

Nov. 24, 1959

L. B. READ

2,914,052

LATCHING SECONDARY FOR TWO-STAGE CARBURETOR

Filed June 25, 1956

3 Sheets-Sheet 1

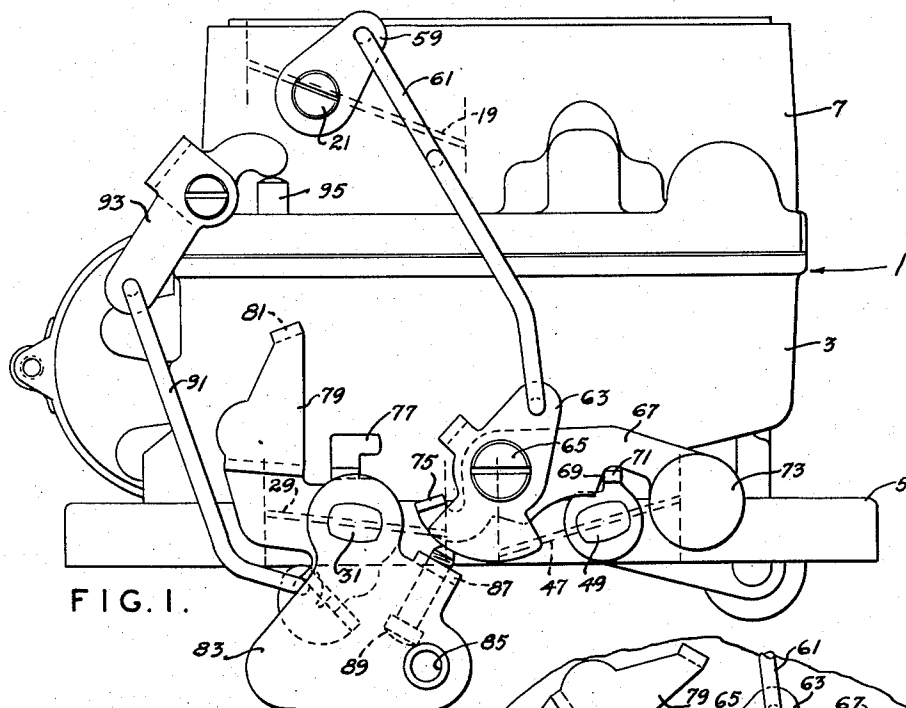


FIG. 1.

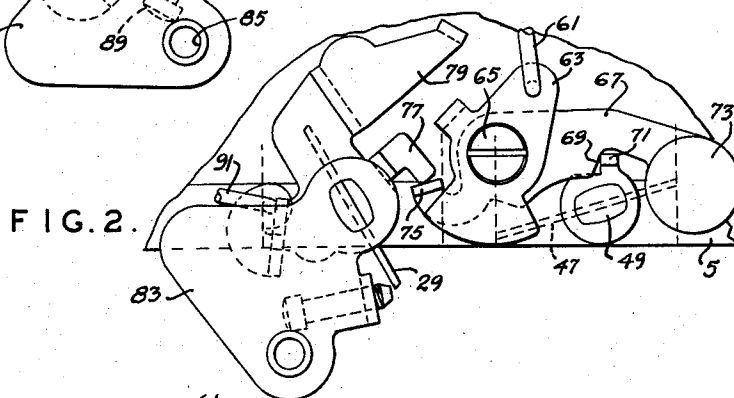


FIG. 2

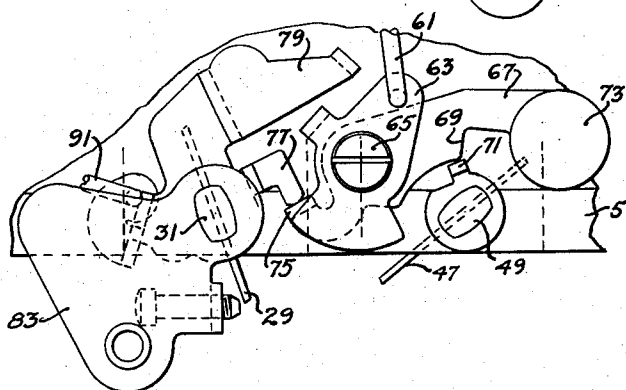


FIG. 3.

