Jan. 16, 1951 M. J. KITTLER 2,538,570

AUTOMATIC CHOKE

Filed May 14, 1949 2 Sheets-Sheet 1

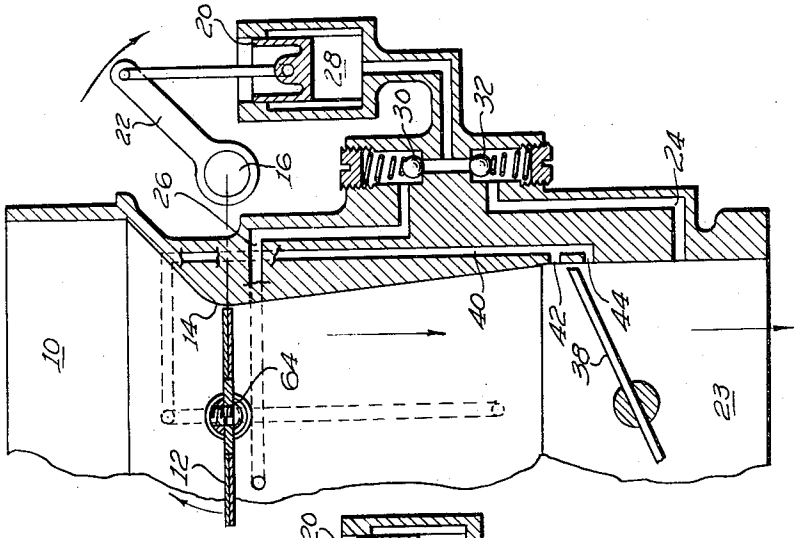


Fig. 2

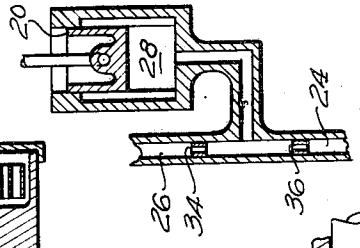


Fig. 3

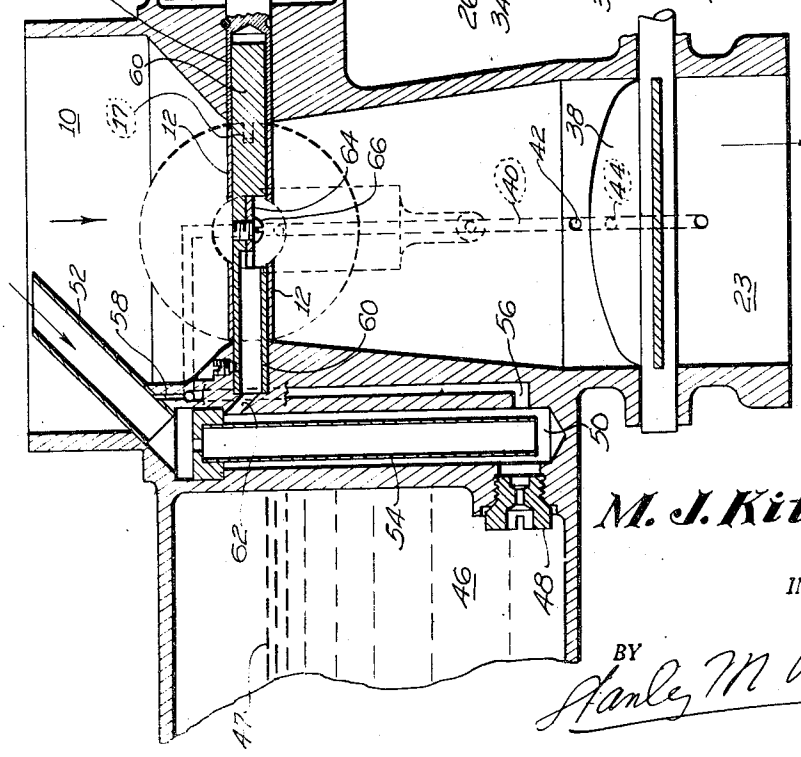


Fig. 1

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Filed May 14, 1949 2 Sheets-Sheet 2

