

Jan. 10, 1939.

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2,143,153

THERMOSTATIC CHOKE-CONTROLLED CARBURETOR

Filed Nov. 19, 1936

3 Sheets-Sheet 1

Fig. 1.

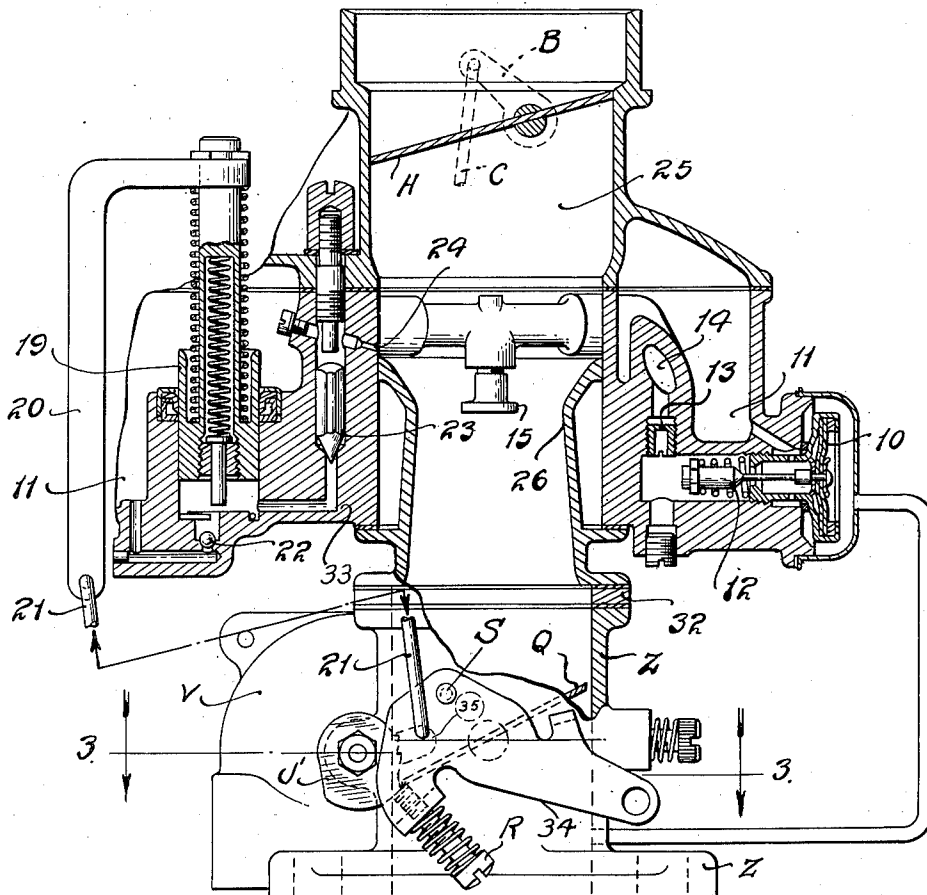


Fig. 5.

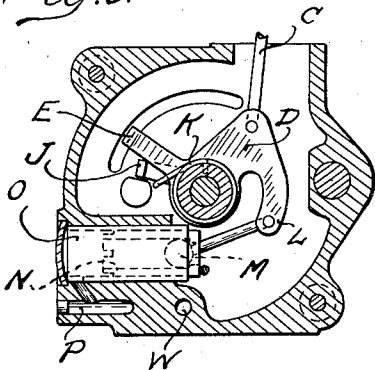
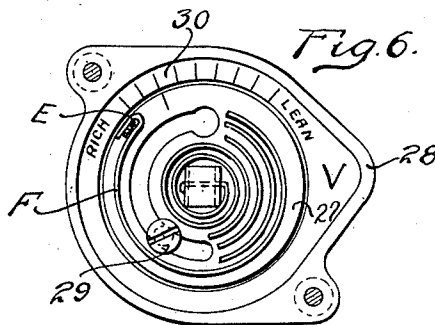


Fig. 6.



