No. 649,865. Patented May 15, 1900.

O. VERHAGEN & G. L. VAN GINK.

CARBURETER.

(No Model.) (Application filed Mar. 6, 1900.)

Fig. 1.

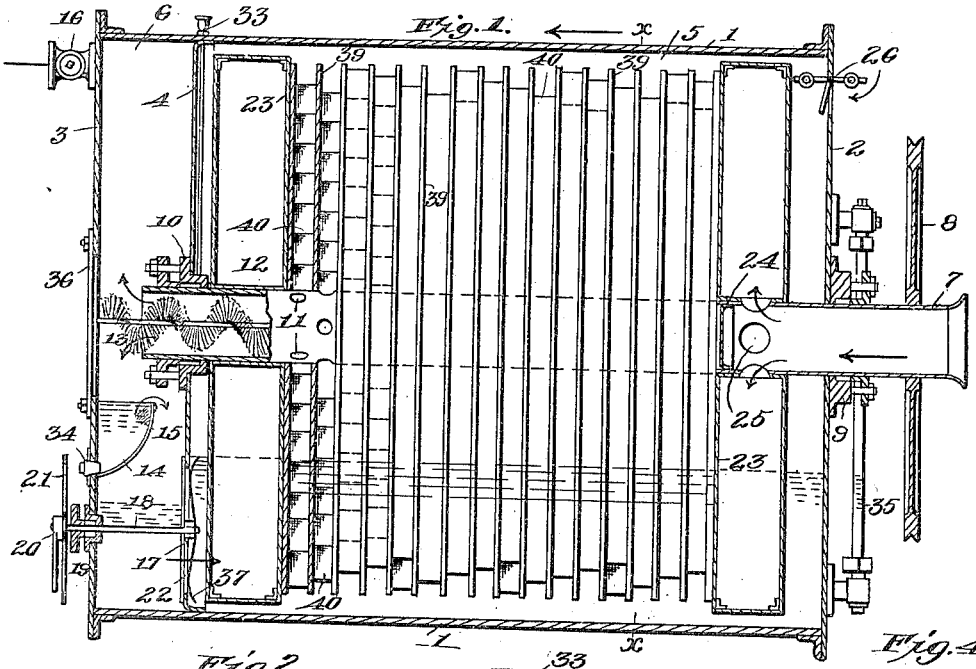

Fig. 2.

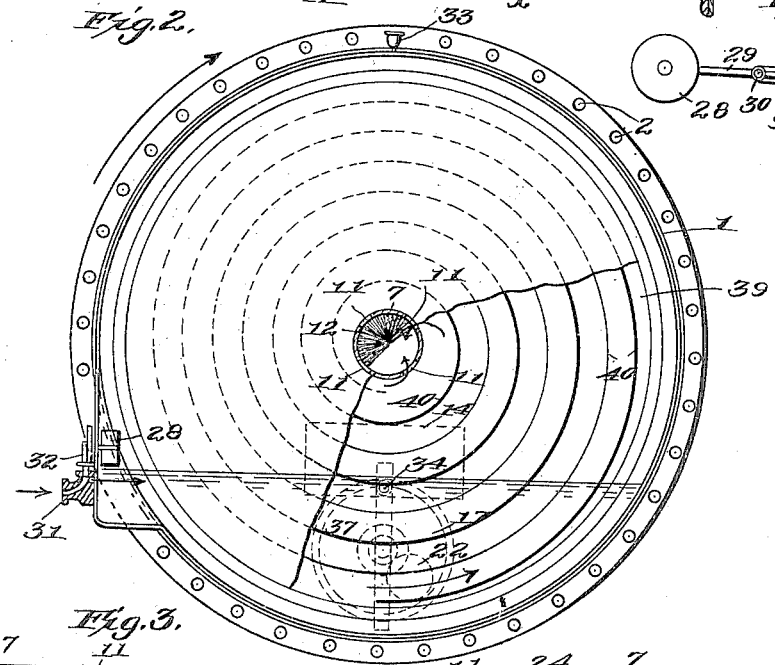

Fig. 3.

