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THROTTLE OPERATING MECHANISM

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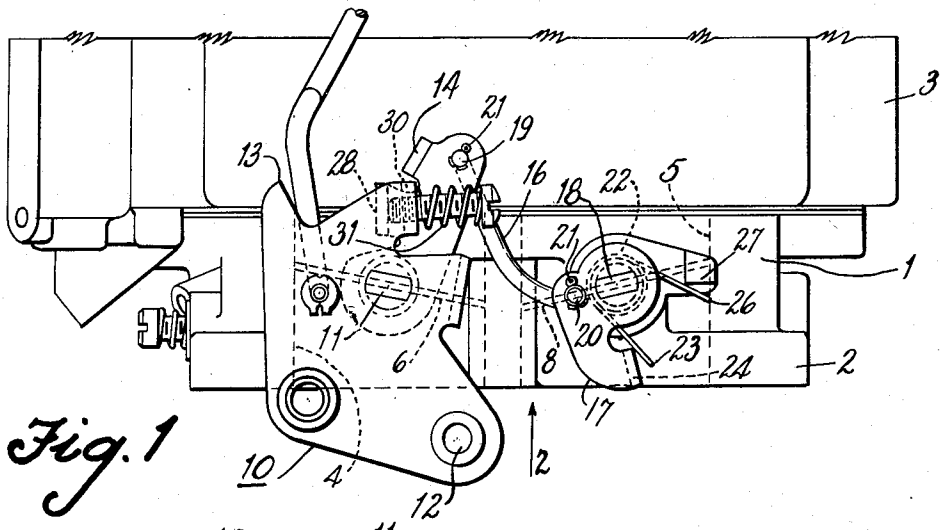


