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C. O. HEDSTROM.

CARBURETER FOR EXPLOSIVE ENGINES.

APPLICATION FILED MAY 10, 1902.

NO MODEL.

Fig. 1.

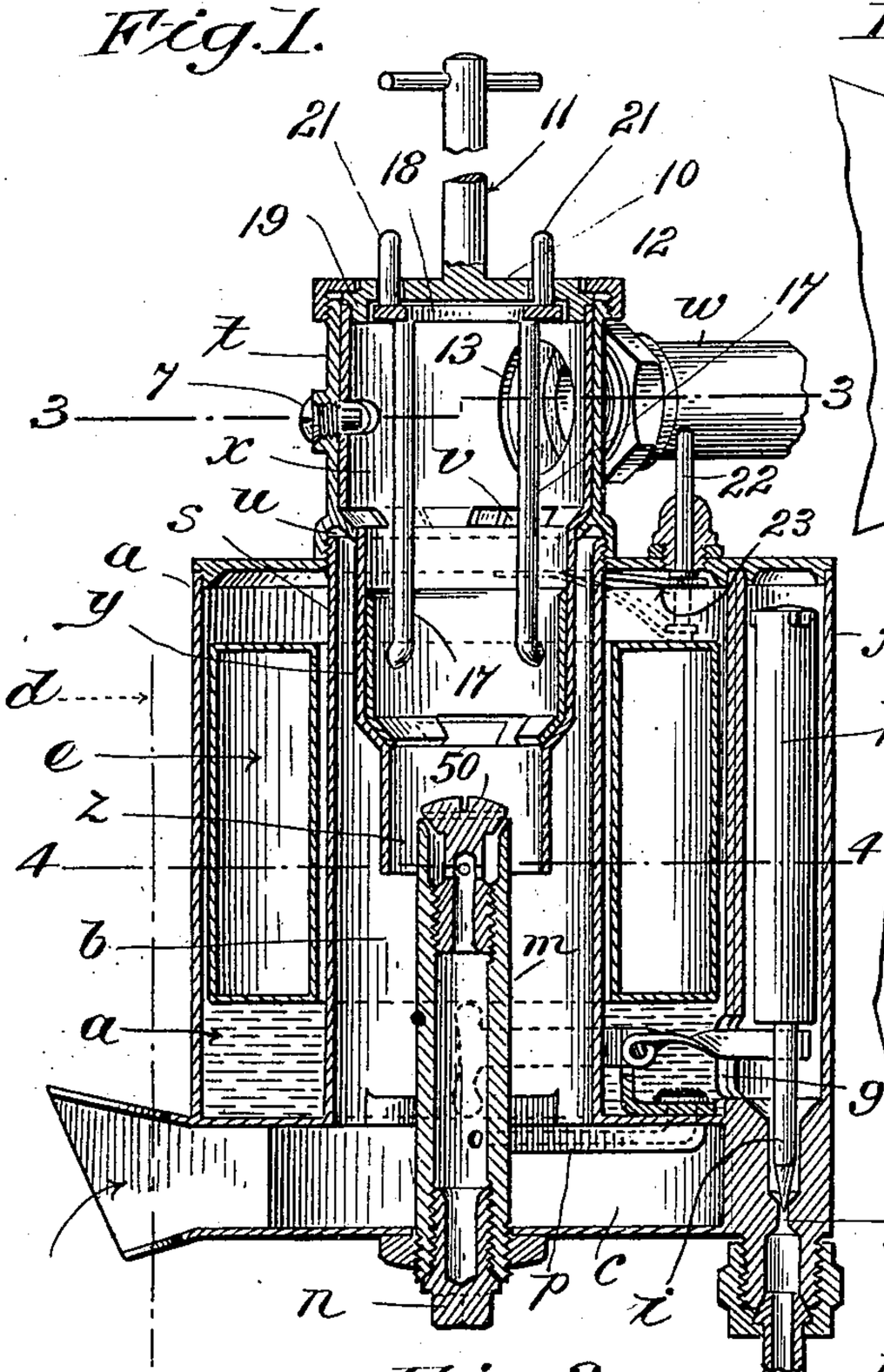


Fig. 3.

