No. 677,305. Patented June 25, 1901.

I. R. B. ARNOLD.

CARBURETER.

(Application filed Mar. 1, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1

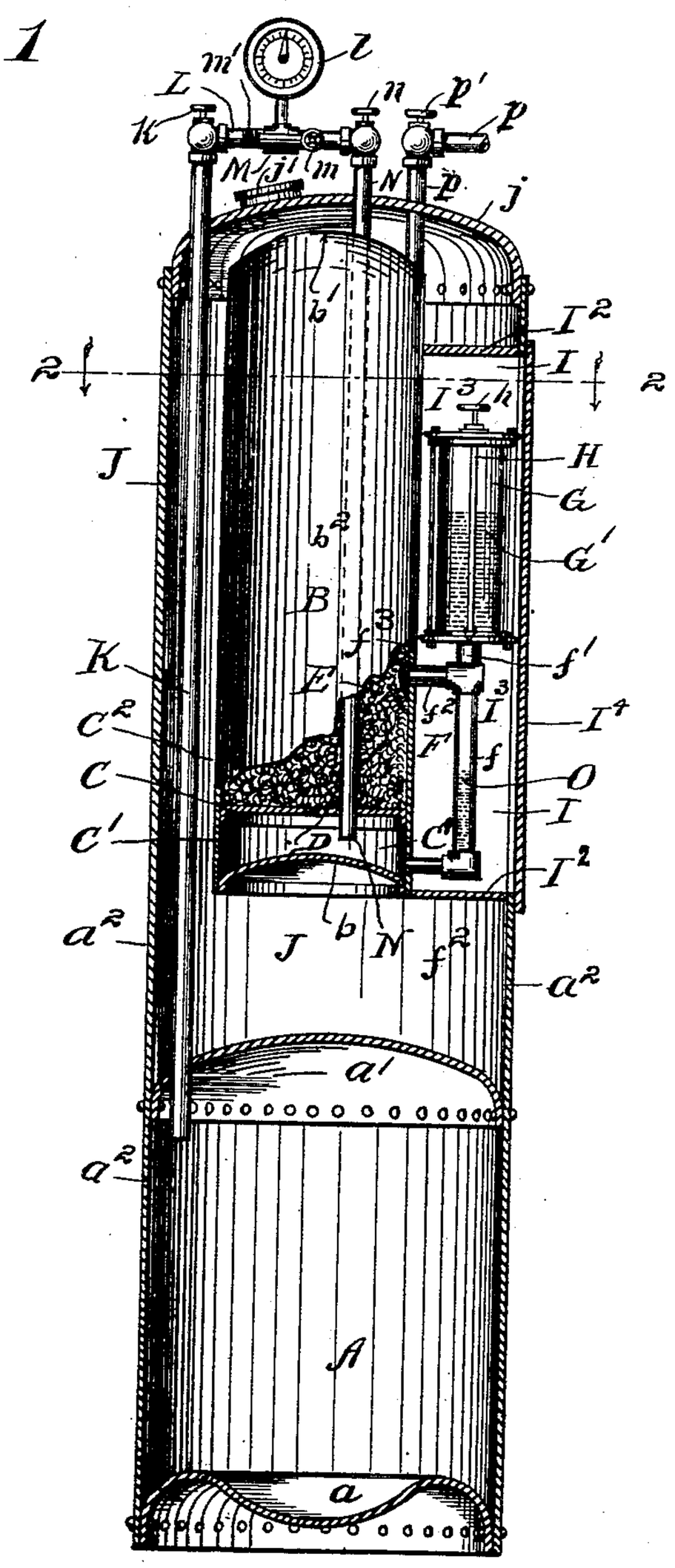

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Fig. 3

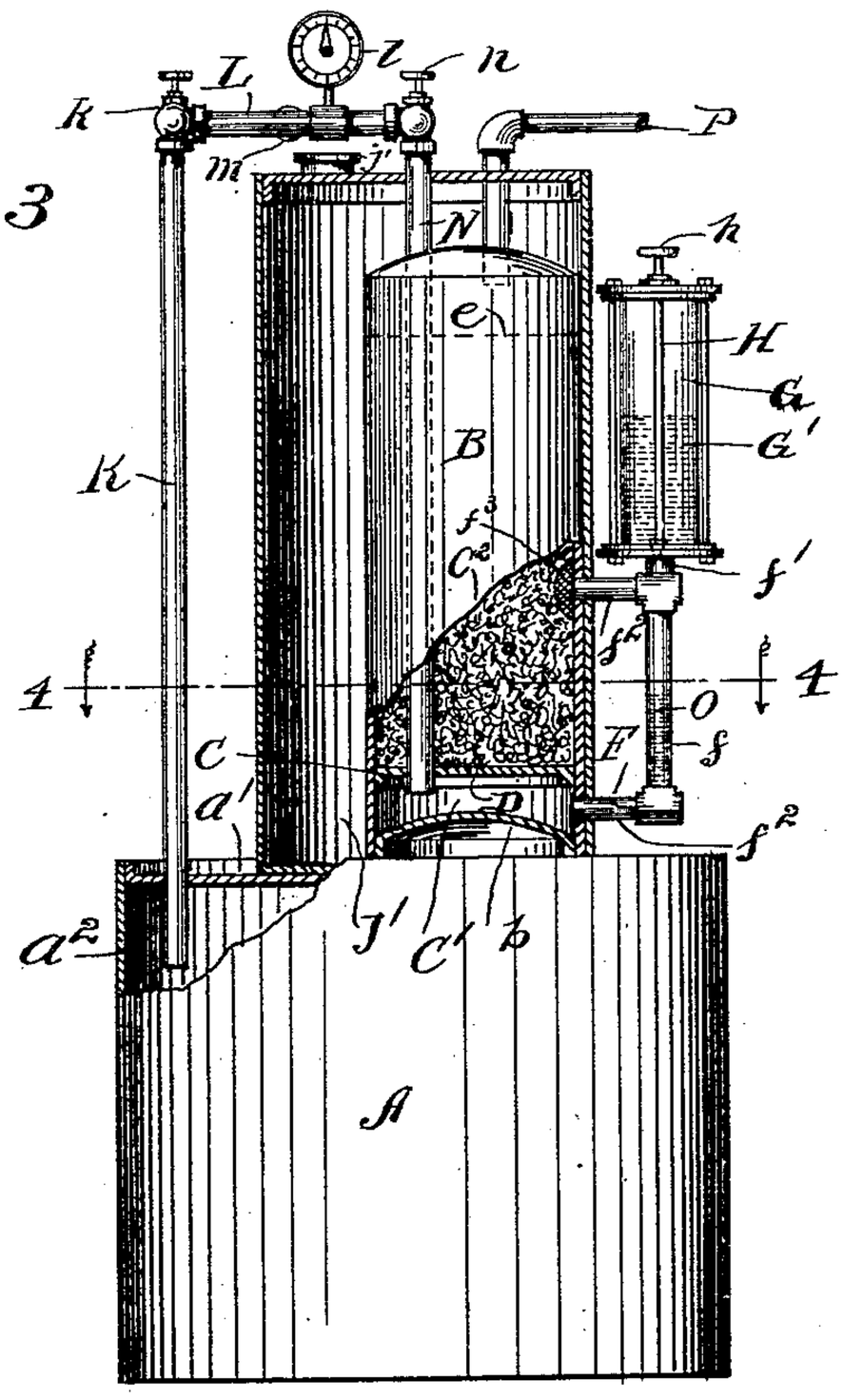


Fig. 4

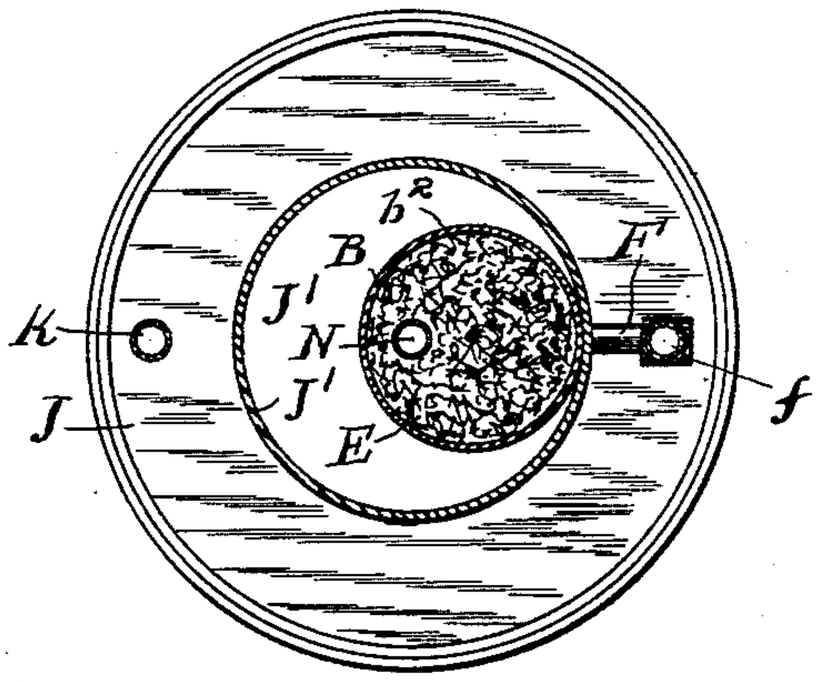
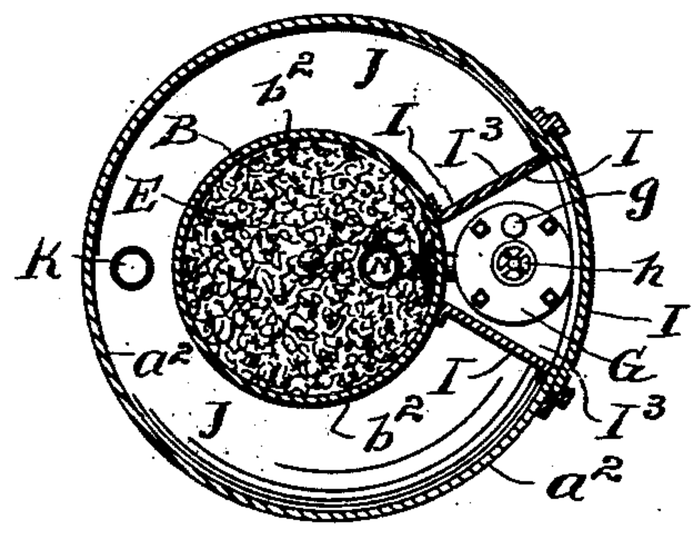


Fig. 2



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UNITED STATES PATENT OFFICE.

IRWIN R. B. ARNOLD, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE STEREOPTICON AND FILM EXCHANGE, OF SAME PLACE.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 677,305, dated June 25, 1901.

Application filed March 1, 1901. Serial No. 49,399. (No model.)

To all whom it may concern:

Be it known that I, IRWIN R. B. ARNOLD, 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 for Use with Calcium-Lights and other Purposes, of which the following is a specification.