Fig. 1

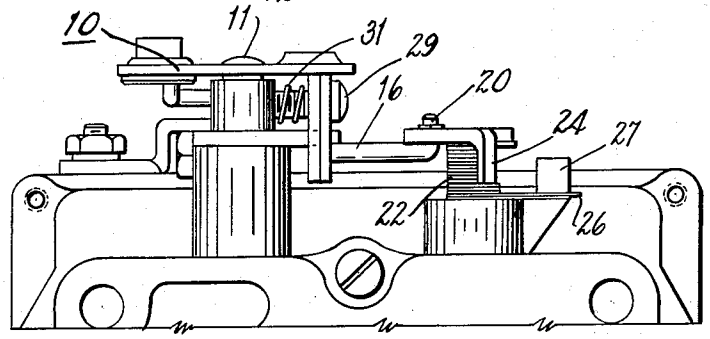


Fig. 2

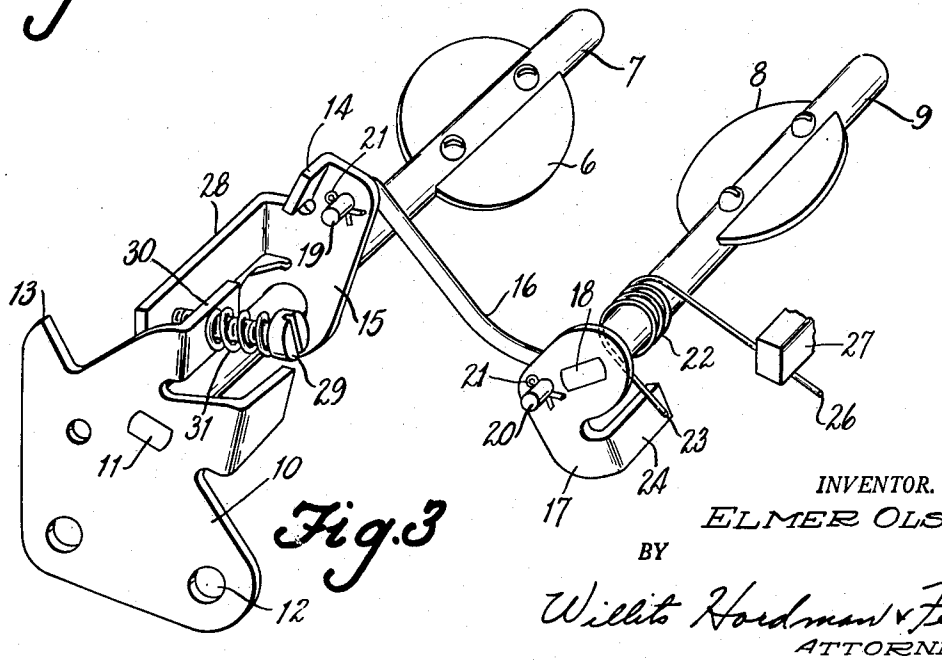


Fig. 3

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THROTTLE OPERATING MECHANISM

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This invention relates to carburetors and particularly to the type of carburetor generally known as a compound carburetor in which there are two or more mixture passages which supply combustible mixture to the engine with which such carburetor is associated and which are rendered effective successively, being provided with throttle valves for controlling the flow therethrough, one or more of which may be opened to a considerable extent before one or more additional throttle valves are opened at all. A carburetor of this type may contain one mixture passage, that is effective at all speeds and may be termed a primary mixture passage, which is controlled by a primary throttle and another or secondary mixture passage, which is rendered effective by the opening of a secondary throttle positioned in such passage and opened in response to movement of the primary throttle after the latter has made some desired predetermined opening movement. This opening movement of the primary throttle before the secondary throttle starts to open may be varied considerably, depending on the performance desired, but the secondary mixture passage is generally rendered effective after the primary throttle has been opened to a considerable extent, for example, about 40 degrees, and the operating connections are such that as the primary throttle makes its remaining opening movement it is effective to move the secondary throttle fully open.

Devices of the type described sometimes have only one primary and one secondary mixture passage, controlled by one primary and one secondary throttle, respectively, or such devices may have a plurality of primary mixture passages controlled by a plurality of primary throttles and a plurality of secondary passages controlled by a plurality of secondary throttles. The present invention is applicable to either form of device and for the sake of simplicity of disclosure, only two mixture passages and two throttles, one primary and one secondary, are shown in the drawings.

In compound carburetors such as described, the secondary throttle is generally opened by the primary throttle through the medium of some form of lost motion connection against the force of a spring which is put under tension as the secondary throttle is moved toward open position and which is relied upon to effect closing of the secondary throttle when the primary throttle is moved to closed position. Some difficulty has sometimes been encountered, due to the fact that the spring has not fully closed the secondary throttle, which occasionally will stick in slightly open position. It is accordingly the primary purpose of the present invention to provide a throttle operating mechanism which is not only effective to positively open the secondary throttle as the primary throttle is moved toward open position, but is also effective to positively and fully close the secondary throttle whenever the primary throttle is moved to its normal idling position, and to accomplish this purpose with the provision of substantially no additional operating mechanism.

A further feature of the invention resides in the provision of means through the medium of which the normal idle stop for the primary throttle engages a member positively connected to the secondary throttle to move the latter to closed position and such member serves as a stop to determine the normal idle position of the primary throttle.

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:

Figure 1 is a side elevation of the lower or outlet end of a compound carburetor in which the present invention is embodied.

Figure 2 is a fragmentary plan view showing one side of the carburetor of Fig. 1, viewed in the direction of the arrow on Fig. 1.

Fig. 3 is a perspective view of the primary and secondary throttles and the actuating mechanism therefor.

In the drawings only the outlet portion of the carburetor is shown, the means for supplying fuel and air as well as various other parts of the carburetor having been omitted, such devices being wholly immaterial so far as the present invention is concerned and for the sake of simplicity only such portion of the carburetor is illustrated as is necessary for a full understanding of the present invention and with which the latter is immediately associated.

