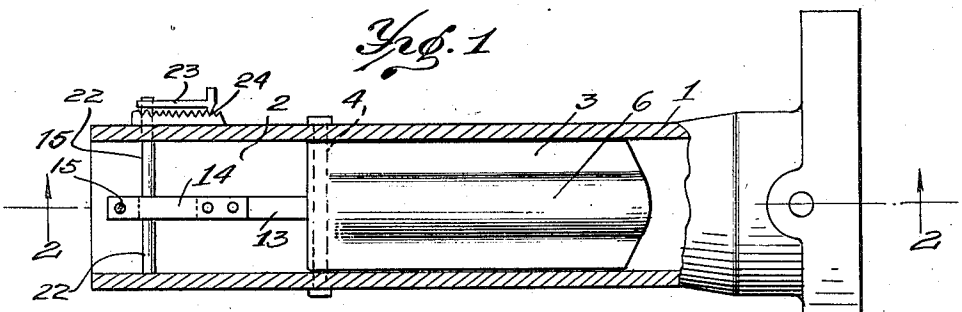
H. G. RENNER.

CARBURETOR.

APPLICATION FILED JULY 24, 1920.

1,428,558. Patented Sept. 12, 1922.

Fig. 1



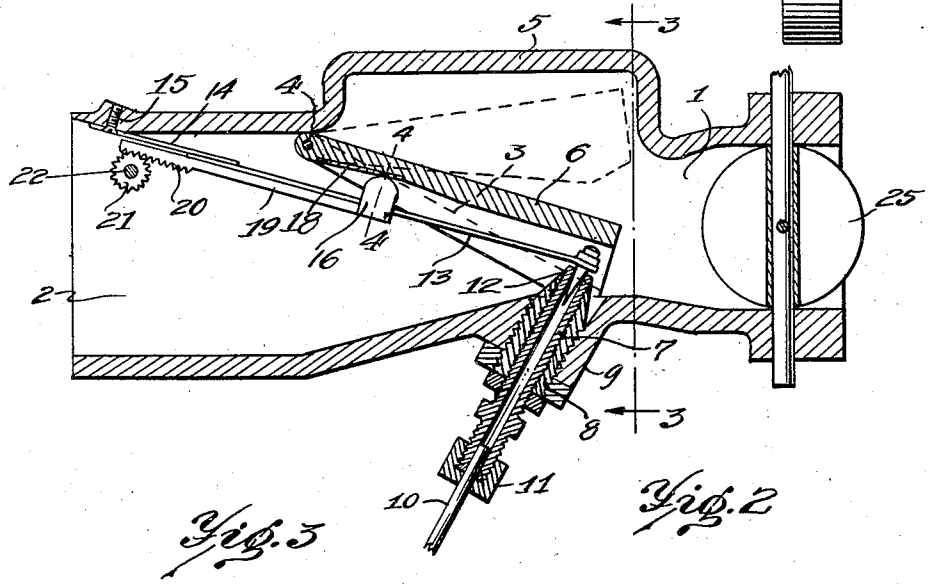
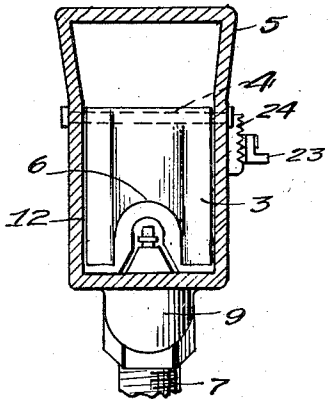


Fig. 2

Fig. 3



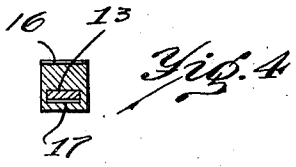


Fig. 4

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UNITED STATES PATENT OFFICE.

HAROLD G. RENNER, OF DETROIT, MICHIGAN.

CARBURETOR.

Application filed July 24, 1920. Serial No. 398,619.

To all whom it may concern:

Be it known that I, HAROLD G. RENNER, a subject of the King of Great Britain, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Carburetor, of which the following is a specification.

This invention relates to carburetors for internal combustion engines, and particularly for motor vehicle engines.

It is an object of the invention to provide a carburetor in which a proper proportioning of the mixture of air and hydrocarbon fuel is automatically accomplished.

A further object is to provide means for varying said proportions through a wide range of adjustment to compensate for variations in the working conditions of the engine.

In attaining these objects the invention contemplates the employment of a flap valve arranged to be subjected to pressure of the incoming air and automatically opening more or less according as said pressure is increased or diminished, said flap valve additionally functioning to automatically control a needle valve regulating the liquid fuel feed, which valve is subjected to pressure by the flap valve tending to minimize the flow of liquid fuel when the flap valve is closed, and which is furthermore spring urged to follow the flap valve as the latter opens, so as to correspondingly increase the liquid fuel feed with the air admitted by said valve.

A preferred embodiment of the invention is hereinafter described and is illustrated in the accompanying drawing, wherein,

Fig. 1 is a plan view of the improved carburetor, partially in horizontal section.

