F. E. BOWERS.

CARBURETER.

APPLICATION FILED JAN. 11, 1909.

997,233.

Patented July 4, 1911.

2 SHEETS—SHEET 1.

Fig. 1

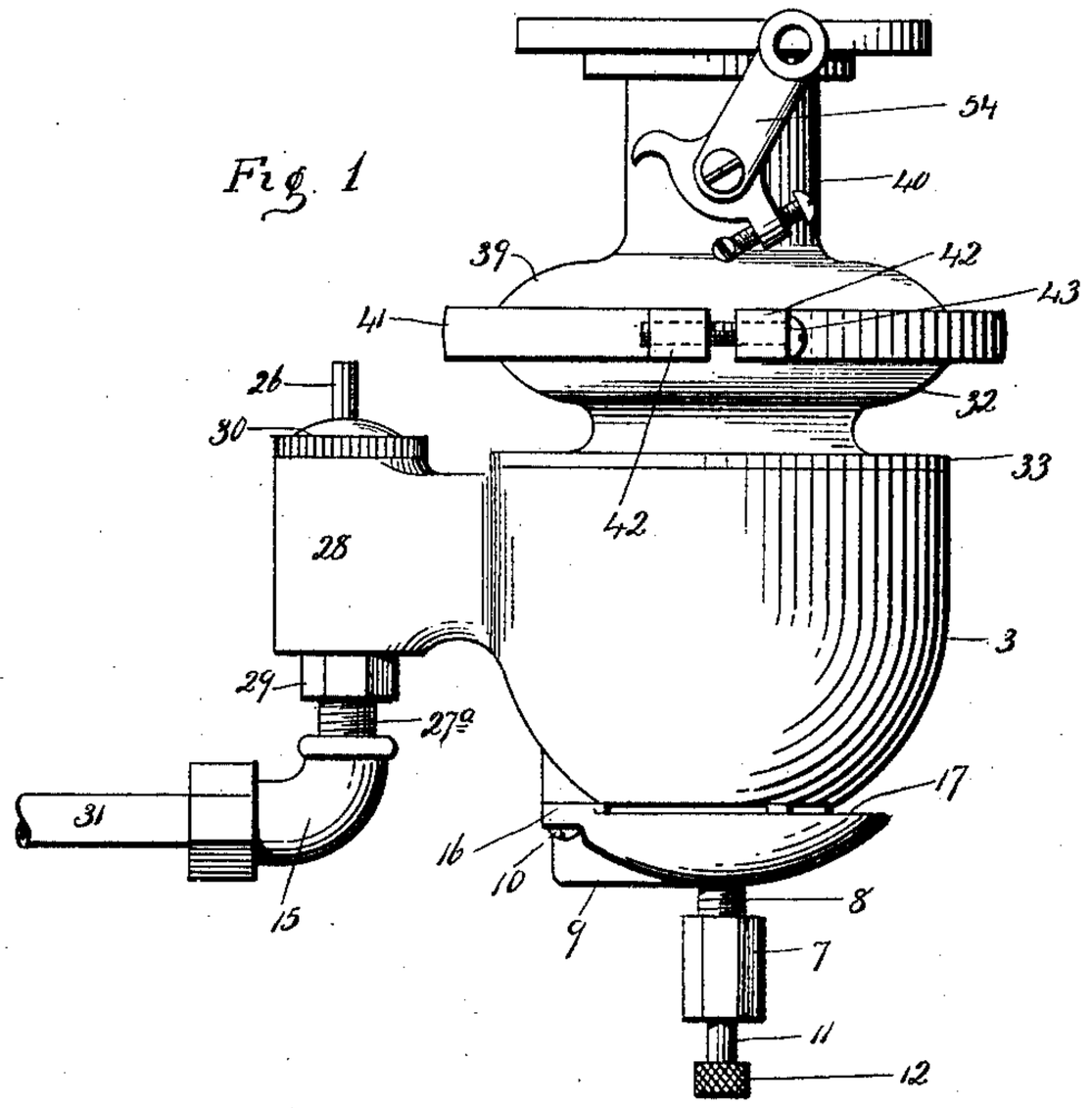

Fig. 2

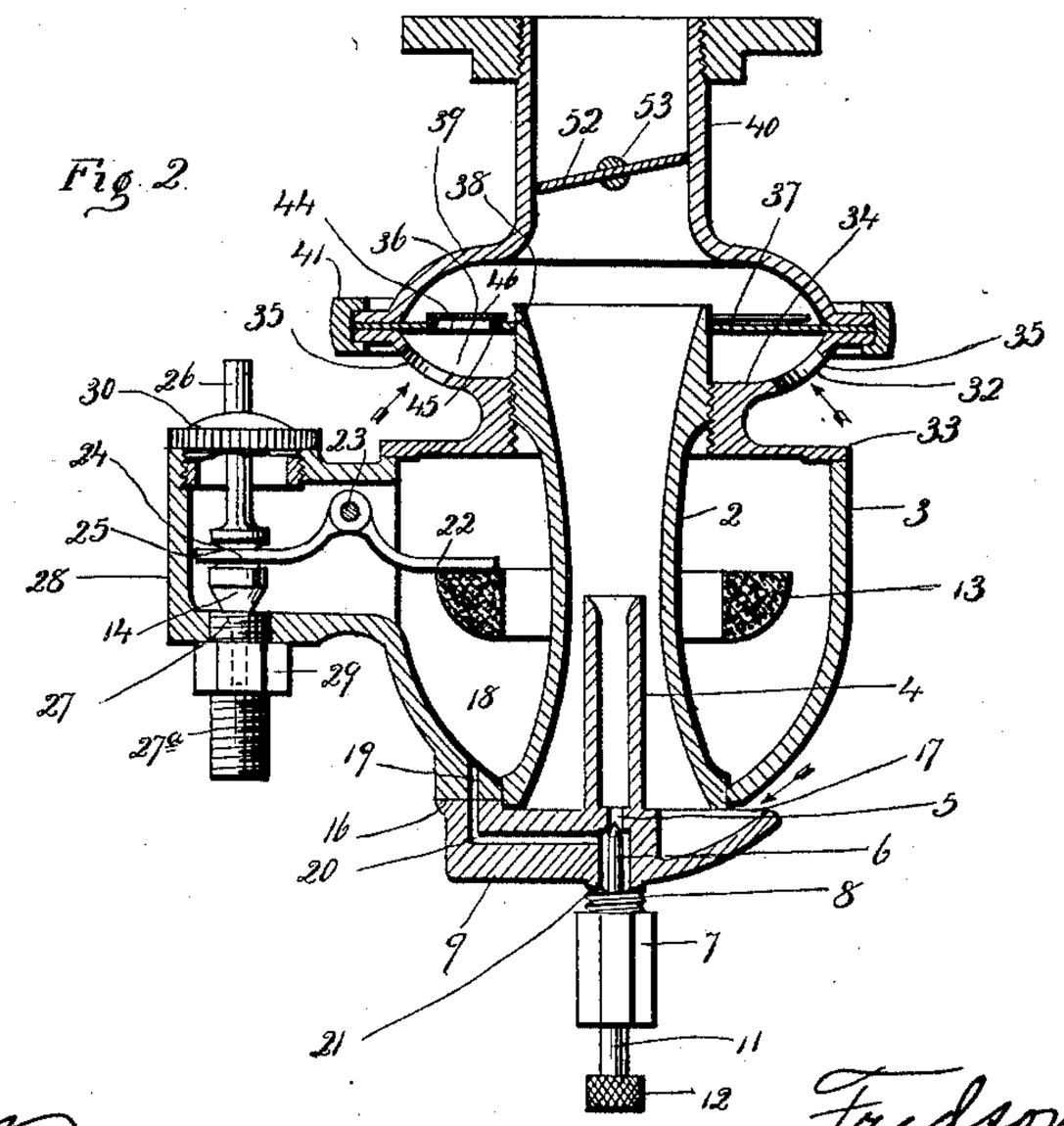

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Fig. 3

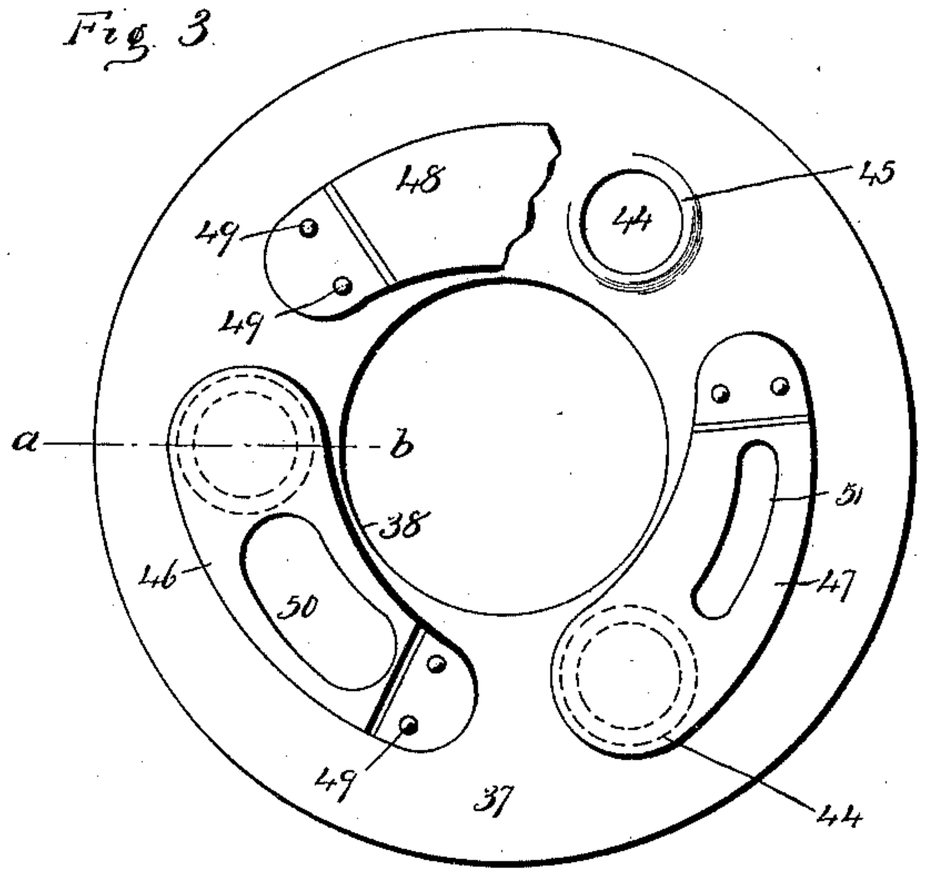


Fig. 4

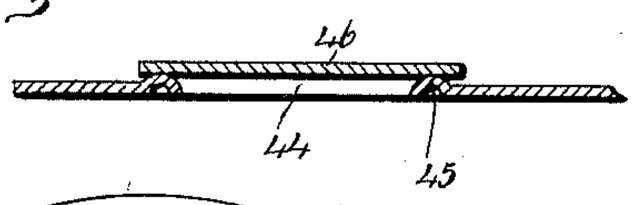


Fig. 5

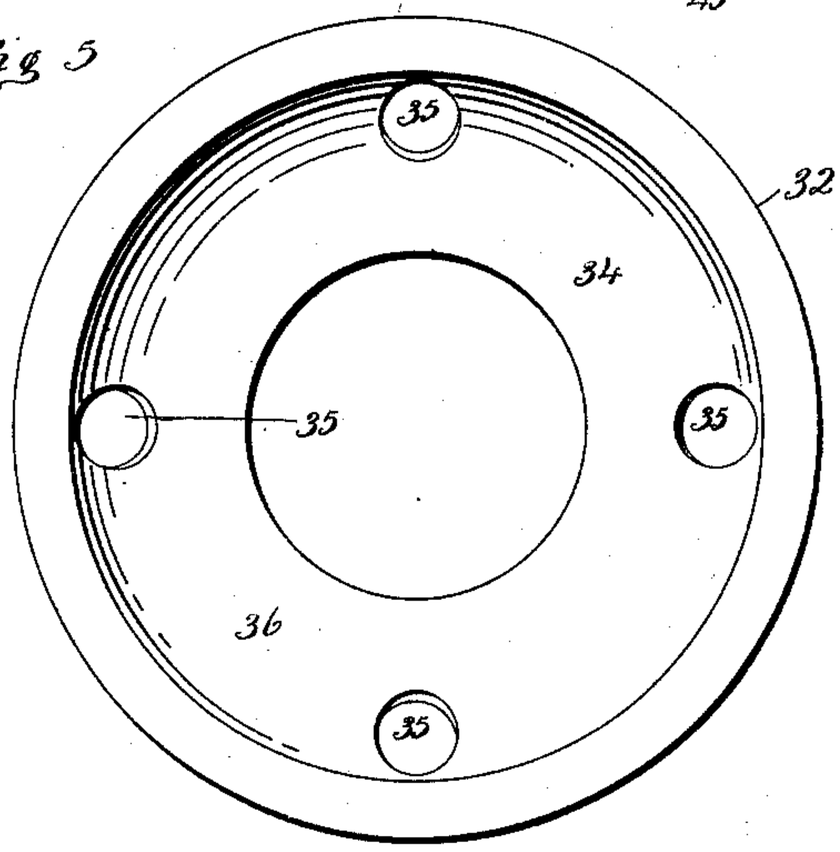
