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CARBURETOR THROTTLE OPERATING MECHANISM

Filed May 31, 1930

3 Sheets-Sheet 1

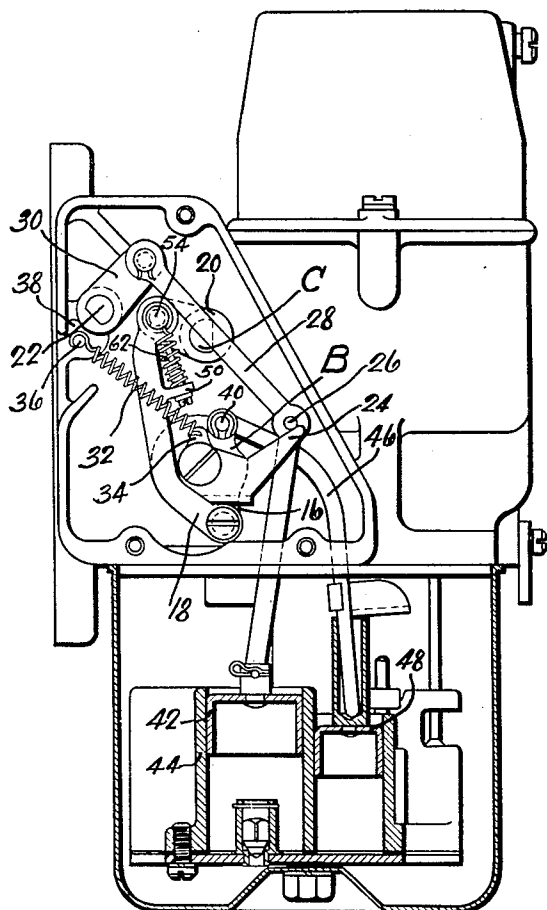


Fig. 1

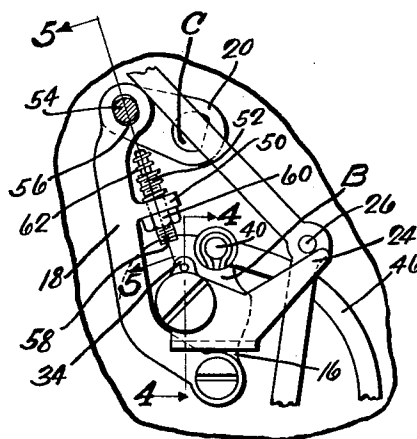


Fig. 2

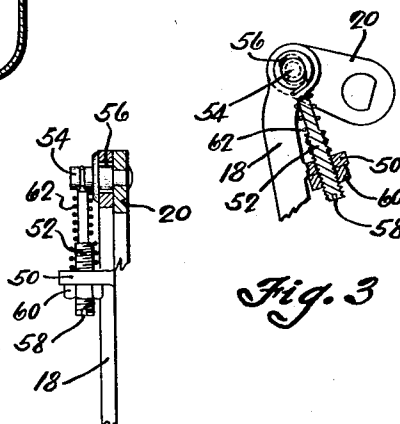


