

Jan. 22, 1946.

E. O. WIRTH

2,393,440

ENGINE CONTROL MECHANISM

Filed June 24, 1939

3 Sheets-Sheet 1

FIG. 1

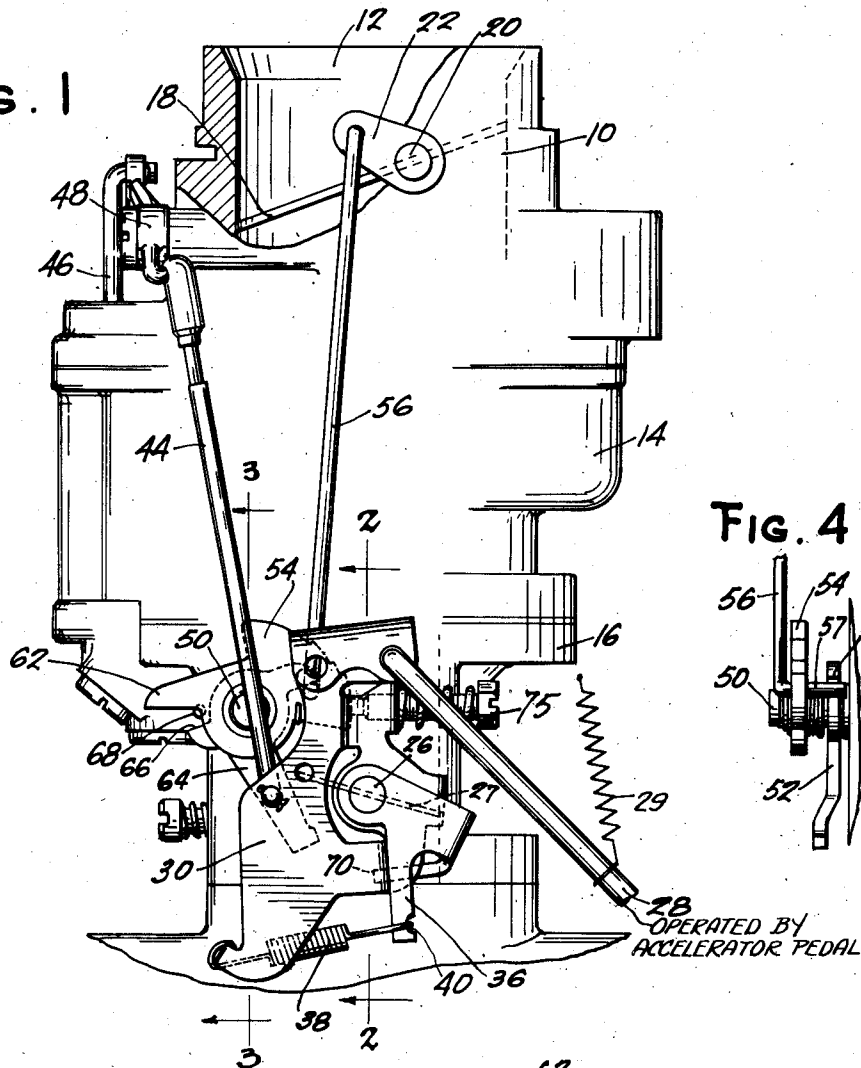


FIG. 4

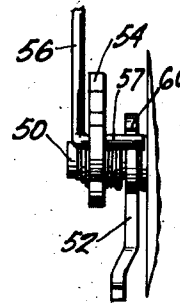


FIG. 2

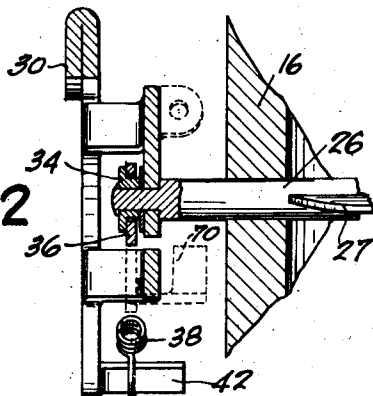
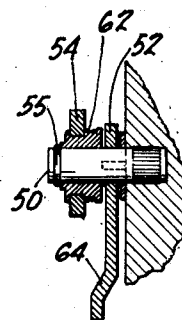