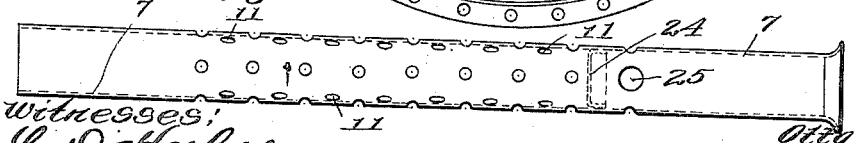

Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

OTTO VERHAGEN AND GERARDUS LEONARDUS VAN GINK, OF AMSTERDAM, NETHERLANDS.

CARBURETER.

SPECIFICATION forming part of Letters Patent No. 649,865, dated May 15, 1900.

Application filed March 6, 1900. Serial No. 7,543. (No model.)

To all whom it may concern:

Be it known that we, OTTO VERHAGEN, gentleman, and GERARDUS LEONARDUS VAN GINK, manufacturer, subjects of the Queen of the Netherlands, residing at Amsterdam, Netherlands, have invented a certain new and useful Apparatus for Producing Carbureted Air, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the said apparatus. Fig. 2 is a cross-section of Fig. 1, taken on the line X X and looking in the direction of the arrow; and Figs. 3 and 4 show details of the arrangement.

Like numerals of reference denote corresponding parts in the several figures.

This invention refers to an improved apparatus for producing carbureted air or "air-gas."

It is well known that air-gas (carbureted air) is an intimate mixture of atmospheric air and vapors of volatile hydrocarbons, such as gasolene, benzolin, alcohol, &c.

The object of the present invention is to produce a highly-carbureted-air gas of an invariable or stable composition and at a constant pressure. This result is obtained by adopting a special type and a special arrangement of spiral passages which, as in the types of apparatus hitherto generally used, revolve in a cylindrical vessel and take in alternately atmospheric air and carbureting liquid. The spiral passages are arranged around a hollow axis, which, with the said passages, is arranged to rotate in a cylindrical reservoir partly filled with air and partly with carbureting liquid. During the rotation of the axis the spiral passages take up air and liquid alternately. The carbureted air passes through the hollow axis into the gas-collecting chamber and is thence conducted to the place where it is to be consumed.

The cylindrical shell 1 is closed at both ends by covers 2 and 3 and is divided by a partition 4 into two chambers 5 and 6. Chamber 5 contains the carbureting liquid and the atmospheric air to be carbureted. Chamber 6 contains the carbureted air. The hollow axis 7 is supported in bearings 9 and 10, constructed in the form of stuffing-boxes, and is made to revolve by means of the cord or belt pulley 8. On the said hollow axis 7 there are mounted at short distances apart disks 39, of soft wood, and between two adjacent disks there is placed a band of sheet-iron 40, wound in a spiral form. The disks 39 are employed in the rough state—that is to say, without being trimmed on their two faces—and the sharp edges of the metal bands embed themselves slightly in the wood, and thus insure a sufficiently-tight joint. The fibrous surface of the disks promotes in the highest degree the distribution of the liquid, and consequently the carbureting. Each spiral 40 commences at one of the apertures 11, provided in the hollow axis 7. They then coil around the axis at a uniform distance apart up to the outer periphery. The spirals are not fixed to the axis nor to the disks, but are maintained in position by forcing the disks together. In this manner there is obtained between two adjacent bands a spiral passage of rectangular cross-section and of very great length, which very advantageously promotes the carbureting of the air. The bands or coils of sheet-iron 40 are arranged so that each is ninety degrees in advance of the next preceding coil. (See Figs. 1 and 2.) Almost the whole of the chamber 5 is filled with the said disks and spirals, forming a system or series of spiral compartments or channels. The disks are screwed together by means of transverse pieces mounted at their periphery, which has the result, as above mentioned, of causing the sharp edges of the metal bands to penetrate into the soft wood of which the disks are made. In the case where for a purpose hereinafter mentioned floats 23 are employed the said floats form the end or fastening plate of the system at each end, Fig. 1.

In Fig. 3 the hollow axis only is shown, and in this figure, as well as in Fig. 1, it is seen how the axis of each compartment is provided in its periphery with four or five apertures 11, through which the contents of the spiral passage are emptied into the hollow axis.

Contrary to the conditions obtaining in other analogous kinds of apparatus in which circularly-curved tubes are used, each separate compartment has the form of a flattened

spiral which, as indicated in Fig. 2, is beveled at the end. The length of each compartment is thereby considerably augmented.

