D. H. HAYWOOD.

CARBURETER.

APPLICATION FILED DEC. 24, 1908.

982,490. Patented Jan. 24, 1911.

3 SHEETS—SHEET 1.

Fig. 5.

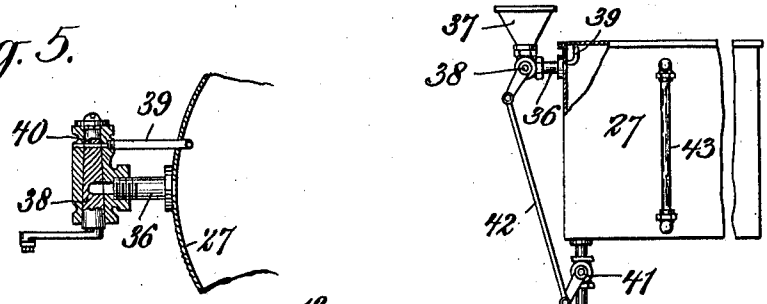


Fig. 1.

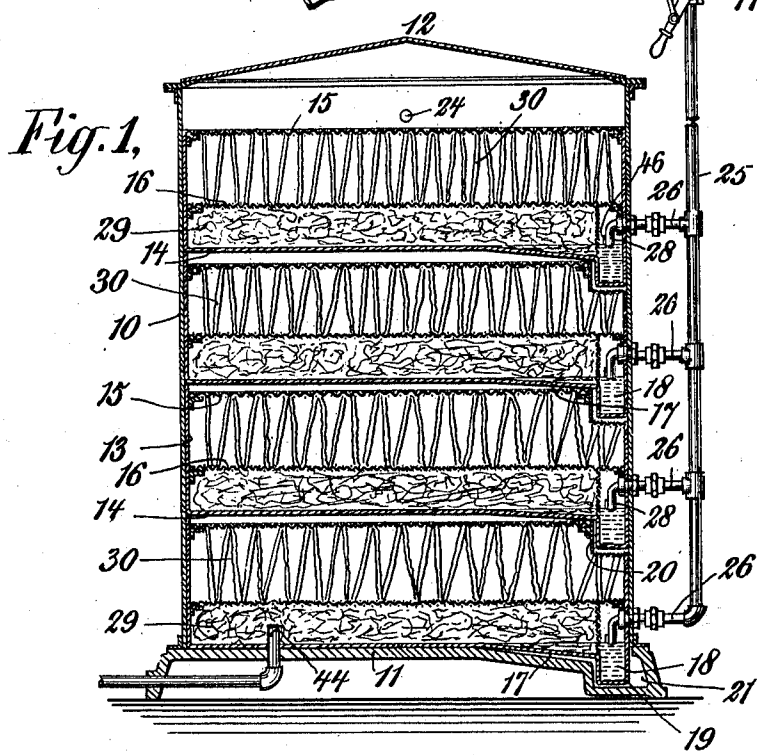
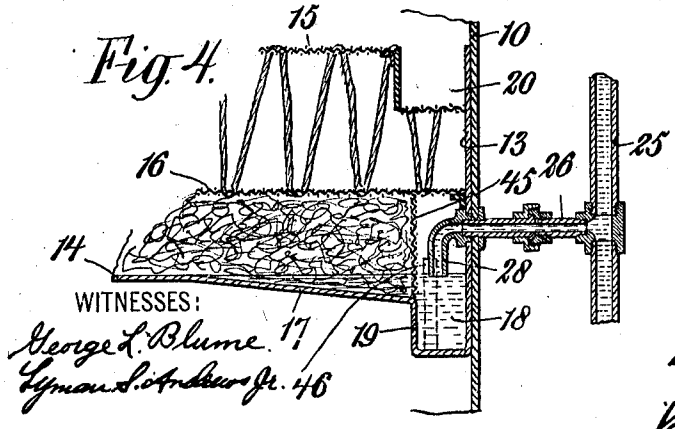


Fig. 4.



WITNESSES:

George L. Blume.

Lyman S. Andrews Jr.

INVENTOR

D. Howard Haywood

BY

Chapin & Haywood

HIS ATTORNEYS

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3 SHEETS—SHEET 2.