FIG. 3



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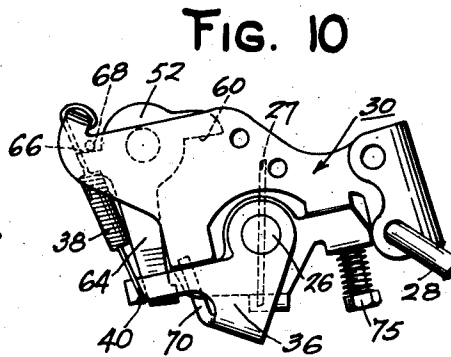
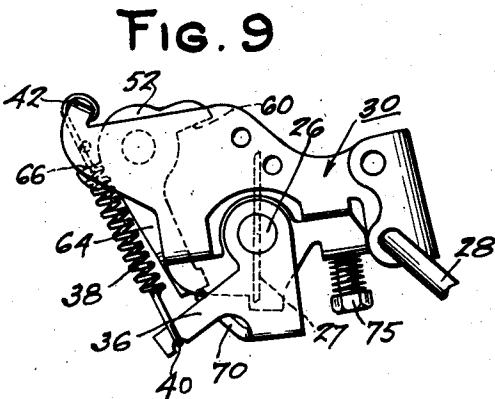
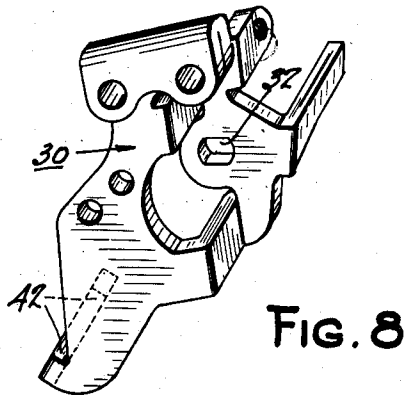
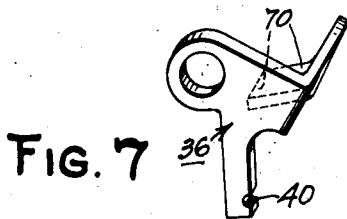
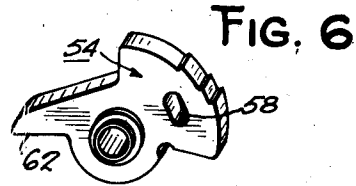
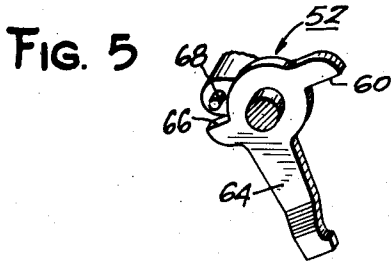
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3 Sheets-Sheet 2



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ENGINE CONTROL MECHANISM

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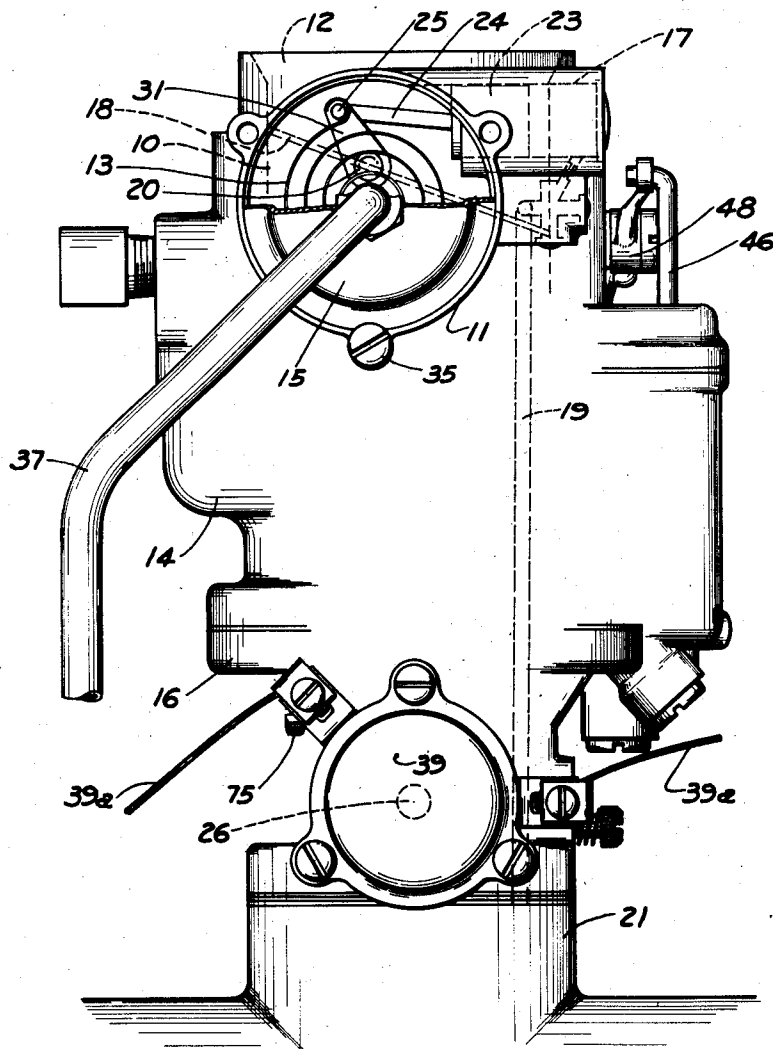


