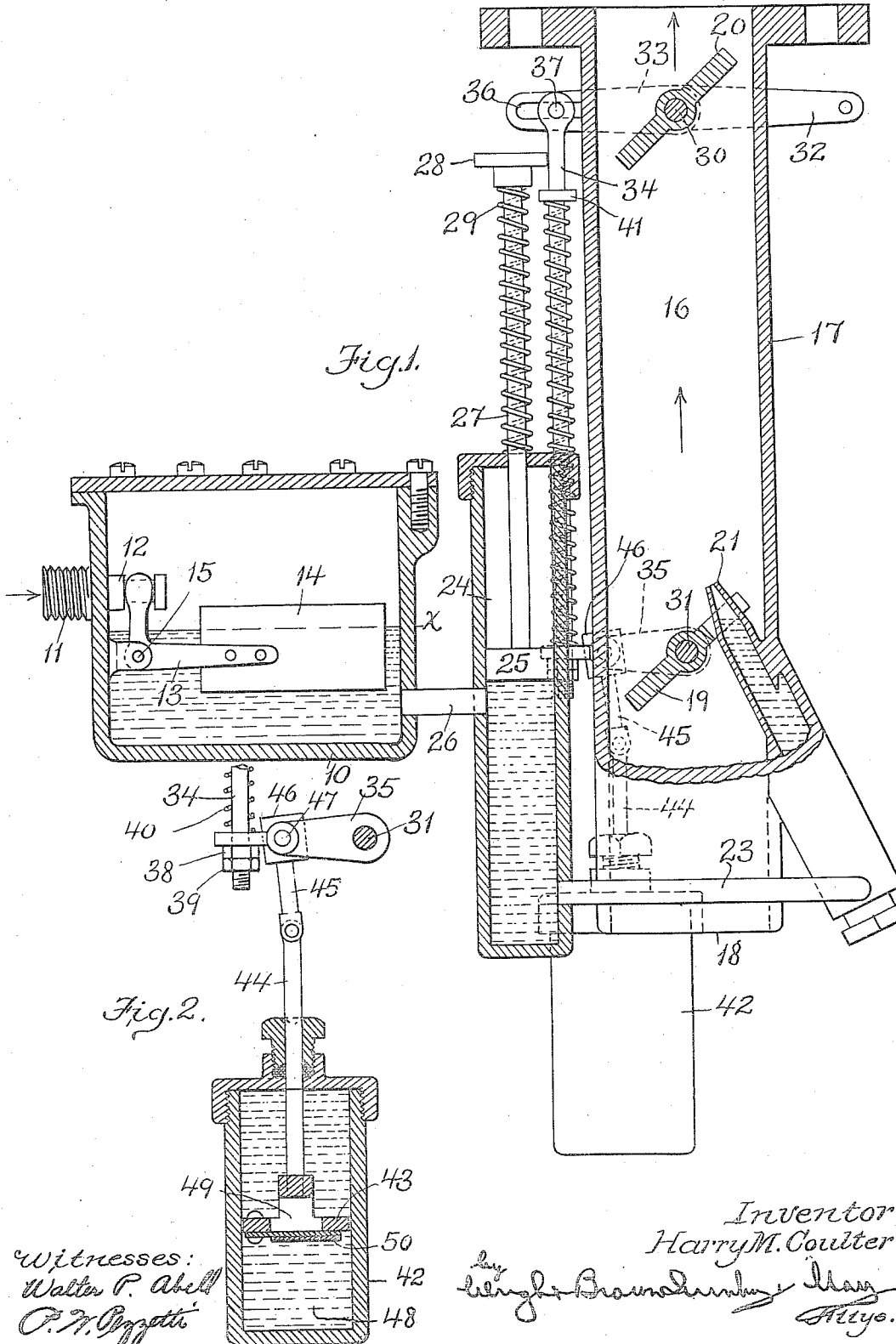


H. M. COULTER.
CARBURETER.
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UNITED STATES PATENT OFFICE.

HARRY M. COULTER, OF BOSTON, MASSACHUSETTS.

CARBURETER.

1,044,754.

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To all whom it may concern:

Be it known that I, HARRY M. COULTER, a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to carbureters which mix air and hydrocarbon gas to produce an explosive mixture for internal combustion motors.

One feature of the invention consists in means for priming the carbureter for starting the motor.

Another feature of the invention consists in means for retarding the opening of the air inlet when the throttle valve is opened suddenly, in order that a combustible mixture relatively rich in gas may be provided when it is desired to suddenly accelerate the speed of the motor.

Of the accompanying drawings which illustrate, in a somewhat conventional manner, one form in which the present invention may be embodied: Figure 1 represents a vertical section, partly in elevation. Fig. 2 represents a vertical section of the dashpot for retarding the opening of the air inlet.

The same reference characters indicate the same parts wherever they occur.