The axis 7 revolves in the direction indicated by the arrow in Fig. 2, and the set of compartments moves thus in the chamber 5, taking up alternately carbureting liquid and air. The small successive columns of air and liquid pass through the spiral, and the carbureting liquid is vaporized therein, the vapors mixing intimately with the air. The carbureted air or air-gas and the remaining air pass through the hollow axis into the collecting-chamber 6. Within the hollow axis there is a helical brush 12. This brush rubs against the inner side of the hollow axis, and its twist is arranged in an opposite direction to that of the rotation of the said axis, so that this brush must have a tendency to issue from the hollow axis. However, as the rod 13, on which the brush is mounted, bears against the cover 3 the brush will remain in position, while nevertheless opposing an obstacle to the liquid issuing from the tube and abstracting therefrom or retaining the fatty particles. The liquid falls into a receptacle 14 and overflows, passing through a brush 15, arranged at the margin thereof, and finally accumulates at the bottom of chamber 6. In this chamber the air-gas is also collected and passes thence through a cock 16 into the gas-main. In the plate or cover 3 there is a central orifice, the covering-plate 36 of which is easily removable, so that the receptacle 14 and the brushes 15 and 12 can be cleaned without trouble. Moreover, the plate or cover 3 is fitted opposite the lowermost point of the receptacle 14 with a screw-plug 34, which can be removed in order to empty the said receptacle.

In order to cause the liquid to return from the chamber 6 to the chamber 5, there is in the partition 4, between the two chambers, a hole, over which is placed a slide 17, which is a little larger than the orifice. The slide itself is provided with an aperture 22, Fig. 2, and is closely pressed against the said partition by a weak spring 37, the ends of which bear against the partition 4 and maintain a sufficiently-tight joint between the slide and the partition.

The chambers 6 and 5 communicate with each other through the aperture 22, so that as long as no air-gas is produced the levels of the liquid in the two chambers are at the same height. In the event of normal production of gas the level in chamber 6 will fall under the influence of the pressure of the air-gas, Fig. 1. Whenever less gas is drawn from the apparatus than is produced therein or if none is drawn from it, the gas-pressure in the chamber 6 will increase, and the liquid will then pass through the aperture 22 of chamber 6 into the chamber 5 until in the end the level of the liquid in chamber 6 has fallen down to the aperture 22. At the same time carbureted air also enters the chamber 5, and by reason of this circumstance the admission of fresh air through the valve 26 will cease and no more carbureted gas will be produced until more gas is abstracted from the apparatus.

The pressure which will have to be overcome in order that gas may pass into the chamber 5 will depend on the height of the level of the liquid in said chamber above the upper margin of the aperture 22. The position of the aperture may be adjusted higher up or lower down by turning the slide 17. In this way the pressure at which carbureted air must again return to chamber 5 can be regulated. The slide 17 is arranged to pivot on an axis 18, which extends through the cover 3 to the outside and is made tight by means of the stuffing-box 19. The slide is made to turn by means of the handle 20, and on the plate 21 the heights of pressure corresponding to the various positions of the handle may be marked.

In the case of large-sized apparatus it is advantageous in order to relieve the bearings to arrange floats 23, as above indicated, by the side of the spiral chambers on both ends of the axis or spindle 7. These floats consist of hermetically-sealed drums of thin plate, which reduce the pressure brought to bear on the bearings and at the same time also the friction to be overcome in turning the axis or spindle. On the right the hollow axis or spindle 7 is closed by the partition 24. Openings 25, arranged in the axis or spindle, permit communication with the interior of the right-hand float. When the weather is very cold, steam or hot air is introduced into this drum in order to warm the carbureting liquid, so that (as experience has proved) a more rapid evaporation of the liquid may be obtained, and consequently a higher degree of carburation of the air. As soon as rarefaction of air occurs in chamber 5 the valve 26 will open under the influence of the pressure of the outside atmosphere and air will enter this chamber. The carbureting liquid flows from a reservoir situated at a higher level through the valve-box 31 into the chamber 5. The valve 27 in this valve-box is made in the form of a floating valve, as shown in Fig. 4. On the axis 30 levers or arms 29 and 32 are arranged, the first of which is situated in the interior of the chamber 5. This lever carries at its extremity a float 28. Lever 32, which is arranged outside the chamber 5, is articulated on the valve 27 and pivots on the axis 30. Close behind this lever a second lever 90, having a segment-slot 91, is arranged on the same axis, but fixed thereto. The movable lever 32 can be fixed on the segment-piece by means of a clamping-screw 92. The segment is graduated. As soon as the level of the liquid falls in chamber 5 float 28 moves downward and valve 27 opens, so that liquid can enter until the level has again reached its normal height. The height of the level can be observed by means of the glass gage 35.

