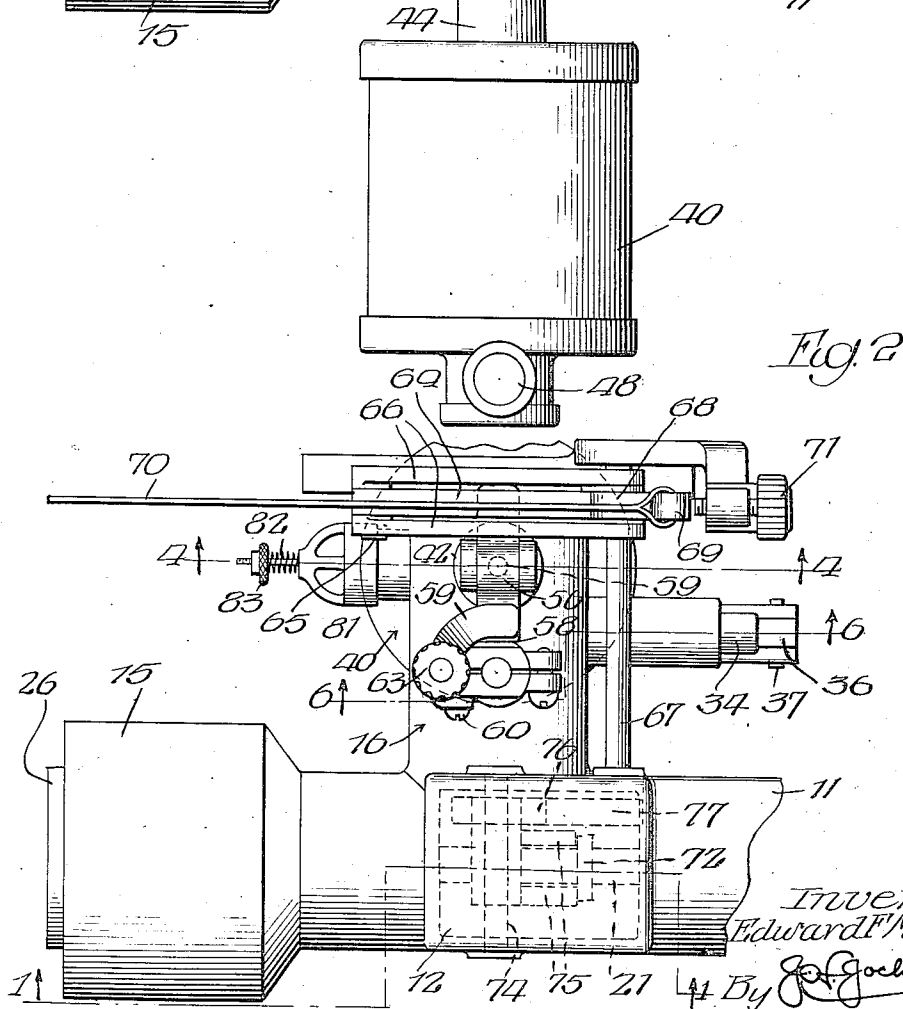
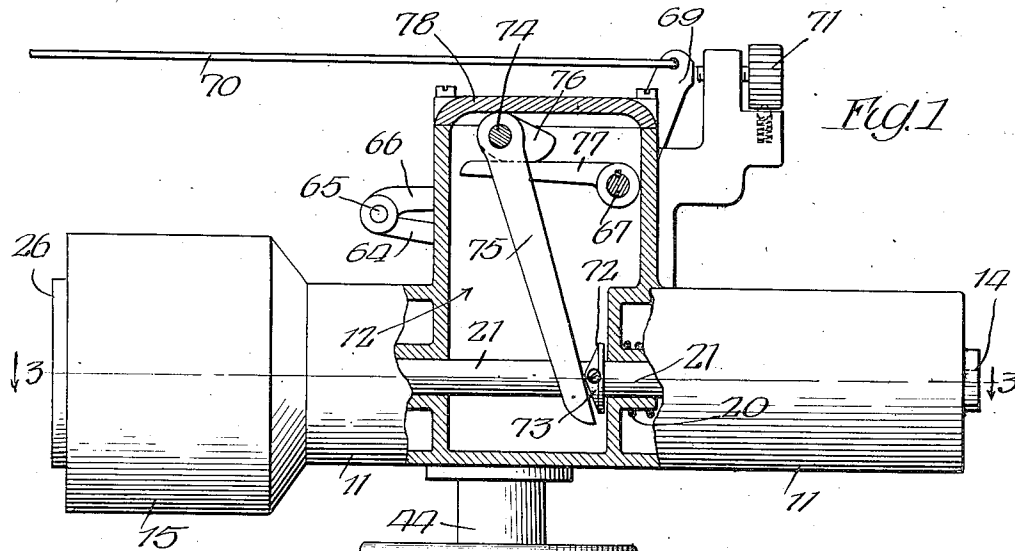


