No. 780,673. PATENTED JAN. 24, 1905.

J. F. LAWRENCE.

CARBURETER.

APPLICATION FILED OCT. 30, 1903.

4 SHEETS—SHEET 1.

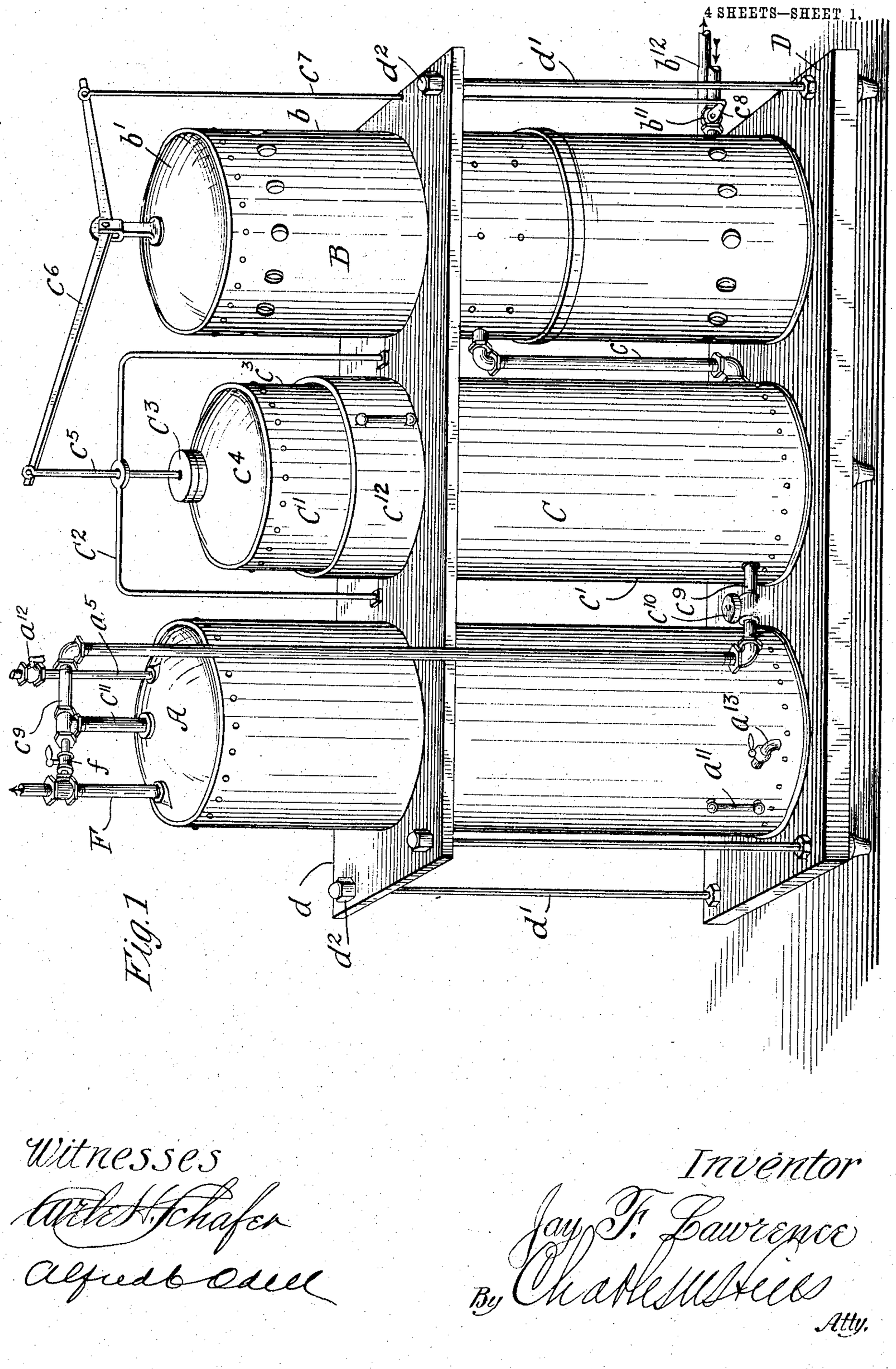

