Feb. 10, 1953 J. T. RAUEN 2,628,085

CARBURETOR

Filed Nov. 8, 1948

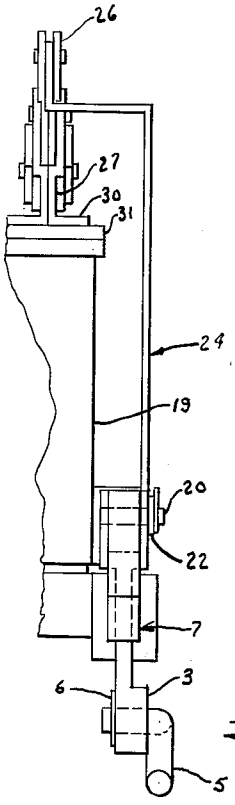


Fig. 2

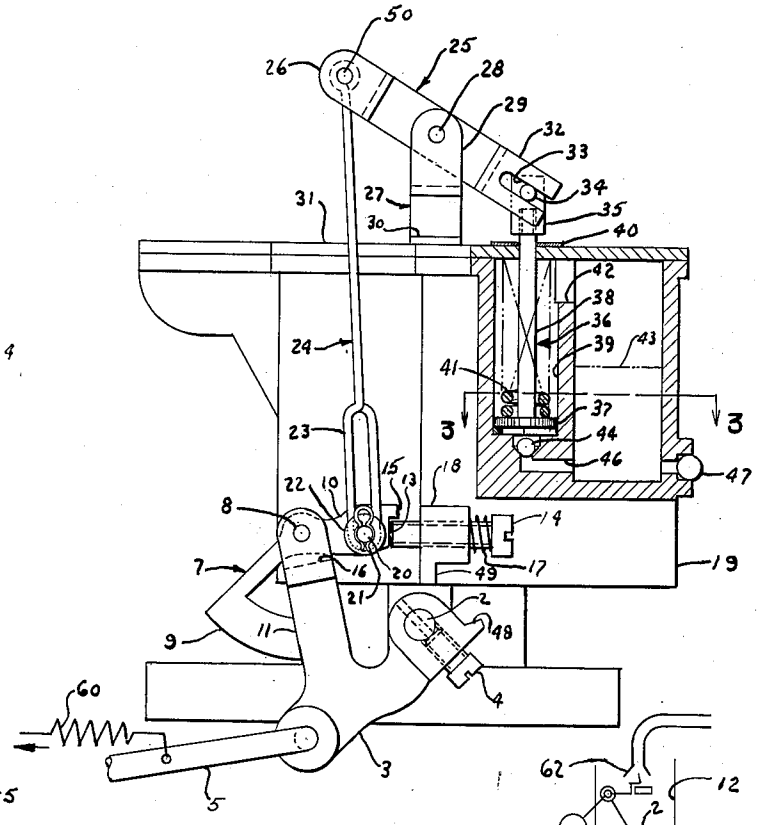


Fig. 1

Fig. 5

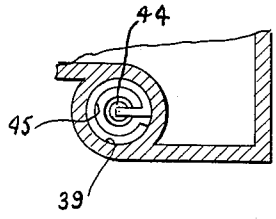


Fig. 3

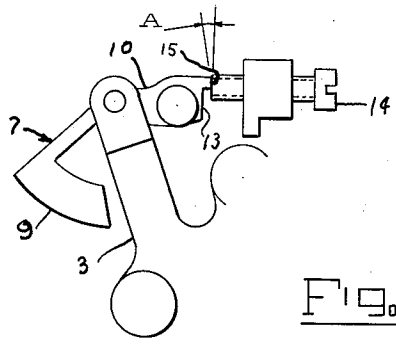


Fig. 4

INVENTOR.

John T. Rauen

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CARBURETOR

John T. Rauen, Detroit, Mich.

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17 Claims. (Cl. 261—65)

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This invention is a continuation-in-part of my Patent No. 2,453,728, issued November 16, 1948, for "Carburetor," and relates to means for maintaining in operation carburetted internal combustion engines of automotive vehicles, after the throttle has been suddenly allowed to close, following opening to a degree permitting fuel to flow to the engine in quantities equal to or in excess of such quantities that provide full power output of the engine, particularly at low engine and vehicle speed.

