

Sept. 24, 1940.

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2,215,682

CARBURETOR

Filed Aug. 17, 1937

2 Sheets-Sheet 1

FIG. 1

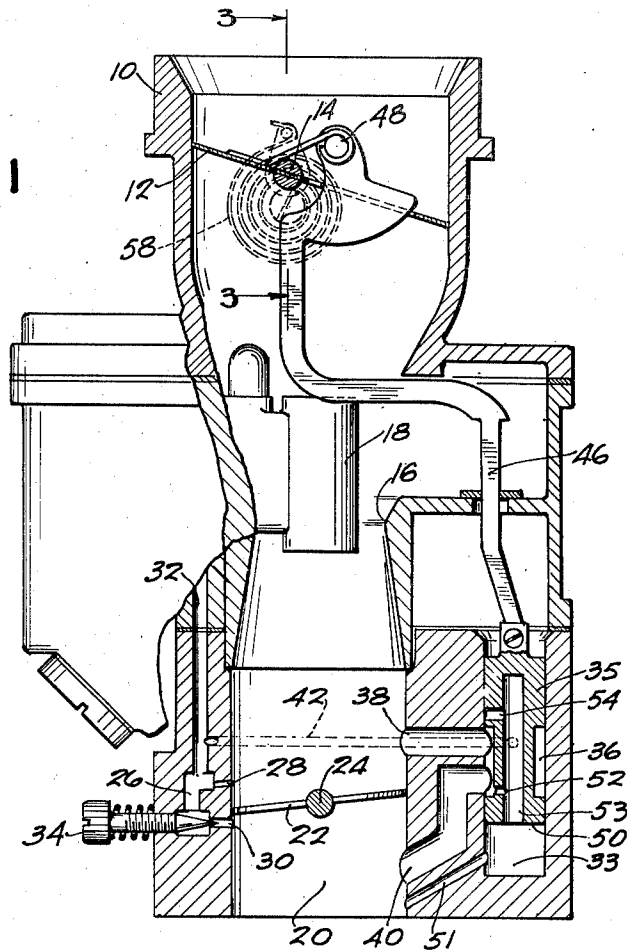


FIG. 2

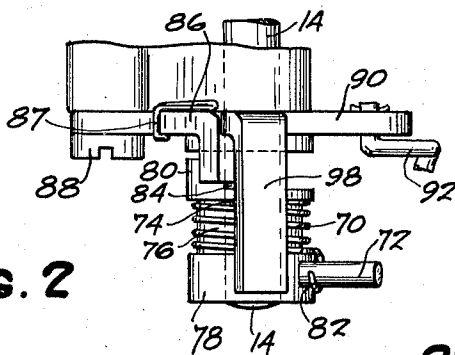
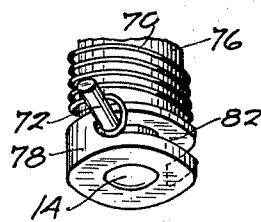


FIG. 2A



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FIG. 4

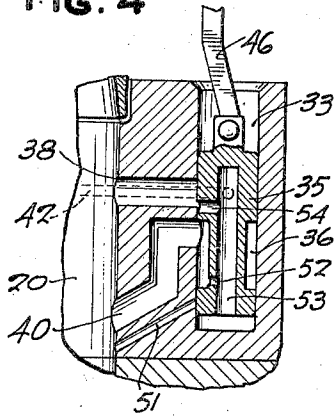


FIG. 3

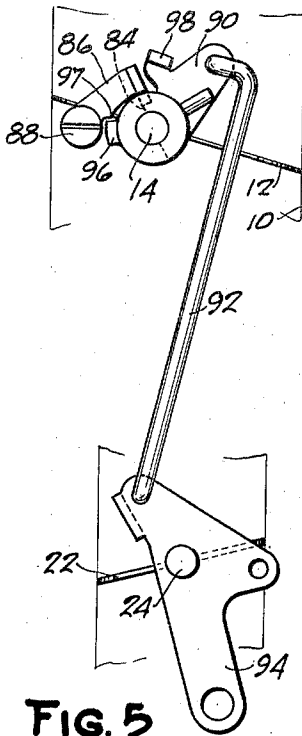
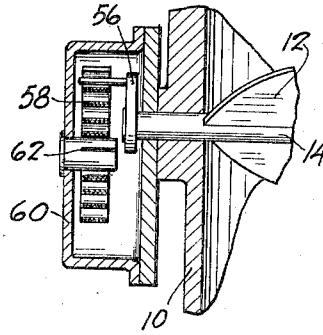