E. F. McCARTHY.
CARBURETER.
APPLICATION FILED SEPT. 18, 1918.

1,381,208.

Patented June 14, 1921.

3 SHEETS—SHEET 1.



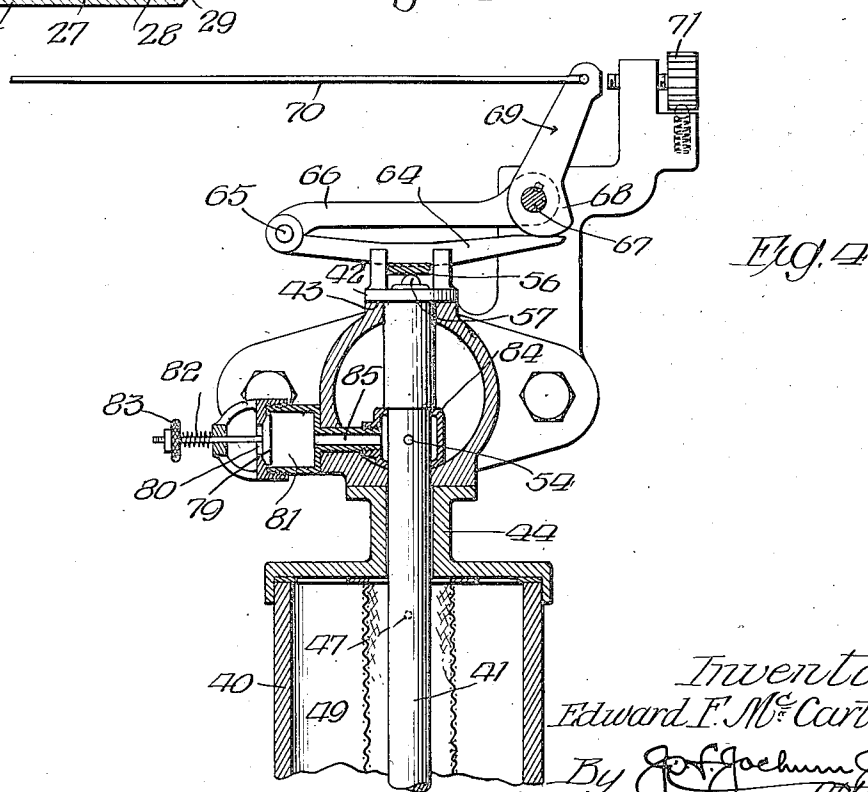
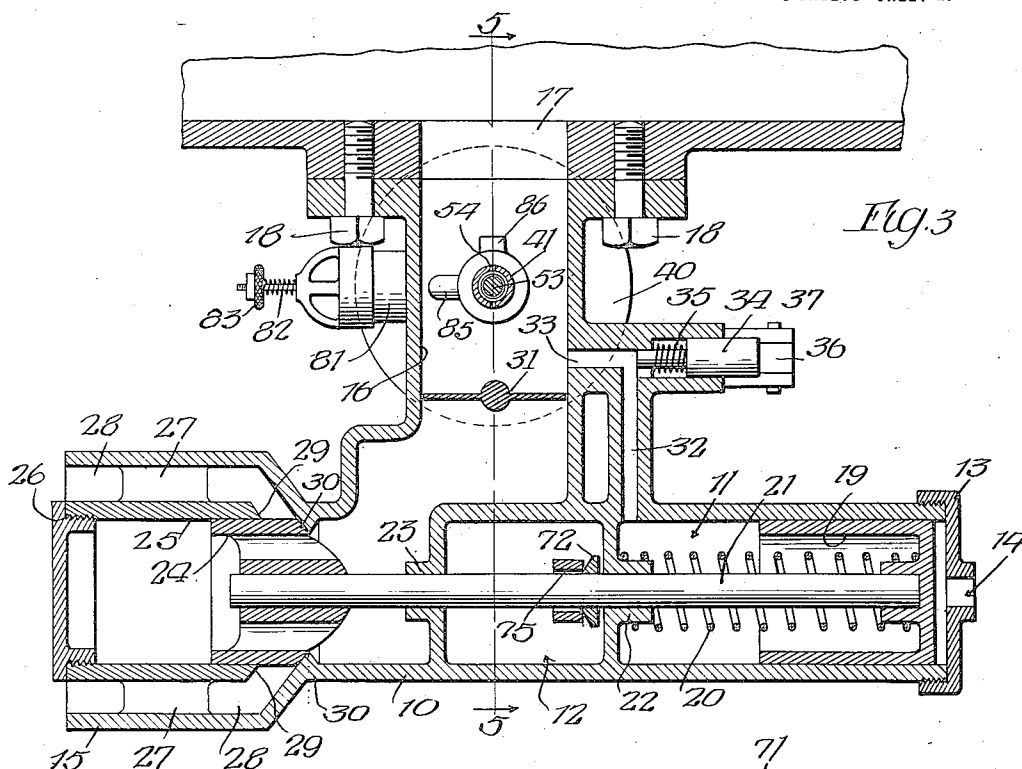
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CARBURETER.