By altering the position of lever 32 on its

axis 30 one can fix the position of float 28, and in this way, and thanks also to the specific gravity of the carbureting liquid, one can regulate exactly the height of level of the liquid at which the valve 27 will be closed or the quantity of air-gas to be produced.

The oil from the reservoir 33 serves to lubricate the bearing 10.

The apparatus acts as follows: Let us suppose that chamber 5 is partly filled with gasolene, benzin, alcohol, or any other very volatile hydrocarbon and for the rest with air. When by means of the belt or cord pulley the axis or spindle is made to revolve in the direction indicated by the arrow, the tube will alternately take up carbureting liquid and air. The liquid partly evaporates in passing through the tubular passages, such evaporation being facilitated by the rough surface of the wood disks, and it can even be considerably aided by the application of brushes in the passages or, as already mentioned, by heating the liquid. The carbureted air or vapor mixture will pass through the hollow axis into the chamber 6. The remaining carbureting liquid passes through the brushes 12 and 15 for the purpose of being freed from fatty matter and accumulates in the chamber 6, from which it will be obliged to pass back gradually under the pressure of the air-gas through aperture 22 into chamber 5 in order to pass once more through the tubes. In this way highly-carbureted-air gas of uniform composition will be obtained, which is not only suitable for lighting and heating purposes, but may also be employed for working gas-engines.

What we claim is—

1. In a carbureter, the combination of a hollow rotary perforated axis open at one end, a chamber having end walls formed with bearings in which the said hollow axis is supported, means for rotating the axis, a series of wooden disks mounted on said axis, a series of sheet-metal bands coiled spirally around the hollow axis and alternating with the wooden disks and forming spiral channels which communicate at their outer ends with the inclosing chamber and at their inner ends with the interior of the hollow axis through the perforations therein, and means for admitting air and carbureting liquid to the chamber, substantially as described, and for the purpose specified.

2. In a carbureter, the combination of a hollow rotary axis open at one end, a chamber having end walls formed with bearings in which the said hollow axis is supported, means for admitting air and carbureting liquid to the said chamber, means for rotating the axis, and a series of soft wooden disks alternating with a series of sheet-metal spirally-coiled bands mounted on the hollow axis and bound together so that the edges of the metal bands press tightly against the faces of the wooden disks, the whole forming a series of spiral channels communicating at their inner ends with the interior of the hollow axis through the perforations therein, and at their outer ends with the inclosing chamber, substantially as described.

3. In a carbureter, the combination of a hollow rotary axis open at one end, a chamber having end walls formed with bearings in which the said hollow axis is supported, means for admitting air and carbureting liquid to the said chamber, means for rotating the axis, and a series of soft and rough wooden disks alternating with a series of sheet-metal spirally-coiled bands mounted on the hollow axis and bound together so that the edges of the metal bands are pressed into the faces of the wooden disks, the spiral bands being so arranged that each one is turned through an angle of ninety degrees with reference to the next adjacent one in the series, the whole forming a series of spiral channels communicating at their inner ends with the interior of the hollow axis through the perforations therein, and at their outer ends with the inclosing chamber, whereby in the rotation of the system each spiral channel takes in carbureting liquid and air alternately, and promotes in the highest degree the carbureting of the air, and then delivers the air and unvaporized liquid to the hollow axis, substantially as described.

4. In a carbureter, the combination of a hollow rotary axis open at one end, a chamber having end walls formed with bearings in which said hollow axis is supported, means for admitting air and carbureting liquid to the said chamber, means for rotating the axis, a series of wooden disks alternating with a series of sheet-metal spirally-coiled bands mounted on the hollow axis and bound together, thus forming spiral channels which communicate at their outer ends with the inclosing chamber, and at their inner ends with the interior of the axis through the perforations therein, and floats attached to said axis for supporting the same and the parts connected thereto, substantially as described.

