March 26, 1957 R. W. SUTTON 2,786,657

CARBURETOR

Filed Dec. 28, 1954 3 Sheets-Sheet 1

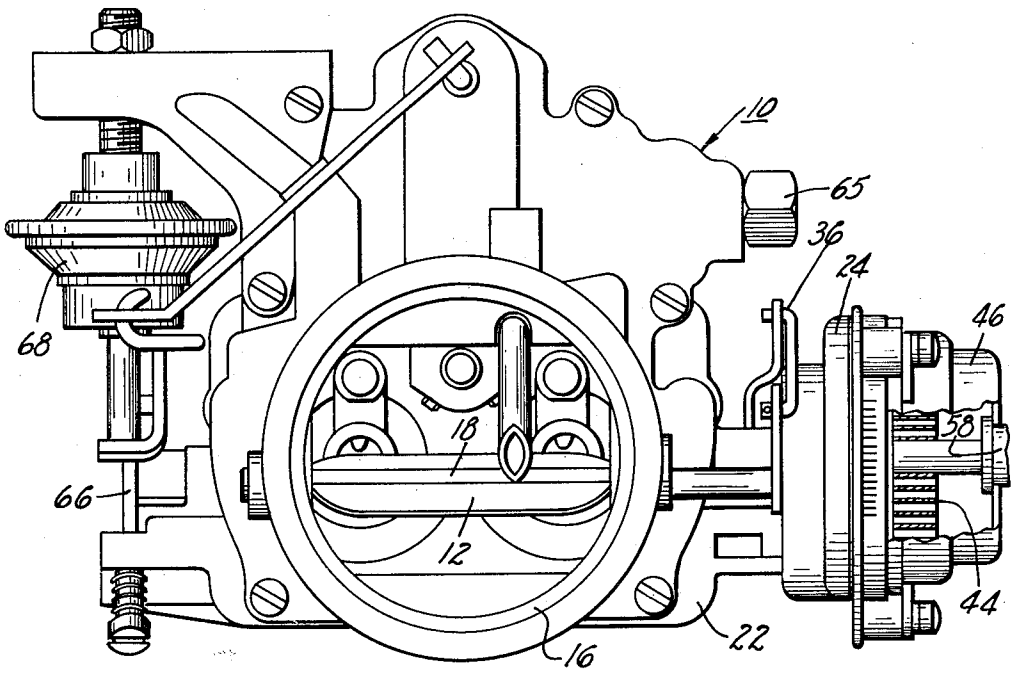

FIG. 1

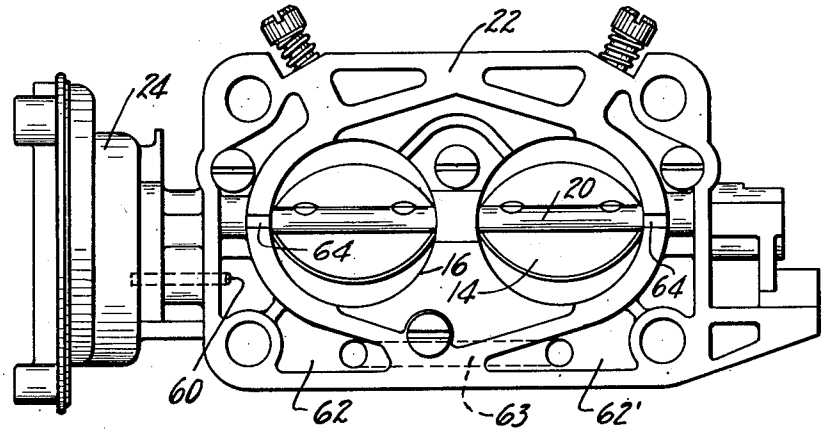

FIG. 2

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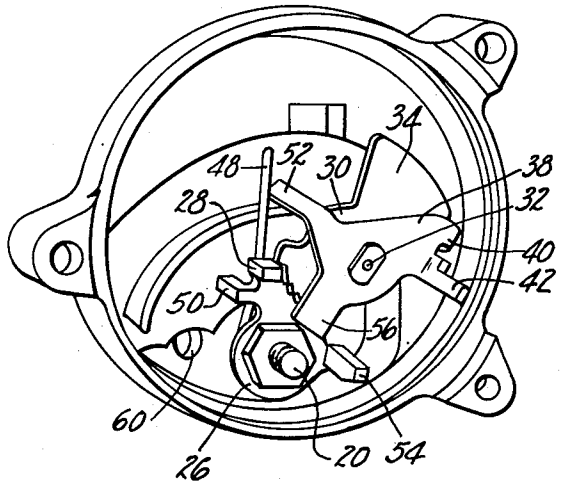