Patented June 14, 1921.

3 SHEETS—SHEET 2.

1,381,208.



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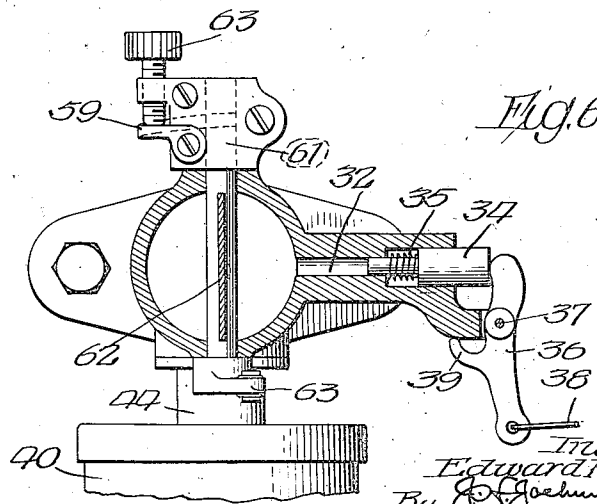
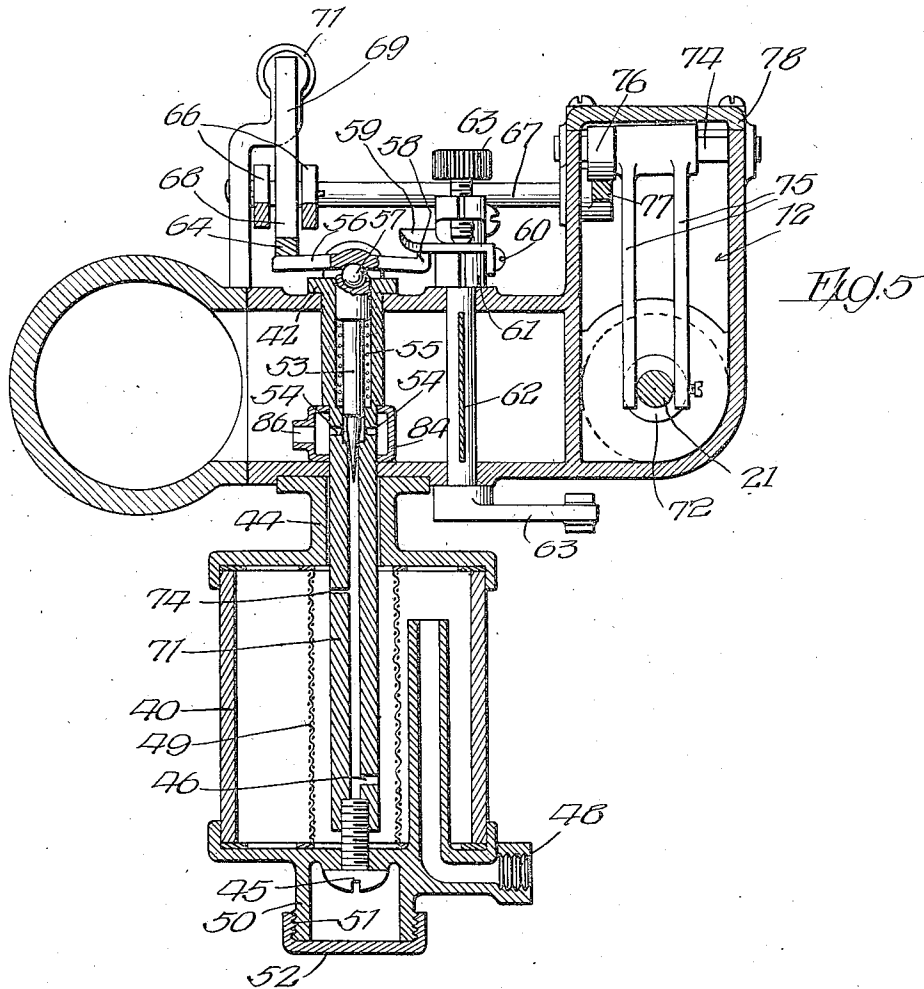
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

EDWARD F. MCCARTHY, OF CHICAGO, ILLINOIS.

CARBURETER.

1.381,208.

Specification of Letters Patent. Patented June 14, 1921.

Application filed September 18, 1918. Serial No. 254,559.

To all whom it may concern:

Be it known that I, EDWARD F. MCCARTHY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to improvements in carbureters, and one of the objects of the invention is to provide a scientific, "fool-proof" and economical apparatus of this character which will not only atomize the liquid fuel to its finest particles, but every globule of fuel will be surrounded by its correct proportion of air, thereby insuring economy in fuel consumption.

A further object of the invention is to provide a plurality of regulating devices, all operating upon a single needle valve, each of the regulating devices being operable independently of the other and at the will of the operator.

A further object is to provide an improved carbureter of this character having an operating piston and compensating mechanism therefor, so arranged as to produce a compact structure and at the same time being housed to protect them from dust and dirt and also prevent them from being tampered with by inexperienced operators.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts, hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which—

Figure 1 is a side elevation of an improved carbureter of this character with parts broken away and as taken on line 1—1, Fig. 2.

Fig. 2 is a top plan view of the parts shown in Fig. 1.

Fig. 3 is a sectional view taken on line 3—3, Fig. 1.

Fig. 4 is a sectional view taken on line 4—4, Fig. 2.

Fig. 5 is a sectional view taken on line 5—5, Fig. 3.

Fig. 6 is a sectional view taken on line 6—6, Fig. 2.

Referring more particularly to the drawings, the numeral 10 designates generally a body, having two chambers 11—12 therein

adjacent each other and at one end of the body, the chamber 11 having an open end provided with a closure 13 and through which closure is an air opening 14. The body is also provided with an enlarged portion 15 opposite the chamber 11. Leading from the body 10 and having communication with the outlet is a throat 16 of the carbureter which has communication with the inlet 17 of the engine; and the body is secured in position in any suitable manner, such as by means of fastening bolts 18.