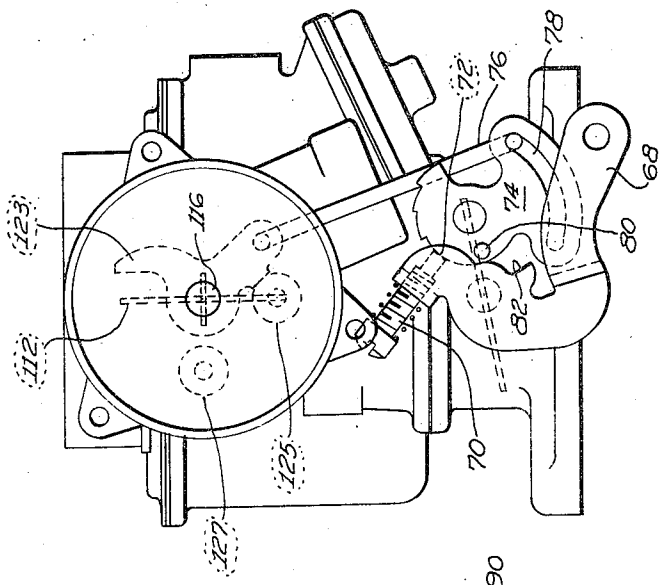


Fig. 4

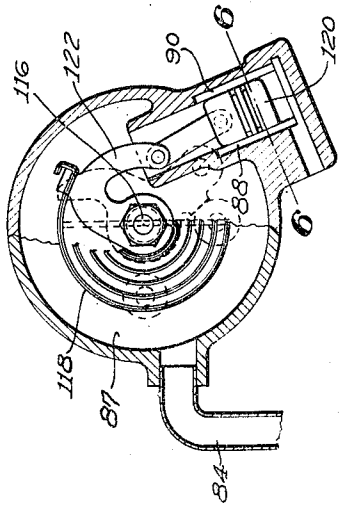


Fig. 5

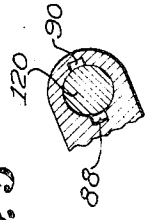


Fig. 6

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2,538,570

AUTOMATIC CHOKE

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Application May 14, 1949, Serial No. 93,345

4 Claims. (Cl. 261—39)

1

The object of this invention is to apply the engine suction and the temperature to the choke valve shown in the Kittler and Winter co-pending application Serial No. 58,748, filed November 6, 1948.

When the choke valve is located in the center of the venturi it is necessarily made concentric and therefore the airflow into the engine does not itself open the choke valve as is the case where the choke valves are placed in the air entrance and are made unbalanced. When the engine fires the engine suction, both below the throttle in the inlet manifold and above the throttle in the throat of the venturi, is available for opening the choke against the spring tension of the coil thermostat, which thermostat tends to close the choke as the engine is running with the choke partly open. As the airflow increases the suction in the passages below the throttle increases and also the suction in the venturi. Either of these two suctions I make available for opening the choke. When the throttle is wide open the manifold suction varies and the venturi suction rises and I arrange that this suction replace manifold suction as the operating force for opening the choke valve.

As disclosed in the co-pending application of Kittler and Winter, Serial No. 58,748, filed November 6, 1948, the fuel is delivered along side the choke valve which is located in the throat of the venturi. The problem of operating the choke valve automatically is different from the problem involved where the choke valve is located in the air entrance leading to the venturi.

Fig. 1 shows the cross-sectional elevation of the choke valve showing the preferred form of my invention.

Fig. 2 is a cross-sectional elevation of Fig. 1.

Fig. 3 is a view of an alternative detail.

Fig. 4 is an outside elevation showing the way the carburetor is actually made including the fast idle cam and the fast idle stop.

Fig. 5 is another cross-sectional detail showing the thermostat, the vacuum piston, and the shaft of the choke valve.