FIG. II

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ENGINE CONTROL MECHANISM

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Application June 24, 1939, Serial No. 281,029

12 Claims. (Cl. 261—52)

This invention pertains to carburetors and more particularly to carburetors having a starting control switch operably associated with the throttle such as, for example, is disclosed in the copending application of Winkler and Wirth, Serial Number 267,783, filed April 14, 1939, now Patent No. 2,234,015 of Mar. 4, 1941.

The starting operation with such an arrangement consists in closing the ignition switch and depressing the accelerator pedal. The latter operation closes the starting control switch which indirectly completes the starting motor circuit, as fully explained in the above mentioned copending application.

In the majority of automotive carburetors, a connection is provided between the throttle and the choke valve whereby opening the throttle to the wide open position causes the choke valve to move to at least partially open position. Such an arrangement is provided to overcome a flooded condition of the engine should one occur during a starting period when the choke valve is yieldingly held in a closed position by the thermostat. Fully depressing the throttle partially opens the choke valve and permits an inflow of additional air to eliminate the flooded condition.

Where both such devices are used in the same installation it is necessary, in order to start the engine when cold, to depress the accelerator pedal sufficiently to close the starting switch but not to such point as will force the choke valve to a partially opened position.

No means is provided in the available starting arrangements of this type whereby the operator is apprised, by feel or otherwise, when the accelerator pedal has been depressed to the proper degree to facilitate starting. As a result, many operators depress the accelerator pedal beyond the position required and in many instances to a position which partially opens the choke valve, thereby decreasing the choking action sufficiently to prevent the engine from starting.

It is an object of the present invention to introduce an additional force resisting opening movement of the throttle at a point beyond that required for closing the throttle controlled starting switch whereby the operator will be definitely warned, by a noticeably increased resistance to further opening movement of the throttle, that the accelerator pedal has been sufficiently depressed.

It is a further object to interpose this resisting force and yet permit forceful depression of the accelerator pedal to the wide open position to overcome a flooded condition should one occur.

It is a further object of the invention to eliminate the additional force opposing opening movement of the throttle at such times as the choke valve is open beyond a predetermined amount, or the engine running.

Other objects and advantages will be apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a side elevational view, partially in section, of a carburetor embodying the invention; Figure 2 is a fragmentary sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a fragmentary view showing the assembled relation of the parts mounted on the stud;

Figures 5 and 6 are perspective views of the levers carried by the stud;

Figures 7 and 8 are perspective views of the levers respectively carried by and attached to the throttle shaft;

Figure 9 is an elevation showing the arrangement of the various cooperating levers when the choke valve is at or near the closed position and the throttle is wide open;

Figure 10 is a similar view showing the arrangement of the same parts when the choke valve is opened beyond a predetermined point and the throttle is wide open; and

Figure 11 is a side elevational view taken from the side opposite that shown in Figure 1.