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Fig. 2.

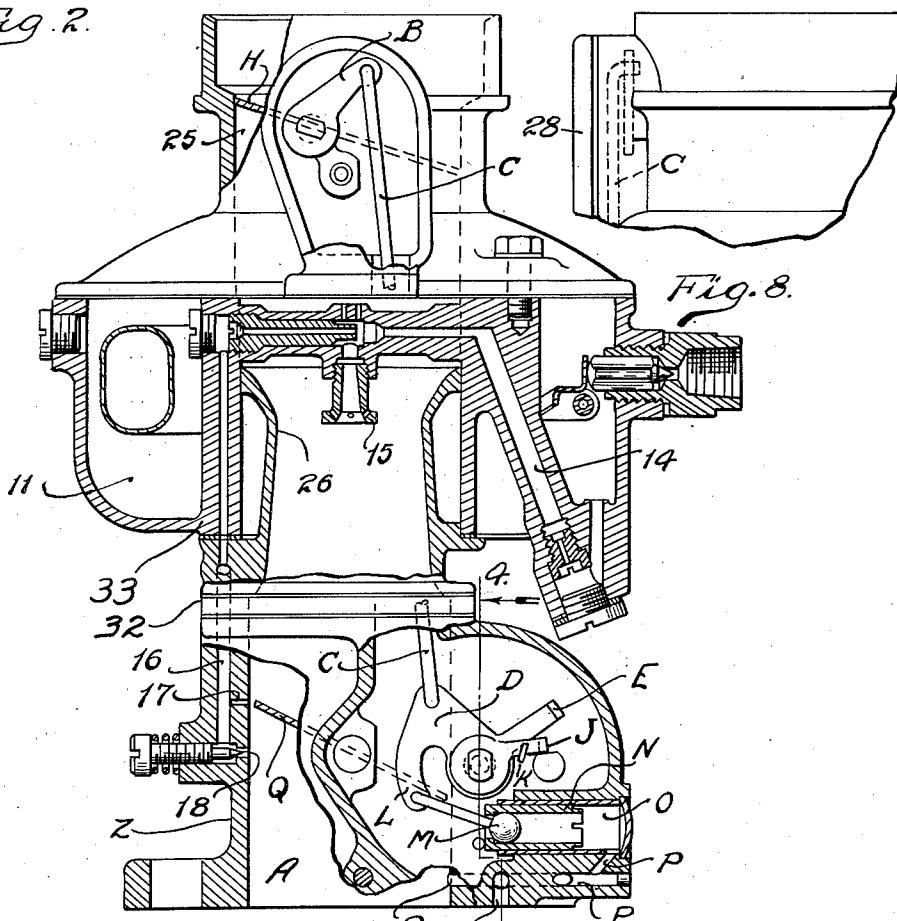


Fig. 8.

Fig. 3.

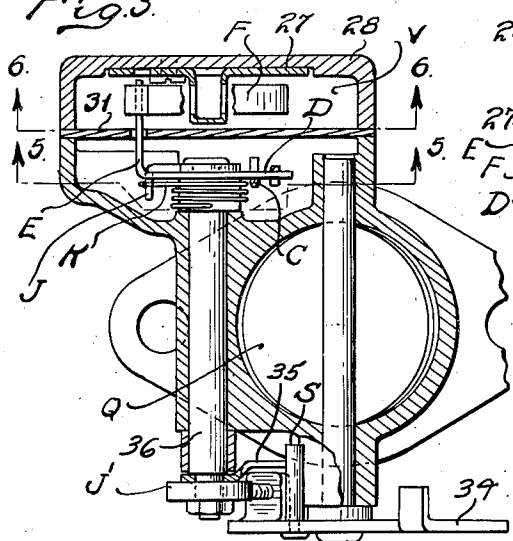
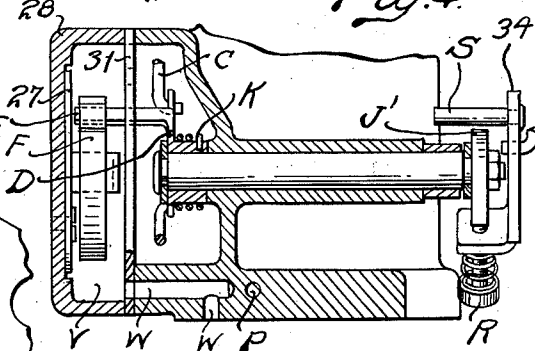


Fig. 4.