Fig. 2,

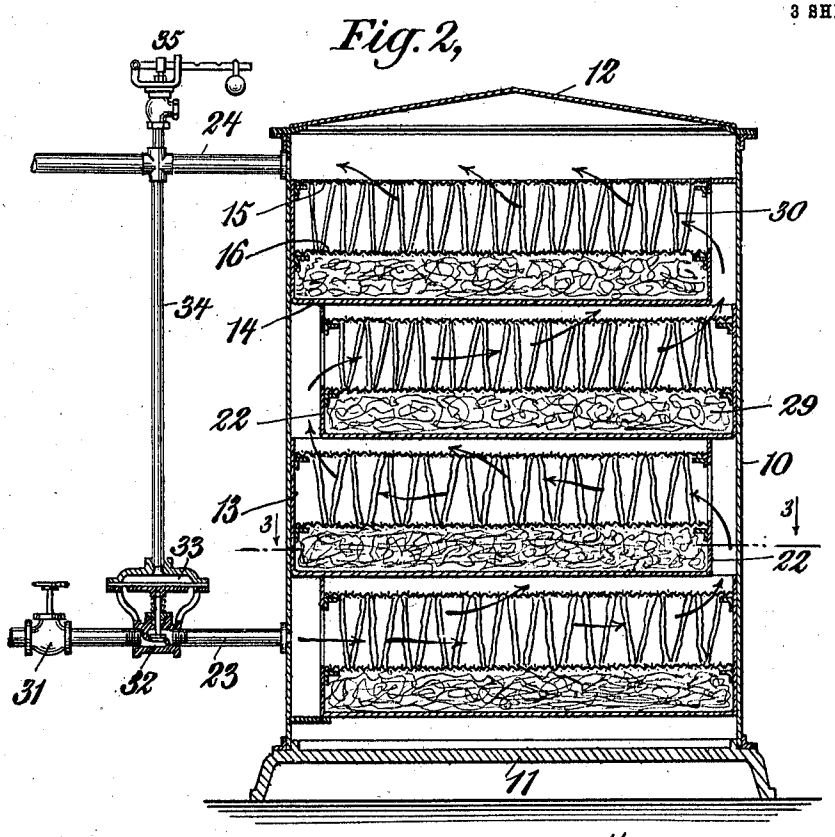
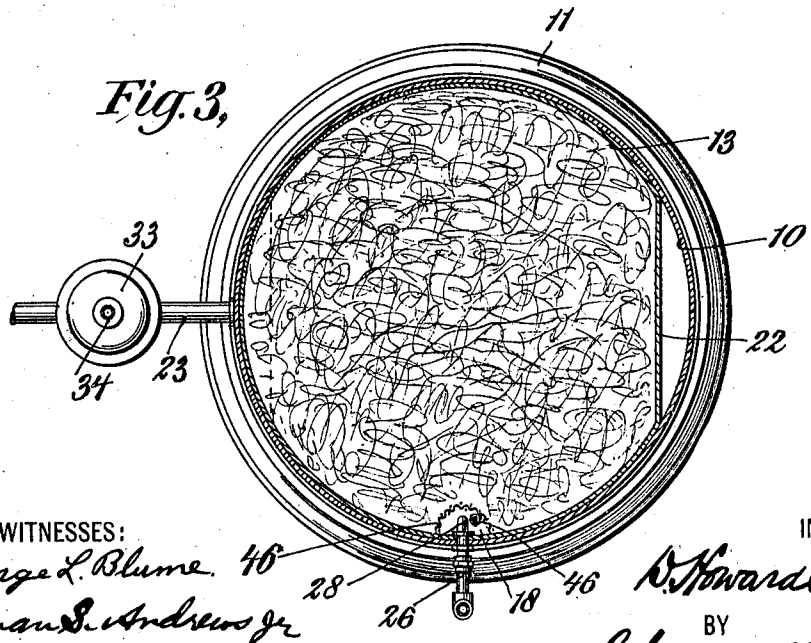


Fig. 3,



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3 SHEETS—SHEET 3.