Referring more particularly to Figure 1, there is shown a carburetor having an air horn section 10 including an air entrance 12, a main body section 14 and a throttle body section 16. The air entrance is controlled by an offset choke valve 18 mounted on a rotatable choke shaft 20 which has a lever 22 rigidly attached thereto at its one end and is arranged to be connected at its other end to a thermostat 13 for automatic choke operation in the known manner.

The automatic choke valve control shown in Figure 11 is for purpose of illustration and any other suitable thermostatic control device may be used in place of that illustrated and described herein. As shown in Figure 11, a casing 11 is secured to the carburetor and within the casing a thermo-responsive element 13 is fixed at one end to a pin (not shown) secured to cover 15 and about which pin the thermo-responsive element 13 is spirally disposed. A cylinder 17 projects from the casing 11 and has a passage 19 which is connected to the intake manifold 21 of

the engine. A piston 23 fits into the cylinder and carries a rod 24 having a bent end 25 to which the free end of the thermostat is hooked. A lever 31 is connected to choke valve shaft 20 and the bent end 25 of rod 24 extends through an orifice in the free end thereof and is guided by said lever. A cover 15 is secured on the casing 11 by screws 35 and a conduit 37 for conducting heated air from a suitable source of heat, such as the exhaust manifold of an engine, leads into the casing. Automatic control of the choke valve in accordance with engine temperature and manifold vacuum is thus obtained in the well-known manner. The throttle body includes a throttle shaft 26 having either one or a pair of throttle valves 27 mounted thereon for controlling the flow of mixture to the engine in the known manner and arranged to be operated by the accelerator pedal of the vehicle through rod 28. The throttle is urged toward the closed position by a tension spring indicated diagrammatically at 29. A starting switch 39 such as disclosed in the above mentioned copending application of Winkler and Wirth, Serial No. 267,783, filed April 14, 1939, is provided and is arranged to be actuated by initial movement of the throttle shaft 26 or corresponding movement of the throttle actuating mechanism, so that said switch is operated when the throttle is moved to a partially open position as is fully described in said copending application. Electrical leads 39a form a portion of an electrical circuit controlling the starter motor.

The throttle lever 30 may consist of a stamping of the general shape shown in Figure 8, and is provided with a flatted aperture 32 which receives a flatted section of the throttle shaft and is thereby adapted to be rigidly fastened to the throttle shaft by riveting as shown in Figure 2. A stepped cylindrical collar 34 is likewise secured to the throttle shaft and carries a free-floating lever 36, shown in perspective in Figure 7, mounted thereon. A pre-loaded tension spring 38, connected at one end to lever 36 adjacent a notch 40 and at its other end to an extension 42 of lever 30, yieldingly urges levers 30 and 36 into contact as shown in Figure 1. Link 44 connects the throttle lever 30 with the acceleration pump 46 through a pivoted arm 48 in the known manner.

A knurled pin or stud 50 is pressed into the throttle body as shown in Figure 3. A lever 52 (Figure 5) and a variable throttle-stop member 54 (Figure 6) are rotatably mounted on the stud 50 and are retained thereon by a snap ring 55 cooperating with a groove in the end of the stud. A link 56 connects the choke lever 22 and the variable stop member 54, its lower end being bent to form a transversely extending portion 57. Portion 57 extends through a slotted aperture 58 in member 54 sufficiently far to engage a radially extending surface 60 of the lever 52 (Figure 4) at such times as the choke valve approaches the closed position. Member 54 is provided with a series of stepped surfaces adapted to selectively cooperate with the throttle stop screw 75 to variably limit the closing movement of the throttle, and thereby provide a decreasing quantity of idling mixture as the engine warms up and the choke valve opens. The member 54 is also provided with a radially extending arm 62 which is arranged to be contacted and rotated in a clockwise direction by the extension 42 of the throttle lever 30 at such times as the choke valve is closed and the throttle approaches wide open position. Such clockwise rotation of stop-member 54 urges

link 56 downwardly and opens the choke valve a predetermined amount for the purpose of deflooding as previously explained.