FIG. 3

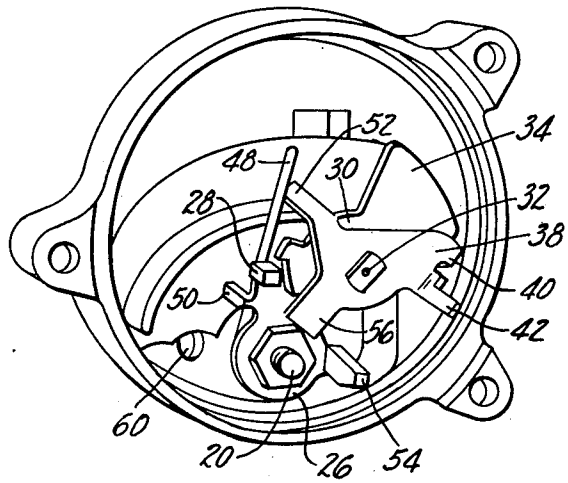

FIG. 4

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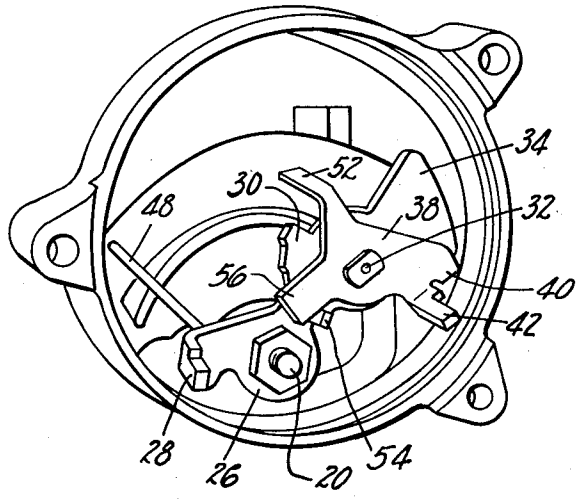

FIG. 5

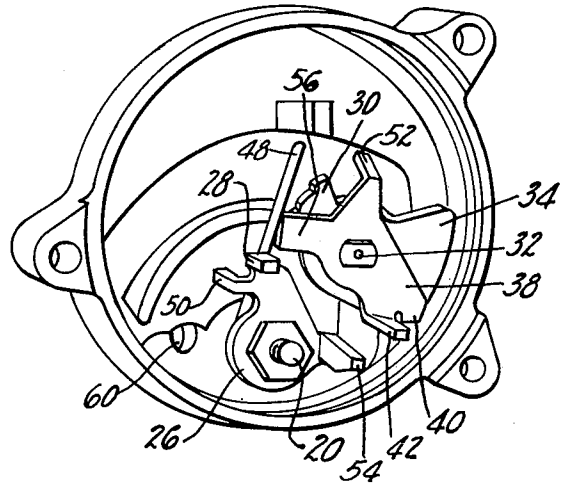

FIG. 6

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CARBURETOR

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Application December 28, 1954, Serial No. 478,065

13 Claims. (Cl. 261—39)

This invention relates to carburetors for internal combustion engines and more particularly to means for automatically controlling the carburetor choke valve to vary the air to fuel ratio of the mixture in accordance to the requirements of the engine under various operating conditions.

