June 21, 1932. F. H. HEITGER 1,863,715

CARBURETOR

Filed Nov. 9, 1929 2 Sheets-Sheet 1

Fig. 1

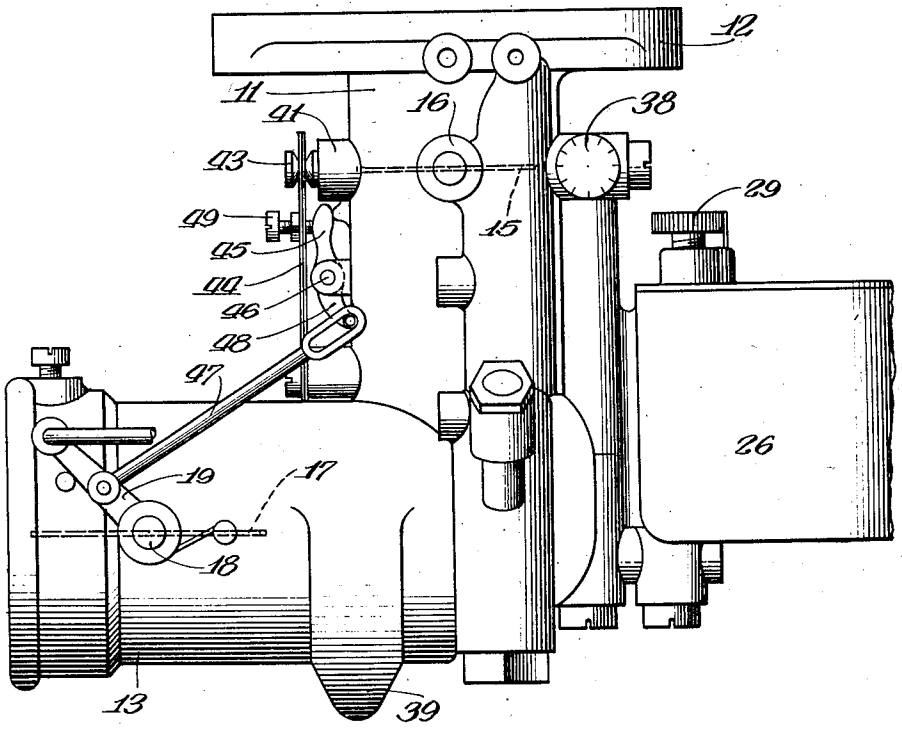

Fig. 5

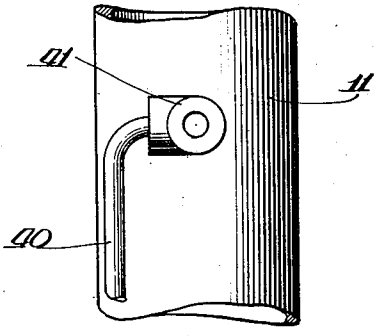

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Fig. 2

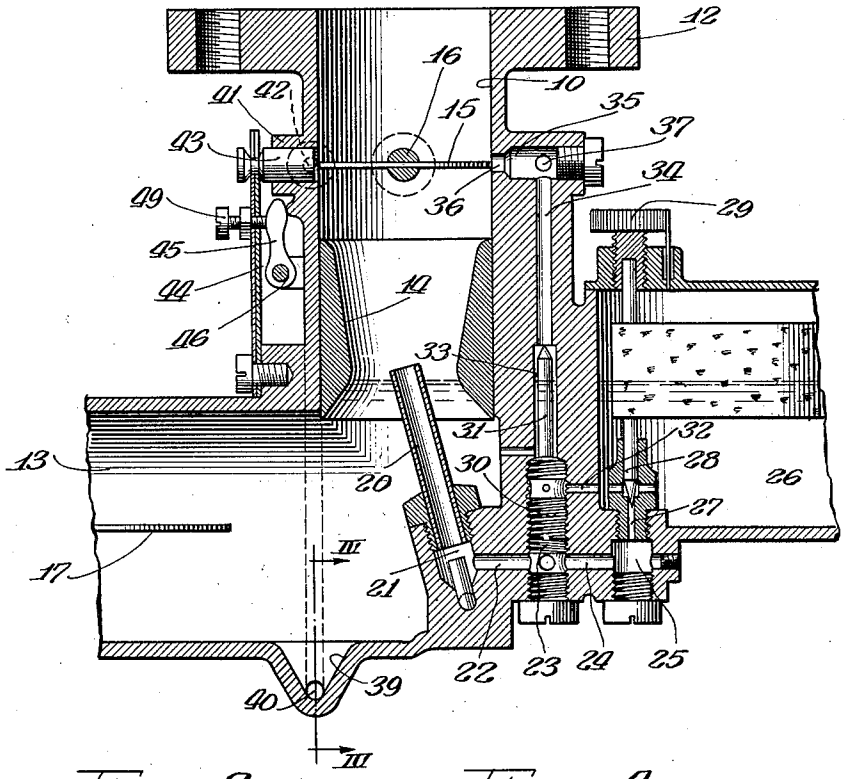


Fig. 3

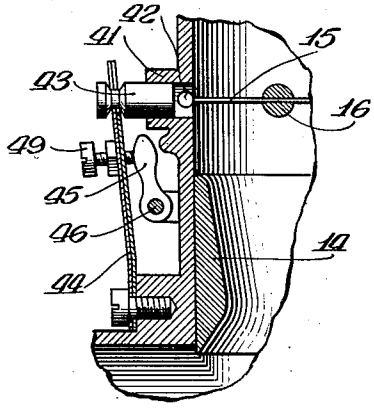
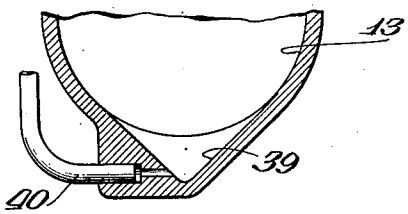


Fig. 4



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Patented June 21, 1932

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UNITED STATES PATENT OFFICE

FRANK H. HEITGER, OF FLINT, MICHIGAN

CARBURETOR

Application filed November 9, 1929. Serial No. 405,925.

This invention relates to a carburetor for internal combustion engines having improved idling fuel supply arrangements.

It is an object of this invention to provide an improved carburetor embodying means operated by the closing of the carburetor choke valve to automatically open a by-pass valve at the throttle, which valve opens a port associated with a conduit from a fuel collecting sump in the air end of the carburetor. This arrangement serves to feed a rich mixture posterior to the throttle even though the throttle is closed. The sump serves to collect fuel overflowing from the normal carburetor nozzle because of the increased suction caused by the choke valve, which at the same time, decreases the air flow below the quantity sufficient to pick up and carry the overflowing fuel up the manifold.

It is another object of this invention to provide an improved and simplified carburetor that will provide an improved and more economical idling fuel mixture supply merging gradually into the normal mixture supply as the carburetor throttle is opened beyond the point necessary to bring the normal mixture supply system into action.