The casing, indicated at 10, provides a fuel chamber into which gasoline or other hydrocarbon fuel is conducted through an inlet 11. This casing incloses a float-operated valve which may be of any preferred construction and arrangement, its function being to maintain a uniform quantity of fuel in the casing. The fuel-inlet valve is indicated at 12, a lever for operating the same is indicated at 13, and a float for actuating the lever is indicated at 14. The lever is pivotally mounted at 15 in such manner that when the float rises the valve is closed, and when the float descends the valve is opened.

The mixing chamber for air and gas is indicated at 16. This chamber is afforded by a suitable casing 17 the upper end of which is formed for connection with a pipe or manifold (not shown) whereby the explosive mixture is conducted to the cylinder or cylinders. The chamber 16 has an opening for the admission of air, said opening in the present instance being at the bottom and indicated at 18. The flow through the mixing chamber is from the bottom to the top.

This casing is provided with a valve 19 which regulates the capacity of the inlet, and is provided with a throttle valve 20 which regulates the volume of carbureted air which may pass to the motor.

The fuel is delivered into the mixing chamber 16 between the inlet valve 19 and throttle valve 20. The fuel nozzle is indicated at 21, and is preferably inclined toward the valve 20. The fuel is conducted to the nozzle 21 through a pipe 23.

The priming device is inserted in the fuel conduit between the float chamber and the mixing chamber. This priming device comprises a cylinder 24 and piston 25. The cylinder is connected with the float chamber by a pipe 26 sufficiently below the fuel level X to insure a quantity of fuel in the cylinder up to the level of the fuel in the float chamber. The pipe 23 is in open communication with the cylinder 24 at a point considerably below the pipe 26. The arrangement of the several elements which form the fuel conduit from the float chamber to the nozzle 21 is such that the fuel will keep them all filled up to the level indicated at X. The piston 25 is provided with a rod or plunger 27 which projects through the upper end of the cylinder and which is provided with a head 28. A helical spring 29 coiled about the plunger is compressed between the head 28 and the upper end of the cylinder, and normally elevates the piston to the position shown, in which position it is slightly above the inlet through which the fuel is admitted. Prior to starting the motor the mixing chamber may be primed by manually pressing down upon the head 28. As soon as the piston 25 covers the end of the pipe 26, that pipe is cut off as a means of escape for the fuel in the cylinder. The fuel is therefore forced with pressure through the pipe 23 and is discharged with sufficient force through the nozzle 21 to carry it past the throttle valve. The motor may be then very readily started because of the relatively great proportion of fuel deposited upon the wall of the mixing chamber. The piston 25 will resume the position shown as soon as it is released, after which the carbureter is ready for continued operation.

As previously stated, the volume of carbureted air which is delivered to the motor is controlled by the throttle valve 20. This valve is affixed to an oscillatory pin 30 which

extends transversely through the casing 17. The air-inlet valve 19 is similar to the valve 20 except that it is cut away on one side in order to clear the fuel nozzle 21. The valve 19 is affixed to an oscillatory pin 31 which extends through the casing 17. These two valves are connected so that they will be opened and closed approximately in unison. The term "approximately" is used because under certain conditions they do not move exactly in unison, as will be understood after further description.

An operating lever 32 is affixed to one end of the pin 30. This lever may be connected by any desirable connecting means (not shown) with a controller or handle within reach of the driver. A second arm or lever, indicated at 33, is affixed to the pin 30. A connecting rod 34 extends from the arm 33 to an arm 35 which is affixed to the pin which carries the air-inlet valve 19. (See Fig. 2). The connection between the arm 33 and the rod 34 is preferably one which may be adjusted to vary the movement imparted to the rod. For this reason the arm 33 is formed with a substantially radial slot 36 in which a pivot pin 37 is adapted to be set at any desired position. The connection between the arm 33 and the rod 34 is formed by the pin 37.

The lower end of the rod 34 extends loosely through the outer end of the arm 35 and is threaded for an adjusting nut 38 which bears against the under side of the arm 35. A binding nut is indicated at 39. A helical spring 40 is coiled about the connecting rod 34 and is compressed between the arm 35 and a collar 41. The stress of the spring normally holds the arm 35 and the nut 38 in contact with each other as shown. It is obvious that the arm 33 is moved upwardly when the throttle valve 20 is closed, and that such movement is transmitted positively to the valve 19 because it is transmitted through the nut 38 and not through the spring 40. On the other hand, when the throttle valve 20 is opened the movement is transmitted to the valve 19 through the spring 40, and it is obvious that the yielding connection afforded by the spring is adapted to permit the valve 19 to open less quickly than the valve 20. The dashpot indicated at 42 is provided for retarding the opening movement of the valve 19. The piston of the dashpot is indicated at 43 and is provided with a rod 44. This rod is connected by a pivoted link 45 with a block 46 which is pivotally mounted upon the arm 35 by a stud 47. The dashpot is preferably filled with some suitable liquid, such for example as oil, indicated at 48. The piston 43 is formed with an opening 49 of relatively great capacity through which the retarding liquid 48 may flow. The piston is further provided with a check valve,

indicated at 50, which is adapted to check the flow in one direction through the opening 49 but which is adapted to swing open and permit free flow in the opposite direction. It is desirable to form the piston and the valve 50 so that there will be some leakage, thereby enabling the piston to move slowly when the direction is such as to close the valve. The valve is arranged to close when the air-inlet valve 19 is being opened, and to open when the valve 19 is being closed.