Fig. 1

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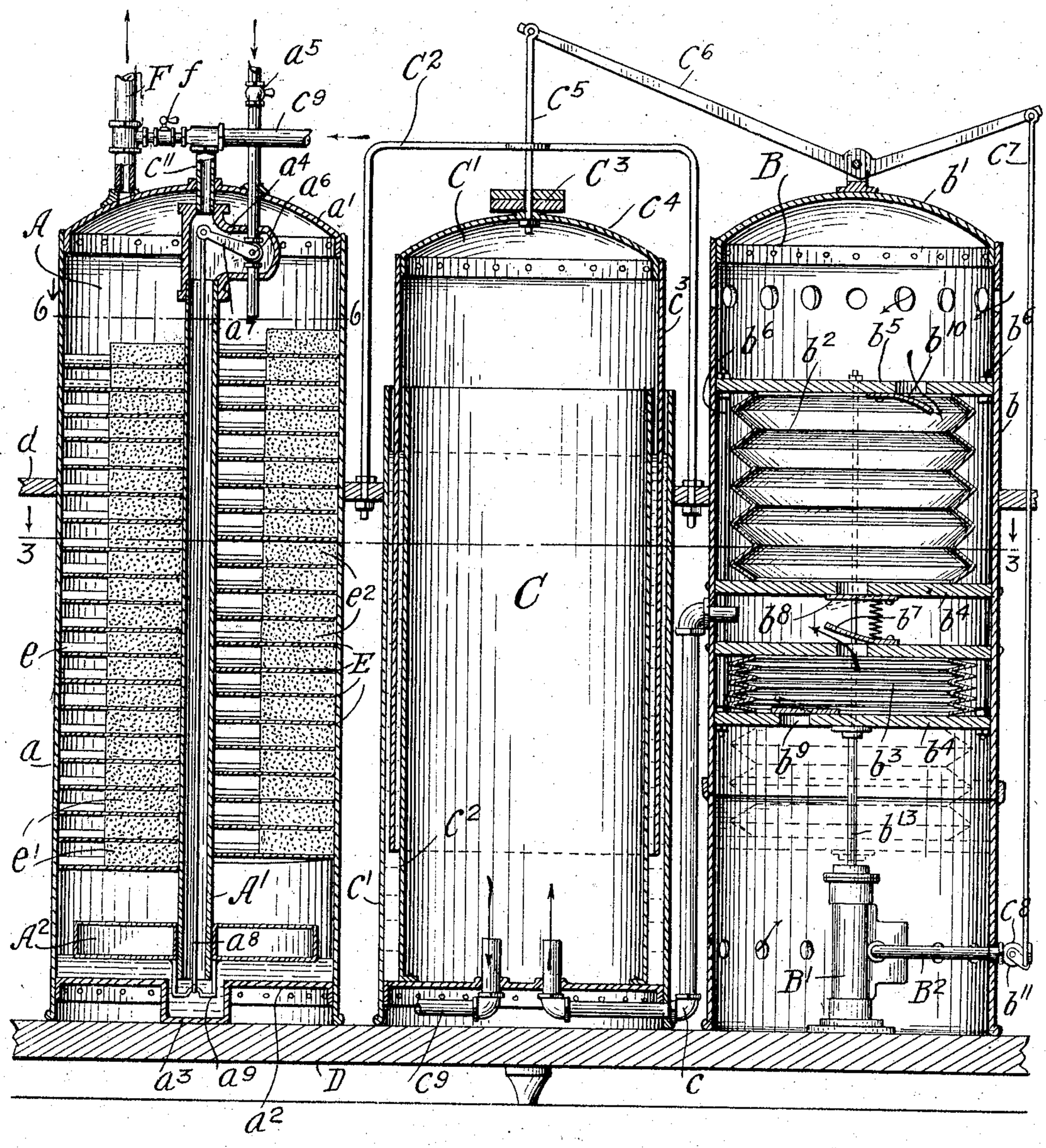
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3

