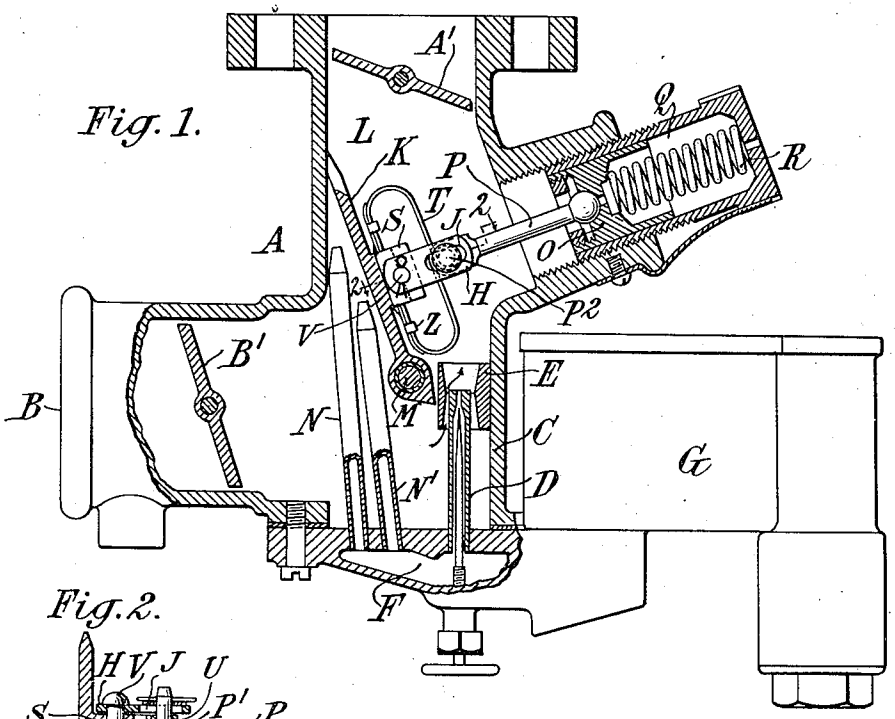


Fig. 2.

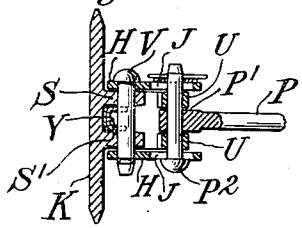


Fig. 3.

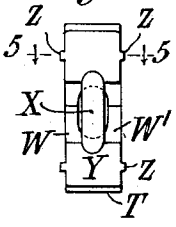


Fig. 4.

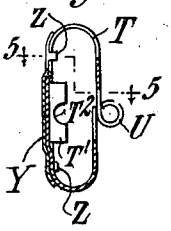


Fig. 6.

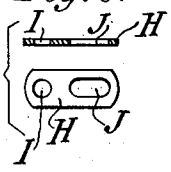


Fig. 7.

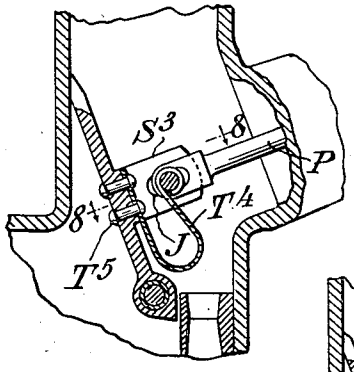


Fig. 5.

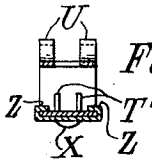


Fig. 9.

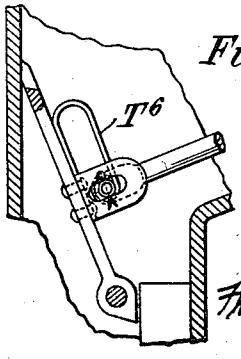
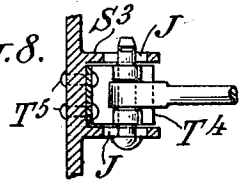


Fig. 8.



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Fig. 10.

