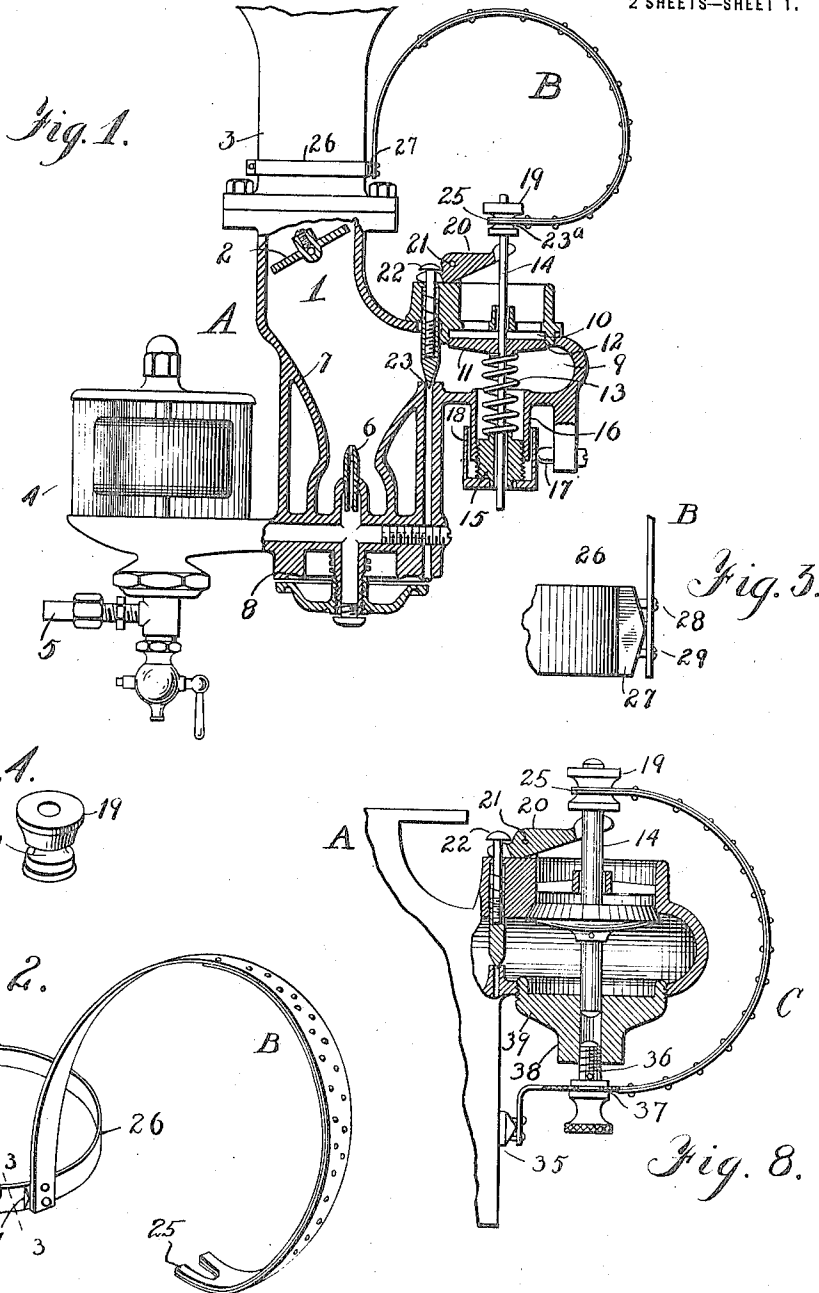


C. F. ROBBINS.
CARBURETER.
APPLICATION FILED FEB. 15, 1913.

1,197,152.

Patented Sept. 5, 1916.
2 SHEETS—SHEET 1.