Fig. 6 is a cross-sectional plan view on the plane 6—6 of Fig. 5 showing the side relief passages of the vacuum piston.

In the figures, 10 is the air entrance, 12 is the choke valve, 14 is the venturi in which the choke valve is mounted on a hollow stationary shaft 60. Another hollow shaft 16 is controlled by the thermostat 18 and drives the choke 12 by a tongue 17.

A vacuum operated piston 20 tends to turn choke valve 12 clockwise towards the open position (Fig. 2). The piston 20 is connected to the lever 22 mounted on the sleeve shaft 16.

The vacuum to operate the piston 20 is derived from the mixture outlet 23, through the passage 24. The corresponding passage 26 is connected to the throat of the venturi 14.

2

In Fig. 2 the passage 26 is connected to the chamber 28 below the piston 20, past the spring loaded valve 30. A spring loaded valve 32 is in the passage 24 leading to the chamber 28, below the piston 20.

In Fig. 3 the restriction 34 takes the place of the spring loaded valve 30, and restriction 36 takes the place of the spring loaded valve 32.

A throttle 38 controls the flow to the mixture outlet 23 and the idle fuel flow through the low speed passage 40. 42 and 44 are the two low speed fuel outlets from the low speed passage 40. The float chamber 46 maintains the fuel level constant along the line 47. A restriction 48 supplies fuel to the fuel well 50. An impact air tube 52 supplies air to the tube 54 which hangs in the well 50. Low speed fuel passage 56 communicates with the low speed fuel passage 40 and outlets 42 and 44. Low speed air vent 58 provides the necessary air for this passage 60 to break the syphon.

60 is a hollow stationary shaft inside the sleeve shaft 16. The hollow portion of the shaft 60, to the left of the center line of Fig. 1, communicates with the well 50 through the inclined passage 62. Choke valve 12 is made from two stampings which embrace the stationary shaft 60. This shaft 60 carries the circular horizontal plate 64 which fits into a corresponding hole in the choke valve 12. This plate 64 is attached to the stationary rod 60 by the cap screws 66. The center of the choke valve is provided with an opening corresponding to the outside diameter of the plate 64 so that when the choke valve is closed, as shown in Fig. 1, the plate 64 restricts flow through the opening in the valve 12.

In Figs. 4, 5 and 6 the lever 122 corresponds to the lever 22 of Figs. 1 and 2 and the thermostat 118 corresponds to the thermostat 18 of Figs. 1 and 2. A vacuum piston 120 corresponds to the vacuum piston 20 of Figs. 1 and 2. A throttle lever 68 carries a throttle stop 70 which is shown engaging with the low speed surface 72 of the low speed cam 74. The element 74 is connected through a link 76 with the arm 123. The arm 123 is connected to the shaft 116 which corresponds to shaft 16 of Figs. 1 and 2. Stop 127 engages with the arm 123 when the choke valve 112 is closed. In the position shown the choke valve 112 is wide open and the arm 123 engages with the stop 125. The lower end of the link 76 engages with the slot 78 in the low speed cam 74. A pin or projection 80 engages with a corresponding projection 82 on the throttle lever 68 so that when the throttle is opened wide the low speed cam 74 is rotated clockwise and the choke valve 12 is moved towards the open position by means of the link 76. A tube 84 conveys hot air to the chamber 87 surrounding the thermostat 118.

In Fig. 6 the piston 120 engages with two slots 88 and 90.

Operation

In the operation when the choke valve 12 is in the position shown in Fig. 2 the moment the engine fires suction is transmitted through the passage 24 and rotates the choke valve 12 clockwise towards the wide open position. The degree to which the choke valve opens and the time taken in making the motion to open is determined by the temperature of the thermostat 18. As the engine warms up the choke valve 12 gradually assumes the wide open position.

During the progress of the choke valve from its fully closed position to its wide open position the disc 64, being stationary, opens an air passage through the center of the choke valve 12. Meanwhile fuel is taken through the restriction 48, up the well 50, down the passage 62, along the passage inside 60 to the center of the choke valve 12 in the opening corresponding to the plate 64. When the choke valve 12 is wide open fuel is drawn from the well 50 by the eddy downstream from the horizontal plate 64.

