T. W. BURR.

CARBURETER.

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1,325,688.

Patented Dec. 23, 1919.

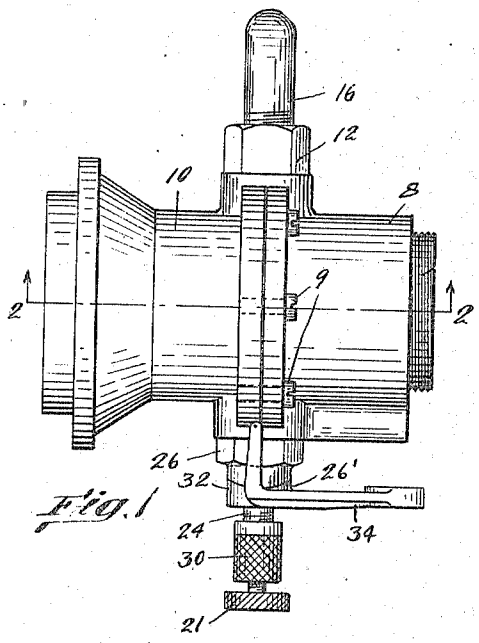


Fig. 1.

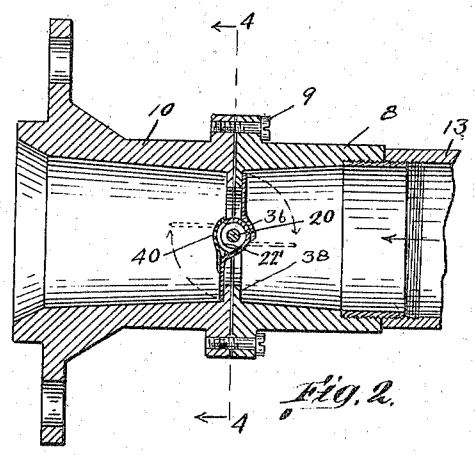


Fig. 2.

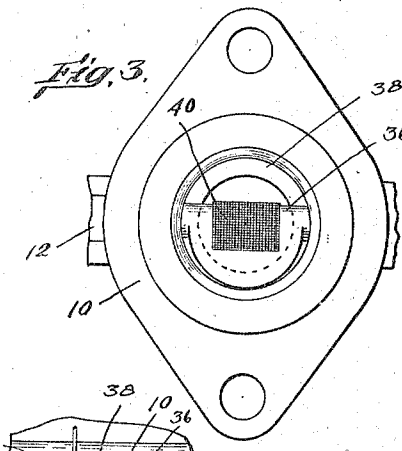


Fig. 3.

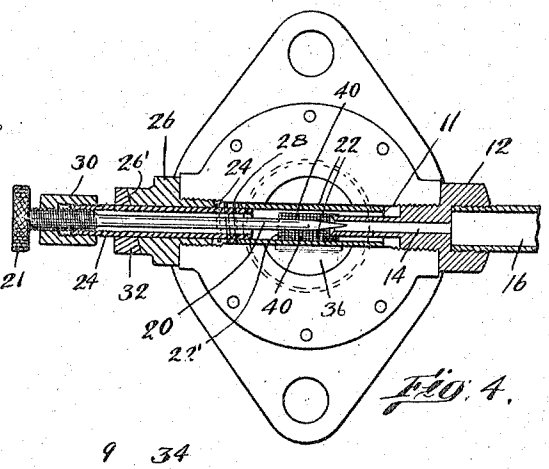


Fig. 4.

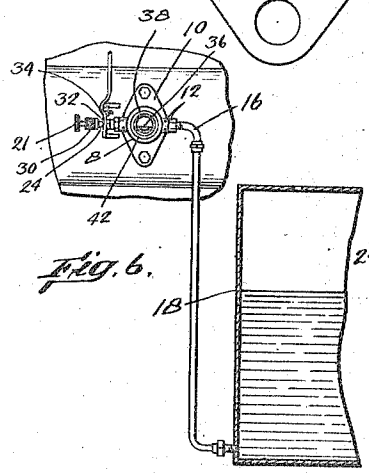


Fig. 6.

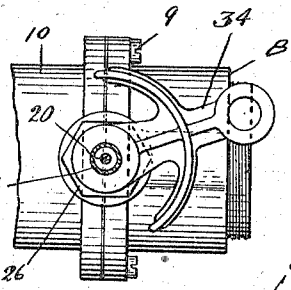


Fig. 5.

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UNITED STATES PATENT OFFICE.

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CARBURETER.

1,325,688. Specification of Letters Patent. Patented Dec. 23, 1919.

Application filed October 16, 1917. Serial No. 196,943.

To all whom it may concern:

Be it known that I, THOMAS W. BURR, a a citizen of the United States, and a resident of Stoneham, county of Middlesex, and State of Massachusetts, have invented an Improvement in Carbureters, of which the following is a specification.

This invention relates to that class of carbureters known as "suction feed" carbureters, or those in which the liquid fuel is lifted from a "low level" tank to the carbureter by the suction action of the engine, or motor.