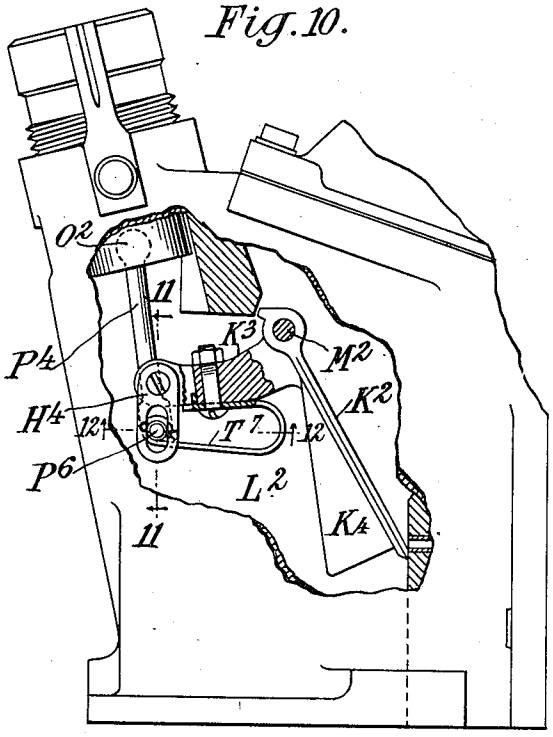


Fig. 11.

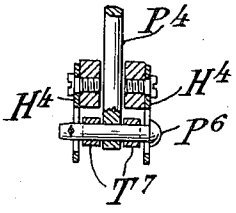
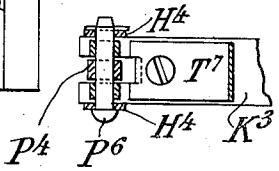


Fig. 12.



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UNITED STATES PATENT OFFICE

2,017,919

CARBURETOR

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Application August 2, 1933, Serial No. 683,262

16 Claims. (Cl. 261—39)

This invention relates to carburetors for internal combustion engines or the like, and aims to provide certain improvements therein. The invention is more particularly directed to carburetors having a thermostatic element which is so constructed and arranged as to vary the relative proportions of the air and gasolene so as to maintain proper mixtures at various outside temperatures. Specifically the invention applies to a thermostatically-controlled air valve of the type in which there is a dash-pot or its equivalent which modifies or governs the action of the air valve under various degrees of suction. In such thermostatically-controlled carburetors the dash-pot or its equivalent is connected in some fashion to the air valve by the thermostatic member, and when the air valve is opened under suction the thrust upon the piston in the dash-pot is communicated through the thermostatic member. In my prior Patent No. 1,793,250 I have illustrated a thermostatically-controlled carburetor of the "Marvel" type wherein there is employed a secondary air valve, a dash-pot arrangement the movements of the piston of which are opposed by a spring, and such piston being connected with the air valve through a thermostatic member. The construction shown in the aforesaid patent is found to work admirably under normal conditions. Occasionally, however, some particular motor to which the carburetor is attached will, because of causes which are well-known, fail to ignite its charge of gas and backfire into the carburetor. This has the effect in a carburetor of the type described of putting a very considerable pressure above the air valve, blocking it momentarily in its closed position, and at the same time placing a considerable pressure upon the dash-pot piston causing it to tend to move in a direction to open the valve. Under these circumstances the thermostatic element which forms a link in the connection between the dash-pot piston and the valve is apt to become strained beyond its proper limits, thereby altering the adjustment of the valve.

The present invention provides means for avoiding this difficulty, and generally for protecting the thermostatic element preferably to an extent so that at no time or under no conditions can it be strained in either direction beyond its elastic limits. The invention also includes certain other improvements in thermostatic devices for carburetors which will hereinafter be more fully referred to.

Referring to the drawings which illustrate the invention,

Figure 1 is an elevation, partly in longitudinal vertical section, of a carburetor of the "Marvel" type showing one form of the present invention applied thereto.

Fig. 2 is a section taken on the line 2—2 of Figure 1.

Fig. 3 is an underside view of the thermostatic element of Figure 1 detached from the air valve.

Fig. 4 is a central section of Fig. 3.

Fig. 5 is a section taken on the line 5—5 in Fig. 4.

Fig. 6 shows an elevation and longitudinal section of one of the thermostat protecting plates.

Fig. 7 is a longitudinal vertical section of the mounting of the thermostatic device, designed for original equipment.

Fig. 8 is a section on the line 8—8 in Fig. 7.

Fig. 9 is a slight modification of Fig. 7.

Fig. 10 is a view of the invention as applied to a down-draft carburetor.