Other and further important objects of this invention will be apparent from the disclosures in the specification and accompanying drawings.

The invention (in a preferred form) is illustrated on the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is an elevation of a carburetor embodying the features of this invention.

Figure 2 is a central vertical section in a plane parallel to Figure 1.

Figure 3 is a fragmental detail similar to part of Figure 2, showing the operation of the structure of this invention.

Figure 4 is a fragmental section through the sump, taken on the line IV—IV of Figure 2.

Figure 5 is a fragmental view with parts omitted, showing the upper connection of the sump tube of Figure 4.

As shown on the drawings:

The carburetor chosen to illustrate one embodiment of this invention comprises a vertical mixture passage 10 in a body 11 having a mounting flange 12; a side air inlet 13 being provided which opens into the mixture passage below a venturi 14 therein. The mixture passage is provided with a butterfly throttle valve 15 on a cross shaft 16, while the air inlet is provided with a butterfly choke valve 17 on a cross shaft 18 carrying an external lever 19. The choke valve is provided to restrict the air supply and thus increase the suction on the fuel nozzle to increase the ratio of fuel to air when starting a cold engine. A fuel nozzle 20 has its outlet positioned at the throat of the venturi 14 and is mounted over a chamber 21 supplied with fuel through a passage 22, the lower portion of an idling well 23 and passage 24 leading from a chamber 25 which is fed fuel from a float bowl 26 through a passage 27 controlled by a needle valve 28 having an externally adjustable head 29 forming the limiting power feed adjustment.

