

June 22, 1937.

H. W. HESS

2,084,489

CARBURETOR

Filed Sept. 6, 1933

3 Sheets-Sheet 1

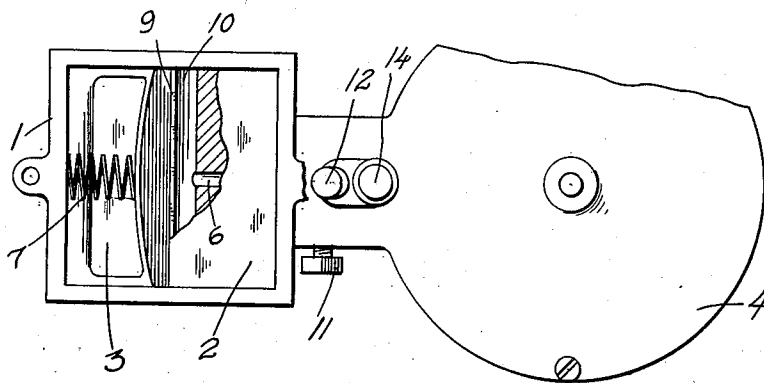


Fig. II.

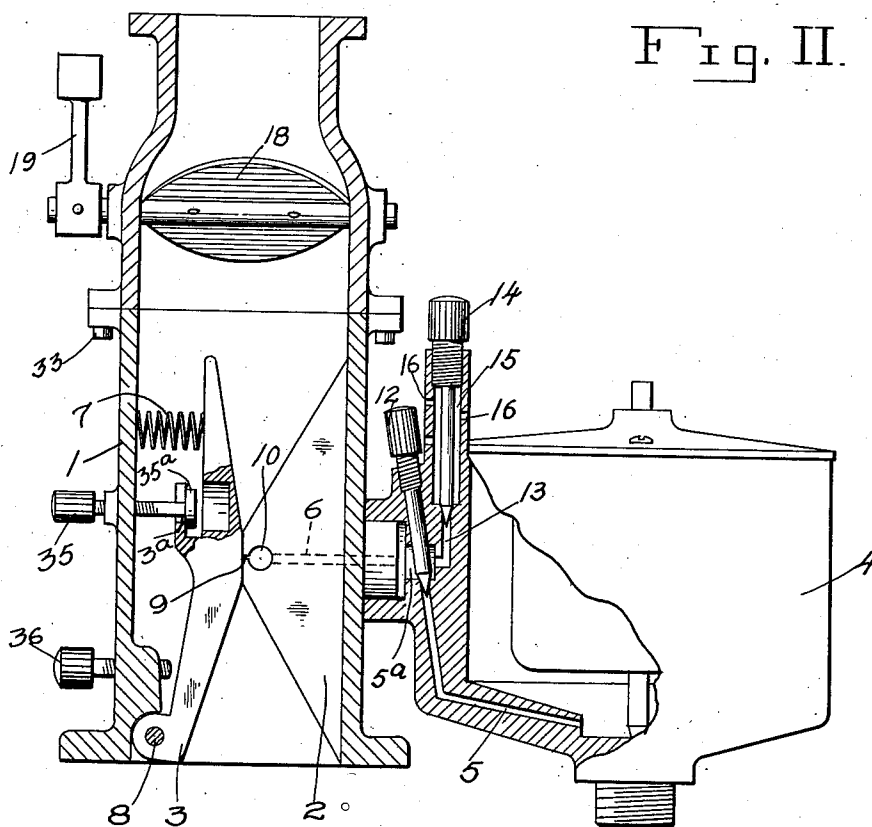


Fig. I.

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Fig. IV.