Fig. 3

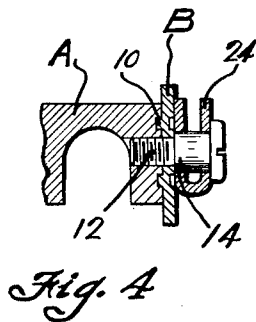


Fig. 4

Fig. 5

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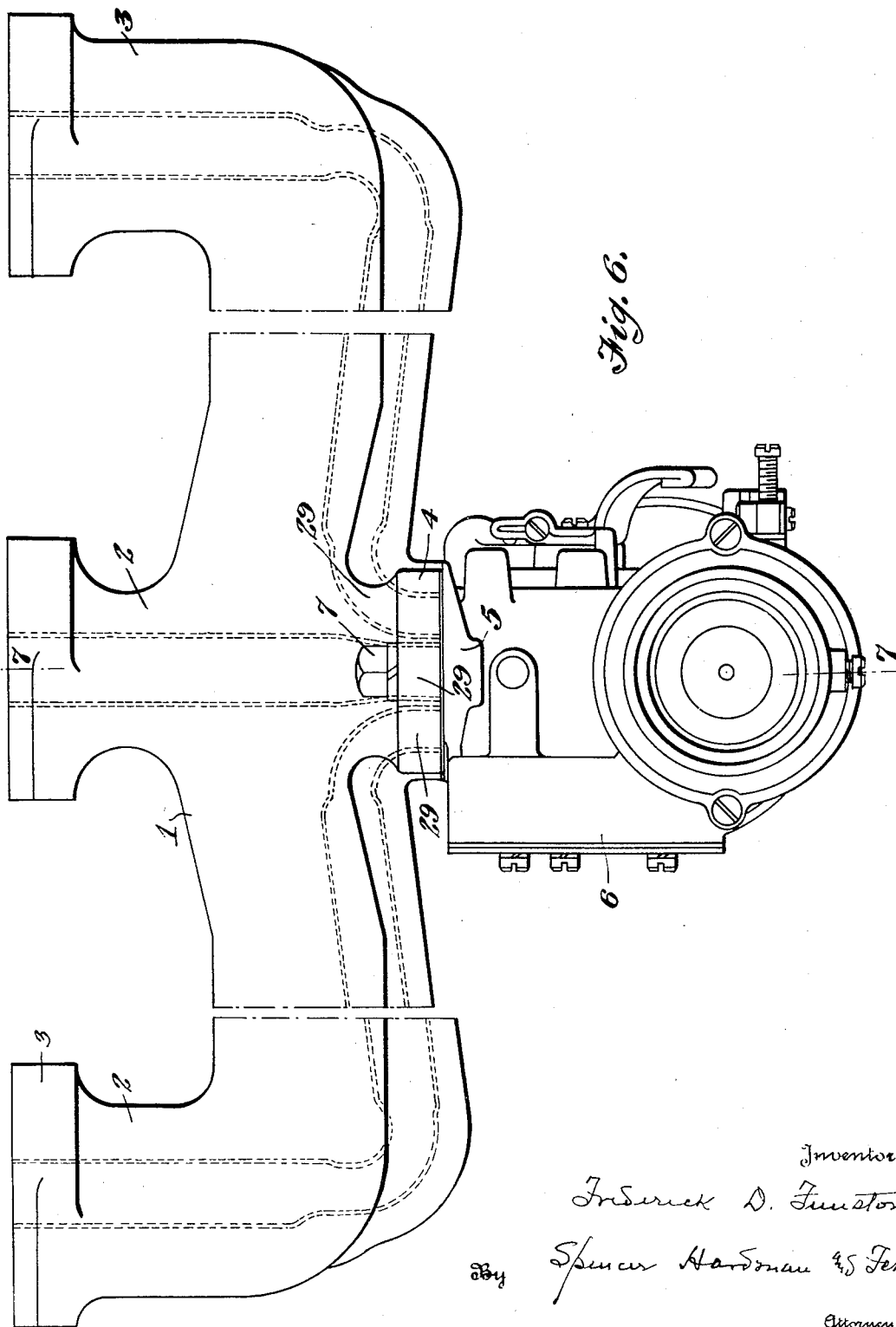
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CARBURETOR THROTTLE OPERATING MECHANISM