Fig. 6,

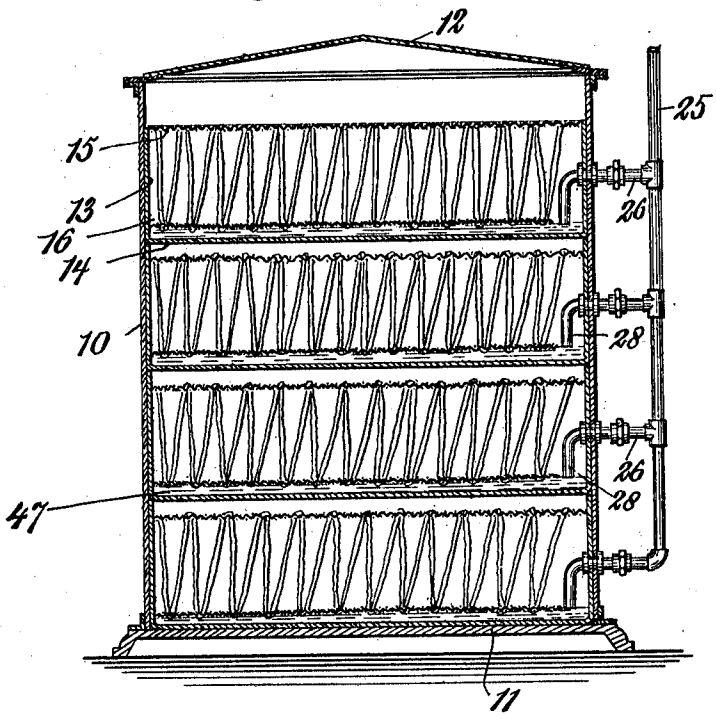
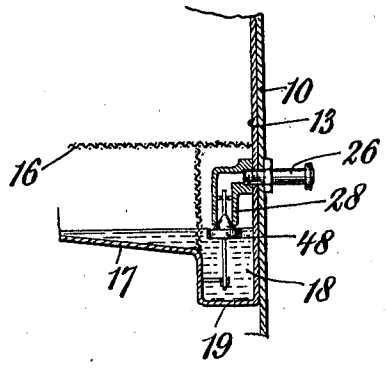


Fig. 7



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INVENTOR

D. Howard Haywood.

BY

Chapin Haywood

HIS ATTORNEYS

UNITED STATES PATENT OFFICE.

DANIEL HOWARD HAYWOOD, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO AMERICAN GAS & POWER CO., A CORPORATION OF NEW JERSEY.

CARBURETER.

982,490. Specification of Letters Patent. Patented Jan. 24, 1911.

Application filed December 24, 1908. Serial No. 469,121.

To all whom it may concern:

Be it known that I, DANIEL HOWARD HAYWOOD, a citizen of the United States of America, and a resident of New York, county and State of New York, have invented certain new and useful Improvements in Carbureters, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in carbureters, in which air or other gas to be enriched is mixed with gas resulting from the evaporation of a volatile liquid such as alcohol, gasolene and the like.

The main objects of my invention are to provide a convenient, simple and inexpensive form of carbureter which may be employed in houses for the production of a gaseous mixture suitable for lighting, heating and power purposes; to provide in such an apparatus for the production of a uniform quality of the gaseous mixture; and to render the apparatus self controlling so that the operation thereof will be entirely automatic.

To these ends my invention consists in an apparatus having a channel therethrough arranged to be employed as a conduit for air, the channel containing a comparatively large quantity of capillary threads which are kept constantly saturated with a volatile liquid, the feed for which is automatically controlled in the operation of the apparatus.

My invention also consists in an improved means for causing the apparatus to cease to operate by automatically cutting off the air supply when the gaseous product is not being withdrawn from the generator, and in many details of construction and combinations of parts, as will be fully pointed out hereinafter.

In order that my invention may be fully understood, I will proceed to describe an embodiment thereof, and will then point out the novel features in claims.

In the drawings: Figure 1 is a view in central vertical section through a carbureter embodying my invention. Fig. 2 is a view in central vertical section therethrough, the plane of section being taken at right angles to the plane of section of Fig. 1. Fig. 3 is a view in horizontal section through the carbureter. Fig. 4 is an enlarged detail view of a liquid seal employed. Fig. 5 is an enlarged detail view in central section of a valve employed in the supply tank or reservoir. Fig. 6 is a view in central vertical section through a carbureter of slightly modified construction. Fig. 7 is a detail view of a modified form of the liquid feed control.