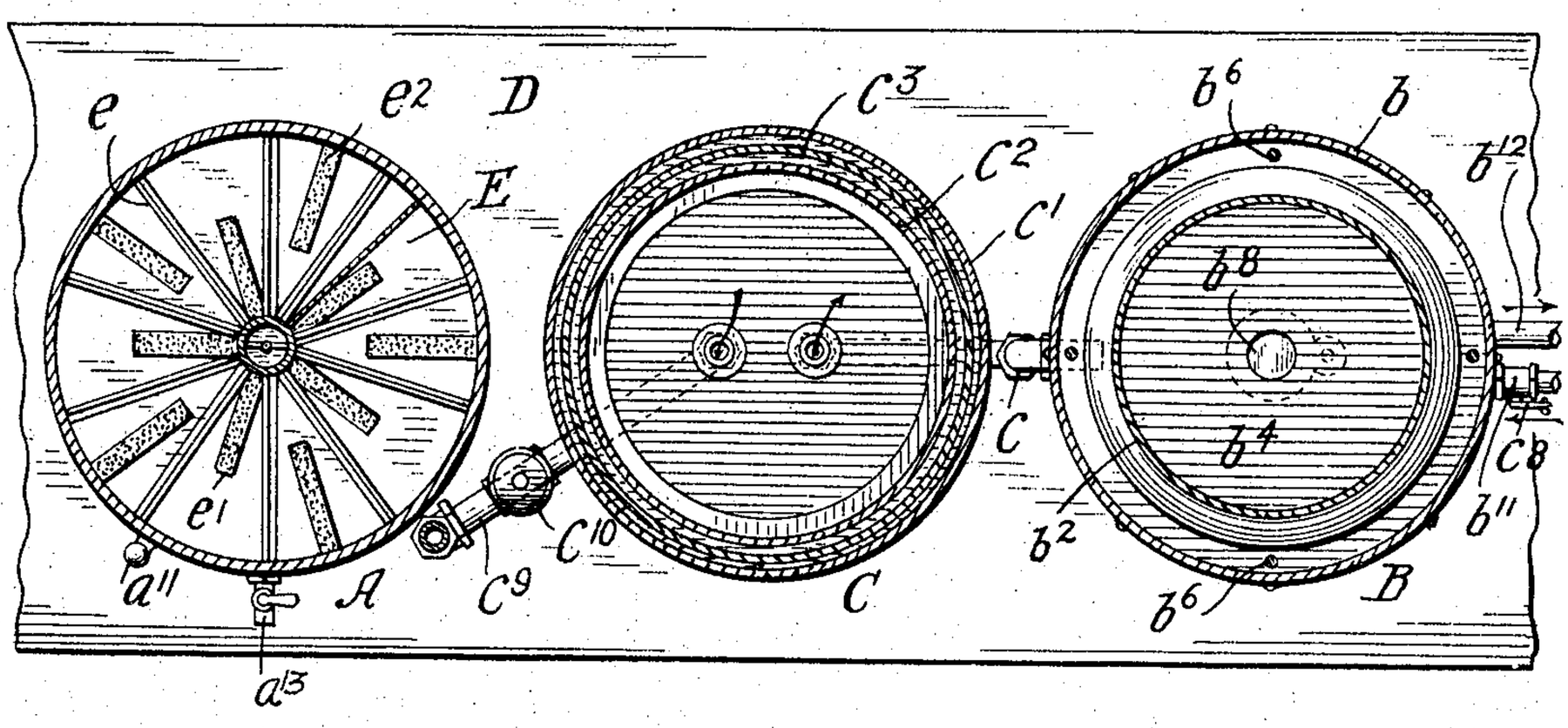
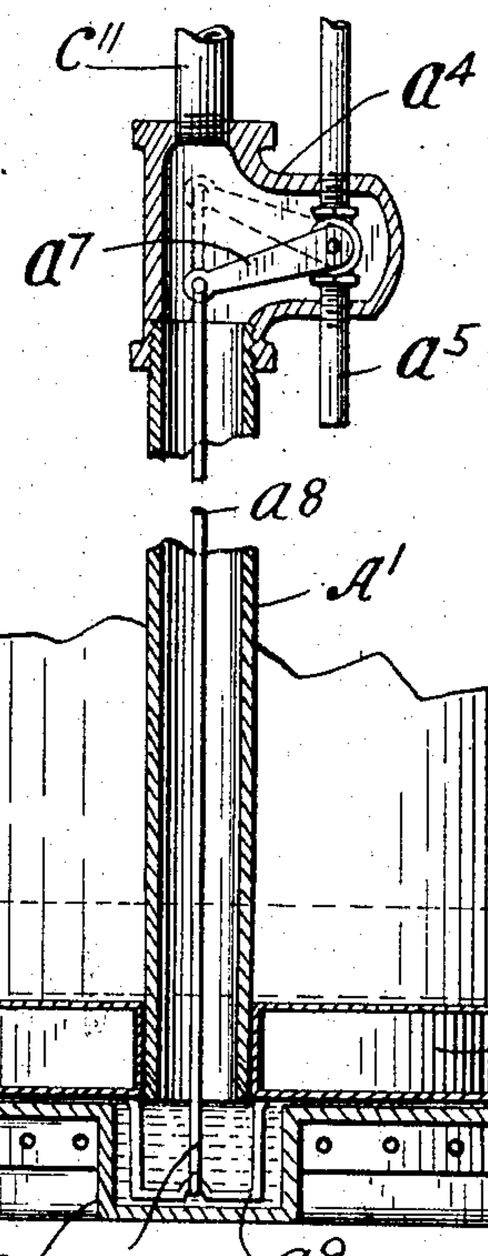