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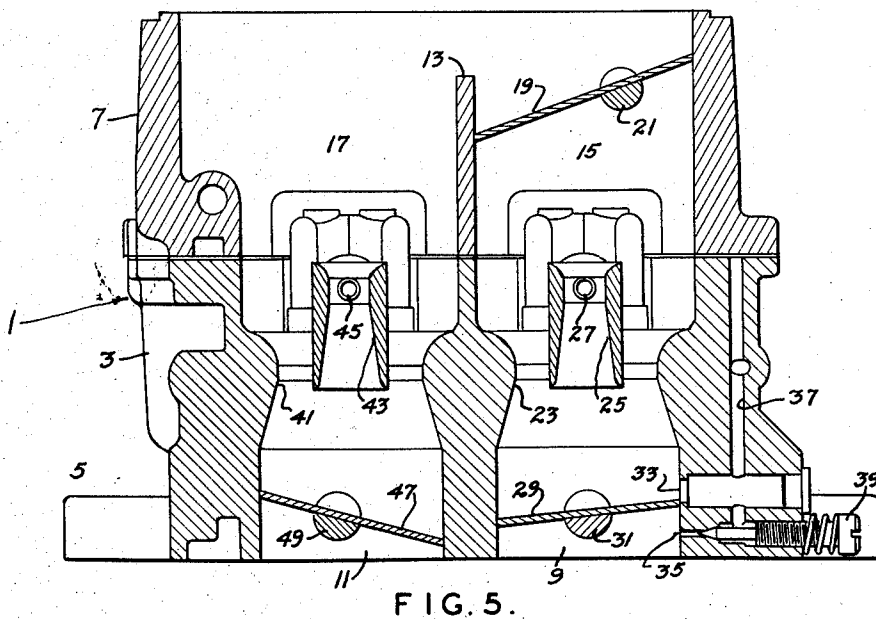
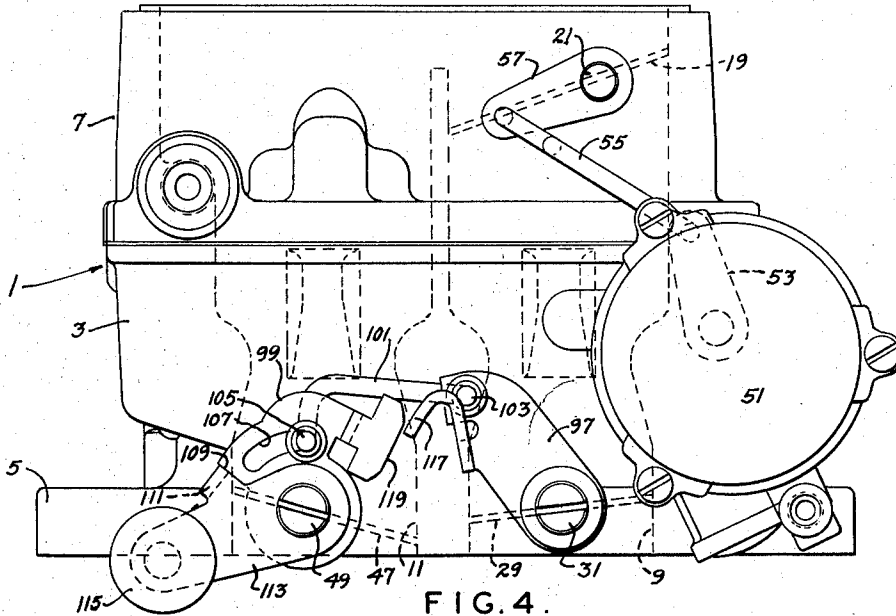
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3 Sheets-Sheet 3

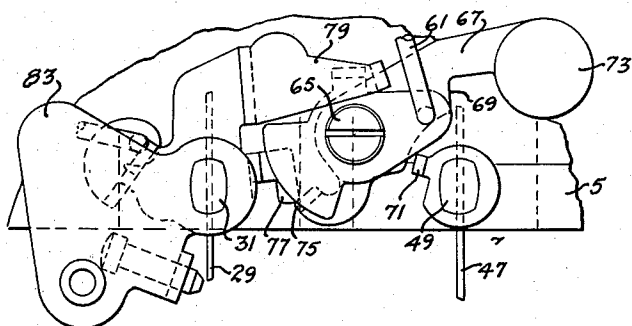


FIG. 6.

