H. M. REICHENBACH.

CARBURETER.

APPLICATION FILED APR. 1, 1910.

**976,692.** Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

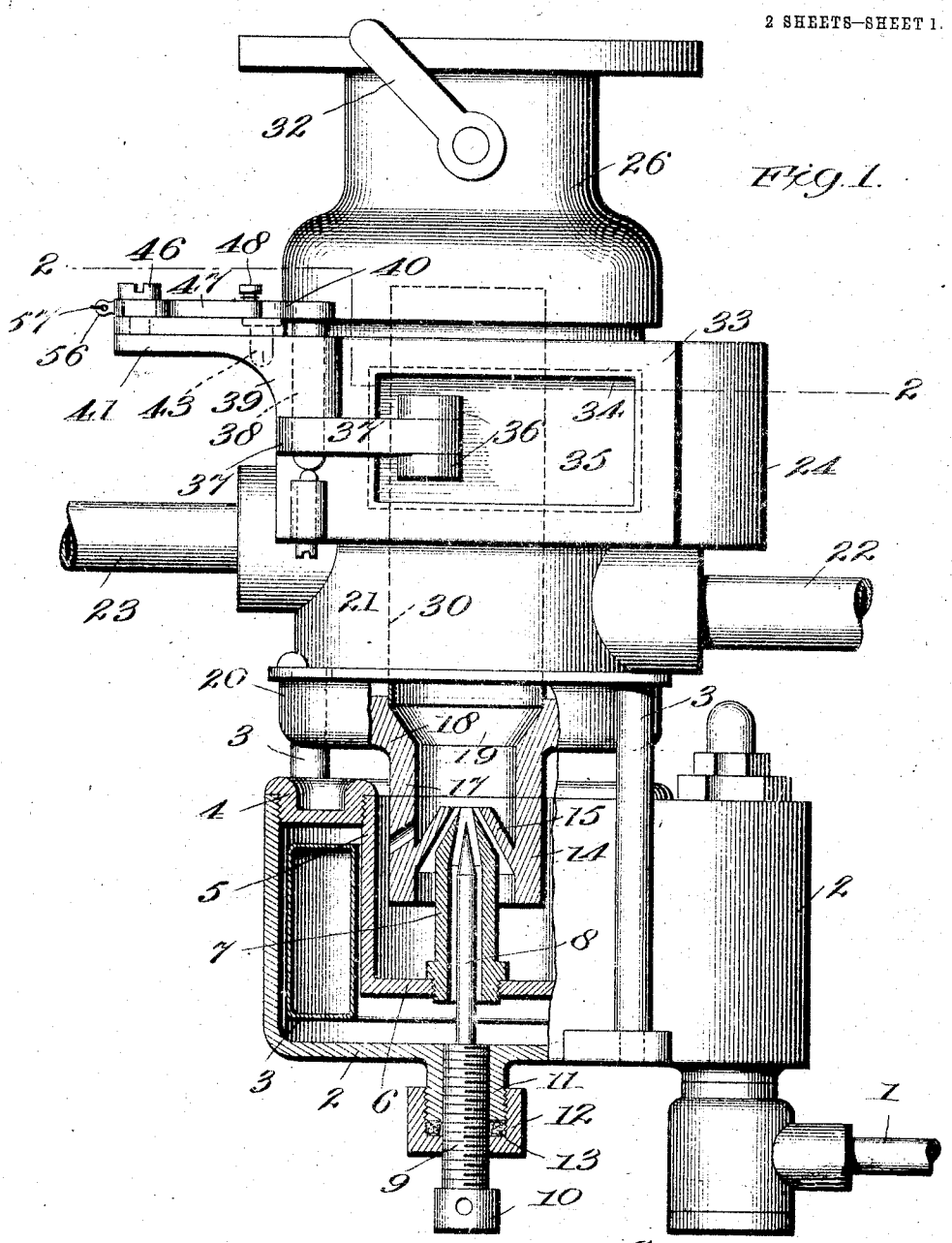


Fig. 1.

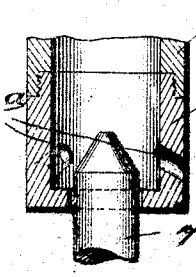


Fig. 5.

Witnesses
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2 SHEETS—SHEET 2.