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5

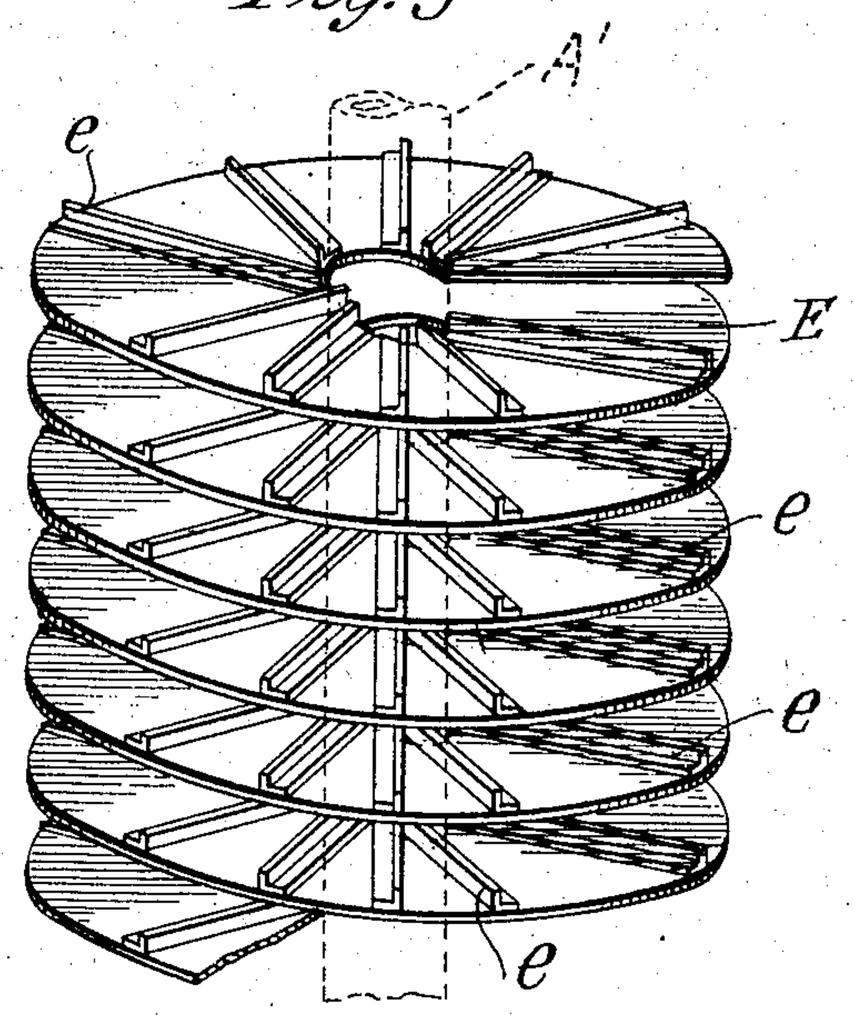

Fig. 7.

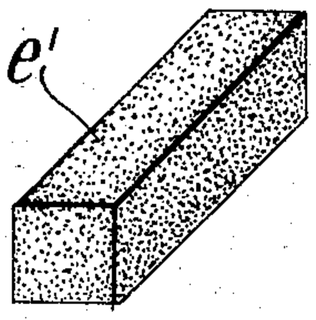

Fig. 8.

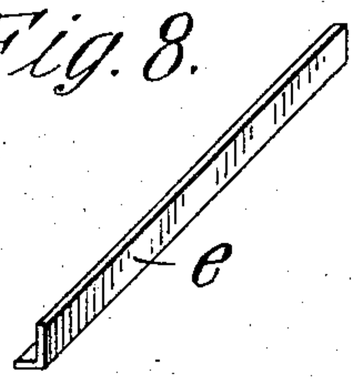

Fig. 6.

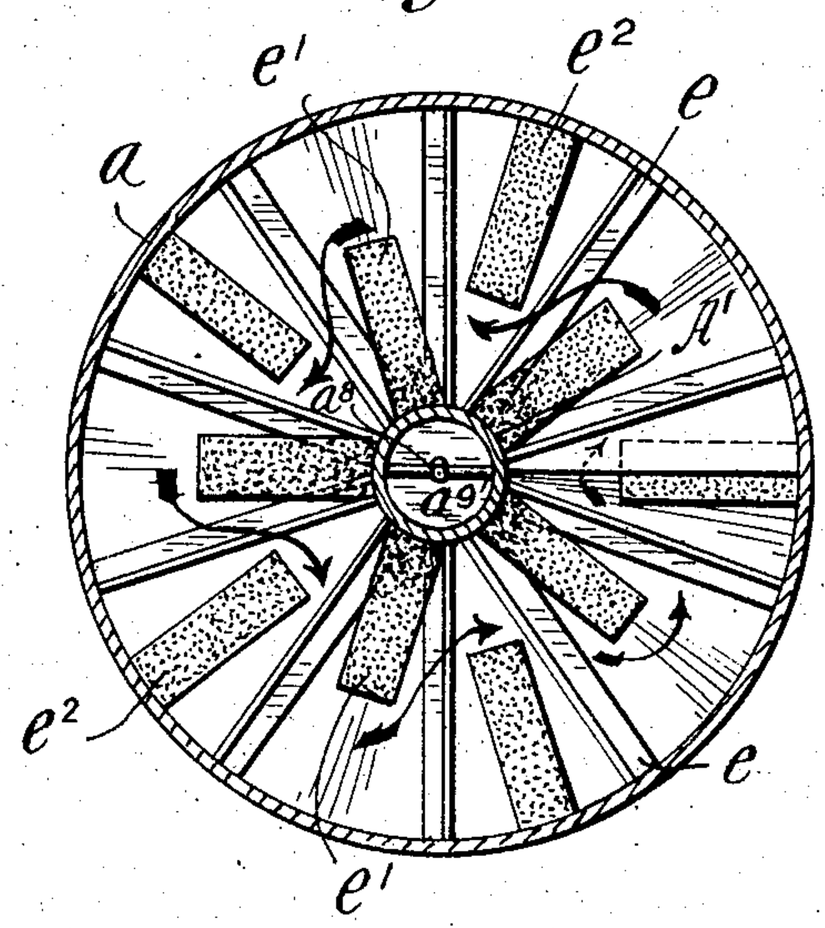

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PHOTO-LITHOGRAPHED BY SACHETT & WILHELMS LITHO. & PTG. CO. NEW YORK.