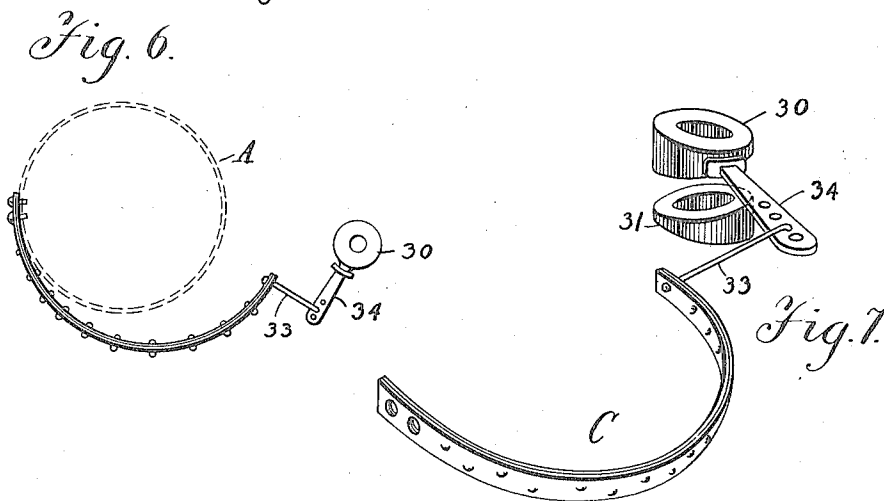
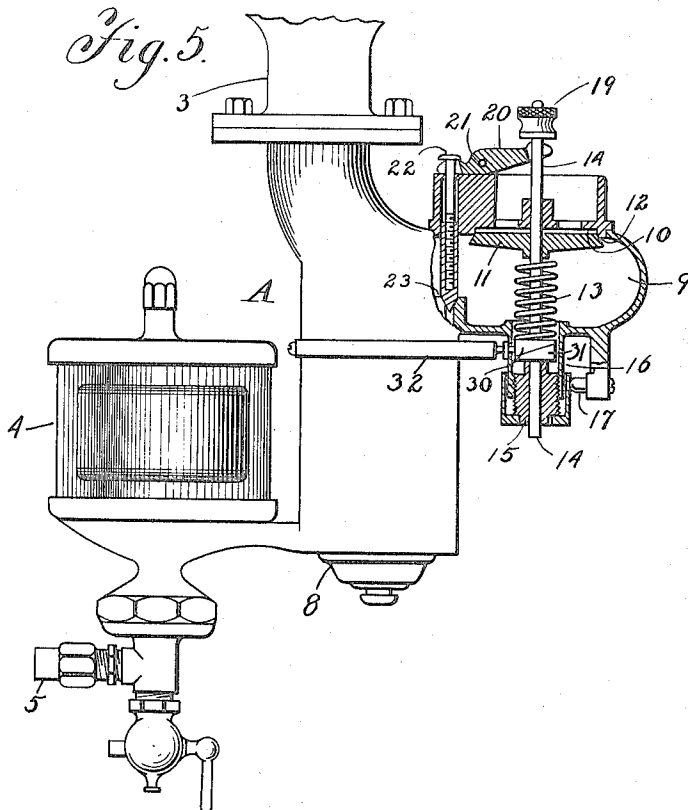
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UNITED STATES PATENT OFFICE.

CHARLES F. ROBBINS, OF WASHINGTON, DISTRICT OF COLUMBIA.

CARBURETER.

1,197,152.

Specification of Letters Patent.

Patented Sept. 5, 1916.

Application filed February 15, 1913. Serial No. 748,571.

To all whom it may concern:

Be it known that I, CHARLES F. ROBBINS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

It is well known that the temperature of the atmosphere has an important effect on the operation of gas engine carbureters so that it is necessary to regulate the proportion of air to vapor according to temperature variations, decreasing the amount of air admitted to the carbureter in cold weather and increasing it in warm weather. In view of this, carbureters are constructed to provide for an adjustment of the valves, particularly the air valve, in order to obtain the proper mixture for efficient running of the engine. The adjustment has heretofore been done wholly by hand, which not only requires on the part of the operator considerable skill and an intimate knowledge of the theory of carbureter operation, but is tedious and objectionable especially in very changeable climates, necessitating frequent readjustment. Furthermore, in cold weather, it is extremely difficult to start the engine, owing to the carbureter being cold and admitting too much air in proportion to the feed of fuel for the production of the proper mixture. To overcome this, carbureter makers now provide what is termed a strangling or starting valve, which, before the engine is cranked, is set to such a position that the volume of air admitted to the carbureter upon the cranking of the engine is reduced so that a high velocity current of air is induced past the spraying nozzle for the making of a rich mixture with which to start the engine. After the engine is started, this strangling valve is returned to normal position so as not to interfere with the free admission of air to the carbureter during regular running of the engine.

