No. 725,148.

PATENTED APR. 14, 1903.

J. RUTHVEN.

CARBURETER.

APPLICATION FILED NOV. 29, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

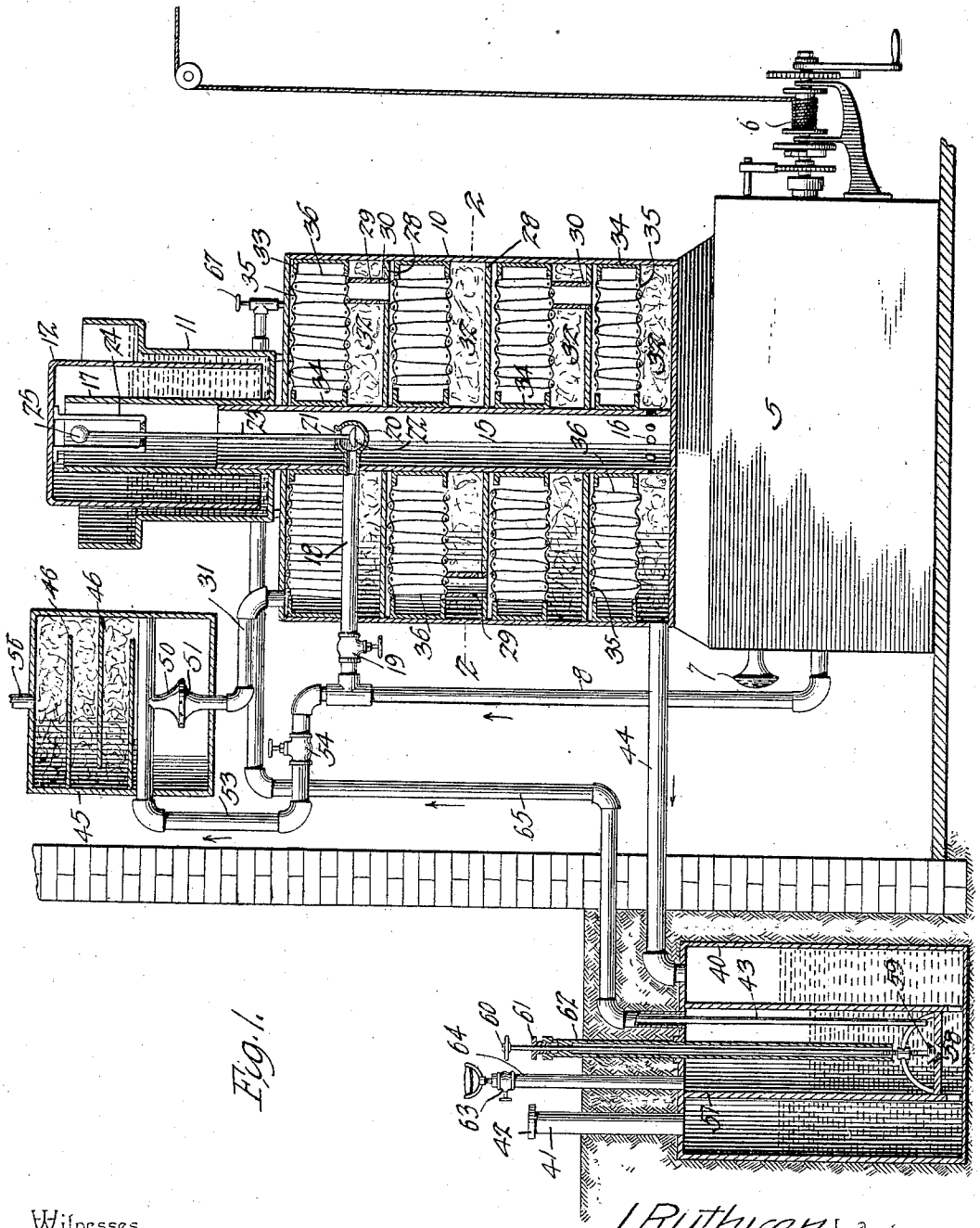

Fig. 1.

Witnesses,

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

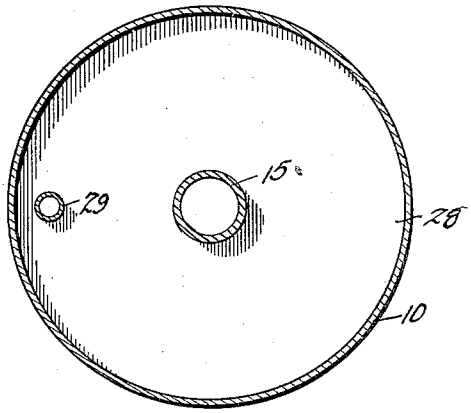



Fig. 3.