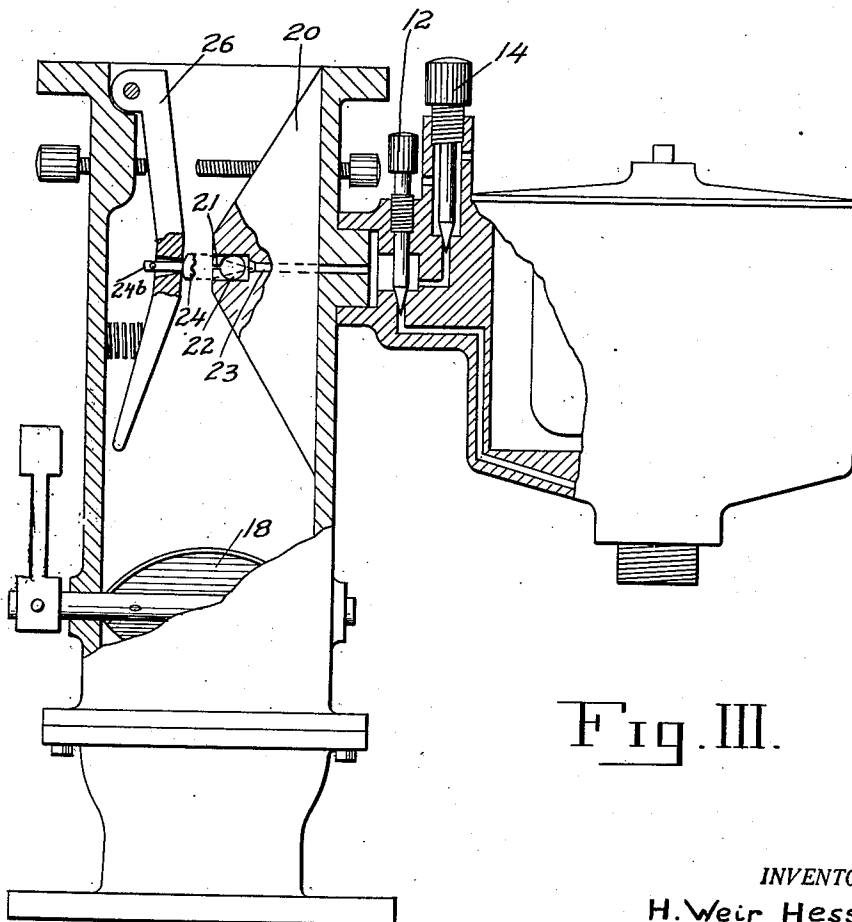
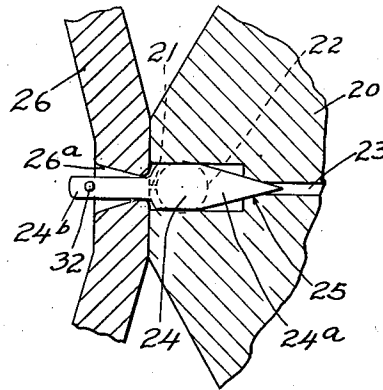


Fig. III.

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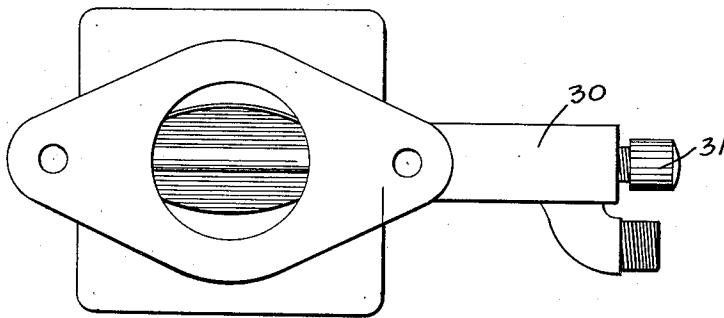


Fig. V.