5. In a carbureter, the combination of a hollow rotary axis open at one end, a chamber having end walls formed with bearings in which the said hollow axis is supported, means for admitting air and carbureting liquid to the said chamber, means for rotating the axis, a series of wooden disks alternating with a series of sheet-metal spirally-coiled bands mounted on the hollow axis and bound together, thus forming spiral channels which communicate at their outer ends with the interior of the axis through the perforations therein, and a gas-collecting chamber with which the open end of the hollow axis communicates, substantially as described.

6. In a carbureter, the combination of a hollow rotary axis open at one end, a chamber having end walls formed with bearings in which the said hollow axis is supported, means for admitting air and carbureting liquid to

the said chamber, means for rotating the axis, a series of wooden disks alternating with a series of sheet-metal spirally-coiled bands mounted on the hollow axis and bound together, thus forming spiral channels which communicate at their outer ends with the inclosing chamber, and at their inner ends with the interior of the axis through the perforations therein, a gas-collecting chamber with which the open end of the hollow axis communicates, and means for returning the unvaporized liquid to the first-named chamber, substantially as described.

7. In a carbureter, the combination of a hollow rotary axis open at one end, a chamber having end walls formed with bearings in which the said hollow axis is supported, means for admitting air and carbureting liquid to the said chamber, means for rotating the axis, a series of wooden disks alternating with a series of sheet-metal spirally-coiled bands mounted on the hollow axis and bound together, thus forming spiral channels which communicate at their outer ends with the inclosing chamber, and at their inner ends with the interior of the axis through the perforations therein, floats attached to the said axis for supporting the same and the parts connected thereto, a gas-collecting chamber with which the open end of the hollow axis communicates, means for freeing the unvaporized liquid from fatty matter as it issues from the hollow axis and collects in the gas-collecting chamber, and means for returning the said liquid to the first-named chamber, substantially as described.

8. In a carbureter, the combination of a hollow rotary axis open at one end, a chamber having end walls formed with bearings in which the said hollow axis is supported, means for admitting air and carbureting liquid to the said chamber, means for rotating the axis, a series of wooden disks alternating with a series of sheet-metal spirally-coiled bands mounted on the hollow axis and bound together, thus forming spiral channels which communicate at their outer ends with the inclosing chamber, and at their inner ends with the interior of the axis through the perforations therein, a gas-collecting chamber with which the open end of the hollow axis communicates, a spiral brush in the hollow axis to free the issuing unvolatilized liquid from fatty matter, a receptacle into which the liquid issuing from the hollow axis falls, a brush on the edge of said receptacle through which the liquid overflowing from the receptacle passes, and means for returning the liquid to the first-named chamber, substantially as described.

9. In a carbureter, the combination of a chamber, a hollow axis rotating in bearings therein, means for rotating the axis, a series of spiral channels mounted on and communicating with the interior of the axis and also with the inclosing chamber, buoyancy-floats connected to said series of spiral channels, to assist in supporting their weight, and means for admitting hot air, steam or gases to one of said floats for the purpose of raising the temperature of the apparatus and carbureting liquid, in cold weather, substantially as described.

10. In a carbureter, the combination with the chamber 5 and the gas-collecting chamber 6 of an opening in the separating-partition 4, an adjustable spring-supported slide covering said opening, and a smaller eccentric opening 22 in the slide whereby on turning the slide the height of the opening 22 can be adjusted to establish any desired equilibrium between the levels of the liquid in the two chambers 5 and 6, substantially as described.

11. In a carbureter, the combination with the chamber 5 and the gas-collecting chamber 6 of an opening in the separating-partition 4, an adjustable spring-supported slide covering said opening, and a smaller eccentric opening 22 in the slide, means for turning the slide from outside the chamber 6, and means for indicating the position of the opening 22, substantially as described.

12. In a carbureter, the combination with the containing-chamber of a float-valve for automatically controlling the admission of carbureting liquid to the said chamber, said float-valve comprising a float 28 carried by an arm 29 pivoted on an axle 30 which extends outside the chamber, an external arm 32 loose on the axle, a segment-arm 38 fixed on the axle, means for connecting the arms 32 and 38 together in different positions, and a connection from the arm 32 to the valve for admitting the carbureting liquid, so that when the float descends, the admission-valve will be opened, and when the float rises the valve will be closed, substantially as described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

OTTO VERHAGEN.
GERARDUS LEONARDUS VAN GINK.

Witnesses:
THOMAS HERMANN VERHAVE,
AUGUST SIEGFRIED DOCER.