The carbureter, in general, comprises an outer shell or casing of cylindrical form, and a plurality of trays horizontally arranged therein to form a plurality of horizontal chambers or subdivisions. The casing is composed of a cylindrical shell 10, a base 11, and a removable cover 12. The trays each comprise a short cylindrical section 13, an imperforate base 14, a perforated top 15, and a perforated diaphragm 16 located between the top and the base. The base or bottom 14 of the tray is inclined downwardly toward one edge thereof for a greater or less distance as is shown at 17, and at the lowermost portion is provided with a well 18 into which the tray will drain. This well may conveniently be formed by means of a small dependent tube 19 which is closed at its lower end as will be well understood by reference to the drawings, a corresponding pocket 20 being provided thereabove for receiving the corresponding tubular portion of the superposed tray. A corresponding depression 21 may conveniently be provided in the base for receiving the dependent tube of the lowermost tray. The trays may conveniently be assembled in the shell by being dropped therein from the top, one above the other, each tray forming a support for the tray thereabove; of course, it will be well understood that other means may be employed for supporting the trays, if desired. While I have heretofore described the side walls of the trays as being of cylindrical form, I preferably flatten one side thereof as at 22 so as to form a communicating duct between contiguous trays, the said flattened portion of adjacent trays being oppositely disposed as will be readily understood by reference to Figs. 2 and 3 of the drawing so that the communicating ducts of successive trays are arranged at opposite sides of the apparatus. By this means, I provide a continuous channel through the apparatus from the lowermost portion thereof to the upper end, in a zigzag path. Near the base of the apparatus,

I provide a supply pipe 23 for air which may either be supplied at a pressure above that of the atmosphere or may be forced through at atmospheric pressure by suction produced through a discharge pipe 24 which is located at the uppermost end of the apparatus. A supply pipe 25 for liquid connects with the apparatus through various branch pipes 26, the said pipe receiving its liquid from a supply tank or reservoir 27. The supply tank 27 is shown as arranged at a higher level than the apparatus so that the liquid therefrom will flow to the apparatus by gravity. Each branch pipe 26 connects with an elbow 28, the lower end of which extends into the wells 18 of the trays. The lower ends of the said elbows are arranged at such a level in the wells as to be sealed by the liquid contained therein, the tank 27 being closed against the admission of air except through the said elbows so that liquid will be supplied to the apparatus only as the level of the liquid in the wells descends to a point beneath the mouth of the said elbows.

Absorbent material such as cotton waste or the like is preferably provided in the spaces contained in the trays between the intermediate diaphragm 16 and the bases 14 thereof, the same being designated by reference character 29 in the drawings, and capillary threads 30 are arranged in the chambers or spaces between the perforated diaphragms 15 and 16, the said capillary threads being conveniently in the form of wicking which is woven backward and forward between the said diaphragms. Perforated shields 45 preferably composed of woven wire are conveniently arranged in proximity to the wells 18 so as to prevent the absorbent material 29 from entering the wells or interfering with the action of the liquid seals formed thereby.

The operation of the apparatus is as follows: A volatile liquid such as gasolene, alcohol or the like is supplied to the apparatus through the pipe 25, branches 26 and elbows 28. The liquid so supplied will be gradually absorbed by the absorbent material 29 until the same is thoroughly saturated and will furthermore be carried backward and forward by capillary attraction along the threads 30 keeping them also saturated. When the absorbent material and threads have become thoroughly saturated, the liquid which flows into the apparatus will rise to a level just high enough to seal the mouths of the elbows 28 and thereafter no more liquid will flow into the apparatus until further supply is required. Air being admitted through the air supply pipe 23, the same will flow in the direction shown by the arrows in Fig. 2 across the saturated threads 30 and will carry with it the gas resulting from the evaporation thereby caused. The resultant gaseous mixture will continue to travel through the apparatus, being compelled by the arrangement of trays to flow across the remaining threads until it is finally delivered through the pipe 21. A sufficient quantity of the capillary threads is provided to present the proper quantity of liquid in the path of the air, to properly proportion the gas and air, the said gas and air becoming intimately intermingled in their passage through the apparatus whereby a gaseous mixture of the proper richness will be produced. I may conveniently provide a regulating valve 31 in the air supply pipe so that the quantity of air delivered may be regulated by hand in accordance with the quality or character of the liquid supplied. This regulation will not need to be varied in the normal operation of the apparatus, but will be effected at the time of the initial adjustment of same, and thereafter should not be interfered with unless a liquid of different character is employed, or a gas of other quality is required.