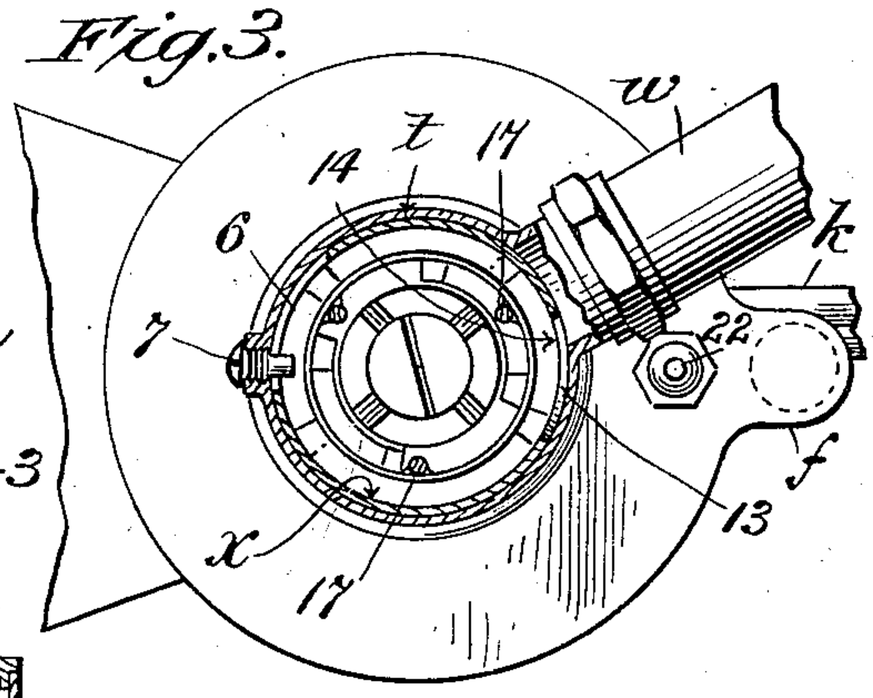


Fig. 4.

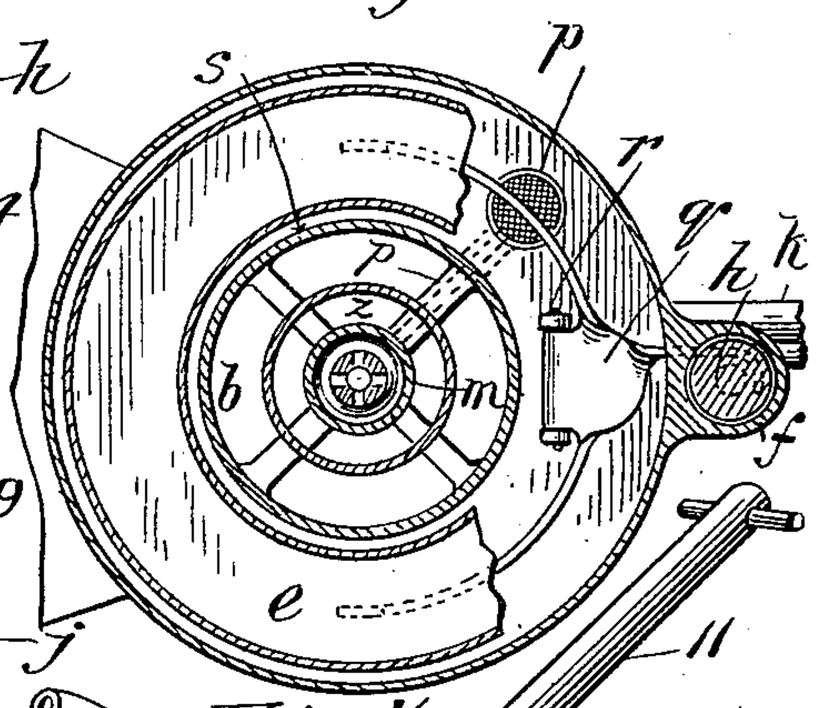


Fig. 2.