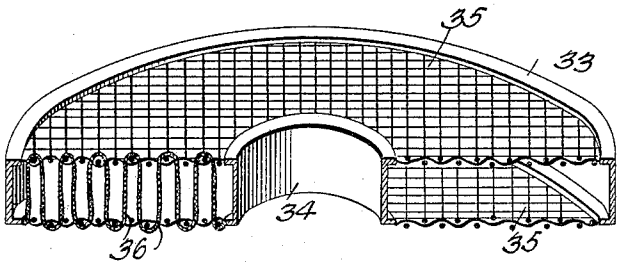
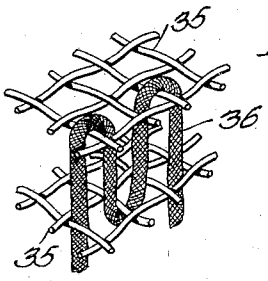



Fig. 4.




Witnesses

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# UNITED STATES PATENT OFFICE.

JOHN RUTHVEN, OF CHICAGO, ILLINOIS.

## CARBURETER.

SPECIFICATION forming part of Letters Patent No. 725,148, dated April 14, 1903.

Application filed November 29, 1902. Serial No. 133,280. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN RUTHVEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Carbureter, of which the following is a specification.

The invention relates to certain improvements in devices for carbureting air or gas, and has for its principal object to provide an apparatus for the production of a gas of uniform quality and in which the operation will be entirely automatic, the carbureting process ceasing when the gas is cut off at the burner and automatically starting as soon as the gas is ignited.

A further object of the invention is to provide a carbureting apparatus intended especially for house systems of lighting and heating and wherein the carbureter proper may be placed within the basement or other convenient portion of the house without rendering it necessary to store quantities of gasolene in the house and in this connection to provide for the connection of the carbureter with a tank of liquid hydrocarbon, such as gasolene, located at a convenient point outside the house, the arrangement being such as to permit the filling of the carbureter with gasolene and the drainage of the excess of hydrocarbon back to the tank, the quantity retained within the house being sufficient only to saturate the fibrous or textile material through which the air or gas is forced during the carbureting process.

A still further object of the invention is to provide an improved form of mixer whereby the carbureted air or gas may be intimately intermingled with air in any proportion to produce a burning mixture suitable for gas-lamps of any character or explosive mixture suitable for use in gas-engines and the like.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of a carbureting apparatus arranged and constructed in accordance with my invention. Fig. 2 is a sectional plan view of the same on the line 2 2 of Fig. 1. Fig. 3 is a sectional perspective view of a form of wick-carrier which may be employed to effect the saturation of the air or gas with hydrocarbon. Fig. 4 is a detail view, on an enlarged scale, of a portion of the wick-carrier shown in Fig. 3.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In connection with the device forming the subject of the present invention I employ any simple mechanism for forcing air or gas under pressure through the carbureting-chamber, such mechanism being, preferably, in the form of a revoluble or other fan, which may be disposed within a casing 5 and operated by a suitable weight attached to a cord or chain wound upon a drum 6 on the shaft of the fan. The air to be carbureted is drawn in through a strainer 7 and is forced by the fan upwardly through an air-pipe 8, or said pipe 8 may be connected to a gas-supply pipe, such as the ordinary house-pipes connected to a city gas plant, where it is desired to enrich the gas by carbureting before it reaches the burners.

The carbureting-chamber 10 is preferably in the form of a vertically-disposed cylindrical tank, which may be mounted on top of the air-pump chamber 5, and at the top of said carbureting-chamber is a tank 11, containing an inverted bell 12, acting as an aerometer, the tank being partially filled with water or other liquid and so arranged as to be acted upon by the pressure of air within the carbureting-tank, so that in the event of the cutting off of the flow of gas from the carbureter the pressure of air within the tank will raise the bell and automatically cut off the supply of air to the carbureting-chamber.