While various types of carbureters of this class have been produced, they are, so far as I am aware, objectionable in that they involve the use of automatic valves, such as float and check valves, auxiliary tanks and other devices, all of which add materially to the cost of manufacture, and some of which require careful adjustment, and are liable to get out of order or require frequent readjustment. Moreover, these devices are, so far as I am aware, adapted to operate in approximately one position only, *i. e.*, the upright position, and are practically inoperative in any other position.

The object of my invention is to produce a suction feed carbureter which is adapted for practically all conditions of use which may be demanded, which will effectively mix the liquid fuel with the air, and approximately maintain the desired relative proportion of air and vaporized fuel under all variations in the throttle opening, so that high efficiency may be secured, and, further, to produce a carbureter which is of such simple construction that it may be made at a relatively small expense and which makes unnecessary the employment of automatic valves, such as float valves and check valves.

I accomplish these objects by the means shown in the accompanying drawing in which:—

Figure 1 is a plan view of a carbureter embodying my invention.

Fig. 2 is a sectional view, at line 2—2 of Fig. 1.

Fig. 3 is a view of the suction end of the device.

Fig. 4 is a sectional view at line 4—4 of Fig. 2.

Fig. 5 is a side view, and

Fig. 6 is a view showing the tank connections.

As shown in the drawing, the carbureter casing is composed of two tubular sections 8 and 10 which are provided with abutting flanges connected by screws 9, this arrangement being preferable, principally, on account of convenience in assembling, but, for the purposes of the invention, the casing members 8 and 10 will be considered as a single casing, one end of which, (the outer end of member 10) is designed to be connected to the engine or motor, and the other end of which is open to the atmosphere.

According to my invention an aperture 11 is bored entirely through the casing, transversely, in such a position that the center line thereof intersects the center line of the passage through the casing at right angles, and also lies in the plane of contact of the casing members 8 and 10.

A plug 12 is threaded into said aperture 11 and is provided with a longitudinal central passage 14, the outer end of which is chambered and threaded to receive the end of the supply pipe 16, which is connected thereto, and is extended downward to the bottom portion of a vented low level supply tank 18, to which it is also connected, as indicated in Fig. 6. The inner end of said plug is tapered or flared to provide a seat for a needle valve 20, as hereinafter described.

A tube 22 is closely fitted and rotatably and slidably mounted in the aperture 11, said tube being arranged to extend across the passageway through the casing, so that its ends bear at opposite sides of said passageway. The opposite end of said tube 22 from the plug 12 is rigidly connected to a tube 24, the latter being inserted therein so that the end of the tube 22 may act as a shoulder. The tube 24 is slidably and rotatably movable in the bore of a plug 26, threaded into, and rigidly held in the opposite end of the aperture 11 from the plug 12, and a coil spring 28 is arranged about the tube 24, and interposed between the inner end of said plug 26 and the shoulder formed by the adjacent end of tube 22. A cap nut 30 is threaded on the outer end of the tube 24 and the stem of the needle valve 20 extends through and is threaded in said nut and in the outer end of the tube 24, so that, by rotating the needle valve by its handle 21, its position with relation to its seat in the end of the plug 12 may be varied.

The screw threads between the nut 30

and the exterior of the tube 24 have a different pitch than those between the shank of the needle valve and the nut and the interior of said tube, so that, to adjust the needle valve, it is necessary to hold the nut from turning in a position in which the needle valve may be turned freely to the desired point. When this has been done the nut is released, and the needle valve is turned in slightly, immediately causing the threads to jam, so that the needle valve will be securely locked against becoming unscrewed or moved out of the position to which it was adjusted.

A cam 32 is rigidly secured on the tube 24, between the nut 30 and the outer end of plug 26, and correspondingly inclined faces are formed on the adjacent sides of said cam and plug, so that, when the cam is rotated from its initial position, shown in Fig. 4, the needle valve will be drawn away from its seat. An arm 34 is formed integral with the cam 32, to which the throttle operating means is connected.

A throttle valve 36, of the butterfly type, is rigidly mounted on the tube 22, within the casing passage, and an annular, internal rib 38 is formed within said passage, which substantially reduces or constricts the area thereof at this point and the opposite sides of which provide seats for the opposite portions of the throttle valve. It will be apparent that, when the tubes 22 and 24 are rotated by arm 34, the valve 36 will be opened or closed.

An opening 22′ is formed in the side of the tube 22, at the side of the throttle valve which, when closed, faces the suction side 10 of the carbureter casing, or portion of the casing which is connected to the engine, said opening being nearly as large as it is practicable to make it, extended nearly half way about the tube and lengthwise thereof, throughout nearly the entire diameter of the passage portion inclosed by the inner edge of the rib 38. Said opening is covered by a screen 40 the meshes of which are preferably very fine.

The air intake end of the casing may be directly open to the atmosphere or connected to a pipe 13 in which the air is heated from the engine exhaust. The passage through the casing is tapered from each end to the rib 38, as shown in Fig. 2.