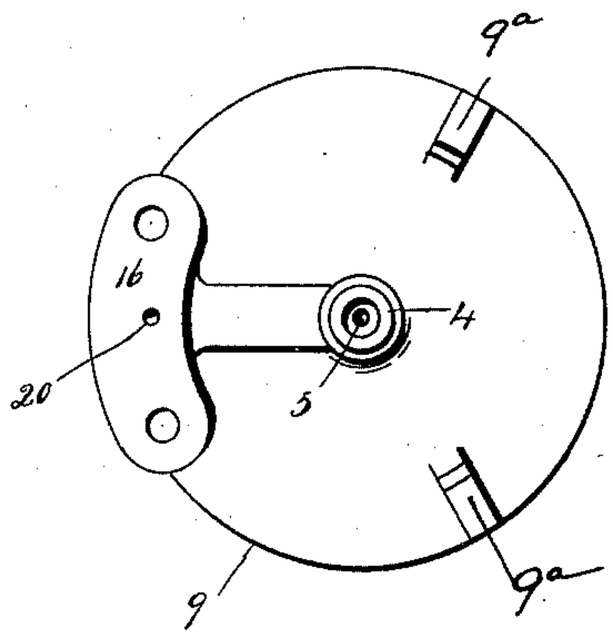


Fig. 6



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UNITED STATES PATENT OFFICE.

FREDSON E. BOWERS, OF NEW HAVEN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE GILBERT MANUFACTURING COMPANY, OF NEW HAVEN, CONNECTICUT, A CORPORATION.

CARBURETER.

997,233. Specification of Letters Patent. **Patented July 4, 1911.**

Application filed January 11, 1909. Serial No. 471,738.

To all whom it may concern:

Be it known that I, FREDSON E. BOWERS, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement in Carbureters; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a view in side elevation of a carbureter constructed in accordance with my invention. Fig. 2 a view thereof in vertical central section through the feed-valve and Venturi tube. Fig. 3 a detached plan view of the annular air-valve plate drawn to full size, showing one of the valves broken away to expose its seat. Fig. 4 a broken view on the line *a*—*b* of Fig. 3 showing one of the flap or reed valves carried by the said plate. Fig. 5 a detached plan view of the cap-section of the valve-body. Fig. 6 a detached plan view of the spray-nozzle cup which forms the bottom-section of the valve-body.