No. 780,673. Patented January 24, 1905.

UNITED STATES PATENT OFFICE.

JAY F. LAWRENCE, OF CHICAGO, ILLINOIS, ASSIGNOR TO NATIONAL LIGHT HEAT AND POWER COMPANY.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 780,673, dated January 24, 1905.

Application filed October 30, 1903. Serial No. 179,184.

To all whom it may concern:

Be it known that I, JAY F. LAWRENCE, a citizen of the United States, and a resident of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Carbureters; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Heretofore many carbureting-machines have been devised for the purpose of utilizing gasolene and other hydrocarbon fluid for lighting, heating, and power purposes. In many instances such constructions have been faulty in operation owing to the necessity of constant watchfulness on the part of an attendant to insure the continuous and uniform operation thereof. In other instances the devices have been faulty owing to imperfect carburization and the constant variation in the richness of the mixture. Many have also been bulky and expensive in construction.

The object of this invention is to provide a carbureter operating automatically to control the supply and regulate the richness of the mixture and adapted either for use for illuminating, heating, or for power purposes, affording a combustible mixture of uniform and any desired richness and illuminating or explosive quality.

It is also an object of this invention to provide a cheap, simple, and very durable construction in which all the working parts are readily accessible and in which the moving parts are reduced to a minimum.

The invention embraces many novel features; and it consists in the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a perspective view of a device embodying my invention. Fig. 2 is a central longitudinal section thereof. Fig. 3 is a section taken on line 3 3 of Fig. 2. Fig. 4 is an enlarged fragmentary detail of portions of the generator-tank, showing the same in central vertical section. Fig. 5 is a fragmentary perspective view of the spiral incline in the generator-tank. Fig. 6 is an enlarged horizontal section taken on line 6 6 of Fig. 2. Fig. 7 is a perspective view of one of the absorbent strips. Fig. 8 is a perspective view of one of the angle-bar flights which extend radially of the spiral incline.

In said drawings said invention is shown embodied in a generating and mixing tank A, a pumping-tank B, and a storage-tank C for the compressed air, which is delivered continuously at uniform pressure into the generator A. The tanks comprising said carbureter, as shown, are supported upon a table or platform comprising a base D and an upper frame d, which engages around said tanks and is connected with said platform by means of bolts d' at each corner of the platform and frame provided with nuts d^2, which engage above and below the frame d and hold the same rigidly with respect to the platform, as shown in Fig. 1. Said pumping-tank B comprises, as shown, a cylindric shell b, provided peripherally with a plurality of apertures near the upper and lower end and having a head b', secured at the upper end thereof. Within said casing is provided a double bellows comprising the upper bellows b^2 and the lower bellows b^3, each similar to an ordinary organ-bellows. As shown, the bottom b^4 of the lower bellows is connected with the upper board b^5 of the upper bellows by means of rods or bolts b^6, which are of such a length that when one of said bellows is fully extended the other of said bellows is in its collapsed or compressed condition. The bottom of the upper bellows and the top of the lower bellows are each rigidly secured in the casing by means affording a tight joint and providing a space or chamber between the same and into which the delivery-valves b^7 b^8 of said bellows open, while the inlet-valves thereof, b^9 b^{10}, are provided in the outer ends of said bellows, as shown in Fig. 2. Means are provided for operating said bellows simultaneously, which in the present instance for convenience is indicated as a reciprocating water-motor B′ of familiar type, such as frequently is employed for operating organ-bellows, and of which the inlet-pipe B^2