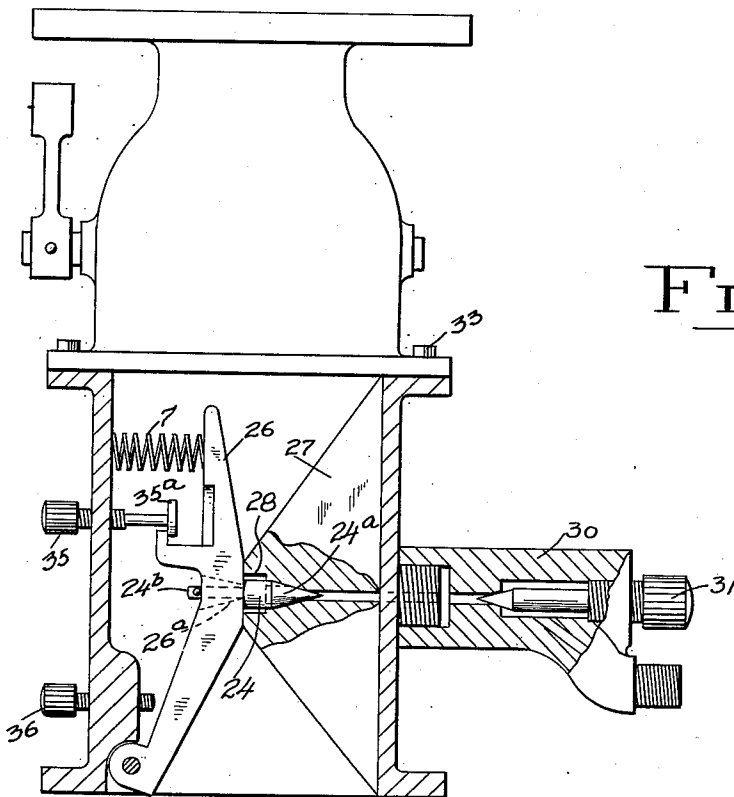


Fig. VI.

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UNITED STATES PATENT OFFICE

2,084,489

CARBURETOR

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Application September 6, 1933, Serial No. 688,295

13 Claims. (Cl. 261—50)

The present invention has relation to carburetors for internal combustion engines.

The general object of my invention is to provide a carburetor for use in connection with internal combustion engines of various types, and which, by simple, manual adjustments or minor replacements, may be adapted for use in connection with either gaseous or liquid fuel.

To this end, the invention consists in the novel combination hereinafter fully described and illustrated in the appended drawings, of which:

Fig. I is a side elevation partly in section of a structure embodying the invention,

Fig. II is a substantially corresponding plan view of the structure with parts broken away for the sake of clearness, and

Figs. III, IV, V, and VI illustrate modifications, the importance of which will hereinafter be fully explained.

Referring in the first instance to Figs. I and II, the numeral 1 designates the casing of my improved carburetor. Within the lower rectangular portion of this casing, which constitutes the mixing chamber of the carburetor, are placed a fixed member 2 and a pivotally mounted member 3. These two members combine to form the Venturi passage of my carburetor. To the side of the casing is suitably secured a float chamber 4, from which fuel passages 5, 6 extend to the face of the fixed Venturi member 2. A suitable spring 7 is employed normally to maintain the pivoted member 3 in contact with the fixed member to close the passage through the mixing chamber.

From this brief description, it should be clear to those versed in the art that suction from the engine cylinder on the intake stroke causes the member 3 to swing on its pivot 8, thereby to withdraw from the fixed member, and to open a passage between the two members for the in-rushing air. Now it is noticed that there is, in the face of the fixed member 6, a transverse slot 9, into which the fuel duct 6 discharges. Behind this slot, and parallel therewith, is a relatively large, cylindrical chamber 10, into which the fuel from the float chamber, mixed with air from the vents 16, is first discharged, subsequently to make its way through the slot 9 to the passage between the Venturi members.

The float chamber 4 may be of any well-known construction, and may be attached to the carburetor casing in any suitable manner, as by means of one or more set screws 11. The fuel duct 5 terminates in an enlarged chamber 5^a, and the orifice of the duct is, at this point, controlled

by a needle valve 12. A second duct 13 communicates with the chamber 5^a, and this duct is controlled by a needle valve 14. An air space 15 is shown to encompass the stem of this needle valve, and a plurality of vents 16 connect this space with the atmosphere.

In view of the foregoing, it is seen that, when the needle valves 12 and 14 are open, there is provided not only a passage for liquid fuel to the mixing chamber, but also an air passage for the purpose of partially carburizing the fuel before it reaches the mixing chamber. It should also be clear to those versed in the art, that the relative adjustment of the two needle valves is of great importance in adapting the carburetor of my invention to the various types of internal combustion engines known in the art.