The most commonly employed automatic choke mechanisms for controlling the choke valve include a thermostate and a suction responsive device. The thermostat is adapted to hold the valve in closed position when the ambient temperature is low and to gradually open said valve or permit it to open as the engine temperature rises. The suction device, which includes a piston operable within a cylinder, is responsive to manifold vacuum posterior to the carburetor throttle and is adapted to modify the action of the thermostat as soon as the engine begins to operate under its own power.

The piston arrangement of suction responsive devices of this character are, however, unsatisfactory in that they must be very sensitive and very fine particles of foreign matter, such as sand or dust, may impair the free movements of said piston and even cause the piston to stick which, if the choke valve is only partially open will result in excessive quantity of fuel in the mixture and in turn will result in excessive fuel consumption and improper operation of the engine, overloading and the like. If the piston sticks in a manner to prevent closing of the choke valve it will be difficult or impossible to start the engine when cold.

It has been proposed in the past to provide an automatic choke control device which eliminates the vacuum piston. Such a device is shown in Patent No. 2,420,917 issued to R. W. Sutton and A. H. Winkler.

It is an object of the present invention to provide an improved automatic choke control device having a compact unitary housing containing the thermostat and critical linkages.

It is a further object of the invention to provide a positively actuated spring for yieldingly opening the choke valve when the throttle valve approaches the closed position during the warming up period of engine operation.

It is a still further object of the invention to provide an improved choke control device formed on the throttle body and having means to heat said body to prevent icing.

Other objects and advantages will be readily apparent from the following detailed description taken in connection with the appended drawings in which:

Figure 1 is a top view of a carburetor embodying my invention;

Figure 2 is a bottom view of the throttle body and choke control device of the carburetor; and

Figures 3, 4, 5 and 6 are perspective views of the interior of the choke control device illustrating the position of the elements during various conditions of engine operation.

Referring now to the drawings numeral 10 designates a carburetor having a choke valve 12 and throttle valve

14 mounted in an induction passage 16 on shafts 18 and 20 respectively. The throttle shaft is journalled in a throttle body 22 and extends at one end into a choke control housing 24 which is cast integrally with said body. A throttle lever 26 is secured to said throttle shaft and is formed with a lug 28 which is adapted to engage the stepped portion of fast idle cam 30 which is loosely pivoted on a shaft 32 in the housing and is weighted as at 34 to assume a slow idle position. Shaft 32 is connected to choke shaft 18 by linkage 36 and is adapted for rotation therewith. An intermediate lever 38 is secured to shaft 32 and is formed with a turned over portion 40 which is adapted to form a one way connection between said lever and fast idle cam. Lever 38 is also provided with a projecting finger 42 adapted for engagement with the hooked end of thermostat 44 which is secured at its other end in a cover member 46. When cold, the thermostat urges lever 38 in a counterclockwise direction to move cam 30 to the fast idle position as shown in Figure 4.

A torsion spring 48 is looped about throttle shaft 20 and is adapted to be engaged by a lug 50 on throttle lever 26. When the throttle valve is closed, the throttle lever through the one way connection formed by lug 50 urges spring 48 into contact with a finger 52 on intermediate lever 38 to move said lever in a clockwise direction to open the choke valve a small amount for breathing such as is shown in Figure 4. Spring 48 is yieldable to permit the choke to close fully when the thermostat is cooled below a predetermined temperature as illustrated in Figure 3 where spring 48 is shown flexed.

When the throttle valve is opened a predetermined amount a lug 54 on the throttle lever is adapted to engage a finger 56 on the intermediate lever 38 so as to move said lever in a clockwise direction to open the choke and thereby "unload" the carburetor.

Cover member 46 is adapted to be connected with a source of heated air (not shown) through a conduit 58. The interior of housing 24 is connected, through a conduit 60 formed in the body section adjacent the throttle shaft, to a hollowed portion 62 in said body. An oppositely disposed hollowed portion 62' is connected to portion 62 through conduit 63. Portions 62, 62' are in communication with the induction passage through channels or grooves 64 formed in the induction passage walls adjacent the throttle shaft.

The remainder of the carburetor structure is conventional and includes a fuel inlet 65, a throttle arm 66 adapted for connection to the usual accelerator pedal (not shown), and a dashpot 68 for retarding the closing movement of said throttle arm.