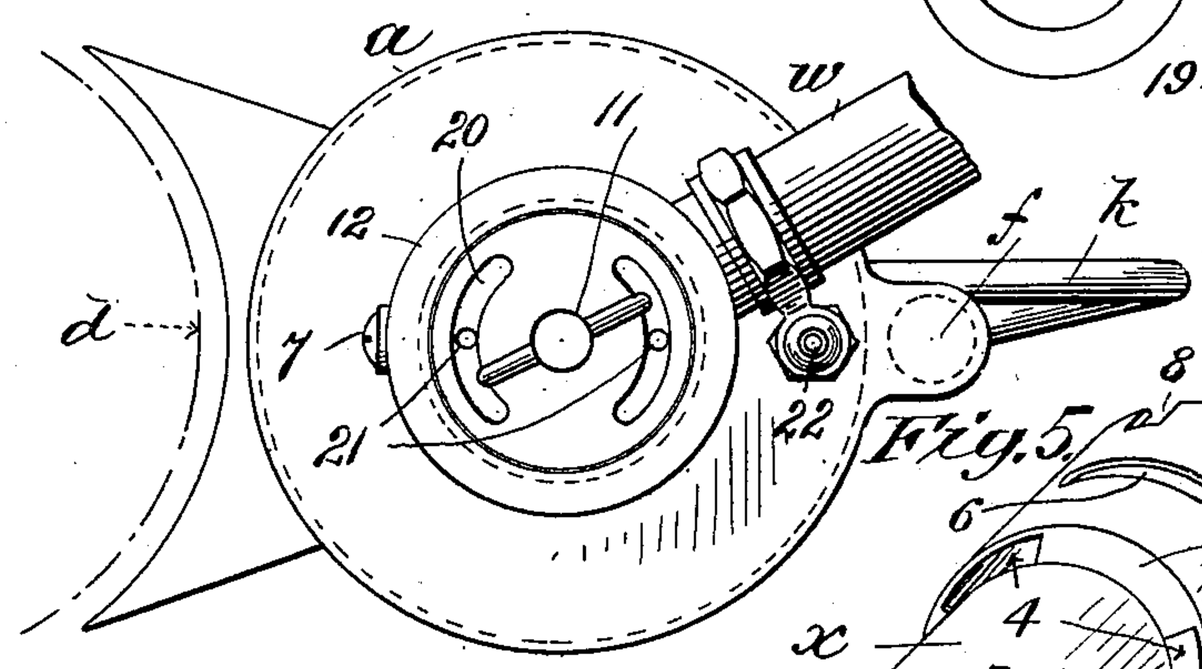


Fig. 7.