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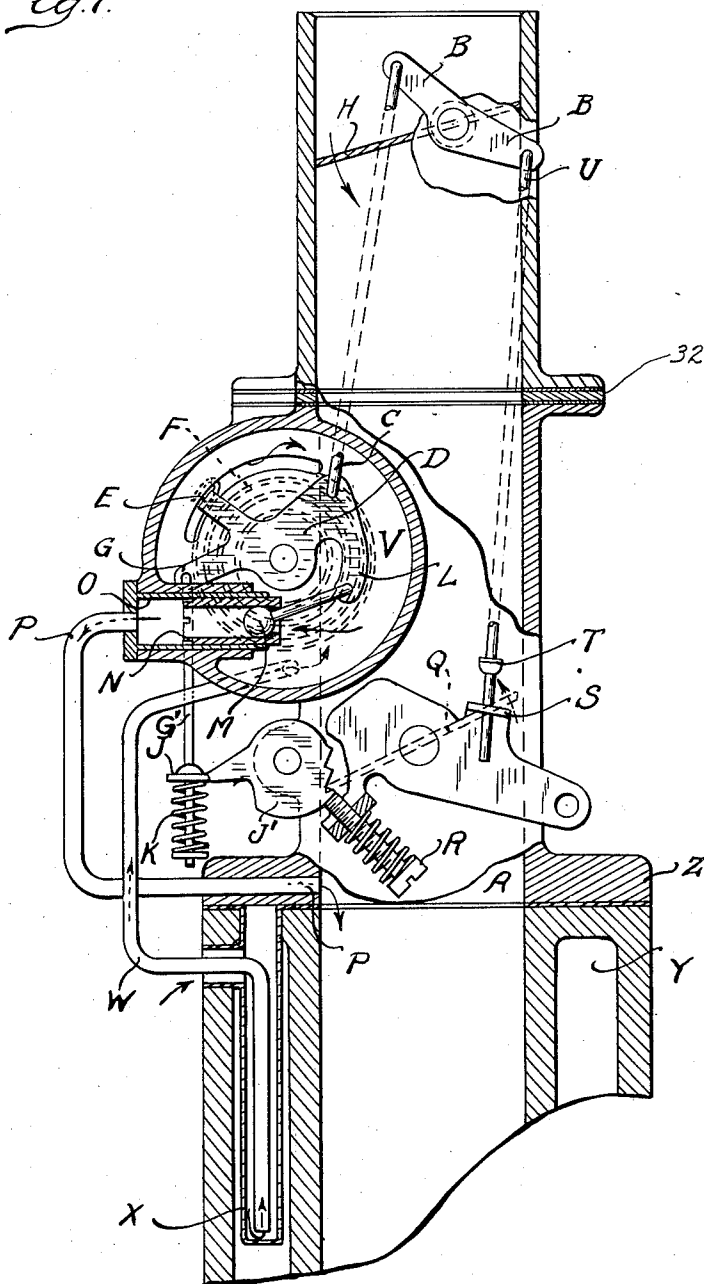
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THERMOSTATIC CHOKE-CONTROLLED CARBURETOR

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Fig. 7.



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THERMOSTATIC CHOKE-CONTROLLED
CARBURETORScott F. Hunt, Detroit, Mich., assignor to M. E.
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Application November 19, 1936, Serial No. 111,693

10 Claims. (Cl. 123—119)

The object of this invention is to improve the starting means of automobile engines.