The carburetor includes a casting 1 having an attaching flange 2 adapted to be secured to the engine manifold in the usual way, while above and secured to the casting 1 is another casting 2 in which certain parts of the carburetor which have nothing to do with this invention, are formed. The casting 1 is generally termed the throttle body and as shown, two mixture passages 4 and 5 extend through this casting and connect with corresponding passages in the intake manifold, passage 4 being a primary mixture passage and the passage 5 being a secondary mixture passage. The primary mixture passage is controlled by a primary throttle valve 6 secured to an operating shaft 7 suitably journalled for rotation in the casting 1 and movable in a clockwise direction to open the mixture passage 4, to increase the amount of mixture supplied to the engine, fuel and air to form such mixture being supplied to both the passages 4 and 5 in any suitable or conventional manner. The secondary mixture passage 5 is controlled by a secondary throttle valve 8 secured to shaft 9 which is also rotatably mounted in the casting 1 and is rotated by means later described in a counterclockwise direction to open the secondary mixture passage as the primary throttle 6 is opened. It will be understood that if the carburetor has a plurality of both primary and secondary mixture passages, two or more throttle valves 6 and two or more throttles 8 could be secured to shafts 7 and 9, respectively.

The operating means for the valves 6 and 8 includes a manually operable lever 10 secured to the flattened end 11 of the shaft 7 and having an orifice 12 in which some suitable form of operating connection extending to the usual foot-operated accelerator pedal is adapted to be connected. The lever arm 12 also has a toe 13 which, after the shaft 7 makes a predetermined clockwise movement, is adapted to engage an ear 14 projecting laterally from a lever arm 15 rotatably mounted on the shaft 7 and connected by a link 16 to an arm 17 secured to the flattened end 18 of the shaft 9 so as to be rotatable therewith. The link 16 has bent-over ends 19 and 20 which extend through holes in the arms 15 and 17, respectively, and the link is held in assembled position by cotter pins 21.

Due to the position of the holes in which the link 16 is connected with respect to the shafts 7 and 9, clockwise movement of arm 15 produces counterclockwise move-

ment of arm 17 and similar movement of the valve 8, this movement of arm 17 and valve 8 being opposed by a torsion spring 22 having one end 23 engaged by an ear 24 extending laterally from the arm 17, and having its opposite end 26 so positioned as to extend beneath a lug 27 projecting from the casting 1. Obviously, the opening movement of the valve 8 is opposed by this spring and the tension of the spring is increased as the valve moves toward open position.

The toe 13 is so positioned that the valve 6 has a considerable movement toward open position, for example, 40 degrees, before it engages the ear 14 and begins to open the secondary throttle 8, but it will be understood that the position of this toe is in no sense limited and the arm 10 can be formed with the toe in any desired position with reference to the ear 14.

Ordinarily, the force of the spring 22 is sufficient to fully close the valve 8 when the primary throttle is closed and no longer positively holds the valve 8 open. However, due to manufacturing tolerances the parts do not fit absolutely accurately and as a result the parts sometimes stick and the valve 8 will not be closed by the spring 22 unless a heavy spring is employed. This is not desirable because it is objectionable to place a heavy additional load on the accelerator pedal, which would be done if the spring 22 was a heavy spring. To overcome this difficulty, means are provided to positively move the valve 8 to its fully closed position when the valve 6 is moved to its closed or idle position on release of the accelerator pedal. To this end the arm 15 is provided with a laterally extending arm 28 which lies in the path of an adjustable stop screw 29 threaded in the ear 30 projecting laterally from the arm 10, and held in any position of adjustment by the spring 31. As the arm 10 moves counterclockwise, the spring 22 ordinarily causes the valve 8 to follow such movement until it is fully closed, but if such valve 8 sticks in any open position the screw 29 will engage arm 28 and positively close such valve through the medium of the operating link 16, the conventional heavy return spring for the accelerator pedal being strong enough for this purpose.

