Feb. 21, 1956 E. J. REPPERT ET AL 2,735,643

THROTTLE RETURN CHECK

Filed Aug. 8, 1952

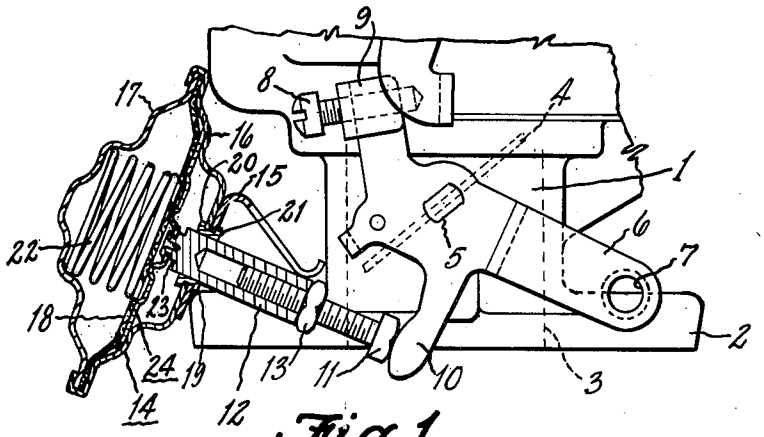


Fig. 1.

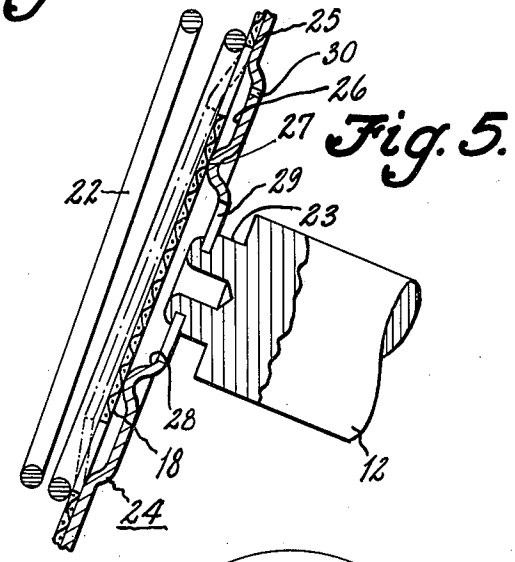


Fig. 5.

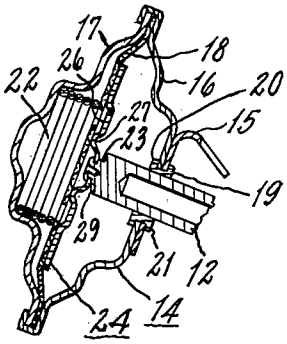


Fig. 2.

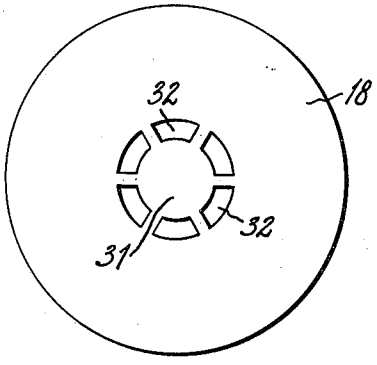


Fig. 4.

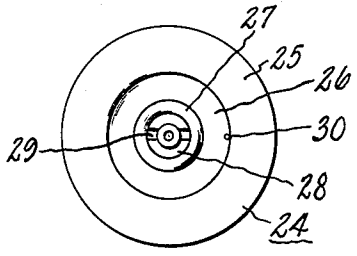


Fig. 3.

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THROTTLE RETURN CHECK

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3 Claims. (Cl. 251—54)

This invention relates to carburetors for internal combustion engines, more particularly to a mechanism for retarding movement of the carburetor throttle to fully closed position upon release of the manually operated accelerator pedal, so as to prevent sufficiently rapid closing of the trottle to cause stalling of the engine, and is an improvement on the device disclosed in the copending application of Olson et al., S. N. 166,748, filed June 7, 1950.

In the device of the aforesaid application there is disclosed an air dash pot having an actuating member which is engaged by an arm, secured to and movable with the carburetor throttle, as the throttle is moved toward closed position, so that the last part of the closing movement of the throttle is retarded and the throttle is not permitted to reach its idle or closed position rapidly enough to cause the engine to stall, as is sometimes the case when the throttle moves rapidly from an open to closed position. The dash pot includes a diaphragm which is secured in an air tight housing and the member which is engaged by the arm on the throttle shaft is attached to the diaphragm and moves therewith. As the member is moved by the closing throttle the diaphragm is moved and forces air from a closed chamber on one side of the diaphragm, through a restricted opening and into a chamber on the other side thereof. Due to the small size of this opening the movement of the diaphragm is necessarily slow and the movement of the throttle is slowed down to that of the diaphragm.