Operation of an engine during the above-mentioned circumstances causes a quantity of fuel to be present within the engine's induction system, which is too much to sustain engine operation at the usual idle setting of the throttle and the corresponding idle speed of the engine, the consequence of which causes the engine to cease operating.

An object of this invention is to provide means, making use of the inertia of matter to partly actuate a stopping member for holding the throttle open in excess of the normal idle position of the throttle whereby sufficient air can get into the engine to support combustion of the previously mentioned excess fuel until such time that the excess fuel is consumed, and only the normal amount of fuel is passing into the engine, whereupon the engine speed increases correspondingly to the previously mentioned excessive idle throttle opening, and, after such conditions prevail the throttle is manually opened slightly for releasing the stop, and then allowed to close to the normal idle position, restoring engine speed to normal idle speed.

Another object of this invention is to provide means for automatically restoring the throttle to the normal idle position, after having been positively stopped before normal idle position, for a varying period of time.

This invention will be best understood by reference to the following description of embodiments thereof shown in the accompanying drawings, wherein:

Fig. 1 is an illustration of one embodiment of this invention as applied to the carburetor illustrated in my co-pending application, hereinbefore mentioned;

Fig. 2 is a side elevational view of Fig. 1;

Fig. 3 is a sectional view of part of the mechanism shown in Fig. 1 as view from line 3—3, with certain parts omitted;

Fig. 4 is an illustration of certain parts of the apparatus shown in Fig. 1, in a different position; and

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Fig. 5 is a diagrammatic illustration of certain parts of the apparatus shown in Fig. 1, and including a conventional throttle valve.

Referring to Figs. 1, 2 and 5, the throttle valve 1 is shown mounted and secured onto the shaft 2. A throttle lever 3 for operating the throttle valve 1 is secured to shaft 2 by screw 4 and carries the conventional foot accelerator pedal connecting rod 5, pivotally connected and secured in place by a conventional hairpin clip 6 snapped onto the rod 5 and retained in place endwise by means of an annular groove cut into the end of rod 5.

The lever 3 also provides a pivotal connection for lever 7 by means of pin 8 tightly pressed into lever 7 and free to pivot in lever 3. The lever 3 is forked to receive lever 7.

One end of lever 7 is provided with an enlarged portion 9 of greater weight than the opposite end 10 for the purpose of over-balancing the end 10 and tending to normally rest in a position engaging lever 3, at 11, when the lever 3 is in the position shown, namely, the position of normal idle setting of the throttle valve 1, Fig. 5.

The normal idle setting of valve 1 is a few degrees open from fully closing passage 12, Fig. 5. Fuel nozzle 62 is arranged in passage 12 ahead of throttle 1. The end 10 of lever 7 is provided with two steps, one step 13 engages one end of screw 14 to provide the normal idle position of valve 1, and the other step 15, Figs. 1 and 4, engages the screw 14 to provide an engine idle speed in excess of normal. The end of the screw 14 engaging the steps 13 and 15 is given a slight conical taper to match a taper of the step 15 forming an angle A, Fig. 4, for the purpose of neutralizing the friction caused by impingement of the step 15 and screw 14 resulting from the force of the conventional spring 60 employed for normally urging the throttle closed. Usage of the angle A will be hereinafter fully described.

The forked portion of lever 3, providing for the pivotal mounting of lever 7, provides a stopping surface 16 against which the end 10 of lever 7 impinges, thus limiting the rotary motion of lever 7 to a position where the step 15 of lever 7 properly engages the screw 14.

The screw 14 is provided for varying the degree of opening of throttle valve 1, to obtain suitable idle speed of the engine.

The spring 17 confined under the head of the screw 14 provides friction to retain the screw 14 to any position of adjustment to which the screw is set. A boss 18 integral with the bowl

19 of the carburetor threadedly retains the screw 14.