is provided with a controlling-valve b^{11}, whereby the supply of water or other actuating fluid for the motor can be regulated or controlled either automatically or by an operator. The delivery-pipe from said motor is indicated by b^{12}, Figs. 1 and 3. Said motor, as shown, is provided with a piston-rod b^{13}, adapted to be reciprocated thereby and which extends upwardly and centrally through each of said bellows and is rigidly secured to the bottom of the under bellows and to the top of the upper, so that with each reciprocation of said piston-rod one of said bellows is inflated and the other delivers the contents thereof into the chamber between said bellows. Leading from said central chamber in the pumping-tank B is a delivery-pipe c, opening upwardly through the bottom of the pressure-tank C, so that the air compressed in the bellows is forced therethrough into said pressure-tank, which, as shown, comprises a gasometer consisting of a lower casing or receptacle having an outer and inner wall c' c^2, providing a narrow annular water-chamber between the same and into which fits the bell C′ of the usual form, comprising a shell c^3, having a diameter suitable to permit the same to enter said annular chamber and having a closed head, (indicated by c^4.) As shown, a retaining-strap of metal C^2, having a central aperture above said bell, is bent to afford a stop for the upward movement of the bell C′ of said gasometer and is engaged at its ends in the frame d by means of nuts having threaded engagement on said ends, which extend below said table. A rod c^5, secured on the upper end of said bell, passes through the central aperture in the strap and at its upper end has pivotal engagement with a lever c^6, pivoted on the head of the pumping-tank D. The opposite end of said lever is pivotally engaged with the connecting-rod c^7, which engages the operating-lever c^8 of the inlet-valve b^{11} of the motor, so that as the pressure-tank fills and the bell thereof rises toward the retaining-strap C^2 the upward movement thereof slowly closes the valve b^{11}, so that when said tank is completely filled the motive fluid is entirely cut off from the motor and the pump ceases until the bell descends sufficiently to open or partly open said valve. The pressure in the gasometer may be increased by the use of weights C^3, supported on the bell of the gasometer. From the bottom of said pressure-tank a pipe c^9, provided with a hand-valve c^{10}, extends outwardly and upwardly to deliver the air into the top of the generator. Said generator-tank A, as shown, comprises a shell or casing a, provided with a closed upper head a' and a bottom a^2, provided with a central depression or cup a^3. Extending axially of said casing is the air-pipe A′, which at its top communicates with the air-inlet pipe c^{11} and in the upper end of which in the top of said casing is provided a laterally-enlarged chamber formed by a casting a^4, threaded on said pipe. The lower end of said pipe A′ extends close to the bottom a^2 and above the cup a^3. Also extending downwardly through the top of said head a' and through the laterally-extended chamber in the top of said pipe A′ is the hydrocarbon-supply pipe a^5, which terminates a short distance below said chamber and is provided within the same with a valve a^6, provided with a lever a^7, which extends into axial alinement with said pipe A′ and is connected at its ends with a rod a^8, which extends longitudinally in said pipe to the bottom of said generator and into the cup a^3, at the mouth of which said pipe A′ terminates. Said rod a^8 at its lower end engages a stirrup a^9, the ends of which extend upwardly on each side of said pipe and are rigidly secured to an annular float A^2, through which said pipe A′ passes. Accumulation of hydrocarbon or other fluid in the bottom of the generator acts to elevate said float and close the valve a^5, while the consumption or vaporization of said hydrocarbon causes said float to descend, again opening said valve and causing an inflow of the hydrocarbon fluid. Rigidly secured on said pipe A′ and affording a tight joint therewith and with the sides of the tank is the spiral incline E, of metal or other suitable material, the upper end of which extends closely beneath the inlet end of the hydrocarbon-pipe a^5 and the lower end of which terminates above the upward limit of movement of the float A^2. Extending radially of said incline are flights e e, having raised edges, and, as shown, constructed of angle-iron rigidly secured to said incline and between which and filling the space between the upper and lower turns of the incline are the blocks of felt or other absorbent material e' and e^2, which, as shown, are of less length than the radius of said shell or generator and are arranged alternately with the opposite end in engagement with the outer surface of said tube A′ and with the shell a of the generator, as shown in Figs. 2 and 6, so that the hydrocarbon fluid when delivered at the top of said incline flows downwardly thereon, a portion being retained by being absorbed by the felt strips between the flights, the raised rib on the lowermost of the same affording a retaining-wall therefor, so that said spiral incline for its entire length affords a succession of shallow evaporating-pans, each of which contains a strip of the absorbent material and the arrangement of which is such, as indicated in Fig. 6, to greatly increase the distance the hydrocarbon fluid must travel and be exposed to the air-current before the same can be delivered from the lower end thereof into the bottom of the generator and the cup a^3. Opening from said generator through the upper head thereof is the delivery-pipe F, from which the hydrocarbon mixture generated is delivered to the point of consumption. As

shown, the pipe c^9 is connected with the pipe F through an intermediate valve f, so that, if desired, in the event of the mixture being too rich air may be admitted and mixed therewith in the pipe through said valve f.

The operation is as follows: Supposing there be no pressure, the pressure-tank or gasometer C—or, in other words, the bell—to be at its lowest position and no appreciable quantity of the hydrocarbon is in the bottom of the generator—or, in other words, the valve of the pipe a^5 being open—it is obvious that the hydrocarbon will flow from said pipe upon said spiral incline and will flow down the same, being in part absorbed by the felt strips e' e^2 and portions thereof being retained between the flights, as before described. As the bell C′ is depressed—or, in other words, is unsupported by internal air-pressure—the valve b^{11} is opened thereby, and the motive fluid being delivered to the motor B′ the bellows are operated at full speed, slowly raising the bell of the gasometer and forcing air therefrom through the pipe c^9 (the valve c^{10} being open) into the axial pipe A′ of the generator, from whence it is delivered from the lower end thereof into said cup a^3 and thence bubbles upwardly through the hydrocarbon fluid in the bottom of the generator and is carried by its own pressure upwardly along the spiral incline between the absorbent strips and over the hydrocarbon in the spaces between the flights until the air in its upward passage becomes saturated with said vapor or sufficiently saturated to afford a desired richness to the mixture delivered from the pipe F. Should the hydrocarbon fluid be delivered through the pipe a^5 too rapidly for the ascending current of air to vaporize the same, it is obvious that the excess will accumulate in the bottom of the generator, as shown in Fig. 2. In consequence this will raise the float A^2, gradually closing or partly closing the valve. The air still continues to flow into the pipe A′ and is delivered beneath the surface of the hydrocarbon in the bottom of the generator, which is agitated thereby, facilitating its vaporizing. The supply of air and the air-pressure is controlled by the movement of the gasometer-bell C′, inasmuch as the connection of the same with the lever c^6 acts to open or close the throttle-valve f^{11} as it rises or falls under the pressure of the air therein.

