P. DANIEL.

CARBURETER.

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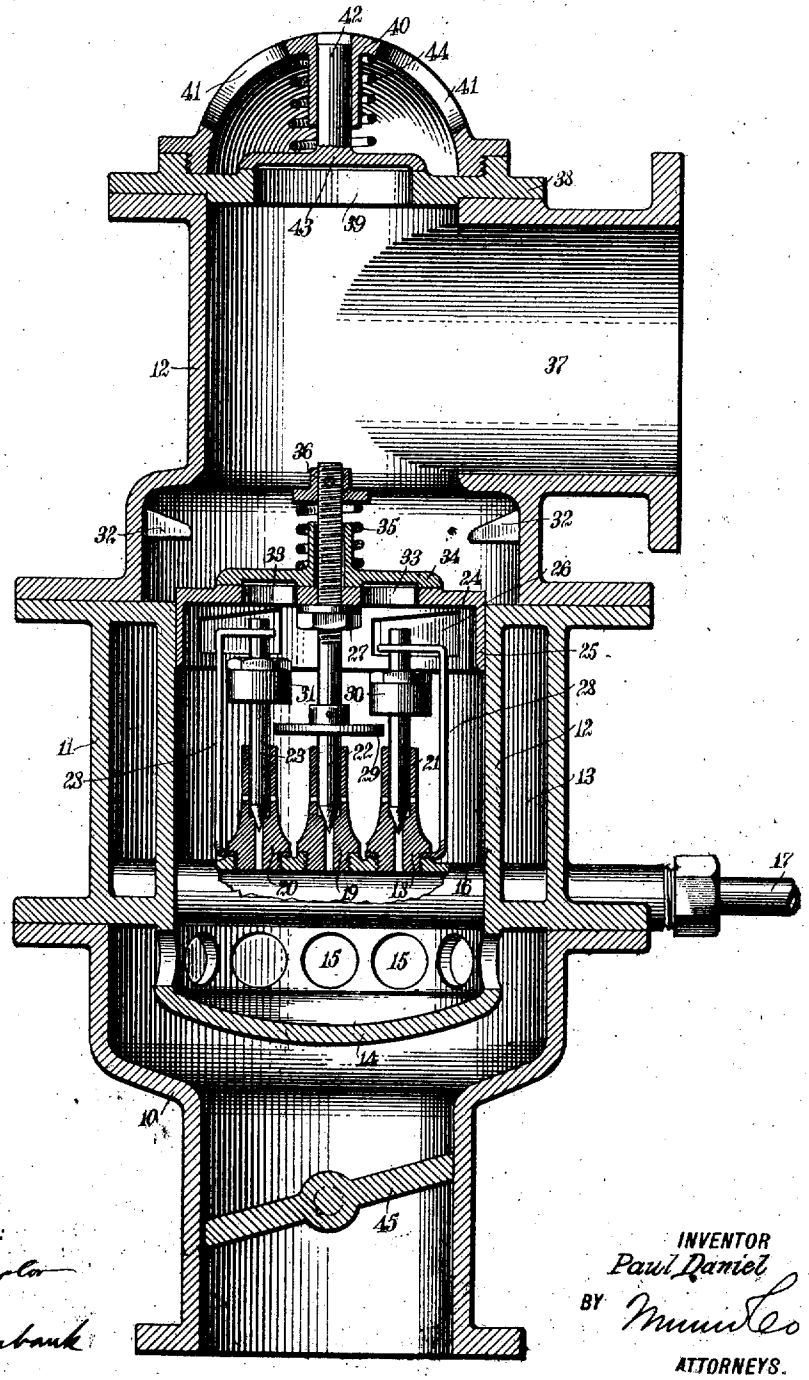
973,262. Patented Oct. 18, 1910.



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CARBURETER.

973,262. Specification of Letters Patent. **Patented Oct. 18, 1910.**

Application filed April 22, 1910. Serial No. 556,963.

To all whom it may concern:

Be it known that I, PAUL DANIEL, a citizen of the Republic of France, and a resident of Perth Amboy, in the county of Middlesex and State of New Jersey, have invented a new and Improved Carbureter, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in carbureters for use in forming the explosive charge for internal combustion engines, and more particularly to that type in which the liquid fuel is delivered through a spray nozzle or jet into the passage through which the air flows to the inlet valve of the engine.

The object of the invention is to more efficiently control and vary the supply of liquid fuel in accordance with the flow of air. This air flow may be induced by the suction pressure of the engine or may be induced by a separate compressor for delivering air through the carbureter of the engine.

My improved carbureter may be used in connection with any type of internal combustion engine, and may be connected at any suitable point in the system.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure is a central vertical section through a carbureter constructed in accordance with my invention.