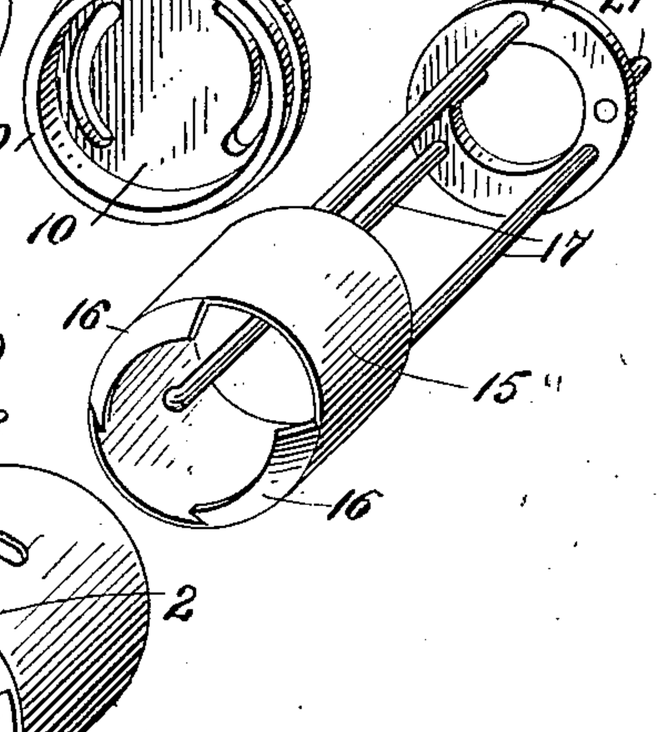
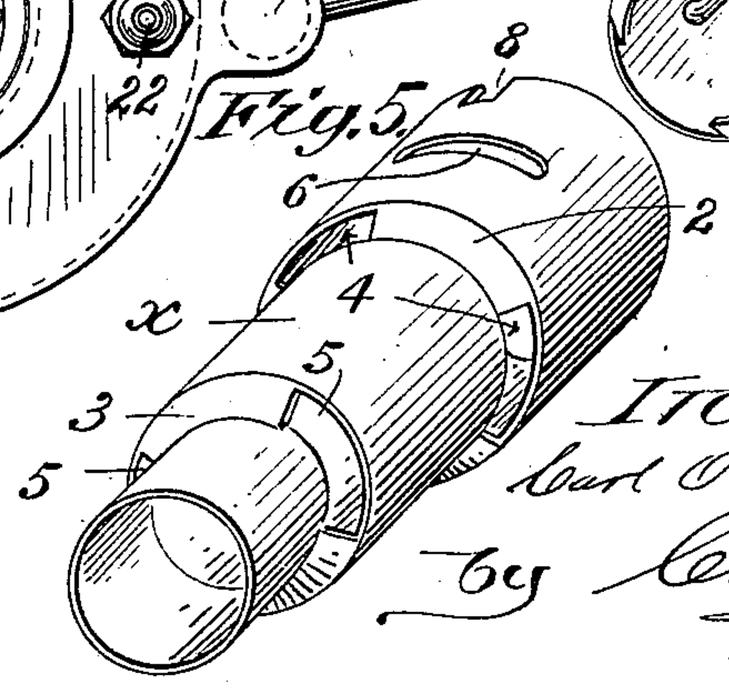


Fig. 5.



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UNITED STATES PATENT OFFICE.

CARL O. HEDSTROM, OF PORTLAND, CONNECTICUT.

CARBURETER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 730,649, dated June 9, 1903.

Application filed May 10, 1902. Serial No. 106,719. (No model.)

To all whom it may concern:

Be it known that I, CARL O. HEDSTROM, a citizen of the United States of America, residing at Portland, in the county of Middlesex and State of Connecticut, have invented new and useful Improvements in Carbureters for Explosive-Engines, of which the following is a specification.

This invention relates to the construction of carbureters for volatile liquids, and it has special reference to that class of devices of this type which are employed in connection with internal-combustion motors, the object of this invention being to provide a carbureter of compact construction wherein the regulation of the supply of liquid may be accurately regulated and whereby the proportion of air required under normal conditions of operation may be supplied thereto in necessary quantities, a further object of the invention being in the provision of means for regulating the area of the opening in the carbureter, through which said normally required mixture may be supplied to the motor in the usual manner, and, further, in the provision of means whereby when the devices are operated which control the area of this opening they will simultaneously operate to permit an increased air-supply without disturbing the devices whereby the normal air-supply is regulated, all of which will be more fully described in the following specification and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a sectional elevation of a carbureter constructed according to my invention. Fig. 2 is a top plan view of the same. Fig. 3 is a transverse sectional view on line 3 3, Fig. 1. Fig. 4 is a similar view on line 4 4, Fig. 1. Figs. 5, 6, and 7 are perspective views of the air-regulating devices shown in separated relation.

In carrying my invention into practice I construct a hollow cylindrical reservoir, indicated by *a*, having extending therethrough a cylindrical passage *b*, which at the lower end of the reservoir *a* opens into a horizontally-disposed chamber *c*, having thereon a flaring mouthpiece, as shown in the drawings, which is cut out in a vertical plane on a curve adapted to coincide substantially with the outline of the cylinder of a motor to which the carbureter may be attached, the outline of a portion of said cylinder being indicated by *d* in dotted lines in Figs. 1 and 2. This flaring mouthpiece is the air-intake, and it is desirable to take in air from a point in close proximity to the cylinder of the motor, whereby the air may be warmed more or less.