Obviously any desired pressure may be obtained in the pressure-tank within the capacity of the motor and bellows by weighting the bell of the gasometer. Said weight C^{13} may be engaged around the rod c^5 at the top of said bell or, if preferred, supported on the sides thereof. The increase in weight obviously necessitates an increased pressure to lift the bell sufficiently to close the valve b^{11} and at the same time forces the air through the pipe c^9 and up the spiral incline at a much greater pressure and more rapid rate, thereby varying the richness of the mixture. The rate of flow of the air from said pressure-tank to the generator can also readily be varied by means of the valve c^{10} and should occasion ever arise may be further varied by means of the valve f, connecting the pipe c^9 and the discharge-pipe F. It is thus obvious that my invention is not only provided with means for automatically regulating the supply and mixture of the hydrocarbon mixture, but as well affords means for manually varying the richness and supply of said vapor.

As a further improvement I have provided water-gages c^{12} in the outer shell c' of the pressure-tank to indicate the amount of water therein to afford a seal and also a similar water-gage a^{11} at the bottom of the generator to indicate the amount of hydrocarbon in the bottom thereof, thereby enabling the supply of the same to be regulated in part, if preferred, by means of the valve a^{12} in the supply-pipe a^5, and I have also provided a cock or faucet a^{13} at the bottom of said generator, through which any excess of hydrocarbon in the bottom may be withdrawn therefrom, if preferred.

While I have described my invention as comprising the pumping-tank, the pressure-tank, and the generator and mixer, it is obvious that, if preferred, air may be pumped directly into the gasometer through the pipe A′ and the pressure-tank C omitted and other suitable means employed for automatically controlling the action of the pumping means and, if preferred, the felt strips may be differently arranged than as herein shown and described or sufficiently thin to permit a part of the current of air to pass over the same, and many other details of construction may be varied without departing from the principles of this invention.

I claim as my invention—

1. A carbureter comprising a generating and mixing tank, an air inlet-pipe therein extending to near the bottom thereof, a hydrocarbon-inlet pipe extending through the top of the generator, a valve therein, an inclined evaporating-surface, a float in the bottom of said tank, a rod connecting the same with said valve, a vapor-discharge pipe connected in the top of said tank, and means delivering a blast of air through said air-pipe to the bottom of the generator and mixing-tank whereby an air-current flows upwardly along the inclined evaporating-surface against the downwardly-flowing current of hydrocarbon.

2. In a carbureter a generator-tank comprising a closed shell, a discharge-pipe connecting in the top thereof, an air-inlet pipe extending axially of the generator to near the bottom thereof, a hydrocarbon-inlet pipe extending through the top of said generator-tank, a valve therein, a float in the bottom

of the tank and operatively connected between said float and valve, a helical incline in said tank having tight connections with said shell and said air-pipe, an absorbent material supported on said incline, means admitting a blast of air through said air-pipe in the bottom of the tank said float acting when hydrocarbon accumulates at the bottom of the tank to close the inlet-valve.

3. In a carbureter the combination with a generating and mixing tank, of an air-pipe opening through the top thereof and extending axially to near the bottom of the same, a hydrocarbon-inlet pipe, a valve therein, a float-valve at the bottom of the tank, a rod extending axially of said air-pipe and operatively connecting the float with said valve whereby the delivery of hydrocarbon through said pipe is regulated by the amount of hydrocarbon in the bottom of said tank.

4. In a carbureter the combination with a generating and mixing tank, of a discharge-pipe in the top thereof, an air-inlet pipe also opening through the top and extending axially therein, a laterally-extended chamber in said air-pipe at its upper end, a hydrocarbon-supply pipe extending through the said chamber, a valve in said pipe within the chamber, a float-valve at the bottom of the tank, a rod connecting therewith, and operatively connected with said valve and operating said valve by the movement of said float and a helical incline extending from near the lower end of the inlet-pipe to near the bottom of the tank and affording a tight joint with the sides of the tank and said air-pipe and radial flights on said incline providing a plurality of shallow evaporating-pans.

5. In a carbureter a tank, a helical incline fitted therein and affording a tight joint therewith, an air-pipe extending axially through said incline, absorbent material arranged radially on said incline and alternately extending from the center and from the circumference, radial flights on said incline affording a plurality of shallow evaporating-pans, means admitting a regulable supply of hydrocarbon at the top of the incline, and automatically-operating means admitting air into the bottom of said tank whereby downflowing hydrocarbon on said incline and the upflowing air are mixed to a desired richness.