It is the object of the present invention to provide automatic means whereby the proportion of air and fuel is regulated according to the temperature of the atmosphere so that no thought of regulating the carbureter is required on the part of the driver with the change of the seasons or with abrupt changes of temperature from day

to day. This automatic means for regulating the proportion of air and fuel also serves to cut down the volume of air admitted to the carbureter in cold weather, so that in starting the difficulties encountered with carbureters now in use are entirely overcome.

In carrying out the invention, a device responsive to temperature variations, a thermostat for instance, is employed in connection with the air-admitting valve so as to exert a varying tension therein, according to the temperature of the atmosphere. When the temperature is low, the thermostat will exert a greater tension on the valve, tending to hold the same seated, than when the surrounding air is warmer, and as a consequence, less air is admitted to the carbureter during cold weather than in warm weather, and also less air is admitted when starting the engine with the carbureter cold than when the carbureter becomes more or less heated by radiation from the engine. This thermostat may be used in connection with the air valve of a single air valve carbureter or with an auxiliary air valve of the carbureter of the multiple air inlet type, the main purpose being to vary the volume of air admitted to the carbureter automatically according to the temperature conditions of the atmosphere. The thermostat may be used in connection with a valve seated by a spring, or it may take the place of the spring, since the thermostat will perform the function of yieldingly holding the valve on its seat, the thermostat being adjustable as to tension to obtain the most efficient operating conditions. Furthermore, the thermostat or temperature-responsive device may be employed as an attachment for carbureters already in use, or it may enter into the embodiment of the carbureter as an essential part thereof.

For a more complete understanding of the invention, reference is to be had to the accompanying drawings, taken in connection with the following description and the claims appended hereto.

In the accompanying drawings, Figure 1 designates a sectional view of a carbureter with the invention applied thereto. Fig. 2 is a perspective view of the attachment removed from the carbureter. Fig. 3 is a detail sectional view on line 3—3, Fig. 2.

Fig. 4 is a perspective view of the connecting nut between the thermostat and valve stem. Fig. 5 is an elevation of a carbureter with portions in section and showing another form of automatic means for controlling the admission of air. Fig. 6 is a plan view of the form of the device shown in Fig. 5. Fig. 7 is a perspective view thereof. Fig. 8 is a view showing the invention applied to the air valve of a carbureter in a manner to take the place of the usual valve-closing spring.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawings, and more particularly to Fig. 1, A designates a well known carbureter of the double-nozzle, double air admission type, the outlet 1 of the carbureter being controlled by a throttle 2 and connected with the stem or trunk 3 of an ordinary manifold through which the gas is supplied to the engine cylinders. Briefly, the carbureter comprises a float chamber 4 that contains the means for controlling the feed of fuel from the source of supply through the connection 5 to the main nozzle 6, the said nozzle being located in the Venturi tube 7, at the bottom of which is the main air inlet 8. Leading off from the upper portion of the Venturi tube is an auxiliary air chamber 9 which has an opening 10 leading to the atmosphere, which opening is controlled by an auxiliary air inlet valve 11 that is normally held yieldingly against its seat 12 by a light helical spring 13. This spring, which encircles the valve-carrying stem 14, bears on an adjusting nut 15 which screws into the tubular extension 16 on the body of the carbureter, the accidental turning of the nut being prevented by a spring-pressed stop 17 engaging the notched exterior of the external portion 18 of the nut. The valve stem 14 extends upwardly above the valve and has threaded thereon an adjustable nut 19 which is adapted to engage a lever 20 fulcrumed at 21 on the carbureter body, said lever being adapted to control a needle valve 22 of the auxiliary fuel spray nozzle 23.

In operation, the explosive mixture is produced by the air passing into the carbureter through the Venturi tube and mixing with the fuel that is sprayed under the suction at the nozzle 6, and this mixture, before passing out of the outlet 1, encounters and is mixed with air that is admitted through the auxiliary air-opening 10 as the valve 11 is opened by the suction from the engine. As the suction increases, the auxiliary air valve 11 opens to a greater extent and thereby causes the auxiliary nozzle valve 22 to open and admit fuel from the spray nozzle 23.