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3 Sheets-Sheet 2



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CARBURETOR THROTTLE OPERATING MECHANISM

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3 Sheets-Sheet 3

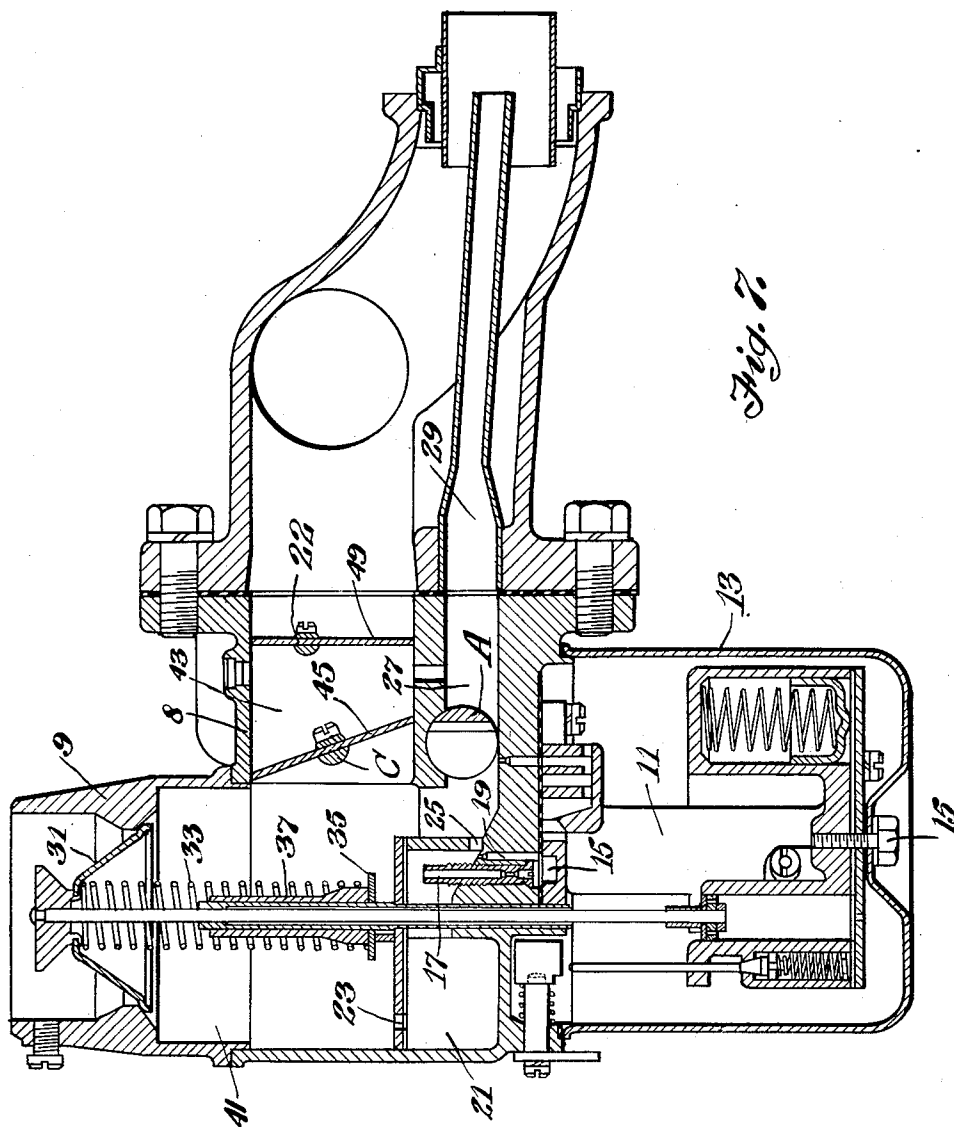


Fig. 7.

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UNITED STATES PATENT OFFICE

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CARBURETOR THROTTLE OPERATING
MECHANISM

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Application May 31, 1930. Serial No. 457,812

9 Claims. (Cl. 123—119)

This invention relates to charge forming devices for internal combustion engines, and more particularly to devices of the type having means for forming a primary mixture of air and liquid fuel which is delivered to a secondary mixing chamber or chambers to be mixed with air therein under certain operating conditions; and which is provided with inter-connected valves for controlling the flow of primary mixture and air to the secondary mixing chamber.

A device of this character is shown in the application of Fred E. Aseltine et al., Serial No. 370,179, filed June 12, 1929, the present invention being illustrated herein as embodied in the device shown in such application.