Figure 1 shows a partial cross section taken on a vertical plane showing the application of this invention to an orthodox carburetor.

Figure 2 shows a cross sectional elevation taken through the starting means.

Figure 3 shows a plan view taken on plane 3—3 of Figure 1.

Figure 4 shows a cross sectional elevation taken on the plane 4—4 of Figure 2.

Figure 5 shows a cross sectional elevation taken on the plane 5—5 of Figure 3.

Figure 6 shows a cross sectional elevation taken on plane 6—6 of Figure 3.

Figure 7 illustrates the invention diagrammatically, omitting the details common to all carburetors. The construction has been modified to make the operation of the device clear.

Figure 8 shows a side view of Figure 2.

Considering Figure 7 first, H is an eccentrically mounted choke valve. B is the choke lever connected through a link C with the lever D. This lever D is connected through an arm E with a coil thermostat F which is mounted concentrically around the shaft of the lever D. An arm G of the lever D engages the arm J which extends from the cam J'. When the lever D moves in the counterclockwise rotation, the lever G is arranged to move the cam J' by positively engaging with the arm J through the shoulder on the rod G'. When the cam D rotates in the clockwise direction this one-way connection permits the lever D to rotate independently of the cam J' and a take-up spring K maintains contact between the shoulder on G' and the arm J. In the actual construction the lever D is located so as to be concentric with the cam J'. In other words the lever D and the cam J' are mounted on the same shaft, but in order to make the diagrammatic drawing clear, they have been separated.

An arm L of the lever D is connected through a ball ended link M with a piston N that reciprocates in the cylinder O which is connected through a pipe P with the mixture outlet. A throttle Q controls the flow of mixture to the mixture outlet A. An adjustable throttle stop R engages with the cam J' so that the closing position of the throttle Q is determined by the position of the cam J'. Mounted on the throttle Q is another stop S which engages with a shoulder T on a rod U which engages with a lever B mounted on the eccentrically mounted choke H. The chamber V in which the thermostat F is located communicates through the pipe W with

a chamber X located in the exhaust jacket Y which surrounds the mixture outlet. The leakage of air past the piston N draws hot air into the chamber V in which is located the thermostat F.

When starting on a cold day the thermostat F engages with the arm E of the lever D and thus imposes a resistance to the opening of the choke H because of the linkage C—B. The moment the engine fires, the vacuum in the mixture outlet is transmitted through the pipe P to the piston N which is drawn over to the left, drawing with it the ball headed pin M and rotating the lever D through the arm L, the link C is drawn down and the choke valve H rotating in the anti-clockwise direction. The result is that the moment the engine fires, an increased amount of air is admitted past the choke valve H.

When the piston N engages with the end of the cylinder O the piston N ceases to be effective and the ball end M becomes the piston; hence the effectiveness of the vacuum in the mixture outlet A becomes less effective, because the area of M is only about half the area of N. Hence the vacuum becomes a less important factor in opening the choke valve. During the starting operation, after the throttle Q is open, the stop S engages with the stop T and rod U, and the choke valve H is forcibly half opened, regardless of temperature and regardless of vacuum in the mixture outlet. As the engine warms up, the thermostat F causes the lever D to rotate in the clockwise direction. The spring K causes the arm J to follow the position of the arm G on the lever D. The result is the cam J' turns with the lever D when the throttle Q is open and the stop R is away from the surface of the cam J'. When the throttle is closed, of course, the return spring on the throttle mechanism tends to cause the stop R to bear against the cam J and to create a certain amount of friction which might interfere with the operation of the entire mechanism if it were not for the provision of the light spring K. It is obvious that as the thermostat F rotates in the clockwise direction the cam J' will follow the rotation of the lever D. Hence the stop R on the throttle Q will engage with the steps on the cam J' as the engine warms up. The throttle, therefore, will close more and more as the temperature rises. The idling speed thus will be reduced as the temperature increases, which is a desirable feature of this device.