In addition to the restricted opening a relatively large passage connects the chambers on opposite sides of the diaphragm, but during movement of the diaphragm as the throttle closes this passage is closed by a valve member, movable in a valve cage carried by the diaphragm, which is moved to position to close said passage by the air pressure which is created on one side of the diaphragm. When the diaphragm moves in the opposite direction, upon opening of the throttle, the valve opens and the diaphragm is permitted to move freely to position to be engaged by the throttle operated arm as previously described.

The primary object of the present invention is to simplify the construction and reduce the manufacturing cost of the throttle controlling dash pot and to this end, according to the present invention, the large passage connecting the opposite sides of the diaphragm and the latter have been so constructed and arranged that the diaphragm itself is utilized as a valve to control the free passage of air from one side of the diaphragm to the other, and the use of the separate valve for performing this function has been eliminated.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a side elevation of the outlet of a carburetor on which the throttle controlling device of the present invention is incorporated and showing such device in section.

Fig. 2 is a fragmentary section of the throttle controlling device with the parts thereof in closed throttle position.

Fig. 3 is a plan view of a metal plate to which the diaphragm is secured.

Fig. 4 is a similar view of the diaphragm itself.

Fig. 5 is a fragmentary section on the same line as Fig. 2, but on an enlarged scale.

Since the construction of the carburetor is of no importance at all so far as the present invention is concerned, only the outlet thereof, which is adapted to be attached to the manifold is shown. The outlet casting 1 has a flange 2, which is adapted to be secured to a corresponding flange on the intake manifold of the engine in the usual manner and the mixture outlet passage 3 is designated by dotted lines. Flow of combustible mixture through the passage 3 is controlled by a throttle valve 4 secured in any suitable way to a shaft 5 rotatably journalled in the casting 1 and having an operating arm 6. This throttle is manually operable by means of a Bowden cable or any other suitable operating connection adapted to be connected in the opening 7 of the arm 6 and extending to the usual foot operated accelerator pedal. The throttle is opened by rotation in a counterclockwise direction and its normal closed idling position is determined on adjustable stop screw 8 which is threaded in an arm 9 integral with arm 6 and engages a suitable cooperating stop to variably limit the closing movement of the throttle as desired, for the purpose of controlling the idling speed of the engine.

In order to retard the final closing movement of the throttle the operating arm 6 has an arm 10 projecting therefrom which is adapted to engage an adjustable stop screw 11 which is screwed into one end of a sleeve 12 and is held in any adjusted position by a lock nut 13. The sleeve 12 is slidable in an opening in a diaphragm housing indicated in its entirety by the reference number 14 and is supported by a bracket 15 which is secured in any desirable way to the casting 1, as for example, in the manner shown in application S. N. 166,748. The construction of the supporting bracket 15 and the manner in which it is secured to the casting 1 are not material so long as the diaphragm housing and the stop screw 11 are in proper position with reference to the arm 10.

The diaphragm housing includes two cup-shaped members 16 and 17 which are secured together to form an air tight joint by crimping the peripheral portion of member 16 over the edge of member 17 with the peripheral edge of a diaphragm 18 clamped between the members 16 and 17 as shown in Figs. 1 and 2. A flanged collar 19 has an opening in the center in which the sleeve 12 is slidable and flanges 20 and 21 between which the supporting bracket 15 and the housing part 16 are clamped. A spring 22 between the diaphragm and the housing part 17 normally holds the diaphragm and the parts connected thereto in the Fig. 1 position.

Secured to a reduced extension 23 of the sleeve 12 by riveting or in any other suitable way is a metal disk designated in its entirety as 24. The outer part of this disk is a flat annular surface 25 to which the diaphragm is bonded in any suitable way. Within and contiguous to the flat surface 25 is an annular groove 26 and inside the groove is a bead 27 the top of which lies in the same plane as the flat surface 25 and which is normally engaged by the central part of the diaphragm 19 when the latter is moved to the left by the closing throttle. At the center of the disk is a depressed surface 28 which is appreciably spaced from the diaphragm and this part of the disk is secured to the extension 23 of the sleeve 12. In this part of the disk are two ports 29 of considerable size which permit relatively unrestricted passage of air from the right to the left side of the diaphragm when the latter is moved to the left upon opening movement of the throttle. In the

groove surface 26 is a restricted orifice 30, as best shown in Fig. 5.

The diaphragm is a flat disk of any suitable flexible material, the outer edge of which is fixed in the housing as already described, and which has a solid central portion 31 adapted to engage the bead 27 as previously set forth. An annular series of openings 32 are provided in the diaphragm adjacent the grooved portion 26 of the metal disk 24 so that the restricted opening 30 is always in communication with the space on both sides of the diaphragm.