Fig. 11 is a section on the line 11—11 in Fig. 10.

Fig. 12 is a section on the line 12—12 in Fig. 10.

Referring first to Figs. 1 to 6, let A indicate the carburetor as a whole, having an air inlet B which is designed to supply substantially all of the air passing through the carburetor. A' is the throttle, and B' is the usual choke. To the right of the air inlet and close against the wall C is a nozzle D provided with a venturi E, the nozzle being in communication with a passage F leading from a float chamber G. A substantially constant feed of gasolene takes place from the float chamber, the float operating the usual needle which controls the valve opening leading from the gasolene supply.

The automatic valve control for the air is indicated at K, and is shown as a valve leading to the mixing chamber L, the valve being pivoted on a shaft M and being so proportioned at its lower and rearward end that there is a constant passage around the valve, indicated by the arrow and unaffected by the valve. This passage is relied upon for the primary jet, the air flowing up through the venturi and around the jet, and serving to maintain a suitable mixture in the mixing chamber L when the engine is idling or the car proceeding at low speed.

One or two auxiliary jets are employed for higher speeds, such jets being indicated by the reference letters N, N', and leading to a gasolene supply such as the passage F. The result of this construction is that as the speed of the engine increases, for instance by opening the throttle

A', greater quantities of gasolene are sucked up through the auxiliary jets. Accompanying this, of course, is an opening of the automatic valve K which opens to a greater or less extent depending upon the suction in the engine.

The air controlling valve K is usually connected directly with the piston O moving in a cylinder Q, the piston and cylinder constituting a dash-pot, and there being a spring R provided which loads the valve and tends to move it back to its closed position.

In my aforesaid patent the piston O is connected with the valve K by means of a shortened link P and a thermostatic element, which latter in turn is connected with the valve so that thrusts upon the valve due to the suction of the engine are transmitted through the thermostat and link to the piston and thence to the spring R.

It will be seen from the drawings that a backfire or sudden increase in pressure in the chamber L will tend to move the valve K to the left and forcibly against its seat. On the other hand the same accession of pressure, because of the substantial area of the piston O on its underside, will tend to forcibly move the piston to the right against the pressure of the spring R. This puts a very considerable strain upon the thermostatic element, which in the present drawing is indicated by the reference letter T.

To avoid the deleterious effect upon the thermostat of such forces acting in opposite directions, the present invention provides a control for the thermostatic element which will relieve the thermostat of such forces before the latter is strained beyond its elastic limit. Furthermore, should there be any condition arising which would tend to strain the thermostat if the pressure were in the opposite direction, the present invention provides a means for relieving the thermostat of that force also.

In Figs. 1 to 6 of the drawings I have shown a form of thermostat which is adapted especially for application to existing carburetors of the type in question. In such carburetors the valve has two lugs cast on its rear surface, such lugs being lettered S, S' (see Fig. 2). These lugs normally form a means of connection with the end P' of the link P. In applying the present invention I use the lugs S, S' as a means of connection of the thermostat body, and I shorten the link P and connect it to an eye U formed on the thermostatic element, as best seen in Fig. 4. The thermostatic element preferably comprises a piece of thermostatic metal formed in a double loop, the middle of the metal being cut away and lugs T' being struck up from it, as best seen in Fig. 4. Each of these lugs is recessed at T^2 for the purpose to be described.

Referring to Fig. 2, it will be noted that the pin V which originally served to connect the link P with the lugs S, S', is retained, and the thermostat is fitted in between the lugs, the cut-away portions W, W' serving to narrow the dimensions of the thermostat so that it will fit between the lugs. When in place upon the valve, as in Fig. 2, the narrow section of the thermostat indicated at X will lie between the lugs and the pin V will pass through the lugs and into the cut-away portions T^2, so that the thermostat is firmly fixed in position by the pin. If desired the thermostat may be strengthened at its cut-away portion by the interposition of a plate Y fastened to the thermostat by small lugs Z, thus tending to prevent any weakness of the thermostat at that point. The end of the thermostat being curled up to form the eye U of a width corresponding to that of a thermostat, it is notched out so as to permit the end P' of the link to pass within the fork thus formed. A pin P^2 (see Fig. 2) is passed through the two sections of the eye U and the end P', thus securing the link to the thermostat.