6. In a carbureter, the combination with the generating and mixing tank, of an air-inlet pipe extending inwardly to near the bottom thereof and having a laterally-directed chamber opening therein in the top of said tank, an inlet-pipe for hydrocarbon extending through the top of the tank and said chamber, a plurality of shallow evaporating-pans arranged to afford a helical incline to receive the hydrocarbon, a float in the bottom of the tank and a rod carried on said float and extending upwardly in said air-pipe and operatively connected with said valve and acting to regulate the delivery of hydrocarbon therethrough by the quantity of the hydrocarbon in the bottom of the tank.

7. In a carbureter the combination with a closed tank, of an air-inlet pipe extending axially thereof and to near the bottom, a cup in the bottom of said tank below the end of said air-inlet pipe, a float surrounding the end of said pipe and provided with a downwardly-extending stirrup extending into the cup, a rod connected on the stirrup and extending upwardly through said pipe, a hydrocarbon-inlet pipe in the top of said tank, a valve connected therein, a lever for operating the same extending into said air-inlet pipe and connected with said rod whereby upward movement of the float acts to close said valve and downward movement acts to open the same.

8. A carbureter comprising a closed cylindric tank, a helical incline therein having tight connection with the walls of the tank, an air-pipe extending axially therethrough and affording tight joints therewith and adapted to conduct air to the bottom of the tank, flights having a raised edge and extending radially of said incline and acting to afford shallow receptacles in the face of the incline to receive and retain downwardly-flowing hydrocarbon and means admitting air through said air-inlet pipe to the bottom of the receptacle whereby a current of air is forced upwardly along the incline and over said receptacles.

9. In a carbureter the combination with a tank, of a helical incline therein affording a tight joint with the sides and closed at the center, flights each having a raised edge arranged radially on the incline and affording between the same shallow evaporating-pans, automatically-regulable means admitting hydrocarbon at the upper end of said incline and means regulated by the pressure acting to admit air at the bottom of the incline whereby a current of air is passed continuously over the evaporating-pans in said incline and a discharge-pipe connecting in the top of the pan.

10. In a carbureter the combination with a tank, of a helical incline therein affording a tight joint with the sides and closed at the center, flights each having a raised edge arranged radially on the incline and affording between the same shallow evaporating-pans, absorbent material in each pan, automatically-regulable means admitting hydrocarbon at the upper end of said incline and means regulated by the pressure acting to admit air at the bottom of the incline whereby a current of air is passed continuously over the evaporating-pans in said incline and a discharge-pipe connecting in the top of the pan.

11. In a carbureter the combination with a tank, of a helical incline therein affording a tight joint with the sides and closed at the center, flights each having a raised edge ar-

ranged radially on the incline and affording between the same shallow evaporating-pans, strips of absorbent material arranged alternately between alternate flights and extending opposite from the center and from the periphery of said incline, automatically-regulable means admitting hydrocarbon at the upper end of said incline and means regulated by the pressure acting to admit air at the bottom of the incline whereby a current of air is passed continuously over the evaporating-pans in said incline and a discharge-pipe connecting in the top of the pan.

12. In a carbureter the combination with a tank having a centrally-disposed cup in the bottom thereof, a pipe in axial alinement with said cup, a float in the bottom of said tank, a rod connected therewith and extending upwardly in said pipe, a hydrocarbon-inlet pipe, a valve therein connected with said rod, a helical incline, radial ribs thereon and strips of absorbent material arranged alternately on said incline.

13. In a carbureter the combination with a tank of a central air-pipe extending into close relation with the bottom thereof, a helical incline rigidly engaged between said pipe and the walls of the tank, upwardly-directed radial ribs on said incline, strips of absorbent material arranged alternately on the inner and outer peripheries of said incline, a hydrocarbon-inlet pipe opening above the incline, a valve therein, a rod in said air-pipe and connected with said valve and a float in the bottom of said tank and engaged on said rod and adapted to operate said valve.

14. In a carbureter the combination with a tank, of a helical incline rigidly engaged therein, an air-pipe extending axially through said incline, a plurality of upwardly-directed radial ribs on the incline, radial strips of absorbent material arranged alternately on the inner and outer margins of the incline, a casing in the upper portion of said air-pipe, a hydrocarbon-inlet pipe extending therethrough, a valve in said inlet-pipe, a float in the bottom of said tank, means engaged on said float acting to operate said valve and a pressure-tank adapted to deliver air through the air-pipe into the tank.

15. In a carbureter the combination with a generator and mixing-tank of a hydrocarbon-inlet pipe opening thereinto, a valve in said pipe, an air-pipe opening near the bottom of the tank, a casing thereon through which the hydrocarbon-pipe extends, a rod extending axially of the air-pipe, means in said casing connecting said rod with said valve and a float surrounding the lower end of said air-pipe and operatively engaged with said rod.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

JAY F. LAWRENCE.

Witnesses:
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W. W. WITHENBURY.