It was above stated, that the slot 9 extends across the face of the fixed member 2, and that it communicates with the relatively large, cylindrical chamber 10. This slot should be very fine, and, in the average sized carburetor, may be as narrow as about six-one thousandths of an inch. It should also be as short as commercially practicable, measuring the distance from the face of the member to the chamber 10, although in the drawings, for the sake of clearness, it has been shown both wide and long. This slot is set at right angles to the direction of air current, and it will be found that the partly carburized fuel is fairly evenly distributed throughout the length of the slot due to the fact that this fuel, upon reaching the cylindrical chamber 10, becomes caught in a whirling motion of the air within this chamber caused by the suction of the motor. As the slot is positioned at right angles to the passage of the air, it is seen that the uniformly distributed, semi-carburized fuel is evenly absorbed by the air throughout the entire width of the mixing chamber.

In the casing, above the mixing chamber, is shown seated a butterfly valve 18 which, through the medium of a lever 19, is connected for manual operation in any customary manner.

It was above stated, that the float chamber 4 is attachable to the carburetor casing in any suitable manner, and, being attachable, it is to be noted that the carburetor casing may be turned upside down, as indicated in Fig. III, without disturbing the relation of the float chamber to the carburetor. In this manner, it is seen that I provide, by a simple, mechanical manipulation, an up-draft or a down-draft carburetor.

Upon examination of Figs. I and II, it is noted that the carburetor casing is rectangular in cross

section, and that in this particular case, it is made square for the sake of convenience and economy. I am, in this manner, enabled to adopt the peculiar Venturi construction described. The

5 Venturi tubes ordinarily used are conical, and do not lend themselves readily to adjustment as to size, but the Venturi passage obtained through the medium of my invention not only yields itself admirably to such adjustment, but
10 also permits of automatic adjustment relative to the suction requirements of the engine. In my earlier experiments, I made use of a pair of pivoted Venturi members, but found it difficult to attain perfect balance between the two mem-
15 bers and perfect control of the duct from the float chamber, besides making the structure much more expensive to manufacture. By continued experimenting, I finally arrived at the construction here shown in which one member is
20 rigidly mounted in the casing, and the other movable relative to this member. The spring 7 is important, and should be correctly calibrated relative to the force of the air drawn through the carburetor to produce a Venturi opening best
25 suited to the size or type of engine served.

The structure of Fig. III may be identically like the one above described, but it includes additional features, the importance of which will now be explained. The fixed Venturi member 20 is
30 made with a transverse slot 21, and an intercommunicating, cylindrical chamber 22, both of which may remain as above described, but there is provided in addition, in the center of the member and in continued alinement with the fuel duct
35 23, a conical valve seat 25 of a size to receive a needle valve 24 of the pivoted Venturi member 26, see also Fig. IV. When the latter is caused to swing on its pivot, by the inrushing air, it is noticed that this needle valve withdraws from its
40 seat to permit fuel to be drawn through the chamber 22 and the slit 21 into the Venturi passage. In this manner, an additional and automatic fuel control is provided, by means of which the correct proportion of fuel to air may
45 always be automatically maintained. This additional control is particularly important in carburetors where the auxiliary air supply, controlled by the needle valve 14, is omitted, or where, in connection with certain types of engines, it is
50 found desirable to maintain this valve closed.

The structure of Figs. V and VI is designed for use in connection with gaseous fuel. The carburetor proper may, in this case, remain substantially as above described, except that it is
55 not necessary, on account of the gaseous nature of the fuel, to retain the thin slit in the fixed Venturi member 27, but this slit may, if desired, be widened to the size of the cylindrical chamber 28. In place of the float chamber, I show a simple
60 gas connection 30 in which a needle valve 31 is seated manually to control the volume of the gas flow. In all other respects the structure may remain substantially like the device of Figs. II and III.

65 The particular means of mounting the needle valve 24 in the pivoted member 26 is not important, so long as the valve retains its freedom of axial movement in the fixed member as the pivoted member swings back and forth. In the
70 drawings, the valve 24 is shown comprising the cone-shaped portion 24^a, terminating in a flattened portion 24^b, which is seated to ride in a flared perforation 26^a of the pivoted member. A pin 32, or its equivalent, is introduced to pre-
75 vent axial movement of the valve in the pivoted

member. This construction is here adopted for the sake of clearness, but in actual practice may, of course, be considerably refined mechanically.