With carbureters of this type, and in fact

all carbureters having air-admitting valves, it is necessary to adjust the tension of the valve spring, such as 13, with the changes of the season and with abrupt changes of temperature from day to day, this adjustment being effected by the turning of the nut 15. It has also been found that in cold weather when starting the engine, difficulty is encountered because the valve 11 opens to too great an extent and admits too great a volume of air. This difficulty, as well as the necessity of readjusting the carbureter for seasonal and abrupt daily changes of temperature, is effectually overcome by means of the temperature-responsive device or thermostat B. This thermostat is made of two materials having different coefficients of expansion and is shown of semi-circular form. The free end of the thermostat is bifurcated at 23^a to span the nut 19, which has a peripheral groove 24 for engaging the bifurcations 25 of the thermostat. By this means, the nut 19 can be adjusted on the valve stem 14 to obtain the proper set of the nut with relation to the auxiliary nozzle-valve lever 20. One element of the thermostat extends beyond the other element and is connected to a clamping ring, clip or the like 26, which embraces the stem 3 of the engine manifold. This ring can be adjusted up and down on the stem to bring the free end of the thermostat in proper relation to the nut 19 of the auxiliary air valve, and further adjustment of the thermostat is provided by the connection of the thermostat with the ring 26. The fixed extremity of the thermostat is fastened to an oppositely beveled block 27, on the ring 26, by screws 28 and 29. By loosening one screw and tightening the other, the thermostat can be thrown to different positions for effecting the proper adjustment thereof with respect to the auxiliary air inlet valve. The thermostat is, of course, resilient so that it exerts a tension on the air inlet valve to act in a supplementary capacity to the spring 13.

The thermostat B is responsive to the temperature of the air under the automobile bonnet and has the effect that in cold weather the valve 11 is held toward its seat with a greater tension than in warm weather, with the result that the volume of air admitted through the auxiliary inlet varies according to the temperature of the atmosphere, less air being admitted in cold weather than in warm weather. In starting the engine in cold weather, the thermostat tends to hold the auxiliary air valve closed so that the air enters the carbureter wholly or principally through the main inlet 8, so that a rich mixture is obtained wherewith to effectively start the engine. As the air in the vicinity of the engine is heated by radiation, the thermostat B will respond thereto and lessen the tension on the auxiliary air

valve 11, so that the same can open and admit the required volume of air to obtain the most efficient running of the engine.

In Fig. 5, the same type of carbureter as shown in Fig. 1 is employed to illustrate the invention, but it is to be understood that the invention can be embodied in various types of carbureter. Between the auxiliary air inlet spring 13 and the adjusting nut 15 therefor is provided means for varying the tension of the spring 13, said means comprising a rotary cam 30 that bears on a cam block 31, which block is held stationary, but can, with the cam 30, move up and down on the valve stem 14 with the adjusting of the nut 15. The cam or element 30 is thermostatically actuated by a thermostat 32 which is fastened to the body of the carbureter at a point opposite to the auxiliary valve chamber, the free end of the thermostat being connected by a link 33 with the arm 34 of the cam. By this arrangement, the cam is turned back and forth with the expansion and contraction of the thermostat so that the spring 13 will be changed as to tension, it being understood that the cam 30 will be raised bodily as it turns in one direction on the block 31, and be lowered bodily as it turns in the opposite direction. The effect of this arrangement is practically the same as the thermostat shown in Fig. 1, in that the auxiliary air inlet valve will be subjected to a greater tension in cold weather than in warm weather to vary the volume of air admitted to the carbureter in such proportion to the fuel supply that the highest efficiency is obtained.