In practice the needle valve is either adjusted so that, when the throttle valve is closed, the needle valve will be held in contact with its seat on the end of plug 12, or it is adjusted to permit a slight leakage, sufficient to run the engine without any load, the latter adjustment being preferable under most conditions. As the throttle valve 36 is swung from closed position by the arm 34, the cam 32 will ride on the cam face 26′ on plug 26, causing the tubes 22 and 24 (which, for the purposes of the invention, may be considered as a single continuous tube), to be moved longitudinally outward, so that they will carry the needle valve away from its seat on the end of the plug 12. This movement will cause the valve 36 to be moved edgewise to a corresponding extent, as it is opened, the distance between the edge of said valve and the side of the casing passage being sufficient to permit this movement. Opposite movement of the arm 34, to close the valve 36, will cause the needle valve to be moved back toward its seat by the action of the spring 28 on the tube 22.

With the above described construction, when the engine is to be started, if the needle valve is adjusted so that a slight flow is permitted past it when the throttle valve is nearly closed, it may or may not be necessary to open the throttle valve slightly before starting the engine, according to conditions. In any case these valves will permit leakage to some extent. The air pressure in the portion of the carbureter casing directly connected to the engine, will be immediately reduced, when the engine is turned over, so that atmospheric pressure on the surface of the fuel in the tank 18 will cause the fuel to be forced up through the pipe 16 past the needle valve, and into the tube 22 and then through the screen 40 into the casing, to which it will be delivered in atomized form.

When the throttle valve is moved to increase the fuel supply to the engine, the needle valve will be correspondingly moved, so that, as the air is drawn past the throttle, it will be mixed with the atomized fuel, as it is discharged through the screen 40, the quantity of fuel discharged being determined by the adjustment of the needle valve.

As the fuel must pass through the screen 40 before it is delivered to the casing, all drops or globules of it will be broken up into a finely divided state, so that the air and liquid will be thoroughly mixed, or the liquid will be effectively vaporized.

As the passage through the carbureter casing tapers, from the air inlet end to the port formed by rib 38, and then is gradually increased in size from said port, a Venturi tube is formed thereby which materially augments the suction action of the engine at the screened discharge opening, so that the effective suction action of the engine is sufficient to cause the fuel demands of the engine to be met under all conditions, the quantity delivered being determined by the adjustment of the needle valve.

With the above described construction, not only is the volume of air drawn past the throttle valve varied accordingly to the extent to which it is opened, but the parts are so constructed that the extent to which the needle valve is opened is also varied in cor-

responding proportion, so that, after the needle valve has once been adjusted, the corresponding proportion of air and fuel, necessary to produce an efficient explosive mixture, will be delivered to the carbureting chamber, in all open positions of the throttle valve. It will be obvious that the pitch of the cams and the relative sizes of the inlet and discharge ports are matters of design. For example, by varying the pitch of the cam at different points, the desired proportion of air and gas may be varied for different speeds, or extent of opening of the throttle valve.

All the advantages of a vacuum feed carbureter, as well as of an ordinary gravity feed carbureter, are thus secured, with the above described construction, without many of the well known attendant disadvantages of such devices. The present device makes unnecessary the use of either a float valve or an air inlet check valve, both of which require careful adjustment and are liable to get out of order.

I claim:—

1. A carbureter comprising a casing having an air passage and a liquid fuel supply passage leading thereto, a throttle valve for controlling said air passage, a stem for said valve, a needle valve extending longitudinally of said stem in position to control said fuel supply passage, and having a threaded connection with said stem, to permit adjustment thereof with relation to the stem, and means to cause simultaneous rotational and longitudinal movement of said stem to move said throttle valve rotatably, to control said air passage, and to move said needle valve longitudinally to control said fuel supply passage in corresponding relation.

2. A carbureter comprising a casing having an air passage, and a fuel supply passage opening to said air passage, a throttle valve for controlling said air passage, a stem for said valve mounted for rotational and longitudinal movements in the casing, a needle valve extending longitudinally of said stem in position to control said fuel supply passage, and having a threaded connection with said stem to permit longitudinal adjustment thereof with relation to the stem, means to rotate said stem to control said throttle valve and means, including a cam, to move said stem longitudinally in one direction or the other, according to the direction in which it is rotated, to move said needle valve in directions to vary the fuel supply in proportion to the extent to which the air supply is varied.

3. A carbureter comprising a casing having an air passage leading thereto, a tubular stem extending transversely of said passage and having a butterfly valve mounted thereon, a liquid fuel supply pipe having an outlet opening into said casing, in axial alinement with said stem, a needle valve axially disposed within said stem in position to control the flow from said opening and having a threaded connection with said stem, to permit adjustment therein, means to rotate said stem, and means, including a cam, for moving said stem longitudinally as it is rotated to vary the air and fuel supply correspondingly.

In testimony whereof, I have signed my name to this specification.

THOMAS W. BURR.

Witness:
LOUIS H. HARRIMAN.