C. E. HALL & W. DICKS.

CARBURETER.

APPLICATION FILED OCT. 18, 1907.

962,140. Patented June 21, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

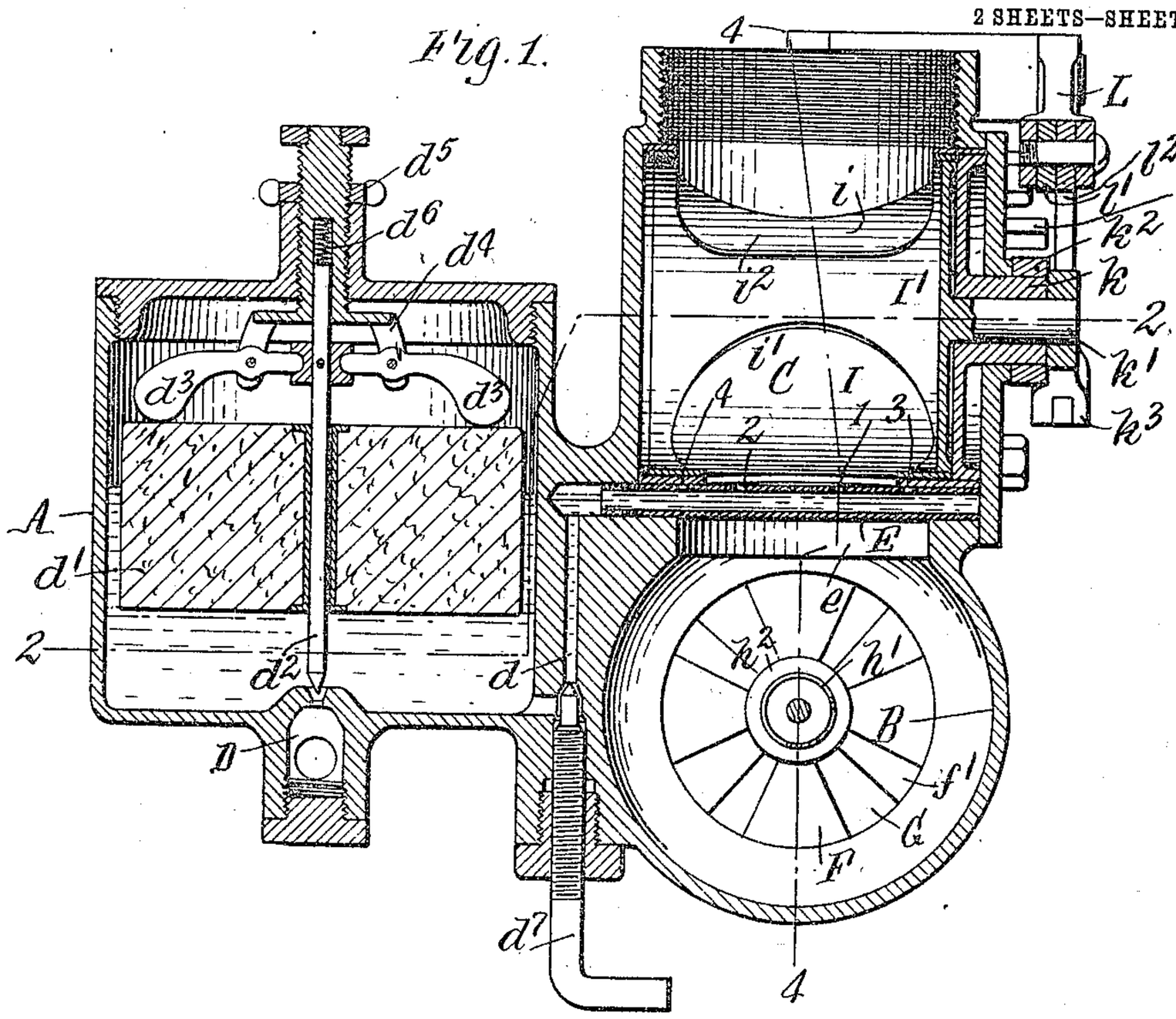
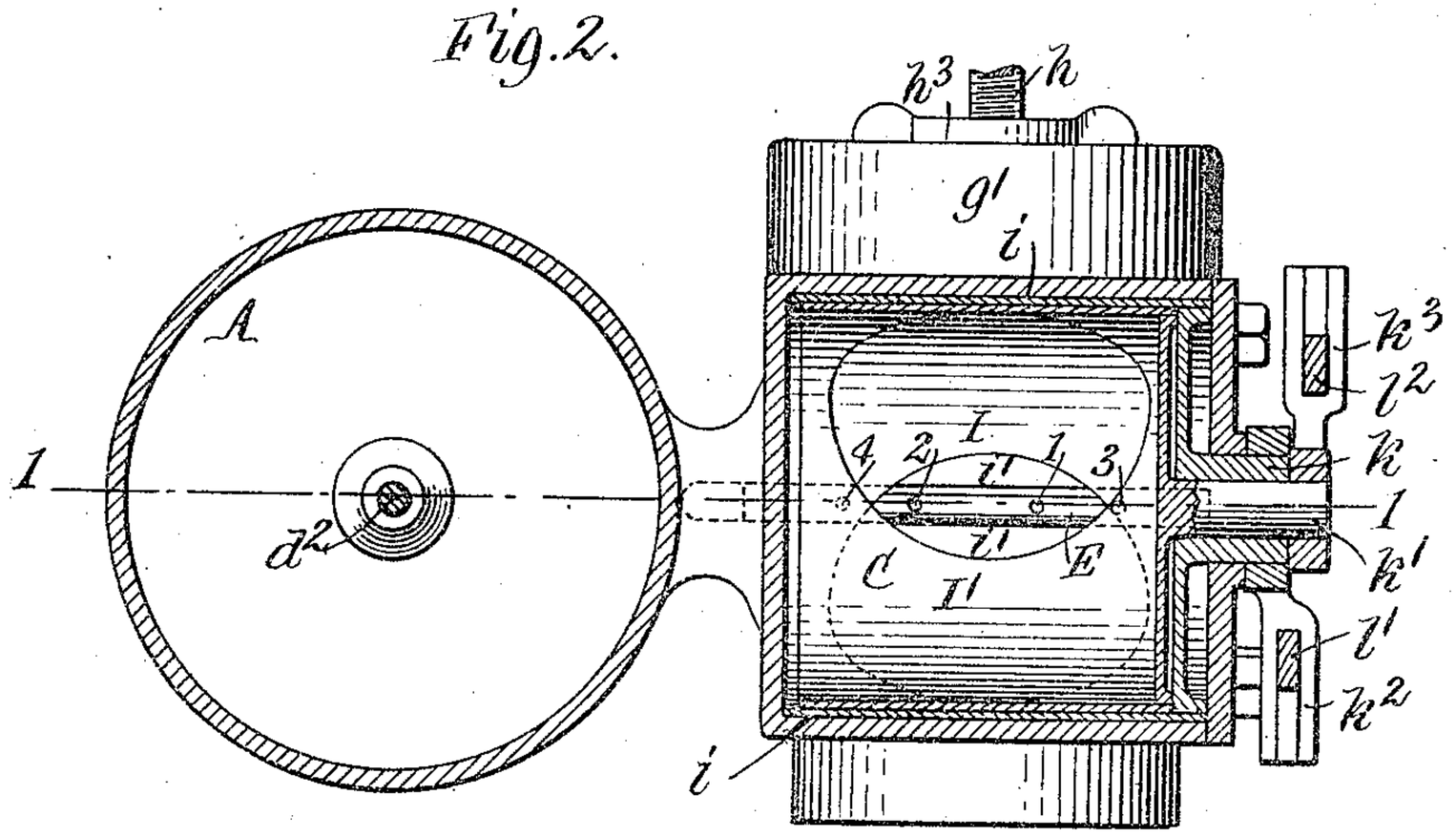