An object of the present invention is to provide an improved throttle operating mechanism in which sufficient clearances are provided to prevent any possible binding of the parts, and in which means are provided to adjust the degree of clearance.

Another object of the invention is to facilitate the manufacture of a device of the character above referred to, by the provision of a throttle operating mechanism which has liberal manufacturing tolerances, but is effective to produce accurate movement of the parts.

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 one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a side elevation of a carburetor unit forming part of a charge forming device constructed in accordance with the present invention, partially in section.

Fig. 2 is a somewhat enlarged detail view of the specific improvement which constitutes the present invention.

Fig. 3 is a fragmentary detail view partially in section.

Figs. 4 and 5 are detail sections on the lines 4—4 and 5—5 of Fig. 2.

Figure 6 is a plan view of a charge forming device in which this invention is incorporated.

Figure 7 is a vertical section on the line 7—7 of Figure 6.

As shown in the drawings the charge forming device in which the present invention is embodied includes a manifold, 1, having three outlet branches, 2, each of which is provided with a flange, 3, for connection to the block of an internal combustion engine in the usual manner.

At the inlet end of the manifold is an attaching flange, 4, to which a corresponding flange, 5, formed on the carburetor unit, 1, indicated as a whole by the reference numeral, 6, is adapted to be connected by machine screws, 7, in the usual way.

The carburetor unit comprises a main housing, 8, and an air inlet coupling, 9, which is adapted to be received in an opening in the upper part of the main housing as clearly shown in Figure 7.

A casting, 11, in which certain fuel passages and other elements of the device are formed is secured to the lower wall of the main housing in any suitable way. The specific construction of this casting and the specific arrangement of the fuel passages form no part of the present invention and accordingly have not been shown for the sake of simplicity of disclosure. A sheet metal fuel bowl, 13, is adapted to be held in position by a screw, 15, which is screwed into the casting, 11, as shown in Figure 7.

For purposes of illustration of the present invention it is sufficient to say that the fuel is maintained at a substantially constant level in the bowl, 13, in the conventional way. The fuel passages formed in the casting, 11, are adapted to convey fuel to a channel, 15, formed in the upper part of said casting, said channels supplying fuel to primary and secondary fuel nozzles, 17 and 19 respectively. These nozzles communicate with a chamber, 21, which for convenience, may be termed a fuel supply chamber, and to which air is supplied through a channel, 23, hereinafter more fully described, to form an emulsion or rich mixture of fuel and air within the chamber, 21. This mixture of fuel and air is drawn through an orifice, 25, into the primary mixture passage, 27, as shown in Figure 7. There are three of these primary mixture passages, 27, and the corresponding number of fuel supply chambers, 21, so that each of the mixture passages, 27, is supplied with primary mixture from a separate and distinct fuel supply chamber. The primary mixture passages, 27, register with three separate primary mixture conduits, 29, as shown in Figure 6, when the carburetor unit is secured to the manifold and these conduits convey the primary mixture to secondary mixing chambers formed in the outlet branches of the manifold adjacent the engine intake parts.

Air is admitted to the carburetor unit through the above mentioned coupling, 9, which is controlled by a spring held valve, 31, as shown in Figure 7. This valve is adapted to be held in closed

position as shown in the drawings by spring, 33, which is received between the valve and the flange, 35, projecting from a sleeve, 37. The valve is adapted to be controlled in its motion by means of a dashpot and other devices which will not be described herein as it is believed that such discussion is unnecessary for a proper understanding of the present invention and reference may be had to application Serial No. 370,179 for a complete disclosure of such devices.