This invention relates to apparatus designed to obtain carbureted air from gasolene or a similar light-gravity oil; and one object of this invention is to obtain a generator of the kind named which will not be liable to explosion when in use, which can be observed by the operator thereof when being used, and a generator which can be used for a long time without danger to the operator; and a further object of the invention is to obtain a carbureter which can be refilled while in operation without danger of an explosion being thereby produced.

I have illustrated my several inventions as embodied in two constructions, one of such constructions being shown in Figures 1 and 2 and the other construction being shown in Figs. 3 and 4.

Fig. 1 is a vertical sectional view of a carbureter embodying this invention, and Fig. 2 is a horizontal section thereof on line 2 2 of Fig. 1. Fig. 3 is a side elevation, broken away to show the several parts in section, of a modification of the construction illustrated in Figs. 1 and 2; and Fig. 4 is a horizontal sectional view on line 4 4 of Fig. 3.

A reference-letter applied to designate a given part is used to indicate such part throughout the several figures of the drawings wherever the same appears.

A is a tank forming a receptacle for air under pressure.

a is the lower end of tank A, and a' is the upper end thereof.

a^2 is the circumferential side wall of tank A. I prefer to continue the circumferential side wall of the tank upward above the top a' of the tank to form a cylinder, within which may be placed the saturater of the apparatus, with certain other parts hereinafter described, in such way that the cylinder obtained by such extended wall will form a receptacle in which warm or heated water may be contained for the purposes hereinafter described.

The bottom a of the tank A is curved or stamped into the shape well illustrated in Fig. 1 of the drawings to obtain great strength and an economical construction.

In constructing the tank A the top a' is first riveted in place, and then the bottom a is also riveted in place. The central part of the bottom a being stamped into a concave shape, (relative to the contents of the tank,) as great pressure can be put upon the contents of such tank as if the bottom were shaped the same as is the top a', while the shape of such bottom permits rivets to be used in securing the bottom in place in the ordinary way.