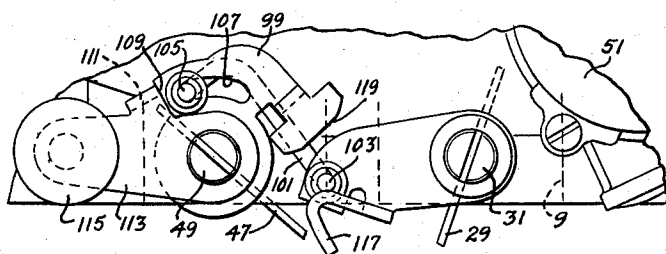


FIG. 7.

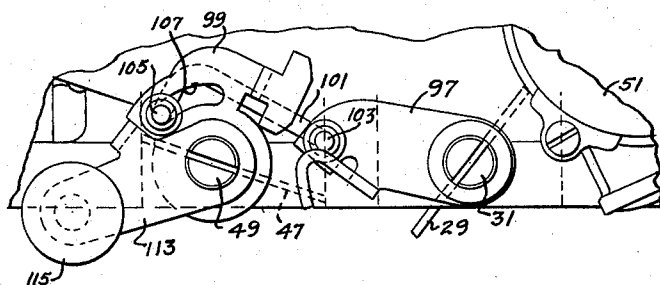


FIG. 8.

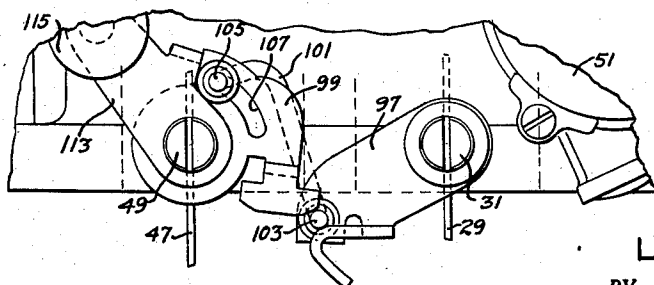


FIG. 9.

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2,914,052

LATCHING SECONDARY FOR TWO-STAGE CARBURETOR

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6 Claims. (Cl. 123—127)

This invention relates to carburetors for internal combustion engines, and more particularly to two-stage carburetors of the type having one or more mechanically operated primary throttles and one or more velocity operated secondary throttles.

To match the output of a two-stage carburetor of the class described to the requirements of the engine supplied with fuel thereby, so as to obtain smooth idling and good all-around performance of the engine, it is important that the secondary throttle or throttles of the carburetor be maintained closed during idling and throughout part of the range of opening movement of the primary throttle or throttles. The principal object of this invention is to obtain positive locking of the velocity operated secondary throttle or throttles in closed position during idling and throughout part of the range of opening movement of the primary throttle or throttles, and mechanical release of the secondary throttle or throttles to permit opening thereof upon a predetermined opening of the primary throttle or throttles, for example, upon opening of the latter to a degree within the range from twenty to thirty degrees before the wide-open primary throttle position. This object is attained, according to the present invention, by providing latch means for locking the secondary throttle or throttles in closed position, and means movable with the primary throttle or throttles for releasing the latch means upon a predetermined opening of the primary throttle or throttles. A further feature of the invention is the provision of means interconnecting the primary throttle or throttles and the secondary throttle or throttles for returning the latter to closed position during the return of the former to closed position. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a view in elevation of one end of a four-barrel carburetor embodying the invention, showing a secondary throttle latch and its operating means in the position assumed when the primary and secondary throttles are closed;

Fig. 2 is a fragment of Fig. 1 showing parts in the position assumed when the primary throttles are partly open, and immediately prior to release of the secondary throttles;

Fig. 3 is a view similar to Fig. 2 showing the primary throttles moved somewhat beyond the position shown in Fig. 2, and showing the secondary throttles released and partly open;

Fig. 4 is a view in elevation of the other end of the carburetor, showing parts of a secondary throttle return mechanism in the position assumed when the primary and secondary throttles are closed;

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Fig. 5 is a vertical transverse section showing one primary mixture conduit (barrel) and the associated secondary mixture conduit (barrel) of the carburetor;

Fig. 6 is a view similar to Fig. 3 showing a further moved position of parts corresponding to wide-open conditions of both the primary and secondary throttles;

Fig. 7 is a fragment of Fig. 4 showing a moved position of parts assumed when the throttles are in the position corresponding to that shown in Fig. 3;