The flow of mixture through the primary mixing chambers, 27, is controlled by a manually operable throttle valve, 39, which is adapted to regulate the quantity of mixture supplied to the engine cylinders, while the air admitted to the carburetor flows first into a main air chamber, 41, and from such chamber through the slot, 23, hereinbefore described to the fuel supply chamber, 21, and through a secondary air passage, 43, to the secondary mixing chambers formed in the manifold outlet passages. The flow of air through the secondary air passage is controlled by a manually operable valve, 45, secured to a shaft, 47, rotatably journaled in the housing and a suction operated valve, 49, secured to a shaft, 51, which is also journaled in the housing. The operating mechanism for these valves, is as described in detail hereinafter but to enable easier understanding of the invention, it may be said that the valve, 45, is operated by the throttle, 39, through the medium of a lost motion connection which permits the throttle, 39, to make a predetermined amount of movement without any accompanying movement of the valve, 45. The amount of this independent movement of the throttle, 39, may be adjusted to suit different conditions of operation but the device is generally so adjusted that the throttle, 39, may open to permit an engine speed which corresponds approximately to a vehicular speed of 30-25 miles an hour on the level before any movement of the valve, 45, takes place. The valve, 49, is entirely suction operated and of course cannot be opened until the manually operable valve 45, begins to operate. The construction of the manifold and the means for forming the primary mixture and for conveying said primary mixture to the outlet branches of said manifold is all exactly as shown in the earlier application. The flow of primary mixture is controlled by a throttle A which is journaled in the housing and is operated by means of an operating plate indicated at B in Fig. 1, while the flow of air through the manifold to the secondary mixing chambers is controlled by a butterfly throttle which is secured to a shaft indicated at C in Fig. 1, the construction being exactly the same as in application Serial Number 370,179. The present invention relates entirely to the mechanism for operating the primary throttle and the butterfly throttle above referred to, and this operating mechanism will now be described.

The throttle valve A is adapted to be operated by means of an operating connection which is connected to the opposite end of the valve from that shown in the drawings, and is adapted to extend to some point convenient to the operator. The throttle is rotated in a clockwise direction in Fig. 1 to open and in the opposite direction to close. The operating plate B is provided with pins 10, which extend into corresponding recesses in the end of the throttle and said operating plate is held in position by a screw 12 screwed into the throttle valve itself, a shoulder 14 on

said screw engaging the operating plate B. Pivotaly connected to an ear 16 projecting from said operating plate is a link 18 which is connected at its upper end to an arm 20 secured in any desirable manner to the shaft C on which the butterfly throttle is mounted. As the throttle A is opened, this link is effective to move the arm 20 in a clockwise direction and in a manner more specifically disclosed hereinafter, to open the butterfly throttle.

There is in addition to the butterfly throttle, a suction operated air valve in the secondary air passage, which is secured to a shaft 22 rotatably mounted in the casing of the carburetor. This valve is normally held closed when the throttle is closed by means of an arm 24, which is clamped between the operating plate B and the head of the screw 12, as fully shown in Fig. 4. The arm engages a pin 26, projecting from a link 28, pivotally connected at its upper end to an arm 30, secured to the valve shaft 22 and is effective to hold the valve closed when the parts are in the position shown in Fig. 1, with the throttle closed, being held in this position by a spring 32, one end of which is connected to an ear 34 projecting from the arm and the other end of which is connected to a pin 36 projecting from a boss 38 integral with the casing. As the throttle A is opened and the operating plate B moves in a clockwise direction, a pin 40 projecting from said plate, engages the arm 24 after the throttle has made a predetermined opening movement and moves the arm out of the way of the pin 26 so as to allow the valve to open under the influence of engine suction.

Connected to the lower end of the link 28 is a dashpot piston 42, which slides in a cylinder 44 and operates to retard the opening movement of the suction operated valve. This dashpot constitutes no part of the present invention and, therefore, will not be further described herein. Pivotaly connected to the pin 40 is a rod 46 which, on opening of the throttle, operates the pump piston 48 to supply fuel during the acceleration period, but this also forms no part of the present invention.