FIG. 5

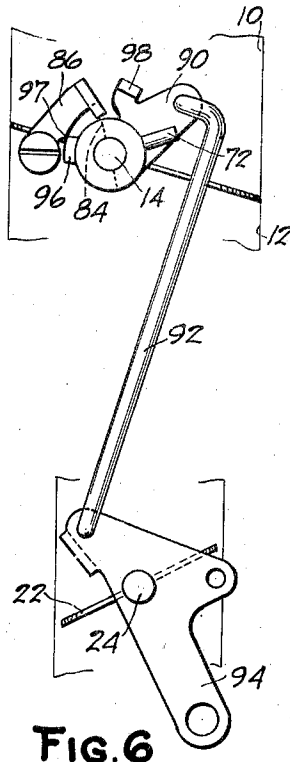


FIG. 6

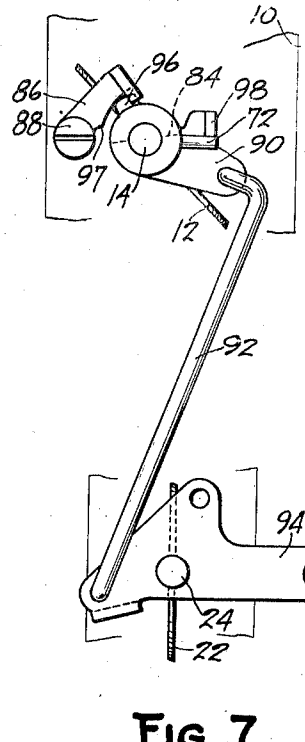


FIG. 7

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CARBURETOR

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Application August 17, 1937, Serial No. 159,549

6 Claims. (Cl. 261—39)

This invention relates to carburetors and more particularly to carburetors for internal combustion engines having an automatic choke for starting purposes.

It has been found in operation of automatic chokes that in order to prevent the engine from stalling immediately after starting, a considerably enriched mixture is required for a brief period over and above that required when the engine is placed under load as when starting off in low gear, and automatic chokes which provide a satisfactory enriched mixture for idling may function unsatisfactorily, due to the mixture being too rich when starting off in low gear. On the other hand, if the mixture be corrected to provide smooth operation on the original low gear start, the engine is liable to stall during idling due to an initially too lean mixture.

The present invention is designed to obviate this difficulty by providing the usual requirements for initial starting and initial idling but automatically leaning the mixture when the engine is loaded as by starting the vehicle. This may be accomplished by loading the thermostatic spring with an additional resilient device, which is automatically disconnected at the time the operator puts the vehicle in motion.

It is accordingly an object of the invention to provide an automatic choke which may provide an initially rich mixture to prevent engine stalling while idling, but which will automatically lean the mixture when the engine is first placed under load.

Other objects have to do with the provision of a simple and effective structure designed to accomplish the foregoing result.

The above and other novel features of the invention will appear more fully hereinafter from the following detailed description when taken in conjunction with the accompanying drawings. It is expressly understood, however, that the drawings are employed for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein similar reference characters refer to similar parts throughout the several views:

Fig. 1 is a longitudinal section through a down-draft carburetor having a built-in automatic choke embodying the invention;

Fig. 2 is an enlarged fragmentary illustration of a portion of the choke shaft and auxiliary spring as viewed from the top;

Fig. 2a is a fragmentary perspective view of a portion of Fig. 2;

Fig. 3 is a fragmentary section taken on the line 3—3 of Fig. 1 and showing the thermostat;

Fig. 4 is a fragmentary portion of Fig. 1 showing the choke piston and fast idle in wide open choke position;

Fig. 5 is a diagrammatic view of the mechanism of Fig. 2 showing the auxiliary spring in operating position.

Figure 6 is a view similar to Figure 5 showing the auxiliary spring in the released position; and

Figure 7 is a view similar to Figure 5 showing the throttle open and choke valve released position of the mechanism.

Referring to the drawings, and particularly to Figures 1 and 2, there will be seen a carburetor having an air horn 10 having an unbalanced choke valve 12 carried on a choke shaft 14, a main venturi 16 and a smaller venturi 18 having a main jet located therein, and a mixing conduit 20 with a throttle valve 22 and valve stem 24. Adjacent the mixing chamber and by-passing the throttle valve is a conventional idling system comprising a port 26 having branches 28 and 30 above and below the throttle in closed position and a fuel passage 32 supplied from any suitable source of fuel supply. An idle fuel adjustment screw 34 is provided to regulate the normal idling mixture.