Fig. 2.



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2 SHEETS—SHEET 2.

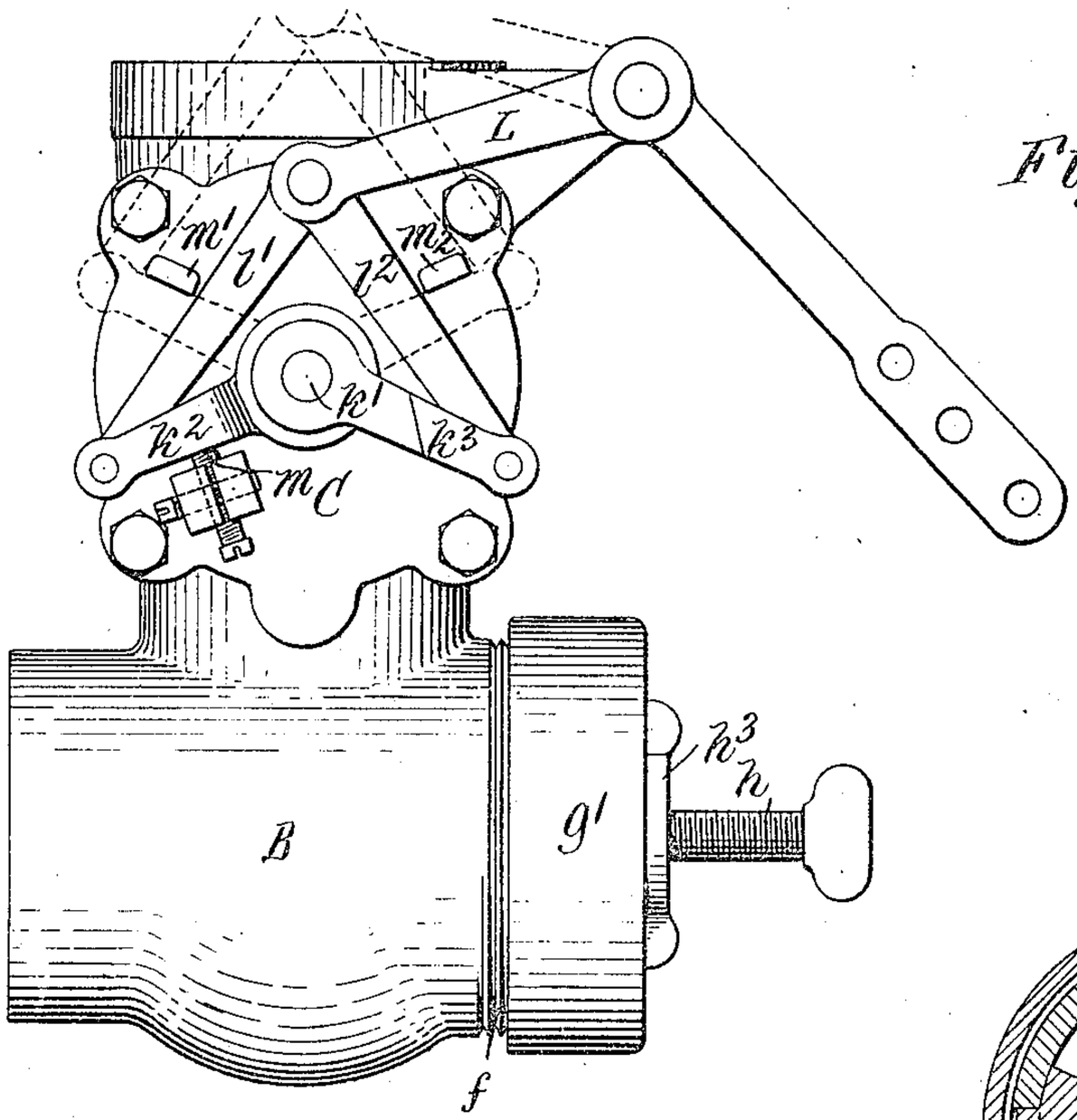


Fig. 3.

Fig. 4.