Arranged to move within the chamber 11, which constitutes a cylinder, is a piston 19 adapted to be moved in one direction by a suitable spring 20, arranged and housed within the cylinder and piston and coiled about the piston rod 21.

The piston 19 is adapted to be moved in opposition to the cylinder 11 by the suction of the engine, as will be hereafter more fully described.

The piston rod passes through a suitable bearing 22 in the wall between the cylinder 11 and the chamber 12, and also through a bearing 23 in the opposite wall and extends into the enlarged opening 15 of the body. Connected with the piston is a piston valve 24 which moves in a cylindrical portion of the enlarged end 15, and the cylinder is preferably closed by a removable closure 26. When the piston 19 reciprocates in the cylinder 11, the piston valve 24 will also reciprocate in the cylinder 25 and this cylinder is preferably spaced from the wall of the enlarged outlet by means of suitable ribs 27 so as to form an air passage 28 around the cylinder 25. The end of the cylinder 15 adjacent the piston 24 is shaped to form a valve seat 30 with which the valve 24 coöperates to open and close the air passage 28 and thereby control the supply of air through the said passage to the throat 16 which leads into the engine cylinder.

Arranged within the throat 16 is a throttle valve 31, preferably of the butterfly type. Leading from the cylinder 16 on the engine side of the throttle 31 is a passage 32 which has communication as at 33 with the throat 16, and a valve 34 is provided to close the passage 33. This valve is preferably operated in one direction by means of a spring 35 and is operable at will against the stress of the spring to close the passage 33 by means of a suitable lever 36 pivotally mounted intermediate its ends as at 37, so that one end

of the lever will engage the valve 34 to shift it. Connected with the other end of the lever is a wire 38 for actuating the lever and the valve. A suitable stop device 39
5 may be provided for limiting the movement of the lever in one direction under the influence of the elastic member 35.

A tank 40 is arranged in a convenient position, preferably below the throat or passage 16 and is supported preferably by
10 means of a nozzle 41 which passes through suitable bearings in the throat or passage 16. The nozzle has a shoulder 42 adapted to rest upon a suitable surface 43 so that when
15 the tubular member passes through the bearing in the portion 43, it will extend through a tubular projection 44 on the cover of the tank 40, to project into the tank and terminate short of the bottom thereof. A fastening
20 device 45 such as a screw passes through the bottom of the tank 40, and into the end of the tubular nozzle 41 so as to force the tubular extension 44 against the throat or passage 16. The nozzle 41 is adapted to be
25 submerged in the liquid in the tank and is provided with an inlet opening 46 preferably adjacent the bottom of the tank, and is also provided with an inlet opening 47 which is of a size somewhat smaller than the
30 opening 46. This inlet is disposed above the normal level of the liquid and is of a very small size, preferably about a number 70 or a number 80 drill, and is provided for the purpose of preventing the trapping of air
35 in the upper part of the tank. Liquid fuel will be drawn into the tank through a supply pipe 48 which extends into the tank, terminating at any desired elevation therein. From the tank, the liquid fuel will be drawn
40 through a strainer 49 which surrounds the tubular nozzle 41, and the strainer is held in position in any desired or suitable manner. Projecting from the bottom of the tank is a flange 50, provided with threads
45 51 for the reception of a cap 52 to form a chamber or inclosure or inclosed space for the fastening device or screw 45, to prevent the same from being tampered with. A needle valve 53 operates in the nozzle 41 and is
50 adapted to control outlet ports 54 which discharge into the throat or passage 16. The valve is normally moved in a direction to open the nozzle by means of a spring 55 and this opening movement is limited by means
55 of a rocker arm 56 which rests intermediate its ends upon a ball or roller bearing 57, seated in the end of the valve 53, the rocker arm itself being preferably provided with a recess for the reception of the ball.