In the specific carbureter shown I provide a casing formed of three superposed sections 10, 11 and 12, which may be designated as the inlet section, the body section and the outlet or discharge section. Each of these is illustrated as being formed of cast metal and the abutting ends of the sections have suitable flanges, by means of which the sections may be rigidly secured together. The central or body section 11 is substantially cylindrical in cross section and within the outer wall thereof is an inner substantially cylindrical wall 12, forming the passage through which the air is delivered. The outer wall of the section and the inner cylindrical wall 12 are connected together at their ends, so as to leave an intermediate jacket 13, through which any suitable heating medium may be circulated to facilitate the vaporization of the liquid fuel if such heating is found necessary. It is of course evident that this jacket may be omitted, if desired. The inner cylindrical wall 12 projects down below the lower end of the outer wall of the casing 11, and terminates in a transverse wall 14. Above this transverse wall, the peripheral wall is provided with a series of apertures 15, through which the air may enter the interior of the body section. In certain forms, the bottom wall 14 may be omitted, but by forming this bottom wall substantially concave or dish-shaped, as illustrated, it serves to collect any slight overflow of liquid fuel and the admitting of the air through ports around the periphery prevents the direct flow of air through the center of the passage and tends to bring the air into more intimate contact with the liquid fuel delivered through the spray nozzles. A conduit 16 extends transversely across the body section 11, adjacent the lower end of the latter and above the bottom 14. This conduit may be formed integral with the casing, if desired, and at its outer end it is provided with any suitable means for facilitating the attachment of a supply conduit 17. On the upper side of the conduit 16, I provide a plurality of spray nozzles, here illustrated as three in number, 18, 19 and 20. These nozzles are similar in construction, and extend upwardly from the upper side of the conduit. Within each nozzle is a valve seat and above the seat are corresponding needle valves 21, 22 and 23. Each valve seats within its corresponding nozzle upon the valve seat thereof, and above each valve seat are passages leading outwardly through the sides of the nozzle to facilitate the escape of the liquid fuel when the valve is raised.

Adjacent the upper end of the cylinder 12, is a transverse partition 24 in the form of a piston valve vertically movable within said cylinder. This piston head has a depending flange or skirt 25 of such size that the piston is free to move vertically yet no material amount of gas may escape between the piston and the cylinder. In this flange or skirt there are a plurality of openings 26 of such size and so disposed that when the piston is in its lowermost position, the openings are closed, while as the piston valve raises the gas may escape out through the openings above the upper end of the cylinder 12. As shown, these openings have inclined upper sides, so that during the raising of the piston the rate of increase in the area of of the openings exposed, will exceed the rate

of movement of the piston. It is, of course, evident that this could be accomplished by the aid of openings of other shapes than those illustrated.

The spray nozzle 19 is located at the center of the cylinder 12 and the needle valve 22 of this spray nozzle has a valve stem extending up through the center of the piston and screw-threaded thereto. A lock nut 27 is mounted on the valve stem below the piston to prevent any relative movement of the piston and valve stem. The valve stems of the two valves 21 and 23 terminate below the under surface of the piston and are supported in suitable guides 28. The valve stem of the piston 22 carries an annular flange or plate 29, and the valve stems of the two valves 21 and 23 have weights 30 and 31 disposed at different distances above the plate 29. Thus, as air is forced into the carbureter at the lower end the gas is sucked out of the carbureter from the upper end, the difference in gas pressure at the opposite ends will cause the piston 24 to rise. This rising movement will uncover the openings 26 and the extent of the opening and the extent of the upward movement of the piston will vary with variations in the difference in gas pressure at the opposite ends of the carbureter. A raising of the piston 24 raises the valve 22, so that liquid fuel may escape and mix with the air passing through the cylinder 12. If the advance in pressure increases so as to increase the flow of air through the carbureter, the piston 24 will be raised to a greater extent and the flange 29 will engage with the under side of the weight 30, which constitutes a stop, and will lift the valve 24 off its seat and increase the supply of liquid fuel. A still further increase in the difference in pressure will cause the flange 29 to engage with the weight 31 and lift the needle valve 23 and still further increase the supply of liquid fuel. Thus, the movement of the single piston 24 serves to vary the size of the air openings, and also to vary the quantity of liquid fuel delivered. Within the upper or outlet section 12, I provide stops 32 for engagement with the upper side of the piston to limit the opening movement of the latter and prevent an excessive movement and dislocation of the parts. For permitting a still further passage of air through the piston after the latter has been opened to the limiting extent, I provide air ports 33 in the piston around the center thereof, and cover these ports with a valve plate 34, held in engagement with the upper side of the piston by a coil spring 35. The tension of this spring may be varied by varying the position of a nut 36 on the valve stem of the valve 22 and serving as a stop for the end of the spring.