Fig. 2 is a vertical sectional view of the same, the section being taken on line 2—2 of Fig. 1.

Fig. 3 is a cross-section view of the carburetor taken on line 3—3 of Fig. 2.

Fig. 4 is a cross section taken on line 4—4 of Fig. 2, showing the flap valve and the means for controlling the movements of the needle valve by said flap valve.

In these views the reference character 1 designates the mixing chamber of the carburetor, and 2 the air inlet thereof, said mixing chamber and air inlet being portions of a continuous horizontal passage. A flap valve 3 is pivoted upon a pin 4 in the upper portion of said passage and, when the engine is idling, extends diagonally across the passage in the direction of the flow of air, as shown in full lines in Fig. 2. Said valve is of sufficient weight to resist such uplifting force as is exerted by the small current of air delivered to the mixing chamber when the engine is idling, but rises responsive to the stronger air current flowing when the engine is under load, assuming the completely raised position indicated in dash lines in Fig. 2 when the engine is under substantially full load. The carburetor casing is formed upon its top with an upward extension 5 serving to receive the valve 3 when the same is in raised position. A portion 6 of the valve, extending centrally with respect to the side edges, is arched transversely of the valve, as is best seen in Fig. 3, the arch having a maximum height at the free end of the valve and being reduced in height as it extends toward the pivotal end, at which end said arch vanishes.

Mounted in the bottom of the carburetor casing is a liquid fuel nozzle 7 which discharges upwardly beneath the free end of the valve 3, inclining somewhat in the direction of the flow of air and projecting within the arch 6. Said nozzle is threaded into a sleeve 8, which in turn has threaded engagement with a boss 9 formed on the bottom of the casing. 10 indicates the liquid fuel supply pipe which is connected to the nozzle 7 by a pipe union 11 or other suitable means. The nozzle 7 is controlled by a needle valve 12 which is carried by the free end of a rock arm comprising a strip of metal 13 extending substantially parallel to the valve 3 through the arch thereof and a leaf spring 14 secured to the other end of said strip and attached by a screw 15 to the top wall of the air inlet adjacent the mouth thereof. The connection between said spring and strip may be established by soldering, brazing, or in any other suitable manner. Said spring is stressed to urge the rock arm 13 and needle valve 12 upwardly, but not with sufficient force to overcome the weight of the valve 3, which acts upon the strip 13 through a block 16 apertured at 17 to engage said strip and having its top rounded to engage a bearing plate 18 carried by the valve 3. The block 16 is adjustable longitudinally of the strip 13, by means of a bar 19 extending beneath said strip and rigidly secured at one end to said

block, the other end of said bar being formed with a rack 20 adjacent the fixed end of the rock arm 13—14. Said rack is engaged by a pinion 21 mounted fast upon a horizontal shaft 22, which shaft extends across the top portion of the air inlet 2 and is journaled in the sides of the carburetor casing. One end of said shaft is provided exteriorly of said casing with a handle 23 which is adapted to be held in various positions of adjustment by engagement with a segmental rack 24 of ratchet teeth upon the adjacent wall of the casing. 25 is the usual throttle member controlling the outlet of the mixing chamber.

Considering now the operation of the described carburetor, when the engine associated with said carburetor is idling the valve 3 occupies the position shown in Fig. 2, resting upon the bottom of the passage 1—2, and allowing a passage of air only through the comparatively restricted opening provided by the arch member 6. Owing to the location of the nozzle 7 beneath the free end of the valve 3, and to the downward inclination of said valve toward said end, an effect somewhat similar to that of a Venturi tube is secured under idling conditions so as to most effectively induce a discharge of the fuel from the nozzle and a mixture thereof with the air. The sleeve 8 has a tapering upper end portion which projects into the arched passage 6, increasing the restriction of said passage and consequently increasing the aspirating effect. By adjusting said sleeve longitudinally within the boss 9, the flow of air permitted under idling conditions may be increased or diminished. When the engine with which the carburetor is associated is under load, the throttle 25 will be opened to produce an increased pressure drop in the mixing chamber 1, and the weight of the valve 3 will be overcome by the air pressure thereupon so that said valve will swing upward to an extent determined by the pressure drop, and will correspondingly increase the flow of air. The described movement of valve 3 will automatically effect an upward shifting of the needle valve 12 so as to increase the discharge of liquid fuel to correspond to the increased flow of air. When the pressure drop is substantially a maximum, the valve 3 will rise to the position which is indicated in dash lines in Fig. 2, inducing the maximum liquid fuel discharge obtainable for any definite position of manual adjustment of the needle valve. The block 16, bar 19, rack 20, pinion 21, shaft 22 and handle 23 form a means for effecting such a manual adjustment. Thus upon turning of said handle the pinion is correspondingly rotated and the bar 19 is shifted longitudinally, moving the block 16 to and from the pivot of the valve 3. The nearer that said block approaches said pivot, the less will be the angular movement of the rock-arm 13—14, resulting from any swinging of the valve 3, while an increase in the distance of the block from said pivot correspondingly increases the response of the rock arm 13—14 to any movement of the valve 3. Preferably the strip 13 occupies a slightly inclined relation to the bearing plate 18, such that when the bearing member 16 is shifted toward the pivot 4, said member exerts a slight down thrust upon said strip which will, when the air valve is in idling position, cause a full seating of the needle valve in the nozzle upon adjustment of the bearing block in close proximity to the pivot 4. Thus it is clear that, while an automatic proportioning of the liquid fuel to the air is accomplished by the invention regardless of changes in pressure drop, this proportioning may be varied through a considerable range, at will of the operator, by turning the arm 23 and correspondingly shifting the block 16.