By providing spring loaded check valves 30—32 (Fig. 2) the suction in the passage 24 is admitted to the chamber 28 below the piston 20 whenever that suction is greater than the suction in the throat of the venturi. Whenever the suction in the throat of the venturi as applied down the passage 26 is greater than the suction in the passage 24 then the check valve 32 closes and the check valve 30 opens. This prevents the mixture ratio getting excessively rich during the opening motion of the throttle valve as the venturi suction helps keep the choke valve open.

In Figs. 5 and 6 the well known means for increasing the speed at which the engine idles in cold weather and for positively and partially opening the choke valve, when the throttle is opened wide, are shown.

When the choke valve 112 approaches its wide open position the suction acting in the piston 120 is reduced by the longitudinal grooves 88 and 90 which act as bleed passages. The flow of hot air through the passage 84 then increases so as to keep the choke valve open once it has been opened and to delay its closure. The reduction in the suction as the choke valve becomes wide open and the increase in heating effect of the hot air tube 84 stabilizes the last motion of the choke valve.

The characteristic feature of this invention is the application of the dynamic (venturi) suction as an alternative to the static (manifold) suction.

The ordinary chokes, in universal use, simultaneously have applied to them manifold suction together with the suction effect of an eccentrically mounted choke valve. As the eccentrically mounted choke valve is unsuitable in this applicant's construction the problem of dispensing with the turning movement of an eccentrically mounted choke became a serious one.

I claim:

1. An automatic choke control for the air entrance to a carburetor having a mixture chamber, a mixture outlet and a throttle therein, a balanced butterfly choke valve having a choke shaft located in the middle of said air entrance comprising a lever mounted on said choke shaft, yieldable and heat responsive means engaging with said lever so as to tend to close the choke valve at low temperatures, a chamber, a movable wall therein also connected to said lever and tending to open said choke valve whenever the pressure in said chamber falls below the value determined by said yieldable and heat responsive means, a first restricted passage from said chamber located so as to be always downstream of said choke valve, a second restricted air passage from said chamber located in said mixture outlet downstream of said throttle valve whereby dynamic suction responsive to the velocity of air flow acts on the first restricted passage and the second restricted passage is subjected to static suction downstream of said throttle valve and in which there is a venturi located in the air entrance to the carburetor and the choke valve is located therein.

2. A device as set forth in claim 1 in which the first restricted air passage is connected to the throat of said venturi downstream of said choke valve.

3. A device as set forth in claim 1 in which the first restricted air passage is connected to the throat of said venturi downstream of said choke valve and in which there is a check valve in each of the restricted passages leading to said chamber so that whenever the suction prevailing in the venturi is greater than the suction downstream of the throttle the check valve in the second restricted passage closes.

4. An automatic choke control for the air entrance to a carburetor having a mixture chamber, a mixture outlet and a throttle therein, a balanced butterfly choke valve having a choke shaft located in the middle of said air entrance comprising a lever mounted on said choke shaft, yieldable and heat responsive means engaging with said lever so as to tend to close the choke valve at low temperatures, a chamber, a movable wall therein also connected to said lever and tending to open said choke valve whenever the pressure in said chamber falls below the value determined by said yieldable and heat responsive means, a first restricted passage from said chamber located so as to be always downstream of said choke valve, a second restricted air passage from said chamber located in said mixture outlet downstream of said throttle valve whereby dynamic suction responsive to the velocity of air flow acts on the first restricted passage and second restricted passage is subjected to static suction downstream of said throttle valve in which there are check valves in the first and second restricted air passages so that the greater of the two suctions available is applied to said movable wall and in which there is a venturi located in the air entrance to the carburetor and the choke valve is located therein and the first restricted air passage is connected to the venturi downstream of said choke valve, means for reducing the suction acting on said movable wall as the choke valve approaches its wide open position.

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