My invention relates to an improvement in carbureters for supplying internal combustion motors with a combustible mixture of vapor gas, the object being to produce a simple, compact and efficient device to automatically regulate the amount of air and gasolene contributed to the mixture according to the requirements of the motor, the said device being constructed with particular reference to simplicity of construction, convenience of adjustment, and reliability of performance in instantly meeting the demands of the motor.

With these ends in view my invention consists in a carbureter having certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

In carrying out my invention as herein shown, I employ a so called Venturi tube 2 secured by its lower end centrally within the bowl-piece or reservoir-section 3 of the body of the device for which the tube forms a central draft. At its lower end the said tube receives a spray or atomizing nozzle 4 rising centrally within it, the top of the nozzle being coincident with the most restricted portion of the tube which is contracted about midway of its length to form a waist. The said spray-nozzle 4 consists of a small tube formed at its lower end with a central opening 5 forming a seat for a needle valve 6 adjustably mounted in a nut-like stuffing box 7 screwed upon a threaded nipple 8 depending from the center of a spray-nozzle cup 9 forming the bottom-section of the body of the device and attached by screws 10 to the reservoir-section 3 thereof. The said needle-valve 6 is located at the upper end of a stem or shank 11 furnished with a knurled operating or finger-button 12. The tube 4 and alined nipple 8 are formed integral with the cup 9 which is very readily fastened to and removed from the section 3, whereby the spray-nozzle is made easily accessible for examination, cleaning or repair. By locating the valve-seat 5 and needle-valve 6 at the lower end of the tube, instead of at the upper end thereof as has heretofore been done in the construction of carbureters, the tube is left filled with gasolene to its top when the float 13 automatically closes the conical feed-valve 14 controlling the feeding of the gasolene through the supply-tube 15, so that a small body of gasolene is left in the tube 4 when the motor is idle. This small body of gasolene provides enough gasolene to start the motor before the suction of the motor starts the spray. In other words, the tube 4 with its charge of gasolene constitutes a cartridge for the starting of the motor. The cup 9 acts as a drip cup to intercept and receive any gasolene which may work over the top of the tube of the spray-nozzle 4. The edge of the cup, shown in Fig. 6, makes no contact with the section 3 except at the brace points 9^a, 9^a and along the bearing surface 16 the ends of which receive the screws 10, the space between the edge of the cup and the section 3 forming the main air-inlet 17 of the device.

Gasolene is fed from the reservoir 18 formed by the section 3, through a passage 19 in the bottom thereof into a registering passage 20 in the cup 9, the said passage 20 leading into an annular space 21 surrounding the needle-valve 6.

The float 13 aforesaid, is supported by the inner arm 22 of a two-armed lever hung on a pivot 23 and having its outer arm 24 forked to enter an annular groove 25 formed in the lower portion of the stem 26 of a conical valve 14 which fits into a tapered

valve-seat 27 in the upper end of a plug 27ª entered into the bottom of a valve-chamber or housing 28 made integral with, and offsetting from the reservoir-section 3, the plug 27 being held in place by a nut 29. A cap nut 30 entering the housing 28 provides a bearing for the valve-stem 26 which it centers. The lower end of the plug 27 receives the tube 15 to which the gasolene supply pipe 31 leads from a gasolene supply-tank. The construction just described provides no spring for closing the feed valve, but relies for that purpose upon the uplift of the float 13 which is, of course, raised by the inflow of the gasolene into the reservoir 18, whereby the two-armed lever is rocked on its pivot 23 and the conical feed-valve 14 jammed down into its tapered seat 27, cutting off the feeding of gasolene into the reservoir 18. As the gasolene is fed out of the reservoir through the nozzle 4, the float 13 descends and lifts the valve 14 from its seat 27, and admits gasolene into the reservoir until it has risen to a sufficient height therein to raise the float the distance required for reseating the valve 14 upon its seat 27 whereby the feeding of gasolene will be stopped as already described. The action of the valve 14 is in this way automatically controlled by the float 13 which responds to the demands made upon the device for gasolene. The only outlet for the gasolene is through the spray nozzle 4 which rises in the tube 2 to the normal or standard height of the gasolene in the reservoir. The action of the float is so sensitive that its effect will be to normally maintain the height of gasolene in the reservoir 18 at the top of the spray-nozzle 4 regardless of the demands made upon the device for gasolene. The main supply of air furnished for admixture with the gasolene is through the narrow passage 17 around the edge of the spray-nozzle cup 9.