The upper or outlet section 12 has a discharge passage 37 on one side thereof, and to which a conduit on the valve chamber of the engine may be connected. To guard against injury to the carbureter in case of "back fire", the outlet section 12 is provided with a top or cover plate 38 having an outlet port 39 therethrough. Secured to the plate 38 is a dome 40, having openings 41 therein, and serving as a spider to guide the valve stem 42 of a valve 43. This valve seats upon the upper surface of the cover plate 38 and covers the port 39 in the latter. The valve is held to its seat by a heavy coil spring 44, which may yield and permit the valve to move upwardly. Normally this valve remains closed, but in case of the generation of excessive pressure in the outlet passage 27 or at any point in the system above the piston 26 the valve may rise and permit the escape of the excessive pressure. A throttle valve may be mounted at either end of the body section of the carbureter, but preferably I employ a throttle valve 45 in the lower or inlet section 10.

Various changes may be made in the construction and operation of my improved carbureter without departing from the spirit of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A carbureter having a passage therethrough, a piston valve controlling said passage, a plurality of spray nozzles within said passage, and a plurality of needle valves for controlling said nozzles, one of said needle valves being rigidly secured to said piston valve and the other of said valves being controlled thereby.

2. A carbureter having a passage therethrough, a piston valve controlling said passage, a plurality of spray nozzles within said passage, a plurality of needle valves for controlling said nozzles, one of said needle valves being rigidly secured to said piston valve, and means for opening the remainder of said needle valves in succession upon successive movements of said piston valve.

3. A carbureter having a passage therethrough, a valve normally closing said passage, a liquid fuel controlling valve secured to said valve, and a second liquid fuel controlling valve controlled by the movement of the first-mentioned liquid fuel controlling valve.

4. A carbureter having a passage therethrough, a valve controlling said passage, a liquid fuel controlling valve connected to said first-mentioned valve, a plurality of additional liquid fuel controlling valves, and means for opening said last-mentioned valves in succession upon successive movements of the first-mentioned liquid fuel controlling valve.

5. A carbureter having a plurality of spray nozzles, needle valves for controlling

said nozzles, means for opening one of said valves, and means carried by one of said valves, for engaging with and successively opening the remainder of said valves.

6. A carbureter having a passage therethrough, a piston normally closing said passage and having openings therethrough, a spring-pressed valve for closing said openings, a plurality of liquid fuel inlet valves, and means for opening said valves in succession upon successive differences in gas pressure upon opposite sides of the piston.

7. A carbureter having a passage therethrough, a valve controlling said passage, a plurality of spray nozzles within said passage, and a plurality of separate valves for controlling said nozzles, said last-mentioned valves being operated in succession upon successive movements of the first-mentioned valves.

8. A carbureter having a passage therethrough, a valve controlling said passage, a plurality of spray nozzles within said passage, a plurality of needle valves controlling said nozzles, and means for operating said needle valves in succession.

9. A carbureter having a passage therethrough, a liquid conduit extending transversely thereacross, a plurality of nozzles connected to said conduit and delivering lengthwise of the said passage, separate valves for controlling said nozzles, and means for operating said valves in succession.

10. A carbureter having a passage therethrough, a valve controlling said passage, a plurality of needle valves within said passage, and means carried by said first-mentioned valve for opening said needle valves in succession upon successive movements of the first-mentioned valve.

11. A carbureter having a plurality of spray nozzles, a plurality of needle valves controlling said nozzles, means for operating one of said needle valves, and means connecting said last-mentioned needle valve to another of said needle valves for opening the latter after a predetermined movement of the first-mentioned needle valve.

12. A carbureter having a piston valve for controlling the flow of gas therethrough, a plurality of needle valves for controlling the flow of liquid fuel and controlled by the movement of said piston valve, and a valve for controlling the flow of gas through said piston valve.

13. A carbureter having a casing provided with an opening in the lower end thereof, a cylinder within said casing and spaced therefrom to leave a water jacket therebetween, said cylinder having a bottom wall and having openings in the peripheral wall below said water jacket, a spray nozzle disposed within said cylinder, and a piston valve within said cylinder for controlling the flow of gas.

14. A carbureter having a casing provided with an opening in the lower end thereof, a cylinder within said casing and spaced therefrom to leave a water jacket therebetween, said cylinder having a bottom wall and having openings in the peripheral wall below said water jacket, a spray nozzle disposed within said cylinder, a piston valve within said cylinder for controlling the flow of gas, a needle valve for controlling said nozzle, and operative connections between said piston valve and said needle valve.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PAUL DANIEL.

Witnesses:
MAURICE P. BRUNN,
CLAIR W. FAIRBANK.