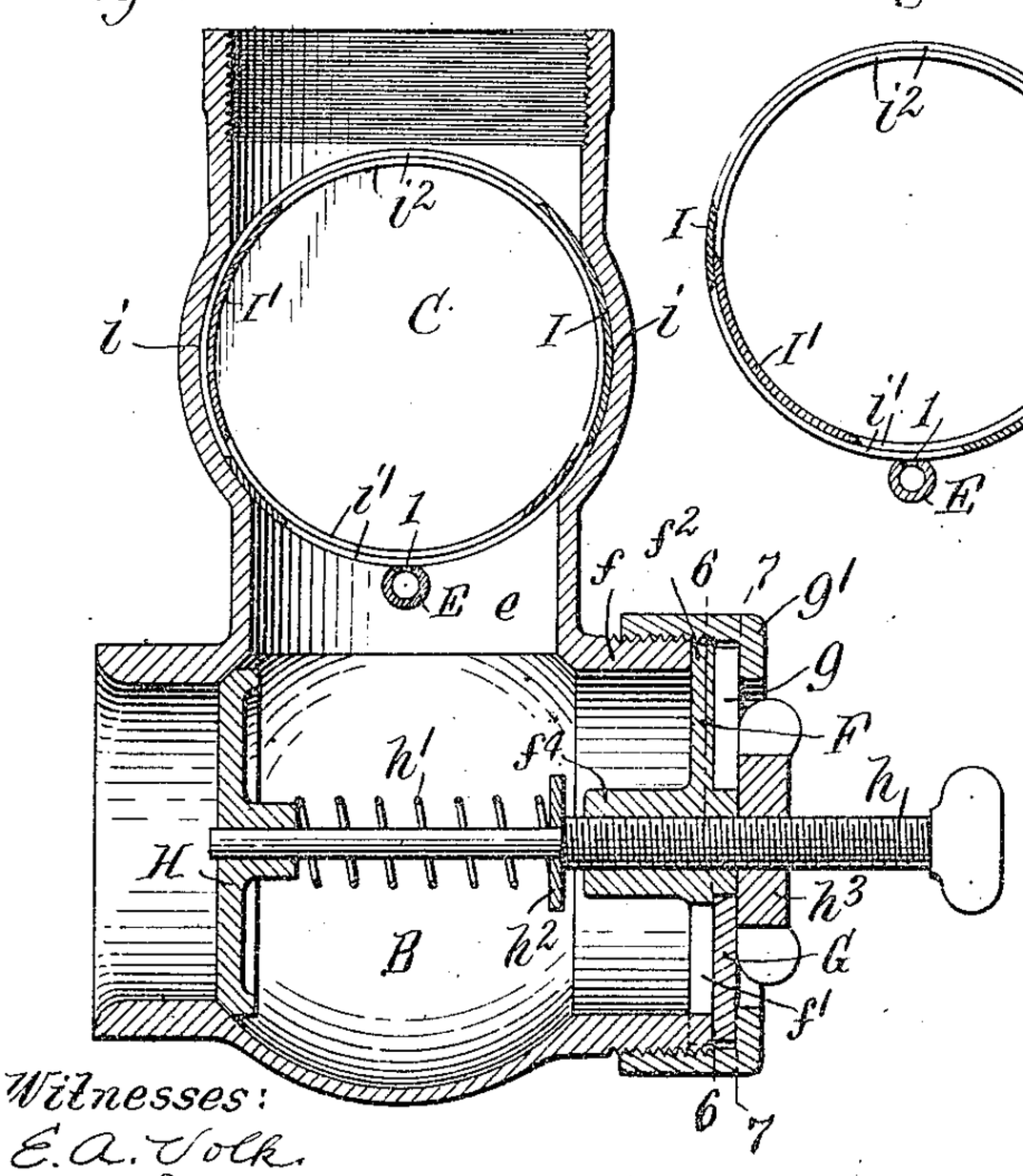


Fig. 5.

Fig. 6.

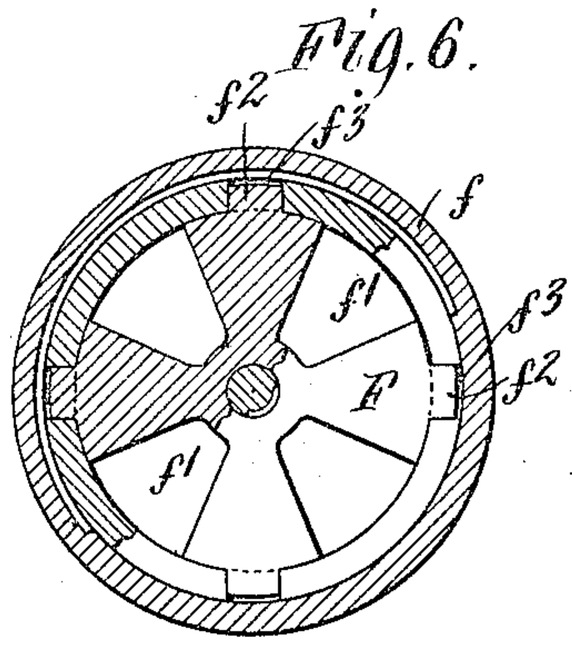
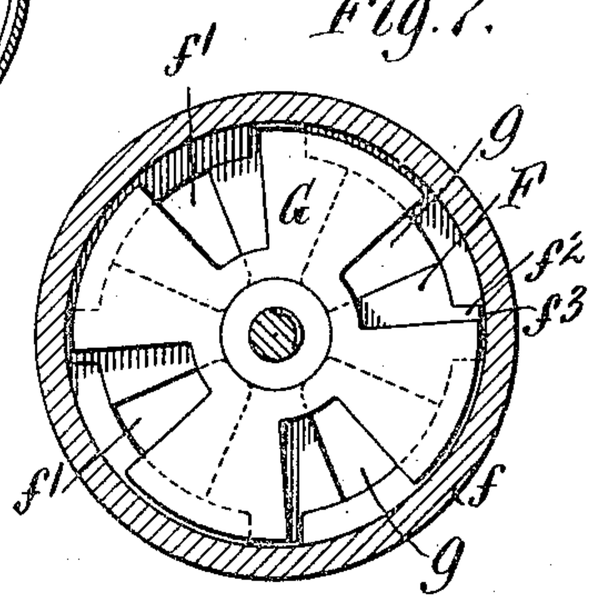