The construction of the reservoir *a* in the form of a hollow cylinder necessarily results in the formation of an annular chamber within which the liquid to be volatilized is received. Within this chamber there is located an annular float *e*. On one side of the reservoir *a* there is formed a valve-chamber *f*, extending lengthwise thereof and parallel with its axis. This valve-chamber is entirely separate from the reservoir *a*, except for an opening *g*, near the lower end thereof. Within this valve-chamber there is a weighted valve-stem *h*, the lower end *i* of which is tapered and is held by gravity in the open end of a small passage *j*, extending through the bottom of the valve-chamber *f* and with which passage there communicates a supply-pipe *k*, which may extend to any suitable supply of liquid which is being used, said supply-pipe being connected to the lower end of said valve-chamber, preferably by means of a union-joint, as shown.

Axially of the passage *b* there is located a hollow post *m*, which passes through the bottom of the casing which forms the chamber *c* and is secured in said casing in any convenient manner. In the lower end of said post which projects through the said casing is a screw-threaded plug *n*, which may be unscrewed for cleaning out said post. In the upper end of said post there is screwed a plug *o*, having an outwardly-tapering head thereon which is adapted to screw down into close proximity with the upper edge of the post, whereby an outwardly-tapering slit is provided for the exit of the liquid stored in the reservoir *a*, which is placed in communication with said post through a passage *p*, extending from the bottom of the reservoir through the chamber *c* to the post and through a passage *p'* through the plug *o*. The inner end of said supply-passage *p* communicates with the reservoir *a* through the bottom thereof and is covered with some suitable filtering

disk or strainer in the usual manner. The construction of this post and its outwardly-flaring slit at the upper end is not new, but is the construction usually employed in this class of carbureters.

The normal level of the liquid in the reservoir *a* is in the proximity of the upper end of the post *m*. The float *e* is so constructed as to counterbalance the gravity-actuated valve-stem *h* when permitted to do so by the falling level of liquid in the reservoir *a*, and to thus operate said valve there is located in the reservoir a bascule-frame *q*, two arms of which extend around under the float *e* far enough to support it properly and another arm of which extends through the opening *g* into the valve-chamber *f* and lying in the latter under a suitable shoulder or projection on the valve, as shown in Figure 1, whereby the valve may be lifted by the descent of the float. This bascule-frame *q* is pivoted at *r* in the reservoir.

It is clear from the above description that when a valve in the supply-pipe *k* is opened liquid may flow into the reservoir through the passage *j* and the opening *g*, for the superior weight of the float resting on the arm of the frame *q* will lift the valve-stem *h*, thus leaving the passage *j* open. As soon as the liquid has risen far enough to lift the float off of the arms of the frame *q* then the weighted valve-stem *h* will drop and close said passage *j*. When this occurs, the level of the liquid in the reservoir will be in proximity to the plane of the top of the post *m*.

The inner wall of the reservoir *a* (which is indicated by *s*) projects somewhat above the upper end of the reservoir, as shown in Fig. 1, and there is screwed thereon a cylindrical part *t*, having substantially the same diameter as the passage *b* through the reservoir. At a point on said cylindrical extension *t*, near the upper end of the wall *s*, there is located an inwardly and downwardly tapering flange *u*, extending entirely around said part *t*, and in this flange air-ports *v* are provided. Leading outwardly from this member *t* there is the pipe *w*, which communicates with the cylinder of some suitable motor. There is supported in this cylindrical part *t* of the device another cylindrical member, (shown in Fig. 5 in perspective,) which is indicated by *x* and is in the form of three connected cylinders having progressively-reduced diameters. The upper end of said member *x* is adapted to have a sliding fit within the cylindrical part *t* of the device. The central part of said member *x*, of substantially the same length as the upper part thereof, extends down into the central passage *b*, but is of less diameter than the latter, whereby an annular air-passage *y* is formed therearound. The lower end of said member *x* encircles the top of the post *m*, and having a greater diameter than the latter there is formed around said post another annular passage *z*. That portion of the cylindrical member *x* which joins the upper to the central portion thereof is beveled, as at 2, to correspond to the bevel of the flange *u*, and it rests on the latter when in operative position. The lower end of the central portion of the member *x* and the upper end of the lowest portion thereof are similarly joined by the beveled part 3. In these beveled parts 2 and 3 air-ports 4 and 5 are cut, respectively. In the upper end of the cylindrical member *x* a slot 6 is cut, into which there projects the end of a screw 7, passing through the wall of the cylindrical part *t*, whereby the rotative movement of *x* may be limited. The length of this slot, however, is such that the rotative movement of the member *x* may extend over the entire length of the port 4. In the upper edge of the upper part of the cylindrical part *x* there is cut a notch 8, with which a lug 9 (see Fig. 7) on the edge of the circular head 10 may engage, whereby said head and said member *x* are interlocked when the parts are in the position shown in Fig. 1. On this head 10 there is a centrally-located operating-post 11, having a cross-bar thereon for conveniently rotating said head. When the head 10 is fitted into the end of the part *x*, a ring 12, screwing onto the upper end of the cylindrical part *t* of the device, serves to hold said head in connection with the upper end of the member *x* by means of the notch 8 and lug 9, and if screwed down tightly said ring may lock both the head 10 and the member *x* in fixed position within the part *t*.