The carbureting-chamber is provided with a centrally-disposed vertical tube 15, provided at its lower end with slots 16 and its upper end extending into the lower portion of a tubular member 17, forming part of the aerometer-tank. The main air-pipe 8 is connected to a horizontally-disposed pipe 18, having a controlling-valve 19, which may be employed to regulate the quantity of air admitted or to entirely cut off the supply, said pipe

extending within the tube 15 and terminating in a valve-chamber 20, having a port 21, opening into the tube 15. In the valve-chamber is a valve 22, held on the lower end of the valve-stem 23, the upper end of which is guided within a yoke 24, carried by the gas-valve, and at the upper portion of the valve-rod is an enlarged head 25, which is engaged by the yoke when the air-bell rises to a predetermined height and in raising the valve-stem cuts off the flow of air into the carbureting-chamber. The carbureting-chamber is divided by horizontal partitions 28 into a number of superposed chambers, and in each partition is an opening for the reception of a vertical tube 29, open at top and bottom and preferably provided with a number of drainage-openings 30 to permit the passage of liquid hydrocarbon by gravity from chamber to chamber. The tubes 29 are arranged in staggered relation, being disposed alternately on opposite sides of the tube 15, so as to form a tortuous passage for the air being carbureted, the air entering through the tube 15 being forced through the opening 16 at the lower end of the tube and thence passing through the several chambers as indicated by the arrows in Fig. 1 and escaping from the carbureting-chamber through a discharge-pipe 31.

The tubes 29 are approximately about one-half the vertical height of the several chambers, and in the space around the tubes, extending up to the tops thereof, the chambers are filled with fibrous material, such as cotton, for the absorption of gasolene or other hydrocarbon, the cotton being indicated at 32, and in the space between the top of the absorbent material and the top of each chamber is placed a cage of the character best shown in Fig. 4.

The cage comprises a pair of rings 33 and 34, the outer ring being approximately equal to the internal diameter of the carbureting-chamber and the inner ring fitting snugly around the central tube 15. The two rings are provided with upper and lower flanges, to which are secured parallel disks 35, formed of reticulated or foraminous material, wire-netting being preferably employed, and through the netting is interwoven suitable absorbent material 36, such as candle-wicking or the like, the netting serving to properly support the wicking and prevent its becoming so tightly packed as to interfere with the passage of the air being carbureted, while the lower portion of the wicking is in contact with the thoroughly-saturated absorbent material 32, which receives the hydrocarbon therefrom by capillary attraction.

At a convenient point, preferably underground, is placed a storage-tank 40, to which gasolene or other hydrocarbon may be supplied through a filling-pipe 41, having a removable cap 42. The tank is connected in the manner hereinafter described to the carbureting-chamber by a supply-pipe 43 and a drainage-pipe 44, suitable means being employed for causing the flow of the hydrocarbon through the pipe 43 into the carbureting-chamber and permitting its gradual flow through the overflow-tubes 29 into the successive chambers, the surplus being returned by gravity through the pipe 44 to the storage-tank, so that there will be no danger of an accumulation of liquid hydrocarbon within the chamber.

In order to prevent the accumulation of hydrocarbon to the level of the upper ends of the tubes 29, I preferably employ the drainage-perforations 30, disposed near the lower ends of the tubes, to permit the gradual drainage of the gasolene, so that there will be no tendency to retain the gasolene in its purely liquid form, the carbureting-chamber being supplied with a large quantity of highly-saturated fibrous material.

In the passage of the air through the several superposed chambers it comes into contact with the saturated wicking and absorbs a sufficient quantity of hydrocarbon to form an explosive or burning mixture; but in some cases this mixture will be too rich in carbon to form a vapor suitable for use with some classes of burners, especially those using incandescent candles, and to reduce or dilute the vapor I preferably employ a filtering-chamber 45. The chamber 45 is provided with a number of horizontally-disposed partitions 46, extending alternately from opposite sides of the chamber and forming a plurality of shelves for the reception and support of a fibrous straining material of suitable character, the partitions terminating short of the walls of the chamber, so as to form a tortuous passage for the gas and air. In the lower portion of the chamber 45 is a mixing-chamber 50, having an enlarged central portion 51, provided with a plurality of minute perforations, and this mixing-chamber communicates at its lower end with the vapor-discharge pipe 31 and at its upper end with a pipe 53, leading from the main air-pipe 8, a valve 54 being employed for the purpose of regulating the quantity of air admitted to the mixing-chamber. The air and gas or vapor mingled in the chamber 50 are forced through the perforations in such manner as to become thoroughly intermixed, the pressure being sufficient to force the mingled air and vapor through the straining or filtering material in the upper portion of the chamber and more thoroughly mix the same, the straining material also serving to absorb any excess of moisture and in a measure purify the vapor before allowing it to pass through the discharge-pipe 56 to the burners.