The end 10 of lever 7 is provided with a pin 20, tightly pressed into a hole in lever 7 and thereby securing the two members together. The extended end of pin 20 is grooved to receive a conventional hairpin clip 21 for retaining a washer 22 and the looped end 23 of member 24. The looped end 23 of member 24 is free to slide upon the pin 20 and between the end 10 of lever 7 and the washer 22. The other end of member 24 is pivotally connected within the lever 25 at the forked end 26 by a pin 50 tightly fitted into the forked end 26 and free to pivot within the eye formed at the end of member 24.

The lever 25 consists of two symmetrically opposite members which are electrically spot welded together to form forks at both ends. The center portion between the forked ends contact and are welded together.

The lever 25 is pivotally connected to a memmer 27 by a pin 28 tightly fitted into the member 27 and free to pivot in the lever 25. The member 27 consists of two symmetrically opposite members electrically welded together where each opposite member engages the other to form a forked end 29 to receive lever 25. The ends 30 of the member 27 are formed outwardly of the center portion of the member 27 to provide for electric spot welding to secure the member 27 to the cover plate 31 of the carburetor bowl 19.

The end 32 of the lever 25, in addition to being forked as above mentioned, is slotted at 33 to provide a free sliding pivot connection for the pin 34 tightly fitted into the member 35. The member 35 is square in cross section and freely slides within the forked end 32 of lever 25. The forked end 32 of lever 25 and fit of the square cross section of member 35 within the forked end 32 prevents member 35 from turning and thereby maintains proper pivotal relation of the pin 34 to the slot 33 during operation of the mechanism.

The piston 36 consists of a head 37 and an integral rod 38 tightly threaded at one end into the member 35 and thereby secured to member 35. The piston rod 38 freely slides within a hole in the cover plate 31 which provides an upper guide for the piston to assure free sliding of the piston within the cylinder 39 formed integral with the bowl 19. The washer 40 is freely fitted around the rod 38 and provides a dust cover to prevent dirt entering the bowl 19. The spring 41 is a conventional coiled compression type and normally urges the piston downwardly.

The cylinder 39 is provided with an overflow slot 42 through which slot the fuel on top of the piston head 37 can freely flow back into the bowl 19 when the piston is raised. Fuel normally stands in the bowl 19 to the level 43.

At the lower end of the cylinder 39 a ball valve 44 is provided. The ball 44 is retained in place by a spring ring 45, Figs. 1 and 3. This ring normally tends to expand and sets up friction between itself and the inside of the cylinder 39, thus remaining in position to retain the ball 44 as the ball is urged upward by fuel flowing into the cylinder during upward movement of piston 36. The ball closes the passage 46 against egress of fuel from the cylinder 39 and allows free ingress of fuel during upward movement of the piston 36. The plug 47 seals the passage 46 exterior of the bowl 19.

The lever 3 is provided with portion 48 for engaging a stop 49 integral with the bowl 19, to limit opening movement of the lever 3 to an angular position corresponding to the fully open position of throttle valve 1.

Depending upon the degree of required manual operation desired, certain of the mechanism shown may be omitted.

Example 1.—The members 3, 7, and 14 are essential to enable an engine to sustain operation under conditions hereinbefore mentioned, but manual re-opening of the throttle just a trifle is required to cause the step 15 of lever 7, as illustrated in Fig. 4, to move out of the path of screw 14 and thereby allow full restoration of the lever 3 to the normal idle position as shown in Fig. 1, and the step 13 of lever 7 to engage the screw 14.

Example 2.—By employing all the members shown in Figs. 1 through 5, the manual re-opening of the throttle mentioned in Example 1 is not required, and the lever 3 will fully restore to the normal idle position after a predetermined delay by step 15 on lever 7.

Example 3.—By omitting the enlarged portion 9 of lever 7 and retaining the end 10 to constitute the entire lever 7, and by instituting slight friction between the member 24 and the end 10 of lever 7, by making the washer 22 of spring material and slightly conical in shape, and thereby impinging member 24 with lever 7, sudden return or closing rotation of lever 3 will force lever 7 against surface 16 of lever 3 and thereby directing step 15 of lever 7 into the path of screw 14, as shown in Fig. 4, and after a predetermined period of time, move lever 7 and step 15 out of engagement with screw 14, and allow full restoration of lever 3 to normal idle position as step 13 engages screw 14, as shown in Fig. 1.