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES E. HALL AND WILLIAM DICKS, OF BUFFALO, NEW YORK, ASSIGNORS TO CHARLES E. HALL COMPANY, OF BUFFALO, NEW YORK.

CARBURETER.

962,140. Specification of Letters Patent. Patented June 21, 1910.

Application filed October 18, 1907. Serial No. 398,067.

To all whom it may concern:

Be it known that we, CHARLES E. HALL and WILLIAM DICKS, citizens of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Carbureters, of which the following is a specification.

This invention relates more particularly to that type of automatic spray carbureters for internal combustion engines in which the liquid hydrocarbon, usually gasolene, is sucked from a spray nozzle or pipe and commingled with a current of air which is drawn into the engine past said nozzle through a surrounding passage by the suction of the engine. These carbureters are ordinarily provided with a float feed for maintaining the gasolene at a constant level in the spray nozzle, and with a throttle valve located between the gasolene nozzle and the engine for controlling the supply of the explosive mixture to the engine, and also with an auxiliary air admission valve operated automatically by the suction of the engine for increasing the supply of air when an increased volume of the explosive mixture is demanded in the higher speeds of the engine.

The objects of the invention are to produce an efficient and practical carbureter of this type of simple, compact construction in which the throttle valve is so constructed and arranged that the opening provided thereby for the passage of the charge will be in very close proximity to and directly opposite to or surrounding the spray nozzle, so that the air will always have a sufficient velocity past the nozzle to insure the proper aspiration of the gasolene regardless of the position of the valve or the size of the opening which it provides; also to so construct the throttle valve that it in addition serves to control the supply of gasolene from the nozzle proportionately as the valve opening is increased or decreased to admit a greater or less volume of air to the engine; also to improve the construction and arrangement of the primary and automatic auxiliary air admission valves, and otherwise improve carbureters of this type in the respects hereinafter described and set forth in the claims.

In the accompanying drawings, consisting of two sheets: Figure 1 is a longitudinal sectional elevation of a carbureter embodying the invention, in line 1—1, Fig. 2. Fig. 2 is a sectional plan thereof, in line 2—2, Fig. 1. Fig. 3 is an end elevation thereof. Fig. 4 is a transverse sectional elevation thereof, in line 4—4, Fig. 1. Fig. 5 is a sectional elevation, similar to Fig. 4, of the throttle valve, showing the same partially closed. Fig. 6 is a sectional elevation, in line 6—6, Fig. 4, showing the main air admission ports. Fig. 7 is a sectional elevation, in line 7—7, Fig. 4, showing the main air admission valve.

The casing of the carbureter is provided with a float chamber A, an air valve or air admission chamber B, which is located at one side of the float chamber, and a mixing or throttle valve chamber C which is arranged above and communicates with the air valve chamber, and the upper end of which is connected to a pipe leading to the engine. The casing may be constructed as illustrated or of any other suitable construction.