The temperature of the thermostat F reflects the temperature of the carburetor generally and also of the exhaust temperature in the jacket Y

surrounding the mixture outlet A because as shown in the arrows, air enters the chamber X and is heated therein and is drawn out through the pipe W into the chamber V surrounding the thermostat. The heated air in V is drawn past the piston N, which is provided with a considerable clearance for obvious reasons, into the pipe P and so into the engine.

Referring now to Figures 1, 2, 3, 4, 5 and 6, which show the device as actually constructed, it will be noticed the chamber V containing the thermostat F is located in the lower half Z of the carburetor which is bolted directly to the exhaust jacket Y. This lower half, therefore, is heated by conduction from the jacket Y to the casting Z. The carburetor parts themselves are numbered as follows: 10 is a diaphragm responsive to the vacuum in the mixture outlet. This admits fuel from the float chamber 11 past the valve 12 and restriction 13 to a fuel passage 14 shown best in Figure 2. The fuel in 14 flows to a nozzle 15 and also to a low speed by-pass 16 which discharges through the outlets 17 and 18 into the mixture outlet A in a well known manner. None of these carburetor details are a part of this invention and are merely used to illustrate a conventional carburetor. For example, the accelerating fuel pump 19 is operated by means of the link 20 and the rod 21 by means of the throttle Q. The fuel from the accelerator pump 19 is drawn from the fuel chamber 11 past the check valve 22 and discharges past a check valve 23 through a nozzle 24 which discharges in an air entrance 25 leading to the venturi 26 into the throat of which the main fuel nozzle 15 discharges. For the rest, the corresponding Figures 1, 2, 3, 4, 5 and 6 are marked with the letters used in the diagrammatic drawing, Figure 7, so that there is no need to describe them any further. As pointed out above, the only difference is that the cam J' is mounted on the same axis as the lever D to which is anchored the spring K.

There are one or two elements added, however, which facilitate the assembly and adjustment of the device. Specifically, a disc 27 in Figure 3 is mounted on the cover 28 which encloses the chamber V and is the anchorage for the thermostat F. As shown in Figure 6, a set screw 29 locks the disc 27 in various positions and a graduation 30 on the cover 28 enables the mixture to be changed from rich to lean for starting. The chamber V is divided into two halves by a partition 31, Fig. 3, and the arm E of the lever D extends through this partition to engage with the thermostat F. It will be noticed that there is quite a thick gasket 32 separating the casting Z from the venturi 26, which in its turn is separated by a gasket from the main carburetor body 33. The cooling effect of the carburetor, therefore, is to that extent not a factor in the temperature of the casing Z which responds fairly promptly to the exhaust temperature of the jacket Y.

A pin S on the throttle lever 34 (Fig. 3) corresponds to the stop S (Fig. 7) and engages with an arm 35 locked to the shaft 36 which carries the cam J' and the arm J which engages with the arm E (Fig. 5) integral with the lever D. Hence as the throttle Q is opened, the choke H is forced open just exactly as is shown in Fig. 7 so that when the throttle Q is wide open, the choke valve H is then half open.

By completely enclosing the starting mechanism by cover 28, I provide a heated chamber for housing the thermostat and by drawing the

air out through the leakage around the piston N and by drawing air in from a passage W located in the exhaust jacket Y, two results are obtained: (1) The thermostatic coil F gets warm quickly and (2) the mechanism is protected from injury. The valve H is unbalanced so that it responds to air flow and thus supplements the action of the pistons N and M. In order to completely enclose the mechanism, the cover 28 extends up so as to cover the link C and lever B. This cover is shown partly broken away in order to disclose the lever B (Fig. 2).