Operation of this invention consistent with Example 1, is as follows:

The members, as shown in Figs. 1, 2 and 5, illustrate their position for normal idling speed of the engine and power output corresponding thereto.

During normal operation of an automobile it is required at times to open the throttle certain distances from the idle position to obtain more power from the engine, and without any immediate increase in engine or vehicle speed above normal idle speed of the engine which in terms of vehicle speed corresponds to normally 7 miles per hour level road operation.

Such throttle opening rotates the lever 3, and the pivot point of lever 7 moves in a circle downwardly. The force of gravity acting upon the end 9 of lever 7 causes the end 9 to cling to lever 3 remaining in contact at 11 during a few degrees of rotation of lever 3 from the position shown in Fig. 1, but during further rotation of lever 3 the lever 7 moves relatively away from contact at 11 with lever 3, and still further rotation of lever 3 brings the end 10 of lever 7 into engagement with the surface 16 of lever 3, whereupon no further rotation of lever 7 as effected by gravity takes place relative to lever 3, and both proceed to rotate in fixed relation to each other.

If the throttle is allowed to close gradually, but with a quick motion, the above described occurrences take place inversely and the throttle restores fully to normal idle position as shown in Fig. 1. When the throttle is open, levers 3 and 7 will be maintained in the relative position shown in Fig. 4 by the engagement of end 10 of lever 7 with surface 16 of lever 3, as previously stated, but lever 3 will obviously be rotated further in a counterclockwise direction than is shown in Fig. 4. If the throttle is allowed to close suddenly

under the influence of the throttle return spring, the inertia of enlarged portion 9 of lever 7, and centrifugal force acting upon such enlarged portion and caused by the speed of rotation of lever 3, will maintain end 10 of lever 7 in engagement with surface 16 of lever 3, in which position step 15 of lever 7 will engage screw 14 as shown in Fig. 4 and stop the throttle in a position providing a throttle opening in excess of the normal idle position of the throttle. The lever 7 is therefore responsive to the speed of closing movement of the throttle and adjusts itself relative to lever 3 so as to be positioned for engagement with screw 14 for stopping the throttle either in a position providing a normal idle or in a position providing an engine speed in excess of normal idle, depending on the speed at which the throttle is allowed to close. The force of spring 60 retains levers 3 and 7 positioned as shown in Fig. 4, until the lever 3 is again urged openward, whereupon the lever 7 being relieved of the load and ensuing friction of positioning the throttle, is free to return to normal position relative to lever 3, coming to a stop as levers 7 and 3 engage at 11. The throttle can then be allowed to return to normal idle position.

Operation of this invention consistent with Example 2 is substantially the same as described in Example 1, differing in that as the throttle is opened the members 24, 25, 36, 41 and 44 are actuated and the lever 7 is retained impinged at 11 against lever 3 by the opposing action of spring 41. If the throttle is opened fully the piston 36 is moved to its outermost position relative to the cylinder 39. If the throttle is allowed to close slowly, or suddenly, the same action of levers 3 and 7 takes place as described in Example 1. If the action is sudden the pin 20 of lever 7 travels the full length of the slot end 23 of the member 24 since the piston 36 is prevented from suddenly moving inwardly of the cylinder 39 under the urging of spring 41 by the presence of fuel taken into the cylinder through the passage 46 and the valve 44 as the throttle was opened. The fuel trapped in the cylinder by closing of valve 44 seeps past the piston head 37 as the spring 41 urges the piston gradually inward at a predetermined speed. As the piston nears the inward end of its travel, the slotted end 23 of member 24 engages pin 20 of lever 7 and disengages step 15 with screw 14 and thereby allows step 13 to engage screw 14 under the urging of the beforementioned conventional throttle return spring. The angle A, Fig. 4, previously herein described, enables disengagement of step 15 on lever 7 with screw 14 by slight effort on the part of spring 41.

Operation of this invention consistent with Example 3 is substantially the same as described in Example 2, differing in that the inertia and centrifugal forces relied upon to actuate lever 7 are substituted by slight friction between lever 7 and member 24, as previously described herein.