It will of course be clear that as the liquid carried by the capillary threads is evaporated, other liquid will rise along the same to take its place. This will cause the level of the liquid in the wells to slightly lower, and hence to uncover the mouths of the elbows 28 with the result that a fresh supply of liquid will be immediately provided to take the place of that which has been used up. Thus the apparatus is automatically supplied with liquid in exact proportion to that employed, and the absorbent material therein will be kept at a uniform degree of saturation. This is an important feature of the invention for the reason that thereby a uniform richness of the gaseous mixture is produced and the apparatus continues its function automatically without the need of personal attention or supervision.

In order to automatically control the supply of air to prevent the production of the gaseous mixture except as it is needed, I provide a throttle valve 32 in the supply pipe 23, the said throttle valve being operated by means of a fluid pressure motor 33 which is in open communication through a pipe 34 with the upper end of the apparatus in which the generated gas is contained. For convenience, I have shown this pipe 34 as connecting with the delivery pipe 24. When none of the gaseous mixture is being drawn away through the discharge pipe 24, the pressure of the accumulated gaseous mixture in the apparatus will operate the fluid pressure motor 33 to close the valve 32 and thereafter as no more air will be admitted, further production of the gaseous mixture will cease. *Per contra*, directly the gaseous product is drawn off through the supply pipe 24, the pressure upon the fluid pressure motor will be relieved, the throttle

valve 32 will open, and air will be again supplied. A safety valve 35 may be provided if necessary or desirable so that if an excess of the gaseous mixture should be accumulated, the pressure thereof will not be allowed to rise above a dangerous point.

In order to recharge the supply tank 27 when the same becomes necessary, I have provided a filling nozzle 36, the same being preferably provided with a funnel-shaped receiver 37 and a cut-off valve 38. In addition to the filling nozzle and cut-off valve, there is also a vent 39 and a control valve 40 therefor, the said control valve being conveniently formed as a part of the plug of the valve 38. By this means when the filling valve is opened so as to admit a fresh supply of liquid, the vent is also opened whereby to vent the upper end of the tank. To prevent the apparatus from being flooded when the supply tank is being recharged and the vent is therefore opened, I have supplied a valve 41 in the pipe 25 whereby the said valve 41 may be closed before the valves 38 and 40 are opened and in order to enforce the proper sequence of operations, I preferably connect the operating levers of the valves with a link 42, the said valves being preferably timed so that the valve 41 can never be opened at the same time as the valves 38 and 40. The tank 27 may be conveniently provided with a gage glass 43 whereby the level of liquid therein may be visually noted at any time. In case by any accident, the apparatus should become flooded, I have provided a drain 44 which enters the lowermost tray, the upper end of the pipe constituting the drain being arranged above the normal level of the liquid in the said tray. I may similarly supply the other trays with overflow pipes 46 if desired.

In Fig. 6, I have shown a slightly modified form of apparatus in which I dispense with the absorbent material 29 altogether and carry the capillary threads down into liquid which is contained in the base of the trays. In this case, the chamber 47 between the intermediate diaphragms 16, and the bases 14 of the trays, is preferably very much shallower than in the form of apparatus shown in the other figures whereby to reduce to a minimum the amount of liquid carried in the trays. The liquid in this form of the apparatus will of course be contained all the way across the trays and the wells 18 may hence be dispensed with, the supply elbows 28 being allowed to enter the trays at any desired point. It will of course be understood that in this form of apparatus, the liquid is carried directly along the capillary threads 30 from the liquid, instead of through the medium of the absorbent material 29.

In Fig. 7, I have shown a float valve 48 which is adapted to positively close the mouth of the feed below 28 when the liquid rises above a predetermined point, and in such case air at atmospheric pressure or above the same, may be freely admitted above the level of the liquid in the supply tank.

While I have described the apparatus throughout as arranged to receive air through the pipe 23, it is obvious that other aeriform or gaseous fluid which it may be desired to enrich may be employed instead of atmospheric air. I have employed the term air herein as a convenient method of expression, not intending thereby in any sense to limit this invention to the employment of atmospheric air only.

What I claim is:

1. In a carbureter the combination with a cylindrical shell or casing, of a plurality of separate and independent cylindrical trays fitted in sliding relation therein, which rest one upon the other, and whose peripheries substantially fit the inner wall of the said shell or casing, each said tray comprising a lower portion including a base and a vertical peripheral wall, which will retain liquid and a portion above the base for supporting capillary threads, and each said tray provided with a flattened portion at its periphery which constitutes a passage leading from beneath to above the liquid retaining portion, the passages of contiguous trays being oppositely disposed, and means for supplying liquid to the trays.