Fig. 8 is a view similar to Fig. 7 showing a moved position of parts assumed when the throttles are in the position corresponding to that shown in Fig. 2; and,

Fig. 9 is a view similar to Figs. 7 and 8 showing a moved position of parts assumed when the throttles are in the position corresponding to that shown in Fig. 6.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, the invention is illustrated in its application to a multi-barrel, multi-stage carburetor 1 of the type commonly referred to as a four-barrel carburetor. Only so much of the construction of the carburetor as is essential to an understanding of this invention will be described herein. Reference may be made to Carlson et al. U.S. Patent 2,715,522, dated August 16, 1955, for example, for such further details as may be desired.

In general, the carburetor 1 comprises a fuel bowl section 3 having a flange 5 by which it may be attached to the intake manifold of the engine on which the carburetor is used. Mounted on the fuel bowl 3 is the usual air horn section 7. The fuel bowl section 3 is formed to provide two primary mixture conduits and two secondary mixture conduits. One primary mixture conduit, designated 9, and one secondary mixture conduit, designated 11, appear in Fig. 5. The air horn section 7 is provided with a partition 13 dividing it to form a primary mixture conduit inlet 15 and a secondary mixture conduit inlet 17.

A choke valve 19 is provided in the primary inlet 15 for controlling the admission of air through the air horn section 7 to the two primary mixture conduits 9. The choke valve is fixed on a choke shaft 21 which extends across the air horn section 7 from one end to the other above the primary mixture conduits (one of which is shown at 9 in Fig. 5). Each primary mixture conduit 9 has a main venturi 23 and a primary venturi 25. As to each of the primary mixture conduits 9, a main fuel nozzle 27 opens into its primary venturi 25. It will be understood that the nozzles 27 are supplied with fuel from the fuel bowl section 3 in a manner such as that shown, for example, in U.S. Patent 2,715,522.

A primary throttle 29 is provided in each primary mixture conduit 9 below the main venturi 23. The primary throttles for both conduits 9 of the four-barrel carburetor are fixed on a throttle shaft 31 which extends across both these conduits. Adjacent one edge of each primary throttle 29 are the usual idle ports 33 and 35 which are supplied with fuel via a passage indicated at 37. The port 35 is controlled by an adjustable needle valve 39 in known manner.

Each secondary mixture conduit 11 has a main venturi 41 and a primary venturi 43. A fuel nozzle 45 opens into the primary venturi 43. This is supplied with fuel from the fuel bowl in a manner such as that shown, for example, in U.S. Patent 2,715,522. A secondary throttle 47 is provided in each secondary mixture conduit 11 below the main venturi 41. The secondary throttles for both conduits 11 of the four-barrel carburetor are fixed on a shaft 49 which extends across both these conduits.

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A choke mechanism housing is indicated at 51 (see Fig. 4). This contains a suction and temperature-responsive mechanism of the character shown in the Coffey U.S. Patent 2,325,372. This mechanism includes a control arm indicated at 53 connected by means of a link 55 to an arm 57 fixed on one end of the choke shaft 21 projecting out of air horn section 7. Fixed on the other end of the choke shaft 21 (at the other end of the air horn section 7) is an arm 59 (see Fig. 1). Arm 59 is connected by means of a link 61 to a fast idle cam lever 63 pivoted on the outside of fuel bowl section 3 at 65.

Also pivoted at 65 is a latch 67. The lower edge of this latch is formed with a shoulder 69 adapted for engagement by a dog 71 fixed on the end of the secondary throttle shaft 49 shown in Fig. 1. The latch 67 is biased to rotate clockwise as viewed in Fig. 1 by a weight 73 at its right end. Its left end is formed with a finger 75 adapted for engagement by an arm 77 formed integrally with a lever 79 fixed on the end of the primary throttle shaft 31 shown in Fig. 1 at the end of the lever 79 is an inturned lug 81 adapted to engage the fast idle cam lever 63 when the primary throttles 29 are fully opened, so as partially to open the choke valve 19 for unloading purposes. The primary throttle shaft 31 also carries an actuating lever 83 provided with a hole 85 for connection of an actuating rod (not shown). A lug 87 on the lever 83 has an idle set screw 89 threaded therein for adjusting the closed position of the primary throttles 29. Lever 83 is connected by a link 91 to one end of a pivoted lever 93 adapted to operate the plunger 95 of an accelerating pump (not shown).