While I have illustrated and described preferred embodiments of my invention, it is understood that these are capable of modification and I therefore do not wish to be limited to the precise details set forth but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. A carburetor adapted to supply fuel to an internal combustion engine comprising a throttle adapted to regulate the flow of fuel from the carburetor to the engine, means biasing said throttle toward closed position, said throttle being movable into a plurality of open positions

one of which provides a throttle opening for normal idle engine operation, and stop means associated with said throttle including a stationary member and a member movably connected to said throttle and responsive to the speed at which said throttle moves toward closed position from open positions thereof so as to automatically position itself relative to said throttle into a position to cooperate with said stationary member for stopping the movement of said throttle under the influence of said biasing means at a position providing a throttle opening in excess of said idle position thereof.

2. A carburetor according to claim 1 including a means operable for rendering said stop means inoperable to position said throttle in said excess throttle opening position.

3. A carburetor adapted to supply fuel to an internal combustion engine comprising a throttle movable to regulate the flow of fuel to the engine, means biasing said throttle towards its normal idle position, and means associated with said throttle including a stationary member and a member movable with and relative to said throttle and responsive to the speed at which said throttle moves toward closed position from open positions thereof so as to adjust itself relative to said throttle into a position to engage said stationary member for stopping said throttle in a position providing a throttle opening in excess of said idle position thereof when the closing movement of said throttle is unrestrained.

4. A carburetor according to claim 3 including a means operable for rendering said throttle stopping means inoperable to position said throttle in said excess throttle opening position

5. A carburetor according to claim 3 wherein said throttle stopping means is inoperable to provide said excess throttle opening upon movement of said throttle toward closed position at a relatively slow speed.

6. A carburetor adapted to supply fuel to an internal combustion engine comprising a throttle movable between open and idle positions to regulate the flow of fuel to the engine, means biasing said throttle toward idle position, means operable for moving said throttle to open position, and stop means including a stationary member and a movable member associated with said throttle and engageable with said stationary member for fixing the position of said throttle under the influence of said biasing means, said movable member being constructed and arranged relative to said throttle so as to position itself relative to said throttle, in response to sudden closing movement of said throttle, into a position to cooperate with said stationary member for stopping movement of said throttle short of said idle position.

7. A carburetor according to claim 6 including a means operable for rendering said throttle stopping means inoperable to stop said throttle short of said idle position.

8. A carburetor adapted to supply fuel to an internal combustion engine comprising a throttle adapted to regulate the flow of fuel from the carburetor to the engine, actuating means adapted to urge said throttle toward a closed position, means for moving said throttle toward a full open position and capable of overruling said actuating means, stop means associated with said throttle and providing a plurality of fixed open positions into which said throttle may be moved during engine operation, one of said fixed open positions providing for normal idle engine speed,

a second one of said fixed open positions providing a throttle opening in excess of that provided by said first fixed open position but less than the full open position of said throttle, said stop means including a stop member and a member movably connected to said throttle and engageable with said stop member for positioning said throttle in either said first or second fixed open position thereof under the influence of said actuating means, said movable member being so constructed and arranged and so associated with said throttle that said member automatically responds to the speed of closing movement of said throttle as effected by said actuating means to thereby adjust itself relative to said throttle and stop member in such manner as to be engageable with said stop member for positioning said throttle in either said first or said second fixed open position thereof depending upon the speed at which said throttle is allowed to move toward its closed position from an open position in excess of said second fixed open position thereof.

9. A carburetor according to claim 8 wherein upon opening movement of said throttle from said second fixed open position, said movable member automatically responds to said throttle opening movement independently of the speed at which said throttle is opened and thereby adjusts itself relative to said stop member in such manner as to be engageable with the same to allow the positioning of said throttle in said first fixed open position thereof.

10. A carburetor according to claim 8 including releasing means connected to said movable member and adapted to operate the same in such manner that in the event said throttle is stopped by said stop means at said second fixed open position, said releasing means eventually adjusts said movable member relative to said stop member into a position to permit said throttle to move from said second fixed open position to said first fixed open position under the influence of said actuating means.