D represents a gasolene supply passage leading to the float chamber, E the gasolene spray nozzle or pipe, and d a passage connecting the float chamber with the spray pipe or nozzle.

d' represents a float in the float chamber, and d^2 a valve operated thereby for keeping the gasolene at a constant level in the spray nozzle. In the construction shown, the valve d^2 consists of a rod passing vertically through the float and it is moved toward or from its seat in the supply passage D by weighted levers d^3 bearing on the float and engaging a collar on the valve. These levers are fulcrumed on a yoke d^4 having a screw-threaded stem extending out through a threaded opening in the top of the float chamber. By turning this stem the levers can be adjusted vertically to regulate the action of the valve.

d^5 is a lock nut for holding the stem and yoke from movement when adjusted. The upper end of the valve is guided in a hole in the stem of the yoke d^4 and a light spring d^6 in said hole bearing on the valve assists in preventing the valve from being reciprocated by the jarring of the carbureter. The described arrangement of the bearing yoke for the valve levers enables a very easy regulation of the valve.

d^7 is an ordinary screw needle valve for controlling the flow of gasolene from the float chamber to the spray nozzle or pipe.

The spray nozzle or pipe E preferably extends horizontally across the casing in the passage *e* thereof between the air admission chamber and the throttle valve or mixing chamber, and is provided in its upper side with one or more, preferably several, gasolene discharge orifices 1, 2, 3, 4.

The air admission chamber B shown is of globular form and is provided at one end with a cylindrical externally threaded nipple or extension *f*, at the end of which is secured a diaphragm or end plate F provided with air admission ports or openings *f'*, Figs. 4 and 6. This end plate is preferably provided with peripheral lugs f^2, Fig. 6, seated in notches f^3 in the end of the nipple *f* to hold the plate from turning, and is also provided with a central hub f^4 having a screw-threaded central opening.

G represents a main air admission valve or damper which consists of a flat plate having a central hole into which the outer end of the hub f^4 extends, forming a bearing on which the valve can turn, and air admission ports or openings *g* corresponding in number with and adapted to register with the ports or openings in the end plate. The valve is held against the outer face of the end plate and it and the end plate are held in place on the nipple *f* by a coupling ring *g'* which is screwed onto the threaded nipple and has a flange inclosing the peripheral portion of the valve. The valve can be turned by hand to cause the openings therein to register fully or partially with the openings of the end plate to thereby increase or decrease the main supply of air to the carbureter.

H represents a supplemental or auxiliary air admission valve which controls the admission of air through the opposite open end of the air admission chamber B. The valve H, which is preferably of the puppet type, seats in an internal conical face in the end of the air admission chamber and is arranged to slide on the smooth reduced inner end of an adjusting screw *h* which is screwed into the threaded opening of the hub of the end plate F and is provided with a thumb piece or handle at its outer end for turning it. A spring *h'* surrounding the adjusting screw between the valve and a washer h^2 bearing against a shoulder on the adjusting screw, holds the valve yieldingly to its seat. The pressure of the spring can be regulated as required, by screwing the adjusting screw in or out in the hub of the end plate F.

h^3 represents a lock nut for holding the adjusting screw when adjusted. This supplemental valve is opened by the suction of the engine in the usual way to increase the air supply when the engine is running at high speeds.

The throttle valve preferably consists of concentric outer and inner hollow cylinders or shells I I' extending across the mixing or throttle valve chamber C parallel with the spray nozzle or pipe E and bearing at their ends in cylindrical seats *i* in the opposite ends of the valve chamber C. The valve shells fit one within the other and are adapted to turn freely upon each other, and have inlet openings *i'* in their lower sides or sides next to the gasolene feed pipe, and outlet openings i^2 in their upper or opposite sides. The inlet openings shown are circular and when in full registration or nearly so, as shown in Fig. 4, afford a practically unobstructed passage between the air admission and mixing chambers. By turning the valve shells in opposite directions this passage or opening can be more or less contracted, see Figs. 2 and 5, or completely closed. The outlet openings i^2 are sufficiently elongated transversely of the shells to afford a practically unobstructed outlet for the explosive mixture in any adjustment of the shells. The outer valve shell preferably bears against the upper or perforated side of the spray nozzle or pipe, which is shown slightly concaved to make a better seat for the shell, so that by turning the shell to place an imperforate portion thereof against the pipe it will close the discharge orifices thereof. The spray nozzle or pipe shown is provided with four discharge orifices, 1, 2, 3, 4, so disposed along its length that they will be opened in the order numbered as the valve shells are turned in the direction to widen the valve inlet opening, and will be closed in the reverse order by the opposite turning of the valve shells. By locating the orifice 1 to one side of the middle of the pipe, as shown, this orifice can not be uncovered before air is admitted to the mixing chamber and it will thus be impossible for the engine to draw in a charge of gasolene alone. The invention is not, however, restricted to the particular number and arrangement of the discharge orifices described and one or more orifices located as calculated to produce the best results could be used.