Fig. 2.

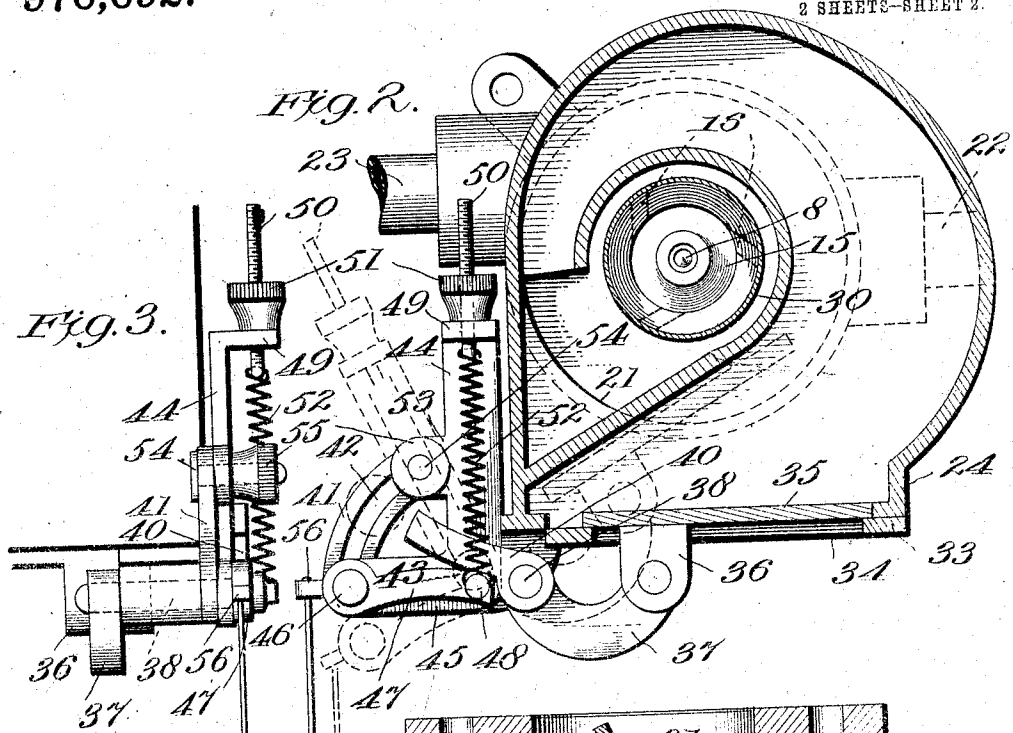


Fig. 3.