In order to increase the gas-producing capacity of the device as well as to provide for regulating the consistency of the mixture, I employ a cap-section 32 internally threaded for being applied to the exteriorly threaded upper end of the Venturi tube 2, the lower end of the cap-section being flanged to form a cap or cover 33 for the reservoir-section 3 and its upper end forming a cup 34 having a plurality of air-inlets 35 leading into an air-chamber 36 located below a removable annular air-valve plate 37 having a central opening 38 to enable the plate to pass over the extreme top of the Venturi tube 2, the edges of the plate being interposed between the edge of the cup 34 and the dome-like flanged lower portion 39 of the throttle-piece 40. The flanged edges of the cup 34 and the portion 39 are clamped together by a binding ring 41 U-shaped in cross-section and having ears 42, 42, for the reception of a clamping screw 43. This construction permits the throttle-piece to be set in any desired position with respect to the body of the carbureter as may be required by the conditions of use as the position of the motor with respect to the carbureter varies in different machines. In other words, this construction permits the throttle-piece 40 to be revolved upon the cap-section before being clamped thereto, as required by the conditions of installation. The body of the device is formed as I may here state, by the reservoir-section 3, cap-section 32 and throttle-section 40.

The valve-plate 37 aforesaid is furnished as shown, though the number may be varied with three circular valve-ports 44 corresponding in combined area to the combined areas of the air inlets 35 in the cup 34. These ports are surrounded by beads 45 forming seats for sheet-metal reed-like valves 46, 47 and 48 secured to the upper face of the plate by means of rivets 49 passing through their ends. As it is designed that these reed-like air-valves shall operate progressively, they are therefore varied in tension. This may be done in various ways. As shown the valve 46 is formed with a relatively large slot 50; the valve 47 is formed with a narrower slot 51, while the valve 48 has no slot. Under this construction the valve 46 offers less resistance than the valve 47, and the valve 47 less than the valve 48 since the valve 46 is more limber than the valve 47, and the valve 47 more limber than the valve 48, so that although the air-pressure from below is exerted on the same area of each valve, the valves will be opened progressively as each opposes a different amount of resistance to the pressure. Therefore the valve 46 will open first; to an increased demand the valve 47 will then open; and then to a still increased demand, the valve 48 will open; they will close in reverse order. These valves 46, 47 and 48 are opened by the vacuum produced by the downward movement of the piston in its cylinder. Therefore as soon as the demand upon the carbureter passes a predetermined point, these air-valves will be called upon one after the other to supply additional or supplemental air for the purpose of increasing the capacity of the device and modifying the consistency of the vapor, this being controlled by a throttle-valve 52 located in the throttle-piece 40 and mounted upon a rock shaft 53 provided at its outer end with a throttle-lever 54 which is connected with the throttle-operating device whatever its character may be, on the automoblie on which the carbureter is installed.

I claim:—

1. In a carbureter, the combination with the body thereof, of a Venturi tube located in the said body and open at its upper and

lower ends, a spray-nozzle cup removably attached to the lower end of the said body from which it is separated by the main air-inlet of the device, and a spray-nozzle carried by the said cup and rising within the said Venturi tube to the most restricted point thereof.

2. In a carbureter, the combination with the body thereof, of a Venturi tube located in the said body and open at its upper and lower ends, a spray-nozzle cup removably attached to the lower end of the said body from which it is separated by the main air-inlet of the device, and a spray-nozzle formed integral with the cup and rising therefrom into the said Venturi tube.