Formed in the carburetor body adjacent the throttle valve is a cylinder 33 having a piston valve 35 therein provided with a fast idle groove or port 36 designed to communicate with ports 38 and 40 entering the mixing conduit above and below the throttle valve when the same is in or near its closed position. A passage 42 connects cylinder 33 to the passage 32 in order to supply fuel for fast idling. In order to regulate the quantity of fuel mixture by-passing the throttle at fast idle, and substantially limit its operation to those stages prior to the time when the engine has warmed up, the piston valve 35 is connected by a link 46 to a crank pin 48 carried on the choke valve, so that the piston will move in accordance with movements of the choke valve. In order that the under face 50 of the valve 35 may be subjected to some portion of the suction within the mixing conduit 20, a restricted conduit 51 connects cylinder 33 with the mixing conduit. An axial bore 53 in the valve 35 is provided with radial ports 52 and 54, designed to communicate, at certain positions of the valve 35, with ports 38 and 40, so as to reduce, more or less, the effect on

valve 35 of the suction exerted through conduit 51. The general construction of the bypass just described is disclosed in S. F. Hunt Patent No. 2,127,735, issued August 23, 1938.

As shown in Fig. 3, one end of the choke valve shaft 14 is provided with a crank 56 upon which acts a thermostatic spiral spring 58, preferably of the bimetallic type, the same being supported within a housing 60, and from the center on a pin 62 to which the same is secured. In practice, the housing may be exposed to heat from the exhaust manifold, or any substitute such as an electrical heater resistance so connected as to be cut in and warm up quickly upon initiation of engine operation.

The structure thus far described is adapted to provide automatic choking having good operating characteristics. However, for idling immediately after starting, generally a richer mixture is required than that required when the motor is placed under load or thereafter. This may be due to the inability of a cold engine to evenly distribute the small quantities of fuel required for idling in a manifold large enough to carry fuel for maximum load conditions, thus requiring a rich mixture to assure that all cylinders receive at least a mixture not too lean to fire. Also, once an engine has been placed under load after starting, it is warmed internally at a rapid rate.

The force exerted by the thermostat tending to close the choke valve when the engine is cold must be sufficient to provide a sufficiently rich idling mixture, but as soon as the engine is placed under load, it has been found that such an adjustment provides an overly rich mixture causing uneven operation of the engine.

This invention contemplates relieving the tension on the choke valve when the throttle valve is opened, so as to provide a leaner mixture when the engine is placed under load.

A particular means for accomplishing this is best illustrated in Figs. 2 and 2a, with its operation shown in Figs. 5, 6 and 7. An auxiliary spring is arranged to apply an auxiliary torque tending to close the choke valve, together with means for releasing the torque dependent upon some act coinciding with the placing of the engine under load.

For this purpose the choke shaft 14 is provided with a pin 72 to which is secured one end of a spring 70, the other end 74 being secured to a collar 76 which is rotatable on the shaft and has two end portions 78 and 80 of enlarged diameter. Spring 70 may be a plain spring, as shown, or may be of temperature responsive material, in which latter case its force will vary with temperature. The end portion 78 is provided with a circumferential radial segmental slot 82 extending to the choke shaft 14 so that the pin 72 is free to rotate relative to the collar through an angle sufficient to permit the choke to move from closed to open position. The end portion 80 is cut away to form a shoulder 84 which bears against a latch 86 pivoted at 88 on the carburetor body.

Freely pivoted on the choke shaft 14 between the carburetor body and the collar 76, is a lever 90 connected by a link 92 to a lever 94 fixed to the throttle shaft 24 and adapted to rotate with the throttle valve 22. The lever 90 has a cam part 96 adapted to engage the underside 97 of the latch 86 to raise the same out of engagement with the shoulder 84, thereby permitting the collar to rotate with the choke shaft, and relieving the tension on the spring 70. The lever 90 also has an arm 98 adapted to engage the tip end of

the pin 72 so that after opening the throttle a predetermined amount, the choke valve is forced to the partially open position shown in Figure 7. The latch 86 may operate by gravity or have a spring 87 urging the same into engagement with the shoulder 84.

Thus, initially opening the throttle relieves the tension on the spring 70, by releasing the collar 76 to which one end of the spring is attached, and further opening of the throttle to the wide open position opens the choke so that if a "flooded" condition exists the engine may be cranked to relieve such condition.