2. In a carbureter the combination with a tubular shell or casing, of a plurality of separate and independent trays fitted in sliding relation therein, which rest one upon the other, and whose peripheries substantially fit the inner wall of the said shell or casing, each said tray comprising a lower portion including a base and a vertical peripheral wall, which will retain liquid, two perforated diaphragms spaced apart above the base, and capillary threads supported by the said diaphragms, and each said tray provided with a portion constructed to form a passage leading from beneath to above the liquid retaining portion, the passages of contiguous trays being oppositely disposed, and means for supplying liquid to the trays.

3. In a carbureter the combination with a tubular shell or casing, of a plurality of separate and independent trays fitted in substantially sliding relation therein, and successively supported by each other, each said tray comprising a lower liquid retaining portion provided with a depressed part into which the liquid will drain, and an upper portion for supporting capillary threads, the upper portion having a pocket for receiving the depressed part of the tray thereabove, and each said tray provided with a portion constructed to form a passage leading from beneath to above the liquid retain-

ing portion, the passages of contiguous trays being oppositely disposed, and means for supplying liquid to the trays.

4. In a carbureter the combination with a tubular shell or casing, of a plurality of separate and independent trays fitted in substantially sliding relation therein, and successively supported by each other, each said tray comprising a tubular portion, an imperforate base, a perforated diaphragm near the upper end of the tubular portion, an intermediately disposed perforated diaphragm, and capillary threads disposed between the said diaphragms, each said tray being provided with a portion constructed to form a passage leading from beneath the tray to a point between the diaphragms thereof, the passages of contiguous trays being oppositely disposed, and means for supplying liquid to the trays.

5. In a carbureter the combination with a tubular shell or casing, of a plurality of separate and independent trays fitted in substantially sliding relation therein, and successively supported by each other, each said tray comprising a tubular portion, an imperforate base, a perforated diaphragm near the upper end thereof, an intermediately disposed perforated diaphragm, and capillary threads disposed between the said diaphragms, each said tray being provided with a portion constructed to form a passage leading from beneath the tray to a point between the diaphragms thereof, the passages of contiguous trays being oppositely disposed, and each said tray having a depressed liquid holding portion in the base, and a pocket in the upper portion for receiving the depressed portion of the tray thereabove, and means for supplying liquid to the trays.

6. A carbureter comprising a casing and a plurality of superposed trays therein, each said tray including a lower portion for containing absorbent material, the base thereof being provided with a depressed portion to constitute a well into which liquid from the tray will flow, and from which the absorbent material is excluded, two perforated diaphragms disposed above the said lower portion, and capillary threads disposed between, and supported by, the said diaphragms, and means for maintaining a substantially uniform quantity of liquid in the depressed portions of each of the said trays, the said carbureter being provided with an air channel therethrough formed between the diaphragms of each of the said trays, and past the bases of said trays upon opposite sides of contiguous trays.

7. A carbureter comprising a casing and a plurality of superposed trays therein, each said tray including a lower portion for containing absorbent material, the base thereof being provided with a depressed portion to constitute a well into which liquid from the tray will flow, and from which the absorbent material is excluded, and an inclined portion leading to the said well, and containing absorbent material, two perforated diaphragms disposed above the said lower portion, and capillary threads disposed between, and supported by, the said diaphragms, and means for maintaining a substantially uniform quantity of liquid in the depressed portions of each of the said trays, the said carbureter being provided with an air channel therethrough formed between the diaphragms of each of the said trays, and past the bases of said trays upon opposite sides of contiguous trays.

8. A carbureter comprising a casing and a plurality of superposed trays therein, each said tray including a lower portion for containing absorbent material, the base thereof being provided with a depressed portion to constitute a well into which liquid from the tray will flow, and from which the absorbent material is excluded, two perforated diaphragms disposed above the said lower portion, and capillary threads disposed between, and supported by, the said diaphragms, and means for maintaining a substantially uniform quantity of liquid in the depressed portions of each of the said trays, the well portions of the said trays being disposed directly one above the other and each provided with an overflow pipe by which overflow from the wells above will successively discharge into the wells beneath, the said carbureter being provided with an air channel therethrough formed between the diaphragms of each of the said trays, and past the bases of said trays upon opposite sides of contiguous trays.

D. HOWARD HAYWOOD.

Witnesses:
LYMAN S. ANDREWS, JR.,
J. C. HARTMANN.