The thermostat may be formed of the usual bimetallic metal and should be reversely arranged, that is to say, it should be arranged so that at higher temperatures the eye U tends to move toward the valve, while at lower temperatures it tends to move away from the valve. The operation is such that the valve opens wider in warm weather than in cold, and the variations of the valve are substantially proportioned to the variations in temperature.

The thermostat as thus far described would not be protected as to shocks such as backfires or the like, and the present invention introduces a means for so controlling its movements under pressure that it will not be forced beyond its elastic limit. The chief direction in which it is apt to be forced is outwardly away from the valve. To protect the thermostat in this direction I prefer to provide a pair of simple plates which are shown in detail in Fig. 6, each of the plates bearing the reference letter H. Each of the plates is provided with a hole I through which the pin V passes, and a slot J through which the pin P^2 passes, the plates being arranged preferably on the outside of the lugs S, S' and on the outside of the bifurcated end of the thermostat. By reference to Fig. 2 it will be seen that if the link P is pulled to the right and the valve K is held, the thermostat can more outwardly only until the pin P^2 reaches the ends of the slots J, at which all strain will be taken off the thermostatic metal and transferred directly to the valve. This is the particular strain which occurs during the backfire when the chamber L is under high pressure.

I prefer, however, to so proportion the slots J that in case any pressure should be encountered tending to force the link toward the valve (such as the sticking of the piston in its cylinder), the strain will be taken off the thermostat by transferring it to the links and thence to the valve. The slots are so proportioned that the thermostat can expand or contract to any useful extent without encountering the ends of the slots. At normal temperatures the pin P^2 may well lie substantially between the ends of the slots. When any of the destructive forces are applied, however, the plates H take the strain off the thermostat. These restraining means also have a utility in preventing any straining of the thermostat during handling, shipping, and the application of the thermostat to the carburetor.

In Figs. 7 and 8 the thermostat T^4 is shown of the single loop type and directly riveted to the valve, as shown at T^5. The protecting means are formed in this case directly in the lugs S^3 which may be cast on the valve, the lugs being provided with slots J as before. In Fig. 9 there is a similar construction, the thermostat T^6 being formed of the single loop extended in the opposite direction from Fig. 7. In this construction the loop is adapted to operate in a portion of the carburetor where there is more room than in Fig. 7.

Both of these latter constructions are adapted for original equipment, while that of Figs. 1 to 6 is designed for installation in carburetors already manufactured. For this purpose the construc-

tion of Figs. 1 to 5 has the merit of permitting the thermostat to be applied to the valve substantially without the use of tools. In original equipment, however, it is a simple operation to provide tools for riveting the ends of the thermostat directly to the valve.

In the construction of Figs. 10 to 12 I have shown the invention as applied to a down-draft carburetor. In this figure K^2 is the air valve which is mounted on a pivot M^2 and is provided with an arm K^3 extending from the rear of the carburetor which is normally connected to the piston O^2 with a link P^4. In applying the thermostat T^7 thereto it is preferable to bolt or rivet the thermostat directly to the arm and pass the link P^4 through the bifurcated end of the latter, as shown in Fig. 11, the end of the link being connected to the bifurcated end of the thermostat, as best seen in this figure, by a pin P^6. The restraining plates H^4 in this construction may be screwed directly to the bifurcated portions of the arm K^3. An explosion in the mixing chamber L^2 in this construction has the same effect as an explosion in the mixing chamber L of Figs. 1 to 6, that is to say, in forcing the valve toward its seat and forcing the piston O^2 against its spring. For completeness it should be noted in this type of down-draft carburetor the weight of the arm K^3 is usually counterbalanced or overbalanced by weighting the valve at K^4.

While I have shown and described several forms of the invention, it will be understood that I do not wish to be limited thereto, since various changes may be made therein without departing from the spirit of the invention, the scope of which is indicated in the appended claims.

What I claim is:

1. The combination in a carburetor of a valve, a thermostat connected with the valve and serving to modify the movements of the latter, and a substantially inelastic restricting means co-acting with the thermostat for preventing movement of the thermostat to points beyond its elastic limit.

2. The combination in a carburetor of an air valve, a thermostat connected with the air valve and serving to modify the movements thereof, a spring connected with the thermostat and opposing the movements of the valve, and substantially inelastic means co-acting with the thermostat for restricting the movement of the thermostat to a point below its elastic limit.