As fully disclosed in the earlier application, the butterfly throttle which is secured to the shaft C is not designed to be opened until after the primary throttle, which is operated directly by the plate B, has been moved a predetermined distance. This distance may vary with specific designs of the device but the device is generally so designed that the butterfly begins to open after the throttle has been opened to a position corresponding to a vehicular speed of approximately 25 miles per hour on a level. In the device disclosed in application Serial No. 370,179, and in this device, this is accomplished by arranging the point of connection of the link 18 with the operating plate B in such a way that the point of connection with this plate moves in an arc which is almost concentric with the point of connection of the said link 18 with the arm 20 for the first part of the movement of the operating plate B. During this motion of the operating plate there would be no movement of the arm 20 and consequently no movement of the butterfly throttle. It will be understood, however, that the arc above referred to, is not exactly concentric with the point of connection of the link 18 with the arm 20. Therefore, there must be a slight amount of looseness in the pivotal connection between said link

and said arm, or the parts would bind. In the former device shown in application Serial No. 320,179, a slot of slightly greater length than the diameter of the pivot pin which projects from the arm 20, has been provided and a spring is connected to an ear extending from the link 18 so as to normally hold the pin in one end of the slot. This slot has to be made of exactly the proper size in order not to bind and at the same time not to permit too much play of the parts. The manufacture of the operating connection, is therefore rendered somewhat difficult because of the exactness of the manufacturing requirements. It will be obvious that if the slot is of insufficient size the parts will not move freely while if the size of the slot is too great the suction imparted to the butterfly will not be that desired.

According to the present invention, means have been provided to adjust the effective length of this slot so that if in the manufacturing of the parts, the slot is not formed of exactly the correct size, an adjustment may be made to regulate the effective size of the slot to secure the exact movement of the butterfly desired. To this end an ear 50 is provided which extends from the link 18, as shown in the drawings, and threaded in such ear is a screw 52, which extends upwardly toward the pivot pin 54, projecting above the lower edge of the slot 56, which is of slightly larger size than the pin, as shown in Fig. 2. The screw 52 is provided with a slot 58 in one end by means of which it may be turned so as to regulate the effective length of the slot and the degree of clearance at the pivot pin while a lock nut 60 is provided to lock said screw in adjusted position. A spring 62 is connected at one end to the ear 50 and the other end is hooked over the pin 54, said spring tending always to pull the pin 54 toward the end of the screw 52. Obviously, the slot 56 may be made somewhat larger than necessary and regulated as to its length by means of the adjustable pin disclosed, to form a slot of exactly the right size to secure proper motion of the parts which permits the parts to be manufactured with less degree of accuracy than in the earlier device but enables the clearance to be adjusted exactly as desired, thus simplifying the manufacturing problems and at the same time securing more accurate operation.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A carburetor for internal combustion engines comprising a mixture passage, means for supplying fuel and air thereto, a throttle, an auxiliary air valve for supplying additional air to said mixture passage as the throttle is opened, means for operating said auxiliary air valve by the throttle, said means including an operating member connected to the auxiliary air valve and so constructed that the point of connection moves in a substantially arcuate path when the valve is moved, means providing limited clearance at said point of connection, and means for adjusting the amount of clearance.

2. A carburetor for internal combustion engines comprising a mixture passage, means for supplying fuel and air thereto, a throttle, an auxiliary air valve for supplying additional air to said mixture passage, means for operating said auxiliary

air valve by the throttle, a pin and slot connection between the operating member and the auxiliary air valve and means for adjusting the effective length of the slot.

3. A carburetor for internal combustion engines comprising a primary mixture passage, means for admitting fuel and air thereto, a secondary mixing chamber into which said primary mixture passage is adapted to deliver a primary mixture of fuel and air, a primary throttle regulating the flow of primary mixture, a secondary air passage adapted to supply air to the secondary mixing chamber, a secondary throttle in said air passage, an operating member connecting said primary and secondary throttles for concomitant operation, the point of connection of said operating member with said secondary throttle being adapted to move in a substantially arcuate path as said secondary throttle is moved, means providing limited clearance at the point of connection of said operating member with the secondary throttle, and means for adjusting the amount of clearance.