In the side of the upper portion of the member *x* there is an opening 13, corresponding in area to that of the pipe *w*. By loosening the ring 12 the operating-post 11 may be rotated to bring the opening 13 more or less into registering position with the end of the pipe *w*. The location of this opening relative to the slot 6 is such that under normal conditions the member *x* may be rotated to bring one end of the slot 6 up against the screw 7, as shown in Fig. 3, whereby only the narrow passage 14 will remain open, through which vapor may pass to the engine through the pipe *w*. The relation of the air-ports 4 to the ports *v* in the tapering flange *u* is such that when the member *x* is in the position shown in Fig. 2 the ports *v* and 4 will be only partially in registering position; but if this member *x* be rotated to bring the opening 13 into fuller registration with the pipe *w* these ports *v* and 4 will be moved toward a fuller registering position, until at the time of complete registration of the opening 13 with the pipe *w* said two ports will also arrive into full registering position.

Within the central portion of the member *x* there is located the tubular member 15, (shown in Fig. 6,) which is, in effect, a valve, inasmuch as the lower end of the member 15 has the beveled portions 16 thereon, which are adapted to cover the air-ports 5 more or less. This valve member 15 is revoluble in said central portion of the member *x* independently of the latter, whereby the supply

of air to the carbureter may be adjusted to normal conditions of operation, as desired. To conveniently operate and adjust this valve member from a point outside of the carbureter, there is secured to the inside thereof the posts 17, the upper ends of which are secured to the ring 18, located within the flange 19 on the under side of said head 10, through which there is cut the two concentric slots 20, through which the pins 21, which are secured to the upper side of the ring, project. This ring fits closely enough to the under side of the head 10 to form a substantially tight closure for said slots 20.

Located in the top of the reservoir, at some convenient place over the upper end of the float *e*, there is an endwise-movable pin 22, and within the reservoir is a spring 23, which normally holds said pin in the position shown in Fig. 1. By pressing down on the end of this pin the inner end thereof will contact with the top of the float, whereby it may always be readily ascertained whether or not the latter is freely movable in the reservoir and in operative condition.