The lever 52 is provided with a downwardly extending foot 64 and a radially extending surface 66. The lever, in the particular embodiment disclosed in the drawings, is urged by gravity toward a position at which surface 66 contacts a stop pin 68 provided in the throttle body. It is pointed out, however, that a light torsional spring could be provided to cooperate with lever 52 to urge it toward the stop pin 68 if the force of gravity were inadequate or if the preferred design and arrangement of levers prevented gravity from urging the lever in the desired direction.

When the choke valve is moved to closed or nearly closed position, the lever 52 is rotated counterclockwise from its gravity position to the position shown in Figures 1 and 9 by the extension 57 of link 56 cooperating with the surface 60. The foot 64 of lever 52 is thereby brought into a position in which the bottom surface of said foot will be engaged by the extension 70 of lever 36 upon opening movement of the throttle beyond a predetermined point. Although further rotation of the lever 36 is thereby prevented, the throttle can be opened to the wide open position, as shown in Figure 9, merely by the application of sufficient additional force to the throttle lever 30 to overcome the resistance of the spring 38. Movement of the throttle to the wide open position under these conditions still permits the extension 42 of lever 30 to contact the arm 62 of lever 54 and through rod 56 to forcibly urge the choke valve to a partially opened position for deflooding the engine.

The spring 38 may be varied in design to produce any desired resisting force so that the operator may be positively apprised as to when the throttle has been sufficiently opened for starting. It is apparent that lever extension 70 and the foot 64 should be so designed that the line of action of the force transmitted between these members will approximately intersect the axis of the stud 50 thereby to prevent the members from disengaging under the action of the force of the spring 38. A V-notch, or some other latching means, may be provided in the foot 64 if the desired alignment of this force proves difficult to attain in a particular case.

During starting periods when the engine is sufficiently warm to insure a partially open choke valve, or during periods of engine operation when the choke valve is likewise at least partially open, the lever 52 assumes the gravity position shown in Figure 10, in which the foot 64 is removed from the path described by the extension 70 of lever 36 during throttle opening movement, and hence spring 38 is no longer effective in opposing opening movement of the throttle.

While the invention has been described with particular reference to a single embodiment, it is to be understood that various changes may be made in the arrangement of parts and the details of construction of the mechanism without departing from the spirit of the invention as defined by the following claims.

I claim:

1. In a carburetor for an internal combustion engine having a starting switch, said carburetor including a mixture passage, a throttle shaft and a throttle valve attached thereto for controlling the passage, said switch having an operable connection with the throttle shaft whereby the switch is closed upon initial opening movement of the

throttle valve, a lever fixed to said shaft, a second lever mounted on the shaft and rotatable relative thereto, a preloaded spring connecting said levers, and means for preventing rotation of said second lever upon throttle opening movement beyond that required to close said switch.

2. In a carburetor for an internal combustion engine, an air inlet, a mixture passage, a choke valve controlling said inlet, a thermostat controlling said choke valve, a throttle shaft and attached throttle valve for controlling said passage, a lever attached to said shaft, a second lever rotatably mounted on said shaft, a spring connecting said levers, and means controlled by the choke valve for preventing rotation of said second lever beyond a given position upon throttle opening movement when the choke valve is near closed position, whereby the spring becomes effective at a partly open throttle position to yieldingly resist further opening movement of said throttle.

3. In engine control mechanism, a carburetor, a choke valve and a throttle valve therefor, a starting switch controlled with the throttle valve, means interconnecting said valves for at least partially opening the choke valve upon throttle opening movement beyond a predetermined position, a pair of pivotally mounted levers, means for positively rotating one of said levers in accordance with throttle position, yielding means interconnecting said levers whereby both of said levers tend to rotate together, a latch adapted in one position to engage the other of said levers to prevent rotation thereof upon throttle opening movement, the engagement of the latch and said other lever being adapted to occur at a part throttle position less than said predetermined position, and means at least partially dependent upon choke valve position for positioning said latch.

4. In control mechanism for an internal engine having a starter switch, a charge forming device, having an air inlet and a mixture passage, a choke valve in said inlet, temperature responsive means for controlling said choke valve, a throttle shaft and attached throttle valve for controlling the passage, said shaft having an operable connection with the switch adapted to operate said switch upon slight opening movement thereof, a lever attached to the shaft, a second lever rotatably mounted on the shaft, a relatively strong spring connecting said levers, means controlled by the choke valve for preventing rotation of said second lever upon throttle opening movement beyond the slightly open position when the choke valve is closed more than a predetermined amount, and choke valve opening means operable only on opening movement of the throttle beyond the position whereat rotation of the second lever is prevented.