The idling well 23 does not affect the operation of the main nozzle system since a plug 30 is inserted as a seal above the passages 22 and 24. An idling fuel nozzle 31 is inserted in the well above the plug and is supplied with fuel through a separate passage 32 from the float chamber. The idling nozzle is positioned in an air bleed chamber 33 drawing air from the mixture passage below the venturi, so that at the tip of the nozzle 31 air is mixed with the fuel drawn therefrom and is delivered through a passage 34 into a chamber 35 having a port 36 opening into the mixture passage in a location straddling the edge of the throttle when the latter is closed to the slowest idling position. The degree of suction on the idling nozzle, and hence the fuel delivery thereof, is restricted by the admission of air through a port 37 opening into the chamber 35, a variation in the size of this port serving to control the idling mixture, an indexed head 38 shown in Figure 1, being provided for controlling the air admitted through the port 37. As the throttle is slightly opened by a clockwise movement, more of the port 36 is exposed above the edge

of the throttle, thus increasing the suction effect thereon and feeding more idling mixture up to the point where the main nozzle 20 comes into action.

When the air valve is closed for starting a cold motor, the increased suction created thereby, causes an excess fuel feed from the main nozzle. Since the throttle is usually nearly closed for starting, the air flow through the venturi is too slight to pick up and carry the fuel so delivered, which falls or flows into a collecting sump 39 formed in the bottom of the air passage. A tube 40 serves to drain this sump and is led to the side of a passaged boss 41 positioned adjacent the edge of the throttle valve when closed, as best shown in Figures 3 and 5. The outlet 42 from the tube into the boss is controlled by a movable plug 43, which is partially withdrawn to open this outlet by suitable linkage cooperating with the choke valve. This linkage comprises a forked spring element 44 engaging the plug, a lever 45 pivotally mounted at 46 so that it can push the element 44 outwardly, and a lost motion link 47 engaged between a downward extension 48 of the lever 45 and the operating lever 19 of the choke valve. With this arrangement, a clockwise movement of the choke valve 17 pushes the link to first take up the lost motion and then operates the lever 45 to partially retract the plug 43 to the open position of Figure 3. The plug 43 thus forms a by-pass valve around the throttle and means for adjustment is provided comprising a set screw 49 acting against the lever 45. If desired, the spring element 44 may be formed as by a bimetallic temperature responsive element as indicated in the drawings in which case the element bends outwardly when cold to partially withdraw the plug and increase the idling speed by supplying fuel from the sump as well as by-passing more air around the edge of the throttle valve.

In the operation of the carburetor embodying the features of this invention, fuel normally stands at the level indicated by the line X in Figure 2 in both nozzles as well as in the float bowl. For starting or idling, the throttle is in the position shown bisecting the idling port 36 and opens by a clockwise rotation. Upon starting the engine as idling fuel and air mixture will be drawn into the manifold above the throttle through the exposed upper part of the port 36 and in addition, some air will be by-passed around the edge of the throttle valve at the location of the plug, or by-pass valve 43. Should the mixture need adjustment for idle it may be accomplished by regulating the admission of air to the chamber 35 through the port 37 by means of the indexed valve head 38.

As the throttle is slightly opened from the position shown, the port 36 will be increasingly uncovered so that more mixture will be fed above the throttle up to the point where the main nozzle comes into action due to the increased throttle opening and consequent increased suction and air flow through the venturi. When starting a cold motor the choke valve is normally closed, causing a surplus fuel feed from the main nozzle which fuel falls or flows to the sump and is fed by means of the tube 40 to the boss 41 where its admission to the mixture passage above the throttle is controlled by the in and out movement of the plug 43. The plug 43 is withdrawn to uncover the outlet 42 by the linkage connecting it to the choke valve lever, when the choke valve is closed. The adjustment provided for the movement of the plug 43 serves to regulate the quantity of flow and hence the idling speed.

It will thus be seen that I have provided an improved carburetor embodying an idling feed controlled by a valve connected to the choke valve and adapted to supply a rich mixture above the throttle when the latter is closed together with the choke valve. The increased vacuum due to choking causes an excess fuel delivery from the main fuel nozzle which fuel is collected and conducted to the idling feed control valve.

I am aware that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted, otherwise than necessitated by the prior art.

I claim as my invention:

1. In a carburetor in combination with the mixture conduit, fuel feed, throttle and choke valves therefor, a valve adjacent the throttle for by-passing air there around, means connecting said valve to the choke valve to be opened by the closing of the choke valve, a fuel collecting sump fed by the overflow from the normal fuel feed, and a conduit leading from said sump to the valve adjacent the throttle whereby the opening of said valve causes the suction above the throttle to draw fuel from the sump.