From the foregoing description it is seen that under normal conditions the opening 13 through the side wall of the member *x* when the motor which this carbureter supplies is running under normal conditions is only partly in registration with the pipe *w*. To adjust the area of the air-ports 5 to provide the necessary quantity of air for the condition of normal operation, the pins 21 may be grasped and the tubular member 15 rotated to uncover said ports 5 more or less. This operation in no wise affects the member *x*, within which the valve member 15 is located, for the latter is locked to the head 10, and it in turn is secured against rotation by the ring 12. It follows then that under normal conditions the operating-rod 11, attached to the head 10, need not be touched. When the cylindrical member *x* is in the position shown in Fig. 3, the air-ports 4 may be so located in said member relative to the ports *v* in the flange *u* that some air may be drawn into the pipe *w* through these ports *v* and 4, if desired, the air reaching said ports by means of the annular passage *y*, located between the central portion of *x* and the wall of the tubular chamber *b*, or, if preferred, the ports 5 may be so proportioned that it will not be necessary to take any air through the upper ports 4 under normal conditions of operation. If, however, it becomes necessary in supplying the demands of the motor to provide an increased volume of explosive mixture, then the rod 11 may be grasped and rotated to bring the opening 13 in the upper end of the tubular member *x* more nearly into registering position with the pipe *w*, whereby upon the suction-stroke of the piston of the motor a larger volume of mixture may be drawn to the motor. In carbureters of this type as heretofore constructed the only operation performed by this movement has been to increase the area of the opening leading into the pipe *w*, the consequence being that the increased suction effect through the carbureter results under such conditions in the aspiration of a greater quantity of the volatile liquid, whereby the relative proportions of the latter to the volume of air drawn through the pipe *w* became changed, because the area of the air-openings was not varied in proportion to the variation of the area through which the mixture was drawn—viz., the passage 14. By my invention, however, I provide, by means of the ports *v* and 4, for an increase in the area of the air-inlet ports which is proportional to the increase in area of the opening into the pipe *w*, and one cannot be altered without altering the other. The result is that whether the motor draws through the pipe *w* the largest volume of mixture which the apparatus is capable of supplying or whether the passage into the pipe *w* is choked down to the point of minimum supply the proportion of air to the liquid remains substantially the same, and no trouble results by reason of imperfect mixing whether the motor be running at its normal speed or its maximum speed.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a carbureter, a hollow cylinder constituting a mixing-chamber provided with outlet and inlet openings at opposite ends thereof; a flange on the interior wall of said chamber, a tubular valve member for said outlet-opening fitting closely said chamber and seated on said flange; a tubular extension of reduced diameter on said valve member, air-ports through the wall of the valve member and flange communicating with an air-passage between said tubular extension and the wall of said chamber, whereby the rotation of the valve member will increase or diminish the area of said air-ports coincidently with the increase or reduction of the area of the outlet-opening, together with a suitably-connected supply-nozzle located within said tubular extension of the valve member.

2. In a carbureter, a hollow cylinder constituting a mixing-chamber provided with outlet and inlet openings at opposite ends thereof; a flange on the interior wall of said chamber, a tubular valve member for said outlet-opening fitting closely said chamber and seated on said flange; a tubular extension of reduced diameter on said valve member, air-ports through the wall of the valve member and flange communicating with an air-passage between said tubular extension and the wall of said chamber; another air-port in said tubular extension located in a different plane from said first-named port, a valve therefor, and means for varying the area of the air-ports in the valve member and in its extension, independently, combined with a suitably-connected supply-nozzle located in the extension of the valve member.

3. In a carbureter, a hollow cylinder constituting a mixing-chamber having an outlet and an inlet opening located near the upper and lower ends thereof, a cylindrical tubular valve member fitting closely the upper portion of said mixing-chamber and rotatable therein, there being an air-passage between the wall of the mixing-chamber and said valve member, a flange on the wall of said chamber on which said tubular member bears, there being air-ports in the flange and in the upper end of said member, and there being other air-ports in said valve member near the lower end thereof, said upper air-ports being movable into and out of registration with the ports in said flange; means for rotating the valve member whereby the area of the air-ports in said member opposite the flange may be varied without changing the adjustment of the air-ports near the lower ends of said member.

4. In a carbureter, a hollow cylinder constituting a mixing-chamber having an outlet and an inlet opening located near the upper and lower ends thereof, a cylindrical tubular valve member fitting closely the upper portion of said mixing-chamber and rotatable therein, there being an air-passage between the wall of the mixing-chamber and said valve member, a flange on the wall of said chamber and on which said tubular member bears, there being air-ports in the flange and in the upper end of said member, and there being other air-ports in said valve member near the lower end thereof, a valve for said lower air-ports, and means for adjusting the same whereby the area of said lower port may be varied without changing the adjustment of the air-port near the upper end of said member, combined with a suitably-connected supply-nozzle located within the lower end of said valve member.

5. A carbureter having inlet and outlet openings, means for varying the area of the latter, and a suitably-connected supply-nozzle located between said openings, means for regulating the air-supply to normal conditions of operation, without varying the area of said outlet-opening, and a separate device for varying the area of said outlet-opening, and coincidentally varying the supply of air without changing the adjustment of the parts whereby said normal air-supply is maintained.

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