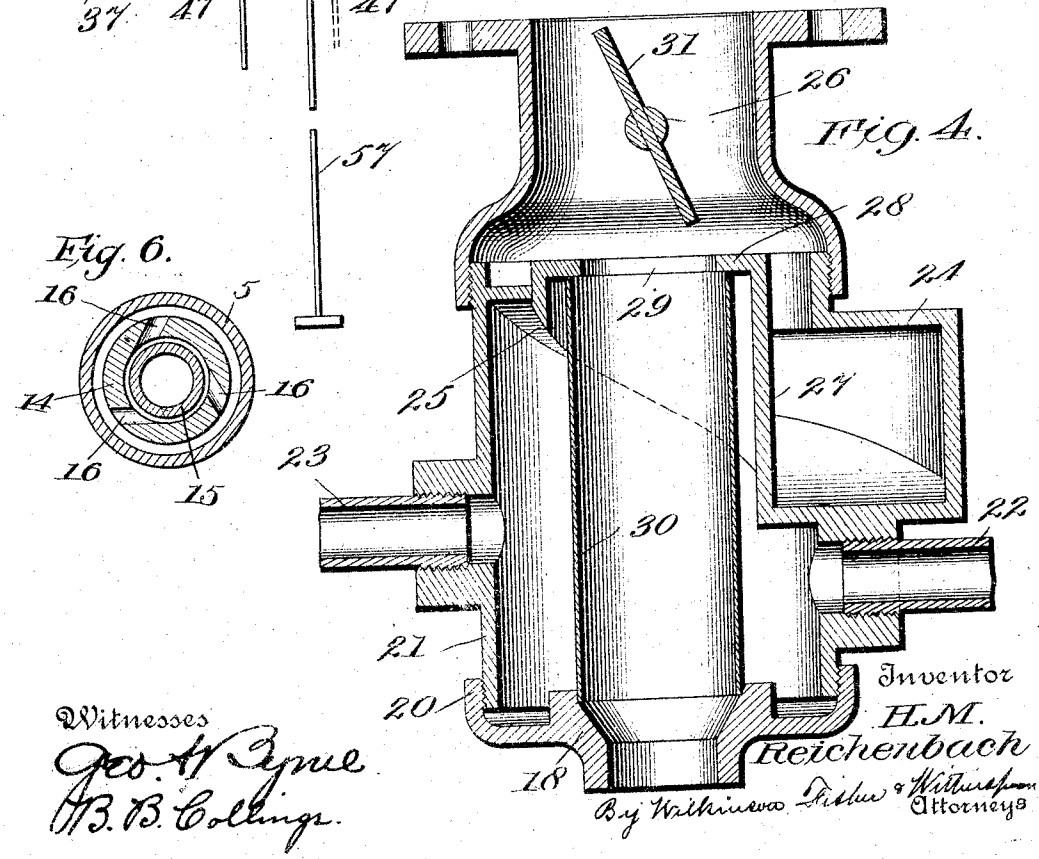


Fig. 4.

Fig. 6.




Witnesses

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# UNITED STATES PATENT OFFICE.

HENRY M. REICHENBACH, OF CHICAGO, ILLINOIS.

## CARBURETER.

976,692. Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed April 1, 1910. Serial No. 552,913.

*To all whom it may concern:*

Be it known that I, HENRY M. REICHENBACH, 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; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in carbureters for supplying volatilized liquid fuel to internal combustion motors.

The objects of my invention are to provide an improved carbureter with means for effecting an improved control of the auxiliary air supply, an improved volatilization of the fuel, having removable nozzles controlling the initial air supply, making it possible with one apparatus to meet varying motor conditions, and having a tangential auxiliary air current and means for producing a vortex around the fuel nozzle to sub-divide the fuel and bring it into intimate contact with a heat supplying surface.

With these objects in view, my invention consists in the construction and combinations of parts as hereinafter described and claimed.

In the accompanying drawings—Figure 1 is a side elevation, partly in section, of my improved carbureter. Fig. 2 is a cross-section thereof on the line 2—2 of Fig. 1. Fig. 3 is a side elevation, showing part of the means for controlling the auxiliary air current. Fig. 4 is a cross-section on a larger scale of the upper part of the volatilizing apparatus, Fig. 5 is a view, partly in elevation, showing the removable nozzle for the initial supply of air, surrounding the fuel jet. Fig. 6 is a cross section through the initial air nozzle, showing the inlets arranged tangentially.

1 represents the inlet supply for the fuel, which delivers into a large casing 2, having a float 3 therein. This casing 2 is fastened to the body of the carbureter by long bolts $3^a$. The top of the casing 2 is open, and in it is screwed a ring 4, into which is screwed a downwardly projecting cylinder 5, the upper end of which is open. In a central perforation in the lower head 6 of the cylinder 5, is screwed a tube 7, communicating with the inside of the casing 2, said tube being beveled at its upper end. Within this tube works freely a needle valve 8. This needle valve is provided with a screw-threaded shank 9, operated by a head 10 and passing through a screw-threaded projection 11 in the bottom of the casing 2.

12 represents a nut, which is screwed onto the lower end of the projection 11 and holds in place a packing 13 to prevent leaking.

14 represents the initial air nozzle, which is open at the bottom and provided with a cone-shaped upwardly projecting portion 15, located above the end of the tube 7. The tube 14 is provided with a number of inclined tangentially arranged inlets 16, so arranged that as the air and fuel are sucked in, a vortex will be formed, thus aiding in the thorough volatilization of the fuel. The part 14 is screwed into, or otherwise removably secured to, the tube 17, which is formed integral with and a part of a casting 18. The tube 17 has a flaring opening 19 at its top. The casting 18 is circular in form and is provided with an upwardly extending annular flange 20, screw-threaded on its interior and engaging the lower end of a cylinder 21, in which the volatilization takes place. This cylinder 21 is provided with an inlet tube 22 and an outlet tube 23, through which pass the products of combustion from the engine, or, if desired, any other suitable means may be employed for heating the interior of the cylinder 21.