The closed or idle position of the primary throttle is ordinarily determined by an adjustable screw similar to the screw 29 which engages a fixed lug on the housing and is carried by the throttle operating arm. In the device disclosed the screw 29 is the idle stop screw, but instead of engaging a fixed lug on the casting to determine the idle position of the primary throttle engagement of the screw 29 with the arm 28, effects the same result. The arm 28 is always moved to the same position when the primary throttle is closed because the secondary throttle 8 is always moved to fully closed position and movement of the arm 28 continues when the accelerator pedal is released until its movement is stopped by the full closing of the valve 8 which can move no further. The arm 8 is, therefore, in effect a fixed idle stop and performs exactly the same function as if it were a fixed element such as a lug on the casting, because its position after the accelerator pedal is released, to permit its spring to close the primary throttle is always the same. By suitable adjustment of the same screw 29 which engages arm 28 to positively return the secondary throttle to fully closed position, the normal idle position of the primary throttle can be changed as desired to adjust the idling engine speed to the R. P. M. desired.

The device herein disclosed is a very simple and durable mechanism, inexpensive to produce, by means of which the secondary throttle is positively opened after a predetermined opening movement of the primary throttle and is positively fully closed thereby through the medium of the idle stop screw which determines the normal idle or closed position of the primary throttle. Also, the device disclosed, although at first glance an apparently minor structural improvement, is a device of considerable importance for the reason that if the secondary throttle does not fully close, the starting operation is interfered

with and the idling operation of the engine is not satisfactory. It will be understood that in carburetors of the type disclosed, the secondary mixture passage is not provided with an idling fuel supply means, so that any opening of the secondary throttle at starting and idling does not merely vary the quantity of the mixture, but also varies the mixture proportions. This produces unsatisfactory operation and difficult starting.

It will also be understood that so far as the present invention is concerned, it makes no difference whether the carburetor on which it is used has one primary and one secondary mixture passage or has four mixture passages or outlets. In other words, it is entirely immaterial to the present invention whether the shafts 7 and 9 operate two or more throttle valves each, or only one.

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. In a compound carburetor having primary and secondary mixture passages to which fuel and air are adapted to be supplied to form a combustible mixture therein, primary and secondary throttle means controlling the quantity of mixture supplied by said primary and secondary mixture passages respectively, a positive operating connection between the primary throttling means and the secondary throttling means for effecting opening of the secondary throttling means after a predetermined opening movement of the primary throttling means, an adjustable idle stop for variably determining the normal idle position of the primary throttling means, and means operated by said idle stop for moving the secondary throttling means to fully closed position as the primary throttling means is moved to normal idle position.

2. In a compound carburetor having primary and secondary mixture passages to which fuel and air are adapted to be supplied to form a combustible mixture therein, primary and secondary throttle means controlling the quantity of mixture supplied by said primary and secondary mixture passages respectively, a positive operating connection between the primary throttling means and the secondary throttling means for effecting opening of the secondary throttling means after a predetermined opening movement of the primary throttling means, an adjustable idle stop for variably determining the normal idle position of the primary throttling means, and means moved by said idle stop as the primary throttling means is moved to its normal idle position for moving said secondary throttling means to its fully closed position and effective to stop the closing movement of the primary throttling means when the secondary throttling means is fully closed.

3. In a compound carburetor having primary and secondary mixture passages to which fuel and air are adapted to be supplied to form a combustible mixture therein, primary and secondary throttle means controlling the quantity of mixture supplied by said primary and secondary mixture passages respectively, an operating arm positively connected to the secondary throttling means and movable by the primary throttling means after a predetermined opening movement of the latter, an adjustable idle stop movable with the primary throttling means and variably determining the normal idle position of said primary throttling means, and an arm extending from said first-mentioned arm and movable by the idle stop to fully close the secondary throttling means as the primary throttling means is moved to idle position.

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