60 One end of the rocker arm 56 is preferably bent upwardly as at 58 to be engaged by a shoe or cam 59 which latter is pivotally mounted as at 60 upon the end of the shaft 61 of the throttle 31, the latter being adapted
65 to be rotated in its bearings by means of a

crank arm 63, to the end of which arm an operating bar or lever is connected, so that when the throttle 31 is opened or closed, the cam or shoe 59 will be moved over the
ends 58 of the rocker arm 56 to depress that
70 end. The cam or shoe 59 is adapted to be adjusted with respect to the throttle 31 preferably by means of a thumb screw 63 against the end of which the cam is adapted
75 to engage, and by adjusting this screw 63, it will be manifest that the position of the cam will be altered with the result that when operated the rocker arm 56 and the
80 valve 53 will be correspondingly moved. The other end of the rocker arm 56 engages a lever 64, intermediate the ends of the latter, and this lever 64 is pivotally supported as at 65 by an arm 66, which latter
85 in turn is connected with a rock shaft 67 to move therewith. This rock shaft is in turn journaled in suitable supporting bearings, and is adapted to be rocked in a manner to be presently set forth, to raise or lower the
90 arm 66 and thereby cause the arm 64 to be raised or lowered.

Loosely mounted upon the shaft 67 is a cam 68 which is arranged in contact with the end of the lever 64 and this cam 68 is provided with an arm 69 to which is connected an operating member 70 such as a
95 wire, adapted to be actuated from the dash board of the vehicle, and by means of which the cam 68 may be turned about its pivot on the shaft 67. When the cam 68 is thus actuated, it will cause the lever 64 to be moved
100 about its pivot 65 and thereby move the needle valve 53. An adjustable stop device 71 may be provided for limiting the movement of the cam 68 in one direction.

From the mechanism thus far described,
105 it will be manifest that the fulcrum of the rocker arm changes according to which of the respective parts is operated. That is to say, when the parts are in the position shown in Fig. 4 and the throttle valve 31 is
110 actuated, the cam or shoe 59 is moved over the end 28 of the rocker arm 56 to cause that end to be depressed or to allow it to be raised by the spring 55, according to the direction of movement of the cam or shoe 59.
115 During this operation, the rocker arm 56 will have a fulcrum upon the lever 64 which latter is held against movement about its pivot by means of the cam 68.

When, however, the throttle 31 is not operated and the cam 68 is moved about its
120 pivot on the shaft 67, the rocker arm 56 will have its fulcrum on the end 58, resting against the cam or shoe 59, and the operation of this cam 68 will cause the lever 64
125 to be rocked about its pivot 65 to control the actuation of the needle valve 53. The operation of the needle valve 53 is also adapted to be controlled by the suction created in the engine cylinder and to that end
130

there is provided on the piston rod 21 and preferably within the chamber 12 a collar 72 which is preferably provided with a wedge-shaped surface 73. Mounted upon a rock shaft 74, journaled in suitable bearings, preferably in the walls of the chamber 12, is a lever 75 which latter is preferably bifurcated and of a length to stand astride of the piston rod 21, so as to engage with the wedge-shaped surface 73 of the collar 72, and connected also with the rock shaft 74 is a cam 76 which has engagement with the arm 77 that is connected with the shaft 67 to rotate therewith. The lever 75, cam 76, arm 77 and collar 72 are all located and housed within the chamber 12 to prevent tampering therewith, and access may be had to the chamber by means of a suitable removable closure 78.

When the piston 19 is actuated by the engine suction manifested in the chamber 11 through the opening 32, it will be drawn inwardly against the stress of the spring 20. This will cause the valve 24 to open to admit air into the throat or passage 16, when the throttle 31 is opened. At the same time, the piston rod being shifted, and the collar 72 having engagement with the lever 75, the latter will be rocked, and this in turn will rock the cam 76 to cause the latter to rock the shaft. This operation will cause the arm 66 to be rocked, which in turn will rock the lever 64 about its fulcrum formed by the contact of the end of the lever 64 with the cam 68. This movement of the lever 64 will actuate the rocker arm 56 about its fulcrum between the end 58 of the arm and cam 59, to actuate the needle valve 53. When the spring 20 operating on the piston 19 overcomes the suction in the engine cylinder, the cam 76 will be moved in the opposite direction to permit the needle valve 53 to be actuated by the spring 55.