The storage-tank 40 is preferably placed underground at a safe distance from the carbureting-chamber and is supplied with gasolene from time to time by the removal of the cap 42 on the filling-pipe 41. Within the tank 40 is a closed chamber 57, having at its lower end a port 58, communicating with the main tank and when open permitting the flow of hydrocarbon by gravity into the inner cham-

ber 57. The port 58 is closed by a valve 59, carried by a handled valve-stem 60, which extends through a stuffing-box 61 at the upper portion of a vertically-disposed tube 62, having its lower end below the normal liquid-level in the chamber. At the top of the chamber is a valved pipe 63, to which may be attached an air-pump 64 for supplying air under pressure to the inner chamber 57 when the valve 59 is closed, or the valve in said pipe may be opened to permit the escape of air and allow the liquid to flow by gravity into the inner chamber 57 when the valve 59 is opened for the purpose.

The carbureter supply-pipe 43 extends down to a point near the lower end of the chamber 57 and in order to guard against accidental breakage is preferably surrounded by a guard-pipe 65. In the operation of this portion of the mechanism the valve in the pipe 63 is first opened to allow the air in the upper portion of the inner chamber 57 to escape, after which the valve 59 is opened and the liquid from the outer tank flows into the inner chamber by gravity until it reaches the same level in the chamber and tank. The valve 59 is then closed, and the pipe 63 is connected to the air-pump and air under pressure forced into the inner chamber. When it becomes necessary to supply gasolene to the carbureter, a valve 67 in the filling-pipe 43 is opened, and the pressure of air in the inner chamber 57 forces the liquid hydrocarbon up through the pipe 43 and into the top of the carbureting-chamber, the latter being filled or nearly filled with liquid hydrocarbon, which is absorbed by the fibrous material and wicking in the chambers, while the surplus hydrocarbon gradually flows through the drainage-pipe 44 to the storage-tank 40.

With a device of this character it is possible to form a vapor of any desired quality by regulating the quantity of gasolene admitted, and further by exercising due care in the proportion of air mingled with the carbureted air in the mixing-chamber 45.

Having thus described the invention, what is claimed is—

1. The combination in a carbureting apparatus, of a casing, a vertically-disposed air-entrance tube arranged within said casing, said tube being open at its upper end and provided at its lower end with discharge-openings leading to the carbureter proper, an aerometer-bell covering the upper portion of the tube, a liquid-containing tank in which the bell is sealed, an air-supply pipe having a valve-casing within the air-tube, a valve disposed within the casing and adapted to open by gravity, a valve-stem connected to the valve, and means for connecting the valve-stem to the bell for shutting the valve and cutting off the supply of air when the pressure reaches a predetermined point.

2. The combination in a carbureter, of a casing, a vertically-disposed air-entrance tube having discharge-openings near its lower end, a plurality of horizontal partitions dividing the casing into a plurality of superposed chambers, tubes extending through openings in the partitions and forming passages for the air during the carbureting process, absorbent material supported by the partitions, wicking arranged in the chambers above the absorbent material, and means for supporting the wicking, substantially as specified.

3. The combination in a carbureter, of the casing, partitions arranged within the casing and forming a number of superposed chambers, tube-sections carried by the partitions and forming air-passages, absorbent material supported by the partitions and of a depth approximately equal to the vertical height of the tubes, a centrally-disposed air-entrance tube having openings or ports near its lower end, reticulated wick-supports arranged in the chambers above the absorbent material, wicking carried by said supports, and a vapor-discharge pipe leading from the upper portion of the carbureter-casing.

4. The combination in a carbureter, of the casing, partitions disposed within the casing and dividing the same into a plurality of superposed chambers, absorbent material arranged within the several chambers, overflow-tubes carried by the partitions and forming air-passages between the chambers, said tubes being of a height approximately equal to the depth of the absorbent material, there being small drainage-openings leading through the lower portions of the tubes to drain off hydrocarbon in excess to that which the absorbent material can take up, an air-entrance tube leading to the casing, a hydrocarbon-supply pipe in communication with the upper portion of said casing, an escape-pipe for the vapor, and a draining-pipe leading from the lower portion of the casing to permit the escape of the excess of hydrocarbon.

5. The combination in a carbureting apparatus, of the carbureting-chamber, absorbent material contained therein, means for supplying air to said chamber, a vapor-discharge pipe leading from the chamber, a filtering-chamber in communication with the vapor-discharge pipe, an air-pipe leading to the filtering-chamber, and absorbent material disposed within the filtering-chamber for filtering the mingled air and vapor.

6. In a device of the class specified, a filtering-chamber, a plurality of horizontally-disposed partitions therein, absorbent material supported by said partitions, a mixing device disposed within the lower portion of said chamber and comprising an inclosing casing provided with perforations, and air and vapor pipes leading to said mixing device.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN RUTHVEN.

Witnesses:
E. L. McILVAIN,
ENOS KIDD.