4. A carburetor for internal combustion engines comprising a primary mixture passage, means for admitting fuel and air thereto, a secondary mixing chamber into which said primary mixture passage is adapted to deliver a primary mixture of fuel and air, a primary throttle regulating the flow of primary mixture, a secondary air passage adapted to supply air to the secondary mixing chamber, a secondary throttle in said air passage, an operating member connecting said primary and secondary throttles for concomitant operation, the point of connection of said operating member with said secondary throttle being adapted to move in a substantially arcuate path as said secondary throttle is moved, means providing sufficient clearance at the point of connection of said operating member with the secondary throttle to prevent binding of the parts, and means to adjust the degree of clearance whereby excess of lost motion is prevented.

5. A carburetor for internal combustion engines comprising a primary mixture passage, means for admitting fuel and air thereto, a secondary mixing chamber into which said primary mixture passage is adapted to deliver a primary mixture of fuel and air, a primary throttle regulating the flow of primary mixture, a secondary air passage adapted to supply air to the secondary mixing chamber, a secondary throttle in said air passage, an operating member extending from said primary throttle to said secondary throttle, a pin and slot connection between the operating member and the secondary throttle and means for adjusting the effective length of the slot.

6. A carburetor for internal combustion engines comprising a primary mixture passage, means for admitting fuel and air thereto, a secondary mixing chamber into which said primary mixture passage is adapted to deliver a primary mixture of fuel and air, a primary throttle regulating the flow of primary mixture, a secondary air passage adapted to supply air to the secondary mixing chamber, a secondary throttle in said air passage, an operating member extending from said primary throttle to said secondary throttle and adapted to move about its point of connection with the secondary throttle as a pivot during a part of the movement of the primary throttle, means for providing limited clearance at the point of connection of said member with the secondary throttle and means for adjusting the amount of clearance.

7. A carburetor for internal combustion engines comprising a primary mixture passage, means for admitting fuel and air thereto, a secondary mixing chamber into which said primary mixture passage is adapted to deliver a primary mixture of fuel and air, a primary throttle regulating the flow of primary mixture, a secondary air passage adapted to supply air to the secondary mixing chamber, a secondary throttle in said air passage, an operating member extending from said primary throttle to said secondary throttle and adapted to move about its point of connection with the secondary throttle as a pivot during a part of the movement of the primary throttle without imparting any movement to the secondary throttle, means for providing limited clearance at the point of connection of said member with the secondary throttle and means for adjusting the amount of clearance.

8. A carburetor for internal combustion engines comprising a primary mixture passage, means for admitting fuel and air thereto, a secondary mixing chamber into which said primary mixture passage is adapted to deliver a primary mixture of fuel and air, a primary throttle regulating the flow of primary mixture, a secondary air passage adapted to supply air to the secondary mixing chamber, a secondary throttle in said air passage, an operating member extending from said primary throttle to said secondary throttle and adapted to move about its point of connection with the secondary throttle as a pivot during a part of the movement of the primary throttle, said operating member being so connected to the

primary throttle that the point of connection therewith moves in the arc of a circle which is nearly concentric with the point of connection of said operating member with the secondary throttle during a part of the movement of the primary throttle, means for providing clearance at the point of connection of the operating member with the secondary throttle and means for adjusting the amount of clearance.

9. A carburetor for internal combustion engines comprising a primary mixture passage, means for admitting fuel and air thereto, a secondary mixing chamber into which said primary mixture passage is adapted to deliver a primary mixture of fuel and air, a primary throttle regulating the flow of primary mixture, a secondary air passage adapted to supply air to the secondary mixing chamber, a secondary throttle in said air passage, an operating member extending from said primary throttle to said secondary throttle and adapted to move about its point of connection with the secondary throttle as a pivot during a part of the movement of the primary throttle, said operating member being so connected to the primary throttle that the point of connection therewith moves in the arc of a circle which is nearly concentric with the point of connection of said operating member with the secondary throttle during a part of the movement of the primary throttle, a pin and slot connection between the operating member and the secondary throttle and means for adjusting the length of the slot.

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