B is a saturater consisting of the bottom b, top b', and circumferential wall b^2.

C is a horizontal partition in the saturater, near the bottom b thereof, dividing such saturater into chambers C′ C², such partition being provided with a communicating passage-way therethrough, (as D,) from chamber C′, below such partition, to chamber C², above such partition.

E is the ordinary cotton packing used for filling saturaters. The top line of such packing E is indicated by broken line e in Fig. 3.

F is a by-pass from chamber C′ to chamber C². Part f of by-pass F is preferably constructed of glass, substantially in the same way as water and other gages are constructed.

f' is a pipe forming a communicating passage-way between the saturater B (by way of by-pass F) and receptacle G. Receptacle G is preferably made of metal ends, with a glass cylinder secured between them, as thereby the contents of the receptacle may be readily observed, and G′ is gasolene contained in such receptacle; but such observation of the contents of such receptacle is not absolutely essential, and such cylinder may be of metal without in any way departing from the construction embodying this invention.

f^2 f^2 are the horizontal pipes of by-pass F, and f^3 is a screen in chamber C² of saturater B designed to keep the end of horizontal pipe f^2 adjacent thereto free to discharge into such chamber C².

H is a valve-stem threaded at its upper end

and provided with the milled hand-wheel *h* to permit the turning thereof, and at its lower end forming a valve-seating to close the passage-way (through pipe *f'*) into such receptacle G.

g, Fig. 2, is a removable cap on the upper end of the receptacle G, which may be taken off to supply gasolene to the receptacle and then replaced that the pressure therein may equalize with the pressure in the saturater.

I I are vertical walls extending from circumferential wall a^2 to wall b^2 of the saturater B, and I^2 I^2 are horizontal walls joined to the top and bottoms ends of walls I I to form recess I^3, in which recess the by-pass F and the receptacle G are placed in the construction illustrated in Figs. 1 and 2.

I^4 is the sliding cover to the recess I^3.

J is a receptacle obtained by the extension of the wall a^2, as hereinbefore described, above the top *a'* of tank A and the placing of the top *j* thereon.

When this apparatus is used in a cool place, the receptacle may have warm or heated water put therein, by removing the cap *j'*, to accelerate the generation of carbureted air in the saturater B, and when during the use of the apparatus for a considerable time the supply of carbureted air in saturater B is less than is desired the same may be accelerated by filling, or nearly so, such receptacle J with heated water.

K is a pipe extending from receptacle A and connecting with horizontal pipe L.

k is a valve or stop-cock in pipe K.

l is a pressure-gage attached to and communicating with pipe L.

M is a pipe connected to and communicating with pipe L.

m is a valve in pipe M, and *m' m'* are screw-threads at the end of pipe M, by means of which a flexible or other pipe may be secured thereto, as by what is known in the art as a "union."

N is a pipe attached at the upper end thereof to and communicating with pipe L and extending therefrom downward into the saturater B through the packing contained in such saturater and through the horizontal partition C, discharging into the chamber C'.

n is a valve or stop-cock in pipe N.

Air, illuminating-gas, fuel-gas, or other gas may be forced into tank A by attaching a conveying-pipe from a suitable supply to pipe M and opening valves *m* and *k* and closing valve *n*.

The pressure obtained in tank A is registered on pressure-gage *l*, and when the desired pressure is obtained valve *k* may be closed.

To transfer some or all of the pressure in tank A to chamber C' and saturater B, valve *m* may be closed and valves *k* and *n* opened.

Gasolene, naphtha, or other light-gravity oil may be put into the generator through pipes M, L, and N whenever desired (if the apparatus is not in use, producing carbureted air) by closing valve *k* and opening valves *m* and *n;* but I prefer to supply the saturater with such gasolene or other light-gravity oil by putting the same into receptacle G, removing cap *g* for such purpose and opening the valve at the lower end of the rod H by turning the hand-nut *h*.

O is gasolene or other light-gravity oil in tube *f* of by-pass F.

P is a pipe extending from near the top of chamber C^2 in saturater B up through the chamber J and to the using-place of the carbureted air generated in and discharged from the saturater therethrough, and P' is a valve or stop-cock in pipe P, by means of which the discharge of carbureted air through such pipe P is controlled.