The operation of the automatic choke will readily appear from the foregoing. When the engine is cold and the throttle closed, the collar 76 is forced to the position shown in Figs. 2 and 5 by the pin 72 which rotates with the choke shaft engaging the end of the slot 82, thereby rotating the collar so that the latch 86 may engage the shoulder 84. If now the engine is cranked, both the spring 70 and the thermostat 58 tend to hold the choke closed against the force of suction, due to the unbalanced construction of the choke, tending to open it. An abnormally rich mixture is therefore produced until the engine begins to operate under its own power, whereupon, due to increased air flow tending to open the choke valve, and increased suction on the piston valve, the choke valve partially opens against the tension of the thermostat spring and the auxiliary spring. When the operator then places his transmission in gear and opens the throttle to start the vehicle, the latch 86 is raised to release the collar, thereby suddenly relieving the choke from the closing tendency of spring 70. If the throttle is subsequently closed, the latch will not again engage the shoulder 84 unless the choke valve at the same time completely closes, thus carrying the collar around to latching position. Since after once starting, both the choke valve and the throttle would not again be completely closed except in the case of a stall, it will be evident that the extra tension only acts between the initial starting time and the time of first opening the throttle an amount commensurate with engine requirements under load.

Thus, there is provided a means for assuring a rich enough mixture to prevent stalling during the idling period, but adapted to promptly lean the mixture to a proper running ratio as soon as a load is applied to the engine.

Though only one embodiment of the invention has been illustrated and described, it is to be understood that the invention is not limited thereto, but may be embodied in various mechanical forms and arrangements of an equivalent nature, the invention being directed to increasing the tension on the choke valve for a brief starting interval and terminated by placing the engine under load. As various changes in construction and arrangement of parts may be made without departing from the spirit of the invention as will be apparent to those skilled in the art, reference will be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a carburetor, an induction passage having an air inlet, a choke shaft and attached choke valve controlling said inlet, temperature responsive means urging the choke valve closed when cold, a throttle controlling flow through the induction passage, a member movable relative to the choke shaft, means including a spring connecting the movable member and the choke shaft

and operative to resist opening movement of the choke valve when movement of the member is restrained, latch means engageable with said movable member for so restraining movement of the movable member, and means movable independently of the choke shaft and actuated by throttle opening movement for disengaging said latch.

2. The invention defined in claim 1 wherein the last named means comprises a lever loosely pivoted with respect to the choke shaft.

3. In a carburetor, an induction passage having an air inlet, a choke shaft having a choke valve controlling the air inlet, a thermostat urging the choke valve closed when cold, a member loosely mounted on the choke shaft, means including a spring interconnecting the member and choke shaft and operative to yieldingly resist opening movement of the choke valve when movement of said member is restrained, latch means engageable when both the throttle and choke valve are in a substantially closed position for restraining movement of said member, and means operative upon a predetermined opening movement of the throttle and movable independently of the choke shaft for disengaging the latch means.

4. In a carburetor, an induction passage having an air inlet, a choke shaft and a valve attached thereto for controlling the air inlet, a thermostat urging the choke valve closed when cold, a throttle controlling the induction passage, a member loosely mounted on the choke shaft, a spring connecting the member and shaft and operative to yieldingly resist opening movement of the choke valve when movement of said member is restrained, latch means engageable when both the choke valve and the throttle are in substantially

closed position for restraining movement of said member, and means operative upon a predetermined opening movement of the throttle and movable independently of the choke shaft to disengage the latch means and thus leave the choke valve under the control of the thermostat, said means being operative upon further opening movement of the throttle to positively move the choke valve toward open position.

5. In a carburetor, an induction passage including an air inlet, a choke shaft having a choke valve attached thereto for controlling said inlet, a thermostat urging the choke valve closed when cold, a throttle controlling the induction passage, means including a resilient element and a member engageable when the choke valve and throttle are substantially closed for yieldingly resisting opening movement of the choke valve, and means movable independently of the choke shaft and actuated by slight opening movement of the throttle for disengaging said member.

6. In a carburetor, an induction passage including an air inlet, a choke shaft having a valve mounted thereon for controlling said inlet, a thermostat urging the choke valve closed when cold, a throttle controlling the induction passage, means including a spring and a member engageable when the choke valve and throttle are substantially closed to yieldingly resist opening movement of the choke valve, and means movable independently of the choke shaft and actuated by the throttle for disengaging said member upon slight opening movement of the throttle and for positively opening the choke valve upon substantial opening movement of the throttle.

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