11. A carburetor according to claim 8 including releasing means associated with and adapted to operate said movable member in such manner that in the event said throttle is stopped by said stop means at said second fixed open position, said releasing means eventually adjusts said movable member relative to said stop member into a position to permit said throttle to move from said second fixed open position to said first fixed open position, said releasing means including timing means.

12. A carburetor adapted to supply fuel to an internal combustion engine comprising a throttle adapted to regulate the flow of fuel from the carburetor to the engine, actuating means adapted to urge said throttle toward a closed position, stop means associated with said throttle and providing a plurality of fixed open positions into which said throttle may be moved during engine operation, one of said fixed open positions providing for normal idle engine speed, a second one of said fixed open positions providing a throttle opening in excess of that provided by said first position but less than the full open position of the throttle, said stop means including a stop member and a member movable with and relative to said throttle, said movable member being engageable with said stop member for fixing the position of said throttle under the influence of said actuating means, said movable member being adapted to respond to movement of said throttle towards said second fixed open position from open positions in excess of said second fixed open position in such manner as to be positioned for engagement with said stop member for stopping said throttle in either one or the other of said fixed open positions, depending upon the speed at which said throttle is allowed to move towards said second fixed open position.

13. A carburetor adapted to supply fuel to an internal combustion engine comprising a throttle adapted to regulate the flow of fuel from the carburetor to the engine, actuating means adapted to urge said throttle toward a closed position, means for moving said throttle toward a full open position, stop means associated with said throttle and providing a plurality of fixed open positions into which said throttle may be moved during engine operation, one of said positions providing a fixed open position for the throttle for normal idle engine speed, a second one of said positions providing a throttle opening in excess of that provided by said first stop but less than the full open position of the throttle, said stop means including a stop member and a regulating member pivotally connected to said throttle and adapted to cooperate with said throttle and said stop member for positioning said throttle in either of said fixed open positions under the influence of said actuating means depending upon the relative position of said regulating member and said throttle, said regulating member being so constructed and arranged relative to said throttle as to be responsive to inertia and centrifugal forces imparted thereto by throttle closing movement to thereby adjust itself relative to said throttle in such manner that said throttle is positioned in either of one or the other said fixed open positions depending upon the speed at which said throttle is allowed to move towards said fixed open positions from open position in excess of said second fixed open position, said regulating member being adapted to respond to said forces to permit positioning of said throttle in said second fixed open position when the speed of closing movement of said throttle under the influence of said actuating means is unrestrained, said regulating member being responsive to gravity when positioned for maintaining said throttle in said second fixed open position so as to be movable relative to said throttle into a position to permit movement of said throttle to said one fixed open position from said second fixed open position upon slight opening movement of said throttle, said regulating member being responsive to gravity for movement into a position to permit positioning of said throttle in said one fixed open position upon closing movement of said throttle at speeds less than said unrestrained speed.

14. In a carburetor, a throttle associated therewith and having a normal idle position, means for operating said throttle, and regulating means operable in response to the speed of throttle closing movement, said regulating means being associated with said throttle and so arranged relative thereto that the operation of said regulating means as effected by the speed of throttle closing movement determines a fixed open position of said throttle in excess of said normal idle position of said throttle into which said throttle may move upon closing movement of said throttle.

15. A carburetor according to claim 14 including a releasing means connected to said regulating means and operable for rendering said regulating means inoperable to position said throttle in said excess throttle opening position.

16. A carburetor according to claim 15 wherein

said releasing means includes a timing means connected thereto.

17. In a carburetor adapted to supply fuel to an internal combustion engine, a throttle for regulating the flow of fuel to said engine, means biasing said throttle toward closed position, and stop means associated with said throttle for fixing the position of said throttle under the influence of said biasing means, said stop means including a stationary stop member, a movable stop member connected to said throttle and engageable with said stationary member in either of two positions for fixing the position of said throttle in either of two fixed open positions, and an actuating member for said last mentioned member associated with said throttle and so arranged relative thereto as to be responsive to the speed of closing movement of said throttle to thereby actuate said movable stop member into one or the other of its said two positions for engagement with said stationary member depending upon the speed at which said throttle is moved toward closed position.

JOHN T. RAUEN.

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