In the construction illustrated in Figs. 3 and 4 the wall a^2 of the tank A is not continued up above the upper end *a'* of such tank, and the saturater B is contained in a smaller receptacle, (lettered J',) which is a receptacle provided with a removable cap *j'*, to be taken off when heated water is to be put in such receptacle. Receptacle J' is set on the top or upper end *a'* of tank A. Saturater B is constructed in the same way as in the construction illustrated in Figs. 1 and 2, and the several parts are therefore lettered the same. The by-pass F is constructed the same also; but the horizontal tubes f^2 f^2 are necessarily put through the cylindrical walls of receptacles J' and B, as is shown in Fig. 3 of the drawings. In this modification no recess is shown wherein to put by-pass F and oil-receptacle G.

The operation of the apparatus illustrated in Figs. 1 and 2 of the drawings is precisely the same as the operation of the apparatus illustrated in Figs. 3 and 4 of the drawings, and I will now describe such operation. Valve *n* is closed, and valves *k* and *m* are opened. Pipe M is connected to a source of supply of air under pressure—as, say, an air-pump—and air is forced into the tank A until pressure-gage *l* registers two or more atmospheres. Valve *k* is then closed, and oil of light gravity, as gasolene, is put into the saturater, say, by forcing it with a pump through pipes M and N, (valve *n* being open,) or receptacle G (if preferred) is filled, or nearly so, with gasolene, ether, or light-gravity oil, and valve-stem H raised by hand-wheel *h*, so that the valve at the lower end of such rod is raised from its seat. If cap *g* is replaced tightly after filling the receptacle G, the flow of the gasolene from the receptacle G will occur even though the contents of the saturater B are under pressure, as upon the opening of the valve on the lower end of rod H the pressure in the receptacle G will soon equalize with the pressure in the saturater because of vapor or gas from the saturater passing through the by-pass F and tube *f'* into receptacle G, and after such pressure has equalized the contents of receptacle G (as gasolene G') will flow

into the saturater B. After a sufficient quantity of gasolene has been put into the saturater B to charge the same receptacle B is again filled, or nearly so, with gasolene.

It will be observed that the passage-way through the horizontal partition C in saturater B is restricted, so that vapor or gas passing from chamber C′ into chamber C^2 may go through by-pass F more easily than through the restricted passage-way, and hence the vapor generated in chamber C′ (or air or other gas forced into such chamber C′, as from tank A, through pipes K, L, and N) will travel through the by-pass, causing apparent ebullition of the liquid contents of the glass tube *f* of the by-pass F. Some of the liquid contents of such by-pass will in the operation of the apparatus be carried therethrough and discharged therefrom into chamber C^2. Some of the gasolene or other light-gravity oil so discharged into the chamber C^2 may be vaporized and carried upward through the packing E and discharged from the saturater through pipe P and used; but a considerable portion of the liquid so discharged into the chamber C^2 will percolate through the packing E to the restricted passage-way in horizontal partition C and passing through such restricted passage-way will be again discharged into the chamber C′. The desired pressure in the saturater B is obtained by suitable opening and closing of valves *k* and *m* and consequent admission of air or other gas to the chamber C′ of saturater B.

From my experience in the use of saturaters and carbureted air I am convinced explosions occur only when too little gasolene-vapor and too much oxygen gas are contained in the saturater, and when the by-pass is constructed as hereinbefore described relative to the chambers C′ C^2 of the saturater and the restricted passage-way through the horizontal partition C is made as described, so that vapor will pass from chamber C′ through by-pass F into chamber C^2, no explosion can occur so long as liquid gasolene is to be observed in tube *f* of the by-pass in apparent ebullition, as hereinbefore described. When such gasolene is not to be observed in tube *f*, additional gasolene should be put into the saturater, even if such need of gasolene is observed while an entertainment is being given. To prevent the necessity of stopping the use of the apparatus at any time, I provide the receptacle G and fill the same with gasolene, as hereinbefore recited. It is simply necessary when such receptacle G forms a part of the apparatus to open the valve at the lower end of rod H from its seat and permit gasolene to flow from receptacle G into the saturater B until gasolene is observed in the tube *f* at about the height indicated in the drawings, Figs. 1 and 3. The valve at the lower end of the rod H is then returned to its seat. This operation of admitting the gasolene from the receptacle G to the saturater may be repeated as often as it may be found necessary during a continuous use thereof until the entire contents of receptacle G are exhausted.