What I claim is:

1. A carburetor having an air entrance, an eccentrically mounted choke valve therein adapted to be opened by the air flow therethrough, a mixture outlet housing separated from said carburetor by a substantial gasket of heat resisting material, a throttle valve in said mixture outlet housing a mixture outlet passage, a throttle stop mounted on said throttle, a chamber integral with said mixture outlet housing, a thermostat mounted therein, a cam mounted on said housing, and adapted to be engaged by said throttle stop, a positive one way connection whereby the thermostat is adapted to rotate the cam so as to prevent the throttle being closed when the thermostat is cold and a yieldable connection from the thermostat to the cam adapted to move the cam in the opposite direction to permit the throttle being closed when the thermostat is hot, a cylinder formed in the wall of said chamber and extending therein, a piston in said cylinder, link means connecting said piston with said choke valve, said thermostat engaging with said link means so as to obstruct the action of said piston, a passage connecting said cylinder with said mixture outlet, an exhaust jacket surrounding said mixture outlet passage, an air chamber in said exhaust jacket, and a passage connecting said air chamber with the chamber containing said thermostat linkage and said vacuum cylinder.

2. Automatic choke control means for a down-draft carburetor having a mixture outlet housing in the lower part thereof and separate from the main body of the carburetor, a throttle mounted therein, a chamber integral with said housing, a thermostat mounted inside said chamber, an air entrance leading to said carburetor, and eccentrically mounted choke valve therein adapted to be opened by the air flow therethrough, a vacuum cylinder in said chamber connected to said mixture outlet, a piston in said cylinder, a lever operatively connected with said piston and with said thermostat and with said choke valve, said thermostat being adapted to oppose the action of said piston and said piston being connected with said choke valve so as to open it as the vacuum in the mixture outlet increases, said piston being in two parts, an outer larger portion operative during the initial opening movement of the choke valve and an inner smaller portion operative alone during the final opening movement of the choke valve.

3. The combination with an exhaust jacketed mixture inlet passage for an internal combustion engine, a carburetor having a mixture outlet casing bolted thereto, said casing having a chamber integral therewith and adjacent to the inlet passage, a thermostat mounted in said chamber, an air passage located in said exhaust jacket and communicating with said chamber, a restricted connection between said chamber and said mixture outlet, an air entrance leading to said carburetor, a choke valve therein, and

linkage interconnecting the choke valve and thermostat.

4. In the combination as set forth in claim 3 in which the chamber also encloses the said linkage.

5. In combination with an exhaust jacketed mixture inlet, a carburetor having a mixture outlet casing bolted thereto so as to be heated thereby, a thermostat mounted on the outside of the casing, a throttle in said casing, an air entrance to the carburetor, a choke valve therein, a loose link connection between the throttle and the choke whereby the choke is opened by the throttle after the throttle has been partly opened, a movable stop means for limiting the closing position of the throttle, linkage connecting the thermostat with the choke valve and with said stop means, and a chamber enclosing said thermostat.

6. The combination as set forth in claim 5 together with a piston mounted in a cylinder, said cylinder being located in said chamber and connected with said mixture outlet, said piston being connected with said thermostat so as to oppose its action for the purpose described.

7. Automatic choke control means for an internal combustion engine having an air entrance, a mixing chamber and mixture outlet connected to said internal combustion engine, a choke valve

in the air entrance, throttling means for the mixture outlet, a vacuum cylinder connected to the mixture outlet on the engine side of the throttle, a double piston in said cylinder, both pistons being operative jointly during the initial movement of the piston by a one way connection between the two pistons, one piston being adapted to operate alone when the other piston has completed its travel, means interconnecting said first mentioned piston with said choke valve, and yieldable means for opposing the movement of said piston.

8. In the combination as set forth in claim 7, the yieldable means opposing the movement of said double piston is made of bi-metallic material so that it responds to temperature change and when cold opposes the movement of said double piston.

9. In the combination as set forth in claim 7, the yieldable means includes thermostatic means which when cold increases the resistance to the movement of said double piston.

10. In the combination as set forth in claim 7, the double piston consists of an inner piston and an outer annular piston, the inner piston being connected with said choke valve.

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