It is well to make the carburetor casing in two parts, bolted together as indicated at 33. The
5 main portion of the casing, and its fuel connections, may be used in connection with all ordinary engine sizes and types, except that the passage from the butterfly valve to the intake manifold should be varied to suit the size of engine served.
10 Where the casing is made in two parts, as just described, this is readily accomplished by merely disconnecting the end portion of the casing and substituting one of the desired size. This size modification is made even more simple if the
15 casing is separated below the butterfly valve as indicated in Fig. III.

Under ordinary conditions, it is preferred to maintain the Venturi passage substantially closed while the engine is idling. At times, however, it
20 may be desirable to maintain this passage slightly open while starting or idling the motor. For the purpose of such adjustment, I have shown a screw 35 seated in the casing to extend into the carburetor and made with a head 35^a, riding in a
25 slot 3^a of the pivoted Venturi member 3, see Fig. I. By manually rotating this screw, any desired adjustment of the pivot member may be readily effected.

Because the structure of my invention is de-
30 signed for use in connection with engines of various sizes and types, it may be found, in some instances, that the pressure of the inrushing air causes the Venturi passage to open further than
35 required for admission of a correct, sufficient flow of fuel. For this reason, it may at times be advisable to provide means for limiting the opening movement of the pivoted member, and such means is herein shown to consist of a screw 36,
40 seated in the casing to extend towards the outer face of the pivoted member.

From the foregoing description, it should be clear to those versed in the art, that my object is to provide a substantially universal carburetor. By this, I mean, the structure which, by simple,
45 mechanical adjustments or replacements, without in any wise altering the principle of its construction or operation, may be adapted to serve internal combustion engines of various sizes and types. The specific constructions here described
50 are merely illustrative of my invention, and may be modified, so long as I remain within the scope of the following claims.

I claim:

1. In a carburetor provided with a mixing
55 chamber rectangular in cross section, a Venturi mechanism comprising a fixed Venturi member and a movable Venturi member yieldingly held in contact with the fixed member, the two mem-
60 bers being throughout their length wide enough to reach across the chamber, the contacting surfaces between the members being positioned intermediate the walls of the mixing chamber and in direction of the flow of air through the carburetor, the fixed member being provided with
65 a fuel duct at right angles to said contacting surfaces and discharging through a slit in the surface of the stationary member transversely extending across the entire width of the member, there being behind the said slit a cylindrical bore
70 for distributing fuel from the said duct evenly throughout the length of the said slit.

2. In a carburetor, the combination with a manually operable valve for controlling the fuel passage from said carburetor, and manually con- 75

controlled means for admitting fuel to the mixing chamber of the carburetor, of a Venturi mechanism comprising two solid nonflexible members having opposed frusto-pyramidal faces relatively movable to open a Venturi passage lengthwise through the carburetor, a spring urging said members together, there being a duct in one of said members for carrying the fuel from said manually adjusted fuel control to the passage between the said members in a direction perpendicular to the flow through said passage, the relative movement of the said members being effected and controlled by the volume of air capable of being drawn through the carburetor relative to the position of the said valve against the tension of said spring.

3. A carburetor provided with a mixing chamber rectangular in cross section, the passage through the said chamber being normally closed by a pair of frusto pyramidal members having the full width of said passage and being positioned with their normally contacting apex surfaces parallel to the flow of air through the carburetor, one of said members being stationary and having a fuel duct perpendicular to its contact surface, there being in said surface a thin slit extending transversely across the member into which the said duct discharges, the other member being pivotally mounted and capable of yielding to the pressure of air drawn into the carburetor to open a Venturi passage through the carburetor, means for yieldingly urging said member against the stationary member, and manually operable means for controlling the movement of said member.

4. In a carburetor, a Venturi mechanism comprising a stationary member and a member movable by the pressure of air drawn into the carburetor to open a Venturi passage through the carburetor, a float chamber, manually adjustable means for controlling a fuel duct from said float chamber through the stationary member to the passage between the two Venturi members, and manually adjustable means for admitting air into the said duct, there being in the face of said stationary member a thin slit and a cylindrical chamber behind said slit in which the partly mixed fuel and air passing through said duct is caused to whirl by the suction through the carburetor and to be evenly drawn throughout the length of the slit into the Venturi passage between the members.