If at any time during the continuous use of the apparatus it be found that the quantity of vapor or carbureted air delivered from the saturater is sufficient, but that the quality thereof is insufficient, heated water is put in the receptacles J J′, respectively.

In the construction illustrated in Figs. 1 and 2 when the slide I^4 is closed the by-pass F and receptacle G are not liable to injury in the transportation of the apparatus from place to place.

The packing E in chamber C′ adjacent to the partition C—that is, between the horizontal pipes f^2 f^2 in air-chamber C^2—may be more solidly packed than is such packing at the upper end of such chamber—that is, above the inlet end of the upper one of pipes f^2 f^2—for the purpose of assisting in the operation obtained by the restricted passage-way through partition C, (relative to by-pass F, as hereinbefore described,) and, in fact, the partition C has been omitted by me and the packing E made very firm in chamber C^2 between horizontal pipes f^2 f^2 and so as to render the path for vapor through the by-pass more easily traversed by such vapor than through such firmly-packed packing; but such construction is much more difficult and less desirable to construct than the partition hereinbefore described and is, in fact, no departure from the construction embodying this invention as herein set out and claimed, the function of this feature of the invention being to obtain the passage of vapor through the by-pass F in passing from chamber C′ and chamber C^2, and the consequent apparent ebullition in tube *f*.

In the operation of the apparatus the tank A may be filled with air at the desired pressure, as hereinbefore set out; but those skilled in the art will perceive that common illuminating-gas from a gas-main or other source is preferable and can be pumped into the tank A instead of air without fear of explosion.

Having thus described my invention and the construction and operation of a machine embodying the same, what I claim as new, and desire to secure by Letters Patent, is—

1. In a carbureter, the combination of a saturater provided with chambers and such chambers provided with a communicating restricted passage-way, in combination with a tube provided with means to observe the contents thereof, such tube provided with a passage-way thereinto from one of the chambers of the saturater and provided with a passage-way therefrom into the other of the chambers of the saturater, and such tube and the passage-ways forming a by-pass so related to the communicating restricted passage-way that vapor flowing from the lower

chamber to the upper chamber of the saturater will pass through the by-pass; substantially as described.

2. In a carbureter, the combination of a saturater provided with chambers and such chambers provided with a communicating restricted passage-way, in combination with a tube, means for observing the contents thereof, such tube provided with a passage-way thereinto from one of the chambers of the saturater and provided with a passage-way therefrom into the other of the chambers of the saturater, and such tube and the passage-way forming a by-pass so related to the communicating restricted passage-way that vapor flowing from the lower chamber to the upper one of the saturater will pass through the by-pass, an oil-receptacle provided with a passage-way therefrom to the saturater and means to restrict such passage-way, substantially as described.

3. In a carbureter, the combination of a saturater provided with chambers and such chambers provided with a communicating restricted passage-way, in combination with a tube, means to observe the contents thereof, such tube provided with a passage-way thereinto from one of the chambers of the saturater and provided with a passage-way therefrom into the other of the chambers of the saturater, such tube and the passage-ways forming a by-pass so related to the communicating restricted passage-way that vapor flowing from the lower chamber to the upper one of the saturater will pass through the by-pass, an oil-receptacle provided with means for observing the contents thereof, and provided with a passage-way therefrom into the saturater, with a valve to restrict such passage-way; substantially as described.

4. In a carbureter, the combination of a tank, a saturater provided with chambers and such chambers provided with a communicating restricted passage-way, packing in one of such chambers, means for discharging the gaseous contents of the tank into the chamber of the saturater which is not provided with packing, in combination with a tube provided with means for observing the contents thereof, and such tube provided with a passage-way thereinto from one of the chambers of the saturater and provided with a passage-way therefrom into the other of the chambers of the saturater, such tube and the passage-ways forming a by-pass so related to the communicating restricted passage-way that vapor flowing from the lower chamber to the upper chamber of the saturater will pass through the by-pass, an oil-receptacle provided with means for observing the contents thereof and provided with a passage-way therefrom into the saturater, with a valve to restrict such passage-way, and a receptacle above the tank and surrounding the saturater, with a recess built into the walls of the last-named receptacle in which recess the by-pass and the receptacle communicating with the saturater are contained; substantially as described.

Signed at Chicago, Illinois, February 15, 1901.

IRWIN R. B. ARNOLD.

In presence of—
CHARLES TURNER BROWN,
GEO. W. BOND.