(No Model.)

C. B. LEE.

APPARATUS FOR PRODUCING AMMONIACAL GAS.

No. 322,458. Patented July 21, 1885.

Fig. 2.

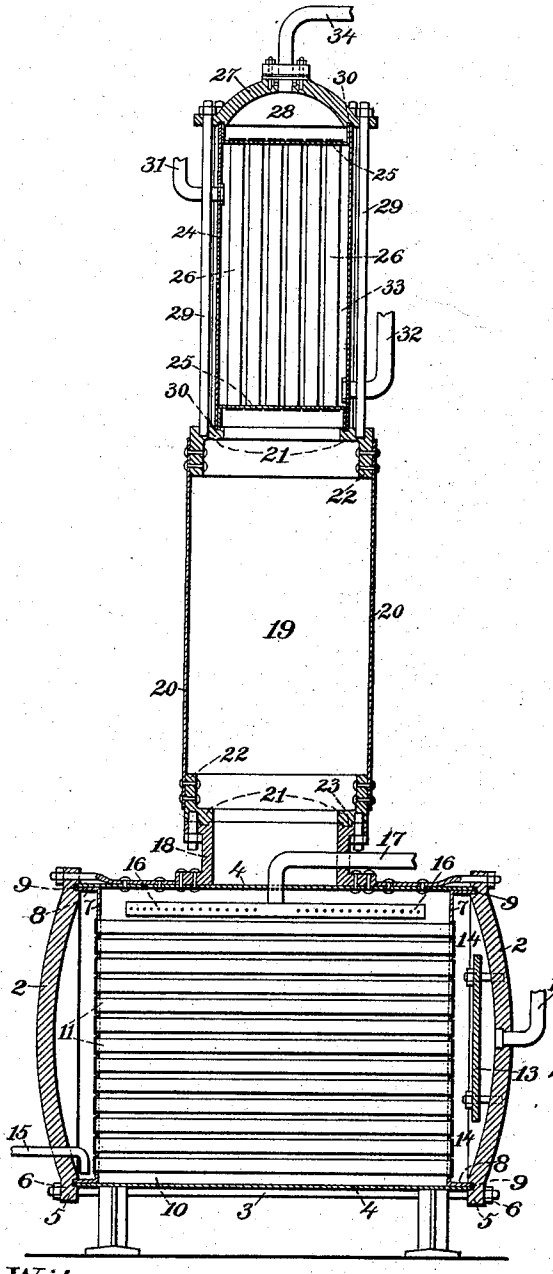
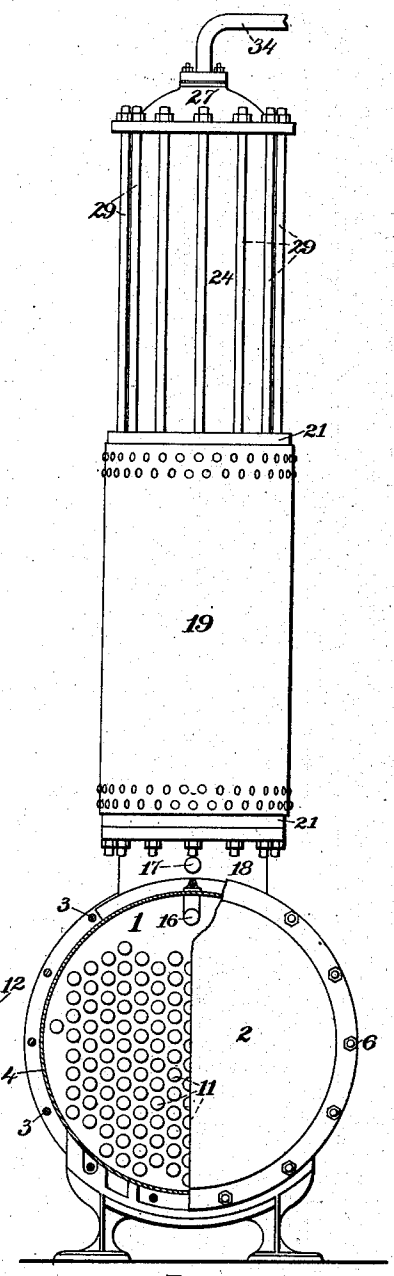


Fig. 1.