2. In a carburetor in combination with the mixture conduit, fuel feed, throttle and choke valves therefor, a valve adjacent the throttle for by-passing air therearound, means connecting said valve to the choke valve to be opened by the closing of the choke valve, means for adjusting the by-pass valve relative to the choke valve, a fuel collecting sump fed by the overflow from the normal fuel feed, and a conduit leading from said sump to the valve adjacent the throttle whereby the opening of said valve causes the suction above the throttle to draw fuel from the sump.

3. In a carburetor, in combination with the mixture conduit, fuel feed, throttle and choke valves therefor, a valve adjacent the throttle for bypassing air therearound, means connecting said valve to the choke valve to be

opened by the closing of the choke valve, including a lost motion connection therein for delaying movement of said valve until the choke valve is nearly closed, a fuel collecting sump fed by the overflow from the normal fuel feed, and a conduit leading from said sump to the valve adjacent the throttle whereby the opening of said valve causes the suction above the throttle to draw fuel from the sump.

4. In a carburetor in combination with the mixture conduit, fuel feed, throttle and choke valves therefor, a valve adjacent the throttle for bypassing said valve, means connecting said by-pass valve to the choke valve to be opened by the closing of the choke valve, means for adjusting the bypass valve relative to the choke valve including a lost motion connection therein for delaying movement of said valve until the choke valve is nearly closed, a fuel collecting sump fed by the overflow from the normal fuel feed, and a conduit leading from said sump to the valve adjacent the throttle whereby the opening of said valve causes the suction above the throttle to draw fuel from the sump.

5. In a carburetor including a mixture conduit, throttle valve and normal nozzle structure and fuel supply thereto, an idling fuel supply arrangement for feeding a fuel and air mixture above the throttle, a bypass valve separate from said idling fuel supply for admitting air posterior to the throttle, and means for supplying fuel for admission past said bypass valve and a choke valve and means connected to said choke valve for operating said bypass valve.

6. In a carburetor including a mixture conduit, throttle valve and normal nozzle structure and fuel supply thereto, an idling fuel supply arrangement for feeding a fuel and air mixture above the throttle, a bypass valve separate from said idling fuel supply for admitting air posterior to the throttle, means for supplying fuel for admission past said bypass valve, a choke valve, and lost motion means associated therewith for operating said bypass valve during the latter portion of the closing movement of the choke valve.

7. In combination with a carburetor and the throttle thereof, a drainage sump within said carburetor, conduit means connecting said sump with the carburetor passages adjacent the edge of the throttle in its closed position, and means controlling the outlet of said conduit means, a choke valve controlling the air inlet to said carburetor, and means associated with the choke valve for operating the means controlling the outlet of said conduit means.

8. In combination with a carburetor and the throttle thereof, a drainage sump within said carburetor, conduit means connecting said sump with the carburetor passages adjacent the edge of the throttle in its closed position, means controlling the outlet of said conduit means, a choke valve controlling the air inlet to said carburetor, lost motion means associated with the choke valve for operating the means controlling the outlet of said conduit means, whereby the movement of said means is confined to the latter part of the closing movement of the choke valve.

9. In combination with a carburetor and the throttle thereof, a drainage sump within said carburetor, conduit means connecting said sump with the carburetor passages adjacent the edge of the throttle in its closed position, and means controlling the outlet of said conduit means, a choke valve controlling the air inlet to said carburetor, and means associated with the choke valve for operating the means controlling the outlet of said conduit means, and means for adjusting the initial position of said controlling means.

10. In a carburetor including a mixture conduit, throttle valve and normal nozzle structure and fuel supply thereto, an idling fuel supply arrangement for feeding a fuel and air mixture above the throttle, a bypass valve separate from said idling fuel supply for admitting air posterior to the throttle, means for supplying fuel for admission past said bypass valve, a choke valve, and lost motion means associated therewith for operating said bypass valve during the latter portion of the closing movement of the choke valve, and means for adjusting the initial position of said bypass valve.

11. In combination with a carburetor, a throttle and a choke valve therefor, a chamber formed in the carburetor wall adjacent the edge of the throttle when the latter is substantially closed, said chamber extending both above and below the throttle edge to form a bypass therearound, a movable member in said chamber adapted in one position to substantially fill the chamber flush with the carburetor wall to close the bypass, and means for connecting said movable member to the choke valve whereby said movable member will be retracted upon closure of said choke valve.

In testimony whereof I have hereunto subscribed my name at Flint, Genesee County, Michigan.

FRANK H. HEITGER.