An arm 97 is fixed on the end of the primary throttle shaft 31 projecting out of the end of the fuel bowl section 3 at which the housing 51 is located (see Fig. 4). An arm 99 is rotatable on the end of the secondary throttle shaft 49 shown in Fig. 4. A link 101 has one end pin-connected to arm 97 at 103 and its other end 105 received in a slot 107 in arm 99. This provides a lost-motion connection between arms 97 and 99. An edge portion of the arm 99, indicated at 109, is arranged in abutting relation with an inturned lug 111 on an arm 113 secured to the secondary throttle shaft 49. Arm 113 carries a weight 115 for biasing the secondary throttles 47 closed. The secondary throttles are velocity operated, i.e., unbalanced to open against the closing bias of the weight 115 in response to suction in the secondary mixture conduits 11 posterior to the secondary throttles. A cam 117 on the arm 97 is engageable with a cam follower 119 on the arm 99 for assisting the return of the secondary throttles to closed position as will appear.

Operation is as follows:

The choke valve 19, the primary throttles 29 and the secondary throttles 47 are shown closed in Figs. 1, 4 and 5. The secondary throttles 47 are locked against opening by engagement of the dog 71 with the shoulder 69 of latch 67 (see Fig. 1). The arm 99 occupies a position between the lug 111 on arm 113 and the cam 117 on arm 97 (see Fig. 4). The end 105 of link 101 is located at the right end of the slot 107 in arm 99, as viewed in Fig. 4.

To open the primary throttles 29, the lever 83 is swung clockwise as viewed in Fig. 1 by the actuating rod (not shown). This rotates the primary throttle shaft 31, lever 79 and the primary throttles 29 clockwise as viewed in Fig. 1, and rotates the arm 97 counterclockwise as viewed in Fig. 4. The latch 67 remains in the Fig. 1 locking position, holding the secondary throttles 47 against opening, until the arm 77 on lever 79 engages the finger 75 on the latch and rotates the latch counterclockwise as viewed in Fig. 1 far enough for the dog 71 to escape from the shoulder 69. Fig. 2 shows the arm 77 in the position where it first comes into engagement with finger 75, and Fig. 3 shows the arm 77 rotated a few degrees past the Fig. 2 position to a position where

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it has raised the latch 67 sufficiently to release the secondary throttles. This release position is preferably within the range from twenty degrees to thirty degrees ahead of the wide-open position of the primary throttles, the latter being shown in the wide-open position in Fig. 6.

Upon the stated counterclockwise rotation of the arm 97, the cam 117 on this arm moves downward past the follower 119 on the arm 99, and the end 105 of link 101 slides from the right end of the slot 107 in arm 99 to the left end of the slot (compare Figs. 4 and 8). The cam 117 clears the follower 119 somewhat prior to release of the latch 67. Upon counterclockwise rotation of the arm 97 past the Fig. 8 position, the link 101 is dragged to the right as viewed in Fig. 8, thereby freeing the arm 99 for clockwise rotation. This frees the secondary throttles 47 for opening against the bias of weight 115 in response to suction. However, even if the secondary throttles do not open under suction, arm 97 may continue to rotate counterclockwise upon opening of the primary throttles past the Fig. 8 position due to the lost motion of the end 105 of the link 101 in slot 107 and the capability of arm 99 to rotate relative to the secondary throttle shaft. Assuming that the secondary throttles do open, the degree of opening is controlled by the primary throttles because of the engagement of the lug 111 on arm 113 with the edge portion 109 of arm 99, and the engagement of the left end of the slot 107 with the end 105 of link 101.

Assuming that the primary throttles 29 are moved to the wide-open position and that the secondary throttles 47 have been moved by suction to their wide-open position, the parts will occupy the position shown in Figs. 6 and 9. Upon return of the primary throttles to the closed position, lever 79 rotates counterclockwise as viewed in Fig. 6 and arm 97 rotates clockwise as viewed in Fig. 9. Arm 97 acts through engagement of the cam 117 with the follower 119 on arm 99 and through the link 101 to rotate the arm 99 counterclockwise, and arm 99 acts through engagement of its edge portion 109 with lug 111 on arm 113 to return the secondary throttles to closed position. Closure of the secondary throttles occurs when the arm 97, returning clockwise from the position shown in Fig. 9, reaches the position shown in Fig. 8. At this point, the dog 71, returning clockwise from the position shown in Fig. 6, reaches the position shown in Fig. 2. Lever 79, returning counterclockwise from the position shown in Fig. 6, reaches the position shown in Fig. 2 and the finger 75 on the latch 67 is released from the arm 77 on lever 79 so that the latch drops into locking position with respect to the dog 71, thereby locking the secondary throttles against opening.