The diaphragm 18 and the disk 24 attached thereto are normally, that is when the engine is not in operation, held in the Fig. 2 position by the conventional return spring which returns the accelerator pedal to normal position when it is released by the operator to permit closing of the throttle, such return spring being considerably stronger than the spring 22. When the throttle is opened the arm 10 is moved away from the screw 11 and the spring 22 moves the diaphragm 19 and the metal plate 24 to the right until such parts assume the Fig. 1 position. As the parts are moved in this manner the pressure of air flowing from the space on the right side of the diaphragm through the ports 29 moves the central portion 31 of the diaphragm out of engagement with the surface of bead 27 to permit a substantially unrestricted flow of air from the space at the right of the diaphragm to the space at the left thereof within the diaphragm housing, thus permitting a rapid and substantially unrestricted movement of the diaphragm assembly to the right to the Fig. 1 position.

On the other hand if the diaphragm assembly is in the Fig. 1 position, which it occupies when the throttle is open, and the accelerator pedal is released to effect closing of the throttle the arm 10, upon engagement with the screw 11, moves the diaphragm assembly to the left. This movement creates a pressure of air upon the central part 31 of the diaphragm 19 which causes that part of the diaphragm to engage the bead 27, so that the part 31 of the diaphragm acts as a valve preventing any flow of air from the space at the left of the diaphragm to the space at the right through the large openings 29. By reason of this stoppage of flow through ports 29 all of the air which moves from the space at the left of the diaphragm to the space at the right must move through the very small hole 30. The movement of the diaphragm to the left must, therefore, take place very slowly and the last part of the movement of the throttle toward its closed or idle position must be correspondingly slow. By retarding the closing of the throttle in this manner stalling is prevented, as fully set forth in the previously mentioned copending application.

It will be apparent from the foregoing that the structure of the earlier application has been considerably simplified, and by utilizing the diaphragm itself as a valve the use of a separate valve to control the flow of air through the unrestricted passage has been entirely eliminated, thus materially reducing the cost and difficulty of manufacture.

While the embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. A dash pot for retarding the closing movements of a carburetor throttle valve which is provided with an arm movable therewith for engagement by a control member of said dash pot, said dash pot comprising a housing, a diaphragm dividing said housing into two chambers and operative when moved to transfer air from one chamber to the other, said control member being connected to said diaphragm and extending outwardly of the housing, a substantially rigid plate, a part of the surface of which is bonded to the diaphragm adjacent the periphery thereof so that the plate is movable with the diaphragm

and the diaphragm is also movable relatively thereto, said plate having an unrestricted opening therein through which air can pass when the diaphragm is moved in one direction, a raised surface on said plate surrounding said unrestricted opening and engageable by the relatively movable port of said diaphragm when moved in the opposite direction to block the flow of air through said unrestricted opening, and said plate having a constantly open restricted opening through which air can pass when the diaphragm is moved in said opposite direction, whereby movement of the diaphragm and control member is retarded in one direction and unretarded in the other.

2. A dash pot for retarding the closing movements of a carburetor throttle valve which is provided with an arm movable therewith for engagement by a control member of said dash pot, said dash pot comprising a housing, a diaphragm dividing said housing into two chambers and operative when moved to transfer air from one chamber to the other, said control member being connected to said diaphragm and extending outwardly of the housing, a substantially rigid plate, a part of the surface of which is bonded to the diaphragm adjacent the periphery thereof so that the plate is movable with the diaphragm and the diaphragm is also movable relatively thereto, said plate having an unrestricted opening therein through which air can pass when the diaphragm is moved in one direction, a raised surface on said plate surrounding said unrestricted opening and engageable by the relatively movable part of said diaphragm when moved in the opposite direction to block the flow of air through said unrestricted opening, and said plate having a constantly open restricted air passage therein forming the only opening in said plate through which air can pass when the diaphragm is moved in said opposite direction, whereby movement of the diaphragm and control member is retarded in one direction and unretarded in the other.

3. A dash pot for retarding the closing movements of a carburetor throttle valve which is provided with an arm movable therewith for engagement by a control member of said dash pot, said dash pot comprising a housing, a diaphragm dividing said housing into two chambers and operative when moved to transfer air from one chamber to the other, said control member being connected to said diaphragm and extending outwardly of the housing, a substantially rigid plate bonded to the diaphragm adjacent the periphery thereof, means on said plate spacing the central part thereof from said diaphragm, said plate being unattached to the diaphragm at the central part thereof so that said central part of the diaphragm is movable relatively to the plate and said plate having an unrestricted opening in the central portion thereof through which air can flow when the diaphragm is moved in one direction, said means on said plate being engageable by the relatively movable part of said diaphragm when moved in the opposite direction to block the flow of air through said unrestricted opening, and said plate having a constantly open restricted opening therein constituting the only passage through which air can pass when the diaphragm is moved in said opposite direction, whereby the movement of said diaphragm is retarded when moved in one direction and unretarded when moved in the other direction.

References Cited in the file of this patent

UNITED STATES PATENTS

1,850,117	McMillan	Mar. 22, 1932
2,033,396	Perrine	Mar. 10, 1936
2,117,421	Holden	May 17, 1938
2,489,381	Lindahl	Nov. 29, 1949
2,598,855	Strebinger	June 3, 1952
2,680,610	Harry	June 8, 1954