24 represents an extension on the side of the cylinder 21, which is open to the air, and a spiral casting 25 makes a spiral passage leading from the part 24 upwardly into the large tube 26, which communicates directly with the engine, this spiral passage being shown in Figs. 2 and 4.

27 represents one wall of the passage, and 28 is the part closing the upper part of the cylinder 21, it being made in one piece with the part 27, and provided with an opening 29, leading into the pipe 26.

30 represents a tube, fitting tightly into the upper end of the opening 19 and tightly against the lower part of the plate 28, said tube being preferably of thin metal, so that it may be readily heated.

In the tube 26 is mounted the throttle valve 31, which is operated by means of the handle 32 by connections (not shown), leading up near the engine.

Against the projection 24 is fastened a face plate 33, provided with an opening 34, which may be closed by a flap valve 35,

which valve works inwardly, as indicated in dotted lines in Fig. 2.

36 represents a projecting arm firmly fastened to the valve 35, to which is pivoted the curved operating lever 37, which is mounted on a long pin 38, extending through an extension 39 of the plate 33. The arm or lever 37 is firmly connected to the pin 38. To the top of the pin 38 is rigidly attached an arm 40. The part 39 has an arc-shaped extension 41, provided with a slot 42, and on a pivot 43 in said extension is mounted a bell crank lever, having one arm 44 and another arm 45. On a pin 46 on the outer end of the arm 45 is mounted an arm 47, having a pin 48 on its inner end, the end of the arm 47 contacting with the lever or arm 40. The arm 44 of the bell crank lever has one end upturned, as shown at 49, and through this passes a screw rod 50, whose position can be adjusted by a screw 51. To the end of the screw rod 50 and to the pin 48, is attached a spiral spring 52, which opposes the inward motion of the flap valve 35 and tends to keep it normally closed. The arm 44 has upon it a projecting ear, through which passes a screw 54, provided with a nut 55, said screw working in the slot 42. By this construction, the bell crank lever can be adjusted, as indicated in dotted lines in Fig. 2, and fixed in any desired position.

56 represents an ear carried by the arm 47 of the bell crank lever, and to this ear is fixed a cord or rod 57, leading up to some point near the operator.

It is obvious that by the construction shown, the spring 52 normally tends to keep the flap valve 35 in a closed position, the suction caused by the movement of the engine piston being great enough to overcome the tension of the spring 52, admitting, through the auxiliary air opening 34, an additional supply of air, which is mixed with the already vaporized charge of fuel mixed with air, in the tube 26.

To vary the tension of the spring 52, it is merely necessary to move the bell crank lever and fasten it, by means of the screw 55, in any desired position on the quadrant 41. This will bring the end of the lever or arm 47 into a different position relatively to the arm 40, thus increasing the effective tension of the spring, which acts on the arm 40 farther away from its pivot pin 38.

In Fig. 5, a modified form of removable air nozzle is shown, consisting of a cylinder $14^a$, screwing into the lower end of a tube $17^a$. Through the perforated end of the cylinder $14^a$ passes a fuel inlet tube $7^a$ for the fuel, similar to the tube 7. $16^a$ represents inclined, tangentially arranged air inlets, but the part corresponding to the part 15, in Fig. 1, is omitted.

The operation is as follows: The engine being in motion and the throttle valve 31 being open, a charge of air is drawn in through the inclined tangential inlet 16 in the form of a vortex, which at the same time draws in fuel through the tube 7, the needle valve 8 being open. The whirling mixture of air and fuel passes upwardly into the tube 30, and the heavier parts being thrown outward by centrifugal force, strike the tube 30 and are immediately vaporized. The carbureted air then passes up through the tube 26 to the engine, an additional supply of air, if needed, being drawn in through the opening 34. In starting the engine, during the cranking operation, the valve 35 is kept closed by pulling upon the cord or rod 57.

By the construction described, the auxiliary air supply is completely under control; the volatilization of the fuel is completely effected, and the drops of unvaporized particles being thrown out against the cylindrical tube 30.

Providing the carbureter with removable nozzles controlling the initial air supply, it is possible with one apparatus to meet all sorts of varying conditions of the motor.