The operation and utility of the valves are as follows:—Assuming, for example, that the vehicle to which the carbureter is attached is moving slowly through a crowded street, at which time the throttle valve 20 will naturally be nearly closed. Incidentally the air-inlet valve 19 will likewise be nearly closed in order to maintain sufficient vacuum between it and the valve 20 to insure drawing the necessary amount of fuel from the nozzle 21. If the traffic conditions are such that the driver has an opportunity to dart ahead suddenly, he will quickly open the throttle valve 20 in order to supply a relatively great volume of carbureted air for the motor. The motor up to this time is revolving at a relatively slow speed, consequently the vacuum in the mixing chamber is not very great.

If, upon suddenly opening the valve 20 while the motor is running at slow speed, the air-inlet valve 19 should be as suddenly opened, it is obvious that the vacuum in the mixing chamber would be almost wholly if not entirely eliminated, and that the pull upon the gasoline would be correspondingly lessened, with the result that the supply of gasoline would be diminished when there would be a demand for an increase. Not only would this fail to fulfil the demand for more fuel, but it would cause the motor to stop, because under the conditions named there would be nothing but uncarbureted air flowing through the mixing chamber, the speed of the motor being so slow as to be unable to maintain the vacuum after the valve 19 was opened; but the yielding connection between the valve 20 and the valve 19, together with the dashpot 42, overcomes the difficulty just described by retarding the opening of the inlet valve 19 for a considerable period after the valve 20 has been opened. The sudden opening of the valve 20 results in compressing the spring 40 without moving the valve 19. A greater volume of carbureted air is thus admitted to the motor, whose speed increases and thereby increases the vacuum in the mixing chamber and draws a relatively great proportion of fuel. The combustible mixture therefore becomes more rich in fuel and the speed of the motor accelerates rapidly. In the meantime the leakage past the piston 43 and

check valve 50 in the dashpot enables the spring 40 to slowly open the air-inlet valve 19, thus increasing the volume of air substantially in proportion to the increasing speed of the motor. The air-inlet valve continues to open until the arm 35 is moved into engagement with the nut 38, whereupon the valves 19 and 20 occupy their normal relation, regardless of whether they are opened to the full extent or only partly opened. If now the throttle valve 20 should be suddenly closed, the air-inlet valve would be as suddenly closed, because the motion is transmitted positively by the nut 38. Sudden closing of the valves is not opposed by the dashpot, because the check valve 50 is arranged to permit sudden closing.

Having thus explained the nature of my said invention and described a way of constructing and using the same, although without attempting to set forth all the forms in which it may be made or all the modes of its use, what I claim is:

1. In a carbureter, the combination with the mixing chamber, of a throttle valve for controlling the outward flow from said chamber, a valve for controlling the air inlet of said chamber, means for delivering fuel into the chamber between said valves, manually operative yielding connections for operating said inlet valve, and means for preventing sudden movement of said inlet valve when the yielding connections are moved, said means being adapted to permit relatively slow movement of said inlet valve.

2. In a carbureter, the combination with the mixing chamber, of a throttle valve for controlling the outward flow from said chamber, a valve for controlling the air inlet of said chamber, means for delivering fuel into the chamber between said valves, manually operative connections for positively closing said inlet valve, said connections having yielding means for opening the inlet valve, and retarding means for preventing sudden opening movement of said inlet valve, said retarding means being adapted

to permit relatively slow opening movement and relatively sudden closing movement of said inlet valve.

3. In a carbureter, the combination with the mixing chamber, of a throttle valve for controlling the outward flow from said chamber, a valve for controlling the air inlet of said chamber, means for delivering fuel into the chamber between said valves, manually operative means for opening and closing said throttle valve, connections between said manually operative means and said inlet valve for operatively moving said inlet valve, said connections including a yielding element whereby said throttle valve may be moved without movement of said inlet valve, and retarding means for preventing sudden opening movement of said inlet valve, said retarding means being adapted to permit relatively slow opening movement of said inlet valve.

4. In a carbureter, the combination with the mixing chamber, of a throttle valve for controlling the outward flow from said chamber, a valve for controlling the air inlet of said chamber, means for delivering fuel into the chamber between said valves, manually operative means for opening and closing said throttle valve, connections between said manually operative means and said inlet valve for operatively moving said inlet valve, said connections including a yielding element whereby said throttle valve may be moved without movement of said inlet valve, and retarding means for opposing said yielding element to retard opening movement of said inlet valve, said retarding means being adapted to permit said yielding element to act slowly to open said inlet valve.

In testimony whereof I have affixed my signature, in presence of two witnesses.

HARRY M. COULTER.

Witnesses:

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