From the above description, it will be apparent that the velocity operated secondary throttles 47 of the carburetor are positively locked against opening in response to development of suction in the secondary mixture conduits 11 posterior to throttles 47 during idling (primary throttles in closed position) and throughout the part of the range of opening movement of the primary throttles from the closed position shown in Fig. 1 to the partly open position shown in Fig. 3. At this point, the secondary throttles are released for opening under suction against the closing bias of the weight 115. The degree of their opening after release depends upon the position of the primary throttles. They are returned to closed position and locked in closed position immediately upon the return of the primary throttles to closed position.

While the invention is herein illustrated as it pertains to a four-barrel carburetor, it will be understood that its principles are equally applicable to a two-barrel carburetor (one primary barrel and one secondary barrel).

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

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As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a carburetor having a primary throttle and a secondary throttle, rigid means for locking the secondary throttle in closed position during initial opening movement of said primary throttle comprising a movable latch biased toward locking position and movable away from locking position against the bias for releasing the secondary throttle, and means movable with the primary throttle and engageable with said latch for moving it away from locking position upon a predetermined opening of the primary throttle.

2. In a carburetor having a primary throttle on a primary throttle shaft and a secondary throttle on a secondary throttle shaft, rigid means for locking the secondary throttle in closed position when the primary throttle is closed and throughout part of the range of opening movement of the primary throttle comprising a movable latch biased toward locking position and movable away from locking position against the bias, a member on the secondary throttle shaft engageable with the latch when the latch is in locking position to hold the secondary throttle closed, and a member on the primary throttle shaft engageable with the latch to move it away from locking position upon a predetermined opening of the primary throttle.

3. In a carburetor having a primary throttle and a velocity operated secondary throttle, rigid latch means for locking the secondary throttle in closed position during initial opening movement of said primary throttle, means movable with the primary throttle for releasing the latch means to allow the secondary throttle to open upon a predetermined opening of the primary throttle, and means interconnecting the primary and secondary throttles for returning the secondary throttle to closed position upon return of the primary throttle toward closed position.

4. In a carburetor having a primary throttle and a velocity operated secondary throttle, rigid means for locking the secondary throttle in closed position during initial opening movement of said primary throttle comprising a movable latch biased toward locking position and movable away from locking position against the bias

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for releasing the secondary throttle, means movable with the primary throttle and engageable with said latch for moving it away from locking position to allow the secondary throttle to open upon a predetermined opening of the primary throttle, and means interconnecting the primary and secondary throttles for returning the secondary throttle to closed position upon return of the primary throttle toward closed position, said latch-engaging means thereupon releasing said latch to allow it to return to locking position under its bias.

5. In a carburetor having a primary throttle on a primary throttle shaft and a velocity operated secondary throttle on a secondary throttle shaft, nonyielding means for locking the secondary throttle in closed position when the primary throttle is closed and throughout part of the range of opening movement of the primary throttle comprising a movable latch biased toward locking position and movable away from locking position against the bias, a member on the secondary throttle shaft engageable with the latch when the latch is in locking position to hold the secondary throttle closed, a member on the primary throttle shaft engageable with the latch to move it away from locking position to allow the secondary throttle to open upon a predetermined opening of the primary throttle, and lost-motion means interconnecting the primary and secondary throttles for returning the secondary throttle to closed position upon return of the primary throttle toward closed position, said member on the primary throttle shaft thereupon releasing said latch to allow it to return to locking position under its bias.

6. In combination with an internal combustion engine having primary and secondary induction systems, primary and secondary throttles, respectively, in said conduits, said secondary throttle being automatically opened in response to operation of the engine above a predetermined capacity, rigid means to latch said secondary throttle closed when the engine is operating below said capacity, and means to release said latch means responsive to a condition incident to operation of the engine substantially at said capacity, said secondary throttle being unbalanced to open.

References Cited in the file of this patent

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2,609,187	Scott	Sept. 2, 1952
2,752,133	Egerer	June 26, 1956