In the operation of the choke control device when the thermostat 44 is cold it moves lever 38 and cam 30 in a counterclockwise direction whereby choke valve 12 is urged towards closed position. A throttle lever 26 engages the fast idle step on cam 30 and spring 48 engages finger 52 on lever 38 to move the choke valve slightly open for breathing in opposition to the thermostat as shown in Figure 4.

When the thermostat is colder than a predetermined temperature the force of the thermostat overcomes the force of spring 48 and moves the choke valve closed in opposition to said spring as shown in Figure 3.

Should the engine become flooded during starting, means is provided for opening the choke to "unload" the carburetor and comprises a lug 54 on throttle lever 26 which engages a finger 56 on lever 38 when the throttle valve is moved toward the open position a predetermined degree whereby the lever 38 will be rotated in a clockwise direction to open the choke valve in opposition to the thermostat 44 as shown in Figure 5.

Figure 6 shows the position of elements during normal

engine idling when the engine has warmed up and the choke valve is wide open.

From the above description it can be seen that the present invention provides a convenient construction which may be located adjacent the throttle shaft of the carburetor to permit reliable control of the choke valve uneffected by dirt, dust or other airborne impurities. The construction of the present invention also provides a convenient means for heating the throttle shaft and throttle body walls of the carburetor to prevent throttle icing.

The details of the arrangement shown and described are by way of example only, and may be varied to meet specific conditions within the teaching of the invention.

I claim:

1. A choke control device for a carburetor having a throttle mounted on a shaft and a choke valve, comprising a housing adapted to receive one end of said shaft, a throttle lever secured to said one end of the shaft, an intermediate lever pivoted in said housing, means connecting said intermediate lever and said choke, a thermostat mounted in said housing yieldingly engaging said intermediate lever to urge said choke valve closed when cold, and a torsion spring mounted on said shaft actuable by said throttle lever to engage said intermediate lever to urge said choke valve open when said throttle valve approaches closed position.

2. A choke control device for a carburetor having a throttle, a choke valve and a shaft for said throttle, comprising a housing adapted to receive one end of said shaft, a throttle lever secured to said one end of the shaft, an intermediate lever pivoted in said housing, means connecting said intermediate lever and choke, a thermostat mounted in said housing yieldingly engaging said intermediate lever to urge said choke valve closed when cold, a cam pivoted in said housing having a one way connection with said intermediate lever adapted to prevent said throttle from closing when said choke valve is closed to a predetermined amount, and a torsion spring mounted on said shaft actuable by said throttle lever to engage said intermediate lever to urge said choke valve open when said throttle approaches closed position.

3. A choke control device for a carburetor having a throttle, a choke valve and a shaft for said throttle, comprising a housing adapted to receive one end of said shaft, a throttle lever secured to said one end of the shaft, an intermediate lever pivoted in said housing, means connecting said intermediate lever and choke, a thermostat mounted in said housing yieldingly engaging said intermediate lever to urge said choke valve closed when cold, means carired by said throttle lever to engage said intermediate lever when said throttle valve approaches wide open position to open said choke valve, and a torsion spring mounted on said shaft actuable by said throttle lever to engage said intermediate lever to urge said choke valve open when said throttle valve approaches closed position.

4. A choke control device for a carburetor having a throttle, a choke valve and a shaft for said throttle, comprising a housing adapted to receive one end of said shaft, a throttle lever secured to said one end of the shaft, an intermediate lever pivoted in said housing, means connecting said intermediate lever and choke, a thermostat mounted in said housing yieldingly engaging said intermediate lever to urge said choke valve closed when cold, a torsion spring rotatably mounted on said shaft adjacent to said throttle lever, a member formed on said throttle lever having a one way connection with said torsion spring adapted to move said spring into engagement with said intermediate lever to open said choke when said throttle valve approaches closed position.

5. A choke control device for a carburetor having a throttle mounted on a shaft and a choke valve, comprising a throttle lever secured to one end of said shaft, an intermediate lever pivotally mounted on said carburetor,

means connecting said intermediate lever and choke, a thermostat mounted on said carburetor yieldingly engaging said intermediate lever to urge said choke valve closed when cold, and a torsion spring mounted on said shaft actuable by said throttle lever to engage said intermediate lever to urge said choke valve open when said throttle valve approaches closed position.