The arrangement whereby a vortex is caused during the volatilization of the fuel, throwing the heavier parts to the outside by centrifugal force, is an especial advantage, especially when considered with a tangential auxiliary air inlet.

The arrangement of the tension spring and parts connected thereto is also of especial importance. By the construction shown, the improved adjustment of the auxiliary air supply permits an adjustment of the tension on the valve for both high and low speeds, at the same time making it correct for all intermediate speeds.

The difficulty heretofore met with in connection with automatic carbureters is due to the fact that it has been difficult and almost impossible to produce a spring correctly proportioned to the various speeds. An increasing spiral spring is commonly used. While this might be correct for some motors, it is not adjustable in the true sense of the word. Great difficulty is experienced in properly calibrating a spring of the increasing spiral type, whereas with the plain spiral type this is a simple matter, the tension being directly proportional to the distension.

Various spring devices have been used in connection with carbureters, but I believe that mine is the first to produce the increasing tension in any fixed ratio, mechanically and practically, and within the observation of the adjuster.

I claim:—

1. In a carbureter, the combination of a casing provided with a fuel inlet and with tangential air inlets, means for heating said casing, said casing being provided with an

opening forming a secondary air inlet, a valve for closing said opening, a spring normally holding said valve closed, and connections acting to mechanically produce any desired increase in the tension of the spring controlling the movement that is at all times limited or fixed in magnitude, substantially as described.

2. In a carbureter, the combination of a fuel tank, a casing through which a heating fluid is passed, a pipe leading from said tank into said casing, and a removable nozzle provided with inclined tangentially arranged inlet openings, said nozzle being secured to the lower end of said casing, substantially as described.

3. In a carbureter, the combination of a casing, means for heating the same, an air nozzle for supplying air to the bottom of said casing, said casing and nozzle being provided with means for producing a vortical motion of the air and the fuel therein, said casing being provided with an opening for an auxiliary air supply, a movable valve for closing said opening, a spring for normally holding said valve closed, and adapted to yield under certain conditions by reason of the suction of the engine, connections acting to mechanically produce any desired increase in the tension of said spring controlling a movement that is at all times limited or fixed in magnitude, and means for positively closing said valve when desired, substantially as described.

4. In a carbureter, the combination of a casing composed of two parts, through one of which the fuel charged air passes, and through the other of which a heating agent passes, a removable air nozzle provided with inclined tangentially arranged inlet openings, said nozzle being secured to one of said parts, a fuel tank having a discharge pipe in proximity to said inlet openings, partitions forming a spirally arranged air passage for furnishing an additional supply of air, a valve normally closing one end of said passage, a spring, connections between said spring and said valve whereby the spring holds said valve normally closed, said connections being adjustable and capable of being fastened in several possible positions, substantially as described.

5. In a carbureter, the combination of a casing, a tube centrally arranged therein, inlet and outlet pipes connected to said casing for the conduction of a heating fluid therethrough, an air nozzle provided with inclined, tangentially arranged inlet openings, said air nozzle being connected to said casing, a fuel tank, and a tube delivering from said tank into said air nozzle, a tube centrally passing through said casing, partitions forming a spiral inclined passage for the admission of an auxiliary air current, a valve for closing said passage, a spring normally tending to hold said valve closed, and connections for varying the intensity of said spring, including a bell crank lever, an arm pivoted on said lever, to which arm one end of said spring is attached, a lever against which said arm bears, a pin to which said lever is rigidly fixed, and a curved lever attached to said pin and to said valve, substantially as described.

6. In a carbureter, the combination of a central casing with a tube centrally arranged therein, inlet and outlet pipes for the conduction of a heating fluid through said casing, around said tube, an air nozzle centrally and removably connected to the lower end of said casing, a fuel tank, a pipe delivering from said tank into said air nozzle, partitions forming a spirally inclined passage for an auxiliary air supply, a valve adapted to close said passage, a spring, and connections between said valve and said spring, whereby said spring normally tends to close said passage, said connections being provided with means for adjusting the tension of said spring in a regular ratio, and a pipe provided with a throttle valve connected to said casing, substantially as described.

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

HENRY M. REICHENBACH.

Witnesses:

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DON COLE.