Thus, it will be manifest that a single needle valve is provided with three separate and independent controlling means therefor.

In order to supply air to the mixture when the depression in the carbureter throat or passage 16 reaches a predetermined point, to thin the mixture, there may be provided an automatically operating air valve 79 which controls an opening 80 in a casing 81, the valve being controlled by a spring 82 adapted to be adjusted by a thumb nut 83. This casing 81 has communication with an air jacket 84 preferably arranged within the throat or passage 16 of the carbureter, and has communication with the chamber 81 by means of a passage 85, and the jacket 84 is also provided with a discharge outlet 86 having communication with the throat or passage 16 of the carbureter. This jacket 84 surrounds the nozzle

41 and is of a size considerably larger than the external diameter of the nozzle, to form a chamber therebetween, and the discharge outlets 54 of the nozzle 41 are disposed to discharge into the jacket 84. Thus, it will be seen that when suction is created in the jacket 84, it will be manifested in the chamber 81 to open the valve 79 against the stress of the spring 82. The amount of air thus supplied will be controlled by the suction in the jacket and the tension of the spring 82.

It is thought that the operation of this improved carbureter will be clearly understood from the foregoing description, but briefly stated, it is as follows:

To start the engine, the throttle 62 is first opened slightly and the cam 68 is shifted forwardly, so that the needle valve 53 will operate to enlarge the fuel orifice. The valve 34 is then actuated to close the passage 33 between the throat of the carbureter and the chamber 11, thereby preventing any suction in the engine cylinder from being manifested in the cylinder 11, and also preventing any air from flowing through the passages 28 as the valve will be maintained closed by the spring 20. A turn or two of the engine crank will be sufficient to prime and start the engine, after which the valve 34 is released to open the passage 32, so that the engine suction will be manifested in the cylinder 11. This suction will actuate the piston 19 against the stress of the spring 20 and at the same time will shift the valve 24 to open the passage 28. The needle valve 53 will be simultaneously actuated by the movement of the piston through the medium of the collar 72, lever 75, rock shaft 67, arm 66 and lever 64 to reduce the flow of fuel through the fuel orifice 54. After the engine is started, the actuation of the carbureter will then be automatic, the piston 19 moving back and forth according to the engine suction.

The air jacket 84 surrounding the fuel orifice 54 receives its air through the valve opening 80, the valve 79 operating to permit the entrance of air when the depression in the carbureter throat 16 reaches a predetermined point, thus admitting air around the fuel orifice 54 and tending to thin the mixture.

This valve also operates during idling of the engine and also at high speeds, and the tension of the spring 82 is such that the valve 79 will remain closed at intermediate speeds.

When the engine is idling the throttle 31 is nearly closed, thereby producing a high vacuum or the highest vacuum possible to be produced by the engine and which vacuum is manifested in the throat of the carbureter adjacent the valve 79. This vacuum will therefore open the valve. When the air

throttle is wide open, the engine also creates a vacuum that will be sufficient to open the valve 79. At intermediate speeds the engine suction will not be sufficient to open the valve 79.

The housing or chamber 12 has no communication with outside air and is tightly closed, thereby rendering the same dust-proof.

The opening 14 provided in the cylinder 11 is of a size to admit atmospheric pressure for the rapid operation of the piston 19, and is small enough so that air will be temporarily confined between the end of the piston and the head 13 of the cylinder, so as to act as a cushion for the piston in the event of back fire in the engine.