Referring to the form of the air valve controlling means shown in Fig. 8, it will be observed that the valve spring 13 of Figs. 1 and 4 is eliminated and the thermostat C is used in its place. In other words, the thermostat is so designed as to perform the function of the usual valve seating spring and to control the opening of the valve according to the temperature of the atmosphere. The thermostat C is anchored at 35 on the body of the carbureter and extends outwardly and upwardly in close conformity to the auxiliary air inlet chamber so that the upper free end of the thermostat engages with the auxiliary needle valve adjusting nut 19 of the air inlet valve stem 14. The tension of the thermostat is adjusted by any suitable means, as for instance a screw 36, passing through the thermostat and having a swivel connection at 37 therewith, the screw being threaded in a fixed part of the carbureter, as for instance the valve stem guide boss 38 of the valve seat cap 39. In practice, the thermostat is so adjusted that at a suitable mean temperature, say seventy degrees, the valve will be held lightly against its seat by the resiliency of the thermostat. The thermostat will, of course, yield and allow

the valve to open under the suction produced by the engine. When the temperature of the air lowers, the thermostat will increase the tension on the valve so that it will require a stronger suction to open the same and consequently less air is taken into the carbureter. With an increase in temperature, the tension exerted by the thermostat on the valve 11 is decreased so that the valve will open more freely and allow enough air to be admitted to produce an effective mixture. Also in starting the engine in cold weather, the thermostat will hold the auxiliary valve under a greater tension, so that little or no air will be admitted by the auxiliary valve, but the air will be admitted through the main inlet and produce a rich mixture for effective starting of the engine.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim as new, is:—

1. A carbureter provided with an air admitting means opened by suction, a device responsive to temperature changes for controlling the said means to vary the amount of air admitted to the carbureter, and a fuel valve operatively connected with the thermostat to vary the fuel supply with the variations in the volume of air admitted.

2. A carbureter comprising a main fuel admitting means, an auxiliary fuel admitting means including a valve, a main air admitting means, an auxiliary air admitting means including a valve, and a thermostat disposed externally of the carbureter and connected with both valves for varying the mixture of fuel and air automatically.

3. A carbureter including a valve adapted to open and close automatically by the suction and cessation of suction through the carbureter, and a thermostat connected with the valve and resilient to permit the valve to open more or less with the same suction according to atmospheric temperature conditions.

4. An engine carbureter including an air admitting valve adapted to open during the charging stroke of the engine, and a thermostatic element forming a loading means therefor and yieldable to permit the valve to open.

5. A carbureter including an air admit-

ting valve, and a combined thermostat and spring disposed exteriorly of the carbureter and connected with the valve to seat and variably load the same.

- 5 6. A carbureter including an air admitting valve, a resilient thermostat connected with the valve and forming a loading means for the latter, and means for adjusting the tension of the thermostat.
- 10 7. A carbureter including an air admitting valve, a thermostat anchored at one end on the carbureter-body and connected at its free end with the valve, and a device for adjusting the thermostat with respect to the
- 15 valve.
8. A carbureter including a main fuel admitting means, and auxiliary fuel admitting means embodying a valve, and a thermostat connected with the said valve for controlling the same in accordance with temperature changes.
- 20 9. A carbureter including a body having an air inlet, an automatic valve for the inlet opened by a draft of air through the body, means connected with the valve and extending out of the body, and a resilient thermostat wholly exterior to the body of the carbureter and throughout its length surrounded with external air, one end of the
- 25 thermostat being fixed and the other being freely movable and connected with the said means for controlling the extent of opening of the valve under a draft of a given pressure.
- 30 10. A carbureter including a main fuel admitting means, a thermostatically con-

trolled auxiliary fuel admitting means, and a thermostatically controlled suction opened air admitting means.

11. A carbureter comprising a body having an air inlet opening, means for supplying fuel to the air admitted through the said inlet opening, a valve controlling said opening, a stem on the valve extending from the opening, a thermostatic spring exterior 45 to the body and having one end fastened with respect thereto and the other end adjustably connected with the said valve stem.

12. A carbureter including an air admitting valve, a thermostat forming the sole seating means therefor, and a fuel admitting valve operatively connected with the air admitting valve to open and close therewith.

13. The combination of a carbureter including an auxiliary air admitting valve, and an auxiliary fuel valve, with an attachment controlling the operation of the valves, said attachment including a thermostat.

14. The combination of a carbureter including an air-suction valve and a stationary seat for the said valve, with an attachment for controlling the operation of the valve, said attachment including a thermostat connected with the valve and anchored 55 on the outside of the carbureter.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES F. ROBBINS.

Witnesses:

JOHN A. MASSIE,
A. A. EGE.