The simplicity of the described construction is favorable to a low manufacturing cost and minimizes the likelihood of a derangement of parts or similar trouble during operation.

I claim—

1. In a carburetor, the combination with a casing having a mixing passage and an air inlet thereto, of a liquid fuel nozzle opening into said mixing passage, a needle valve controlling said nozzle, a pivotal valve subjected to pressure of the incoming air, a rock-arm carrying said needle valve, a bearing member movably embracing said arm and engaging said pivotal valve and means causing said rock arm to move in unison with said valve, whereby an opening of the air valve effects a predetermined opening of the needle valve.

2. In a carburetor, the combination with a casing having a mixing passage and an air inlet thereto, of a liquid fuel nozzle opening into said mixing passage, a needle valve controlling said nozzle, a rock-arm carrying said needle valve, a pivoted valve subjected to the pressure of the incoming air, means causing said rock-arm to follow said valve in its opening movement, and means for varying the angular movement of said rock-arm responsive to movement of the air valve.

3. In a carburetor, the combination with a casing having a mixing passage and an air inlet thereto, of a liquid fuel nozzle opening into said mixing passage, a needle valve controlling said nozzle, a rock-arm carrying said needle valve, a pivoted valve subjected to the pressure of the incoming air, means causing said rock-arm to move toward said valve in the direction of opening of the latter, a bearing member interposed between said rock-arm and air valve

and adjustable to or from the pivotal axis of said valve, and means for adjusting said bearing member.

4. In a carburetor, the combination with a casing having a mixing passage and an air inlet thereto, of a liquid fuel nozzle opening into said mixing passage, a needle valve controlling said nozzle, a rock-arm carrying said needle valve, a pivoted valve subjected to the pressure of the incoming air, a bearing member interposed between said rock-arm and air valve, a rack member connected to said bearing member and extending longitudinally of said rock-arm, a pinion engaging said rack closely adjacent the pivot of said rock-arm, and means for actuating said pinion to thereby adjust said bearing to or from the pivot of said air valve.

5. In a carburetor, the combination with a casing having a mixing passage and an air inlet thereto, of a liquid fuel nozzle opening into said mixing passage, a needle valve controlling said nozzle, a pivotal valve subjected to the pressure of the incoming air and having its free end arranged above said needle valve, a rock-arm carrying said needle valve extending beneath said air valve and having a greater radius than the air valve, a bearing member interposed between said rock-arm and air valve, and carried by one thereof, and means for adjusting said bearing to or from the pivot of the air valve.

6. In a carburetor, the combination with a casing having a mixing passage and an air inlet thereto, of a liquid fuel nozzle opening into said mixing passage through the bottom of said casing, an air valve pivoted in the upper portion of said casing and extending in closed position diagonally across the air inlet so as to adapt said valve to be opened by the pressure of inflowing air, said valve having a transversely arched portion extending radially thereof, within which portion said nozzle projects when the valve is lowered, said portion providing an air passage under idling conditions, a needle valve engaging said nozzle, and a rock-arm carrying said needle valve extending into said arched position of the air valve and having a radius greater than that of said air valve, said arm being constrained to move toward the air valve, a movable bearing member interposed between said rock-arm and air valve, and means for shifting said bearing member to or from the pivot of the air valve to vary the opening of the needle valve effected by an opening movement of the air valve.

7. In a carburetor, the combination with a casing having a mixing passage and an air inlet to said passage, of a pivotal flap valve arranged in the air inlet and normally restricting said inlet, a nozzle opening into said mixing passage, a control valve for said nozzle, a rock-arm carrying said nozzle control valve approximately parallel to said flap valve in the closed position thereof and flexibly mounted at an extended point from the pivot of the flap valve at substantially the same distance from the center of said air passage, a bearing member interposed between said flap valve and rock-arm, and means compelling the rock-arm to move in unison with the flap valve so far as is permitted by said bearing.

8. In a carburetor, the combination with a casing having a mixing passage and an air inlet thereto, of a liquid fuel nozzle opening into said mixing passage, a needle valve controlling said nozzle, a pivotal valve subjected to pressure of the incoming air, a rock arm carrying said needle valve, means causing said rock-arm to swing in unison with said valve, and means for varying the angular movement of the rock-arm with respect to the movement of said valve.

In testimony whereof I sign this specification.

HAROLD G. RENNER.