That is to say, the inward movement of the piston 19 caused by the engine suction is comparatively slow, while the receding movement, due to the action of the spring, supplemented by the force upon the piston manifested by the back fire, is very rapid so cannot pass out of the opening 14 with such rapidity, and is therefore temporarily trapped or partially compressed and acts as a cushion.

While the preferred form of the invention has been herein shown and described, it is to be understood that many changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:

1. A carbureter embodying a fuel supply nozzle, a needle valve for controlling the nozzle, means tending normally to actuate the valve in one direction, a rocker arm detached from and supported intermediate its ends upon the end of and entirely by the needle valve, an air throttle valve, means for actuating the latter, a cam device connected with the air throttle valve to operate in unison therewith, the said cam device being detached from and engaging one end of the rocker arm to actuate the needle valve in opposition to the first recited means, an actuating member also detached from and operating upon the opposite end of the rocker arm to actuate the needle valve in opposition to the first recited means, and means for operating the said actuating member, the said actuating member and the cam device each serving as a fulcrum for the respective ends of the rocker arm.

2. A carbureter embodying a fuel supply nozzle, a needle valve for controlling the nozzle, means tending normally to actuate the valve in one direction, a rocker arm detached from and supported intermediate its ends upon the end of and entirely by the needle valve, an air throttle valve, means for actuating the latter, a cam device connected

with the air throttle valve to operate in unison therewith, the said cam device being detached from and engaging one end of the rocker arm to actuate the needle valve in opposition to the first recited means, an actuating member also detached from and operating upon the opposite end of the rocker arm to actuate the needle valve in opposition to the first recited means, and means for operating the said actuating member, the said actuating member and the cam device each serving as a fulcrum for the respective ends of the rocker arm and each operating to actuate the needle valve in the same direction.

3. A carbureter embodying a fuel supply nozzle, a needle valve for controlling the nozzle, means tending normally to actuate the valve in one direction, a rocker arm detached from and supported intermediate its ends upon the end of and entirely by the needle valve, an air throttle valve, means for actuating the latter, a cam device connected with the air throttle valve to operate in unison therewith, the said cam device being detached from and engaging one end of the rocker arm to actuate the needle valve in opposition to the first recited means, an actuating member detached from and operating upon the opposite end of the rocker arm to actuate the needle valve in opposition to the first recited means, a piston operable in one direction by engine suction, a piston rod connected with the piston, a rock shaft connected to said actuating member for operating the latter, and an operative connection between the rock shaft and the said piston rod.

4. A carbureter embodying a fuel supply nozzle, a needle valve for controlling the nozzle, means tending normally to actuate the valve in one direction, a rocker arm detached from but supported intermediate its ends upon the end of and entirely by the needle valve, an air throttle valve, means for actuating the latter, a cam device connected with the air throttle valve to operate in unison therewith, the said cam device being detached from but engaging one end of the rocker arm to actuate the needle valve in opposition to the first recited means, an actuating member detached from and operating upon the opposite end of the rocker arm to actuate the needle valve in opposition to the first recited means, a piston operable in one direction by engine suction, a piston rod connected with the piston, a rock shaft connected with the said actuating member for operating the latter, a shoulder carried by the piston rod, and an arm connected with the rock shaft and extending into the path of movement of the said shoulder.

5. A carbureter embodying a fuel supply nozzle, a needle valve for controlling the nozzle, means tending normally to actuate

the valve in one direction, a rocker arm detached from but supported upon the end of the needle valve and entirely thereby, an air throttle valve, means for actuating the latter, a cam device pivotally connected with the air throttle valve and movable therewith, said cam device being detached from but engaging and resting upon one end of the rocker arm, an adjustable stop device carried with the air throttle valve and engaging the cam to vary the position of the cam with respect to the air throttle valve.

said cam operating to actuate the needle valve, an actuating member detached from and operating upon the other end of the rocker arm to actuate the needle valve in the same direction as it is operated by the said cam, and means operating automatically to operate the said actuating member.

In testimony whereof I have signed my name to this specification, on this 13th day of September, A. D. 1918.

EDWARD F. McCARTHY.