3. In a carbureter, the combination with the body thereof, of a Venturi tube located in the said body and open at its upper and lower ends, a spray-nozzle cup removably attached to the lower end of the said body from which it is separated by the main air inlet of the device, a spray-nozzle carried by the said cup and rising therefrom into the most restricted portion of the Venturi tube, the said nozzle providing for the reservation of a small body of liquid fuel for the initial starting of the motor, a valve located at the lower end of the spray-nozzle and an automatic feeding-device for supplying liquid fuel to the lower end of the said spray-nozzle.

4. In a carbureter, the combination with the body thereof, of a Venturi tube located centrally therein and open at its upper and lower ends, a spray-nozzle cup removably attached to the lower end of the said body from which it is separated by the main air-inlet of the device, a spray-nozzle rising from the cup into the Venturi tube, a valve-seat located at the bottom of the said spray-nozzle, a valve mounted in the said cup for the closure of the said valve-seat, and means located below the cup for adjusting the valve.

5. In a carbureter, the combination with the body thereof, of a Venturi tube centrally located therein and substantially corresponding in diameter at its upper and lower ends, of a spray-nozzle cup removably attached to the lower end of the said body from which it is separated by the main air-inlet of the device, the said cup being located in a plane at a right angle to the axis of the body, a spray-nozzle rising from the cup within the said tube, a valve-seat at the lower end of the said spray-nozzle, a valve mounted in the said cup for closing the said seat, and means for adjusting the said valve, the said cup being adapted to be secured at one of its edges to the body at a point to one side of the axial center thereof.

6. In a carbureter, a sheet-metal air-valve plate formed with a plurality of ports encircled by beads struck up from the plate to form valve-seats, in combination with a corresponding number of reed-like sheet-metal valves carried by the said plate, normally resting upon the said valve-seats for closing the said valve-ports, and differentiated in stiffness so as to open progressively according to the suction produced by the motor.

7. In a carbureter, the combination with an air-valve plate provided with a plurality of ports, of a corresponding number of reed-like sheet-metal valves normally closing the said ports, all of the said valves being of the same length and thickness, but cut away to differentiate them in tension as required to cause their progressive operation according to the suction produced by the motor.

8. In a carbureter, the combination with an air-valve plate provided with a plurality of ports, of a corresponding number of sheet-metal reed-like air-valves secured to the said plate and normally closing the said ports, the said valves being cut away between their ends to differentiate them in tension, and hence to regulate the order in which they are operated by the suction of the motor.

9. In a carbureter, the combination with an air-valve plate provided with a plurality of ports, of a corresponding number of sheet-metal reed-like air-valves secured to the plate and normally closing the said ports, each valve being secured at one end to the plate and extending at its other end over its port, and intermediate portions of the valves being cut away as required to differentiate them in tension.

10. In a carbureter, the combination with a reservoir, of a cap-section located thereupon, a throttle-section applied to the said cap-section, a removable, annular sheet-metal air-valve plate clamped between the said cap-section and throttle-section, the said plate being formed with air-ports, reed-like supplemental air-valves applied to the upper face of the said air-plate and cut away for being differentiated in tension so as to open progressively according to the suction produced by the motor, and an air-tube rising from the reservoir and terminating at its upper end at the said plate.

11. In a carbureter, the combination with a reservoir-section, of a cap-section applied thereto and formed with air ports for the entrance into it of outside air, a throttle-section applied to the cap-section upon which it is rotatable to meet the requirements of installation, the said cap and throttle sections being shaped to form a supplemental air-chamber, an air-tube arranged centrally with respect to the said sections, an annular air-valve plate interposed between the cap and throttle sections and encircling the upper end of the said tube and provided with a plurality of air ports, a corresponding

number of air-valves carried by the said plate, and a binding-ring fitting over the edges of the cap and throttle sections and adapted to be contracted for binding the same together after the throttle section has been properly positioned upon the cap section.

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

FREDSON E. BOWERS.

Witnesses:

ANNA J. BOYLE,

GEORGE HOTCHKISS.