5. In a carburetor, a body having a rectangular mixing chamber, a stationary Venturi member occupying the full width of the chamber and having a frusto pyramidal face, a second Venturi member also of the width of the chamber and pivotally mounted at one end of the chamber, said second member having a substantially corresponding face, a spring urging the apices of the two members together, means for limiting the movement of said member on its pivot, a float chamber mountable on a lateral projection of the body and communicating with the passage between the members through a thin transverse slit in said projection and stationary member, and means carried by said pivoted member for controlling said passage.

6. In a carburetor having its mixing chamber rectangular in cross section, a fixed Venturi member in said chamber, a pivotally mounted Venturi member in the chamber, the two members having opposed frusto pyramidal faces, a spring urging the apex surface of one member towards the other to close the passage through

the chamber, the fixed member having a fuel passage leading to its apical surface, and a member carried by said pivoted member for engaging said passage to control the admission of fuel and for evenly distributing the premixed fuel over the entire width of the Venturi passage.

7. In a carburetor having a rectangular mixing chamber, a fixed Venturi member in said chamber, a pivotally mounted Venturi member in the chamber, the two members having opposed frusto pyramidal faces, a spring urging the apex surface of one member towards the other to close the passage through the chamber, means for limiting the movement of said pivoted member, and an element carried by said pivoted member for engaging a fuel passage through said fixed member to control the admission of fuel to the chamber.

8. In a carburetor, a float chamber, a rectangular tubular body fitted for attachment to said float chamber and reversible relative thereto, Venturi members having opposed frusto-pyramidal faces seatable in said body, there being a thin transverse slit in the face of one of said members for carrying fuel from said float chamber and for evenly distributing the fuel between said faces, and means yieldingly maintaining the frusta of said members in contact.

9. In a carburetor, a float chamber, a rectangular tubular body fitted for attachment to said float chamber and reversible relative thereto, Venturi members seatable in said body, means yieldingly maintaining said members in contact to close the passage through the body, there being a thin transverse slit in the face of one of said members for carrying fuel from said float chamber and for evenly distributing the fuel between said faces, and manually operable means for controlling the passage from the body.

10. In a carburetor, a float chamber, a rectangular tubular body fitted for attachment to said float chamber and reversible relative thereto, Venturi members having opposed frusto-pyramidal faces seatable in said body, there being a thin transverse slit in the face of one of said members for carrying fuel from said float chamber and for evenly distributing the fuel between said faces, means yieldingly maintaining the faces of said members in contact to close the passage through the body, a tubular extension mountable on one end of the body, and a butterfly valve in said extension.

11. In a carburetor provided with a rectangular Venturi passage and a duct leading into said passage, means actuated by the force of the air drawn through the carburetor on the suction stroke of the engine for adjusting the size of said passage relative to the volume of the inflowing air, and means for premixing the fuel passing through said duct and for evenly distributing the premixed fuel over the entire width of the Venturi passage.

12. In a carburetor, a Venturi mechanism capable of yielding to the force of the air drawn through the carburetor to adjust a Venturi passage through the carburetor relative to the correct fuel delivery required of the carburetor, and a float chamber communicating with said passage through a thin transverse slit, there being behind said slit a cylindrical chamber for premixing the fuel drawn into said passage.

13. In a carburetor, a manually operable valve for controlling the passage from said carburetor, a Venturi mechanism in the mixing chamber of the carburetor, said mechanism comprising a

stationary member through which extends a duct terminating in a thin orifice slit arranged transversely of the mixing chamber for carrying fuel evenly distributed to the mixing chamber, a solid 5 non-flexible member pivotally mounted for movement relative to said stationary member, said members having opposed frusto-pyramidal faces, and resilient means urging said movable member against the said stationary member to

close the passage through the mixing chamber and the discharge opening of the said duct, the said movable member being capable of yielding to the pressure of air drawn through the carburetor against the tension of said resilient member thereby to swing it on its pivot to open the 5 Venturi passage and to uncover the orifice of said duct.

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