6. A choke control device for a carburetor having a throttle, a choke valve and a shaft for said throttle, comprising a throttle lever secured to said shaft, an intermediate lever pivoted on said carburetor, means connecting said intermediate lever and choke, a thermostat mounted on said carburetor yieldingly engaging said intermediate lever to urge said choke valve closed when cold, a torsion spring mounted on said shaft, a member formed on said throttle lever adapted to engage said spring and to move said spring into engagement with said intermediate lever to open said choke when the throttle valve approaches closed position.

7. In a carburetor having a body section with an induction passage therethrough, a shaft in said body, a throttle valve mounted on said shaft in said passage, a housing formed on said body and adapted to receive one end of said shaft, a throttle lever in said housing secured to said shaft, a crank in said housing having an arm extending outwardly therefrom, an unbalanced choke valve in said passage, means connecting said choke valve and said arm, a cam rotatably mounted on said crank, an intermediate lever fixed to said crank adjacent said cam having a one way connection thereto, a thermostat in said housing yieldingly engaging said intermediate lever to urge said choke valve toward closed position, means on said cam for preventing said throttle from closing when said choke is closed a predetermined amount, resilient means actuable by said throttle lever to engage said intermediate lever to urge said choke open, and means actuable by said throttle lever to open said choke valve when said throttle valve approaches wide open position.

8. A choke control device for a carburetor having a throttle, a shaft for said throttle and a choke valve, comprising a throttle lever secured to one end of said shaft, a lever operatively connected to said choke, and a spring looped about said shaft, said spring having an arm adapted to engage said last mentioned lever to urge said choke valve toward open position when said throttle approaches closed position.

9. A choke control device for a carburetor having a throttle, a shaft for said throttle, and a choke valve, comprising a housing, a throttle lever in said housing operatively connected to said shaft, a choke lever in said housing operatively connected to said choke valve, yieldable means in said housing having a one way connection with said choke lever, and means associated with said throttle lever for rendering said yieldable means effective to urge said choke valve toward open position when said throttle lever approaches substantially closed position.

10. A choke control device for a carburetor having a throttle, a shaft for said throttle, a choke valve and a shaft for said choke valve, comprising a throttle lever secured to one end of said throttle shaft, a choke lever connected to one end of said choke shaft, a spring mounted on said throttle shaft having an arm adapted to engage said choke lever to urge said choke valve toward open position when said throttle approaches closed position, and temperature responsive means formed to yieldingly oppose said spring when cold.

11. A choke control device for a carburetor having a throttle mounted on a shaft and a choke valve, comprising a housing adapted to receive one end of said shaft, a throttle lever secured to said one end of the shaft, an intermediate lever pivoted in said housing, means connecting said intermediate lever and said choke, a thermostat mounted in said housing yieldingly engaging said intermediate lever to urge said choke valve closed

when cold, and a torsion spring mounted on said shaft adapted to engage said intermediate lever to urge said choke valve toward open position when said throttle approaches closed position.

12. A choke control device for a carburetor having a throttle and a choke valve, comprising a throttle lever operatively connected to said throttle, a lever operatively connected to said choke, a thermostat operatively connected to said choke, a thermostat operatively connected to said last mentioned lever to urge said choke valve toward closed position when cold, and a spring mounted on said carburetor adapted to engage said last mentioned lever only when said choke valve is closed a predetermined amount, and means associated with said throttle lever for controlling the effectiveness of said spring.

13. A choke control device for a carburetor having a throttle, a throttle shaft and a choke valve, comprising

a throttle lever secured to said shaft, a choke lever operatively connected to said choke valve, a torsion spring mounted on said shaft, a portion of said spring being adapted to engage said choke lever to urge said choke valve toward open position, a thermostat operatively connected to said choke valve to urge said choke valve toward closed position when cold, and means formed on said throttle lever to control the effectiveness of said spring to urge said choke valve toward open position.

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