The valve shells I I' can be operated by any suitable means. As shown, the outer shell is provided at one end with a hollow stem *k* projecting through the adjacent end of the valve chamber, and the inner shell has a stem *k'* extending out through said hollow stem. Levers k^2 k^3 secured to the outer ends of the stems are connected by links *l'* l^2 to a common operating lever L, by swinging which the valve shells will be simultaneously turned in opposite directions to more or less open or close the throttle valve, depending upon the direction of movement of the operating lever. Suitable stops *m* *m'* m^2 are shown on the end of the throttle valve chamber C for limiting the opening and closing movements of the valve shells.

The operation of this type of carbureters is well understood. The suction of air by the engine through the passage *e* and mixing chamber around the spray nozzle or pipe draws the gasolene out of the discharge orifices and it is atomized or vaporized and mixed with the air in the mixing or throttle valve chamber to carburet the air or form the combustible mixture. The volume of the explosive mixture admitted to the engine is controlled by opening or closing the throttle valve as required. When the engine is running at high speeds the suction is increased so as to automatically open the supplemental air admission valve and supply the necessary additional air.

By means of the throttle valve constructed as described, the opening through which the air must pass is located in the closest possible proximity to the spray nozzle or pipe so that the velocity of the air past the same will be sufficient to properly take up the gasolene even when the throttle is partially closed and the engine is running at slow speed. At the same time the spray nozzle or pipe is always disposed centrally with respect to the opening of the throttle valve regardless of the area of the opening, thus insuring a better distribution of the air around the pipe and consequently a more uniform mixture. While the horizontal spray nozzle or pipe parallel with the axis of the throttle valve shells is preferred, it will be manifest that the throttle valve arranged and constructed as described would also be desirable in connection with an upright spray nozzle, such as ordinarily employed, having the discharge orifice at its upper end. Furthermore, as the throttle valve also serves to open and close the discharge orifices of the nozzle or pipe, it will be apparent that the described construction would be useful in a carbureter without a float feed. The same throttle valve construction would also be useful for controlling the supply of air and gasolene to the engine irrespective of the sort of main and supplemental air valves used or even in a carbureter not provided with such valves.

We claim as our invention:

1. In a carbureter, the combination of a casing having an air passage, a spray pipe arranged transversely in said passage and having a plurality of discharge orifices in one side thereof, a throttle valve comprising inner and outer shells arranged transversely in said passage to turn on an axis parallel with said spray pipe and having holes in the sides thereof adjacent to said nozzle, and means for turning said shells in opposite directions to increase and decrease the area of the opening provided by said holes, whereby the discharge orifices of said pipe are covered and uncovered successively and said opening is kept concentric with respect to said pipe, substantially as set forth.

2. In a carbureter, the combination of a casing having an air passage, a spray pipe extending transversely in said passage and having a plurality of discharge openings arranged on one side thereof, a throttle valve comprising inner and outer cylindrical shells arranged transversely in said passage to turn on an axis parallel with said spray pipe and having holes in the sides thereof adjacent to said nozzle, and means for turning said shells in opposite directions to increase and decrease the area of the passage provided by said holes, one of said shells bearing against the side of the pipe having the discharge orifices, whereby the discharge orifices in said pipe are opened and closed by said shell and said opening is kept concentric with respect to said pipe, substantially as set forth.

3. In a carbureter, the combination of a casing having an air chamber, a plate at one end of said chamber provided with air admission ports and with peripheral parts which interlock with said end of the chamber to hold said plate from turning, a rotatable valve bearing against said end plate and having ports to register with said ports in the end plate, a coupling ring screwed on said end of the chamber for holding said end plate and valve in place, and means for supplying liquid hydrocarbon into said casing, substantially as set forth.

4. In a carbureter, the combination of a casing having an air chamber provided with air admission openings at its opposite ends, an air valve controlling one end of said chamber, a valve controlling the other end of said chamber, an adjusting screw and guide for said latter valve bearing in the first mentioned end of said chamber, and means for supplying liquid hydro-carbon into said casing, substantially as set forth.

Witness our hands, this 12th day of October, 1907.

CHARLES E. HALL.
WILLIAM DICKS.

Witnesses:
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