3. The combination in a carburetor of an air valve, a thermostat connected with the air valve and serving to modify the movements thereof, a piston connected with the thermostat, and a substantially inelastic member connected with the thermostat and substantially restricting said thermostat to movement within its elastic limits whereby to avoid distortion of the thermostat.

4. The combination in a carburetor of an air valve, a thermostat connected with the air valve and serving to modify the movements thereof, a piston connected with the thermostat, and a member connected with the thermostat and constraining said thermostat to move within its elastic limits in either direction.

5. The combination in a carburetor of an air valve, a thermostat connected with said air valve, a dash-pot connected with said thermostat, and a member connected with the air valve and dash-pot, said member permitting the dash-pot and air valve to be relatively moved in accordance with the thermostatic movements of the thermostat, said member limiting such relative movements to an amplitude within the range of thermostatic movements whereby to avoid straining the thermostat.

6. The combination in a carburetor of an air valve, a thermostat connected with said air valve, a dash-pot connected with said thermostat, and two members connected with the air valve and dash-pot, said members permitting the dash-pot and air valve to be relatively moved in accordance with the thermostatic movements of the thermostat, said members limiting such relative movements to an amplitude within the range of thermostatic movements whereby to avoid straining the thermostat, and said members being arranged on each side of the thermostat and connected to the dash-pot by a link interposed between the said members.

7. The combination in a carburetor of an air valve, a dash-pot, a link connected with the dash-pot, a thermostat connected with the air valve, and two plates arranged one on each side of the thermostat, said plates having slots adapted to permit normal movements of the thermostat and positively connecting the valve and link to prevent abnormal movements of the thermostat.

8. The combination in a carburetor of an air valve, a dash-pot, a link connected with the dash-pot, a thermostat connected with the air valve, and two plates arranged one on each side of the thermostat, said plates having slots adapted to permit normal movements of the thermostat and positively connecting the valve and link to prevent abnormal movements of the thermostat, and said plates being pivoted to the valve.

9. The combination in a carburetor of an air valve, a dash-pot, a link connected with the dash-pot, a thermostat connected with the air valve, and two plates arranged one on each side of the thermostat, said plates having slots adapted to permit normal movements of the thermostat and positively connecting the valve and link to prevent abnormal movements of the thermostat, and said plates being rigidly connected to the valve.

10. The combination in a carburetor of an air valve having a pair of lugs at its rear, a pin passing through said lugs, a thermostat having a portion engaging said pin and the rear of the valve whereby to be held in a substantially fixed position relative to the valve, and a dash-pot connected with said thermostat.

11. The combination in a carburetor of an air valve having a pair of lugs at its rear, a pin passing through said lugs, a thermostat having a reduced portion adapted to pass within said lugs, and a dash-pot connected with said thermostat, and said thermostat having on each side of said reduced portion a flange adapted to engage said pin.

12. The combination with a carburetor of an air valve having a pair of lugs, a thermostat having a reduced portion fitting between said lugs, and a reinforcing plate connected with the thermostat and also passing between said lugs, the thermostat having means for connection with a dash-pot.

13. The combination in a carburetor of an air valve having a pair of lugs, a dash-pot, a thermostat, a pin connecting said thermostat with said air valve, and plates one on each side of said thermostat connected to said lugs by said pin, said dash-pot having a link, one end of said link being connected with said thermostat, a pin passing through one end of said link and through said plates, and said plates having slots through which said pin passes.

14. The combination in a carburetor of an air

valve pivoted at its top, said air valve having an arm at its rear, a thermostat connected with said arm, a dash-pot connected with said thermostat, and means connected to said arm and said dash-pot for constraining the movements of said thermostat within the elastic limits of the latter.

15. The combination in a carburetor of an air valve pivoted at its top, said air valve having an arm at its rear, a thermostat connected with said arm, a dash-pot connected with said thermostat, and means connected to said arm and said dash-pot for constraining the movements of said thermostat within the elastic limits of the latter, and said means comprising a pair of plates having slots permitting of lost motion between said thermostat and said dash-pot.

16. A thermostatically adjustable connection for a carburetor valve, said connection comprising a portion of the valve slidably engaging a portion of a connected member and thermostatic means engaging the valve and the connected member and normally carrying the load imposed upon the connection, said thermostatic means being adapted to vary the adjustment of the connection to compensate for varying temperature conditions.

CHARLES F. ROBBINS.