5. In a charge forming device having an air inlet and a mixture outlet, a choke valve in the inlet, a throttle shaft and attached throttle valve for controlling the outlet, a lever attached to the shaft, a second lever rotatably mounted on the shaft, a spring connecting said levers, a latch controlled by the choke valve and adapted to be operative to engage said second lever only when the choke valve is closed more than a predetermined amount, said latch when in the operative position being adapted to prevent rotation of the second lever beyond a given position upon throttle opening movement whereby the spring resists opening movement of the throttle beyond a partly open position, said spring offering appreciable re-

sistance to opening of the throttle beyond said partly open position.

6. In a charge forming device having an air passage, a throttle shaft and attached throttle valve for controlling said passage, a lever attached to the shaft, a second lever rotatably mounted on the shaft, a spring connecting said levers, a latch adapted to be positioned in the path of the second lever for limiting rotation thereof so that the spring resists movement of the other lever beyond a given position, and means for positioning said latch.

7. In engine control mechanism having an accelerator pedal actuated starter switch, a charge forming device having an air inlet and a mixture passage, a choke valve in the inlet, a throttle controlling the passage, choke valve actuating means operable only on opening movement of the throttle beyond a predetermined position, and yielding means suddenly becoming operative at a throttle position less than said predetermined position to oppose further opening movement of said throttle.

8. In a carburetor for an internal combustion engine having a starter switch, a carburetor comprising an air inlet, a mixture passage, an automatically controlled choke valve controlling the inlet, a throttle controlling the mixture passage, said starter switch being adapted to be actuated upon initial opening of the throttle valve to a predetermined position, a spring urging said throttle toward its closed position, yielding means associated with the throttle for substantially and abruptly increasing the force resisting opening movement of the throttle beyond said predetermined position at such times as the choke valve is near the closed position, and means actuated by the throttle upon additional opening movement thereof to move said choke valve toward open position.

9. In an engine control mechanism including a starter switch, a charge forming device having an induction passage, a choke valve in the passage, a throttle shaft and a throttle valve attached thereto for controlling the passage, said starter switch being adapted to be actuated by slight opening movement of the throttle, means actuated by throttle opening movement only beyond a substantially open position at least partly opening the choke valve, a lever attached to the shaft, a second lever rotatably mounted on the shaft, a spring interconnecting said levers, a latch having operative and inoperative positions and adapted when in operative position to engage said second lever for preventing rotation thereof upon throttle opening movement beyond a moderately open position, and means dependent upon the choke valve position for positioning said latch.

10. In engine control means having an accelerator pedal actuator switch, a charge forming device having an air inlet and a mixture passage, an automatically controlled choke valve in the inlet, a throttle controlling the passage, choke valve actuating means operable only upon opening movement of the throttle beyond a predetermined position, and yielding means adapted to become operative at an intermediate throttle position less than said predetermined position to oppose with appreciable force further opening movement of said throttle.

11. In engine control mechanism having a starter switch, a charge forming device having an induction passage, a throttle controlling said induction passage, said starter switch being ar-

ranged to be actuated upon opening movement of the throttle to a predetermined position, yielding means urging the throttle toward closed position, and other yielding means adapted to become operative to offer appreciable increased resistance to throttle opening movement after the throttle is opened beyond said predetermined position whereby the operator is apprised of the proper throttle opening for closing said switch.

12. In engine control mechanism including an induction passage, a choke valve and a throttle valve in said passage, means for opening the throttle valve, means yieldingly urging the throttle valve toward closed position, means operated by the throttle opening means upon opening

5 movement of the throttle beyond a predetermined position for at least partially opening the choke valve, and a starter switch adapted to be actuated by the throttle opening means at a predetermined throttle position less than the first mentioned predetermined position for actuating said switch: means for abruptly increasing resistance to throttle opening movement at a throttle position intermediate said predetermined positions; and means controlled by the choke valve for rendering the last mentioned means operative when the choke valve is adjacent its closed position.

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