Witnesses.

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CHARLES B. LEE, OF GALVESTON, TEXAS.

APPARATUS FOR PRODUCING AMMONIACAL GAS.

SPECIFICATION forming part of Letters Patent No. 322,458, dated July 21, 1885.

Application filed April 24, 1885. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. LEE, of Galveston, in the county of Galveston and State of Texas, have invented a new and useful Improvement in Apparatus for Producing Ammoniacal Gas; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to generators for generating ammoniacal gas to be used for refrigerating purposes and for the manufacture of ice; and it consists in an improved construction, whereby the gas is relieved of its moisture before entering the condenser, a better apparatus is obtained, and repairs are facilitated and cheapened.

To enable others skilled in the art to make and use my invention, I will now describe it by reference to the accompanying drawings, in which—

Figure 1 is an elevation, and Fig. 2 is a vertical section, of my improved apparatus.

Like figures of reference indicate like parts in each.

I make a generator, 1, preferably of cylindrical form, having heads 2, which are secured thereto by bolts 3, extending lengthwise outside of the shell 4 through the flanges 5 of the heads, and secured in place by nuts 6. In the ends of the generator are tube-sheets 7, which have flanges 8, extending parallel with the shell and riveted thereto, the ends of the flanges and shell being flush and entering grooves 9 in the inner faces of the heads 2, in which grooves is a packing of rubber, lead, or of other material, which is capable of resisting the action of the ammonia and steam and of forming a tight joint against the pressure of the same in the generator. The heads 2 can be drawn with the requisite degree of tightness against the ends of the shell 4 by means of the bolts 3. Extending lengthwise of the inner chamber, 10, of the generator between the sheets 7, with which they have tight joints, are tubes 11. The steam is supplied to the generator by a pipe, 12, entering through one of the heads 2, and inside of the head in front of the end of the steam-pipe is a dispersing-plate, 13, which spreads the steam through the end chamber, 14, so that it shall enter and pass through all of the tubes 11 and maintain an even temperature throughout the generator. The water of condensation escapes through a trapped pipe, 15, also extending through one of the heads 2. In the upper part of the chamber 10 above the tubes 11 is a pipe, 16, provided with fine perforations, which is connected with the pipe 17, by which strong aqua-ammonia is forced under pressure into the chamber 10, which it enters through the perforations in the form of fine jets or spray. Riveted to the upper side of the shell 4 is a tubular casting, 18, supported on which is a gas-receiving drum or cylinder, 19. The cylinder 19 has a strong thin shell, 20, and thick annular ends 21, to which the ends of the shell are riveted, and inwardly-projecting flanges 22. The lower annulus, 21, is bolted to the upper flange of the casting 18, and between the meeting faces is a tongue-and-socket joint, 23, which may be properly packed, if desired, to insure tightness. Supported on the upper end of the cylinder 19 is a drier, 24, consisting of a shell provided with tube-sheets 25 and tubes 26, similar to those of the generator 1, and a dome-shaped head, 27, forming a chamber, 28, above the upper tube-sheet, 25. The head 27 is secured on the shell by means of bolts 29, extending between it and the upper annulus, 21, of the cylinder 19. The edges of the shell 20 and its flanged tube-sheets 25 enter grooves 30, both in the upper annulus, 21, and the head 27 similar to and packed in the same manner as the grooves 9 of the generator 1. The drier 24 is provided with adit and exit pipes 31 32, which admit cold water to and permit it to escape from the chamber 33, where it circulates around the tubes 26, which extend longitudinally through the chamber 33 between the tube-sheets 25. Opening out of the chamber 28 is a pipe, 34, which conducts the gas therefrom to the liquefying-condenser.

Thus constructed the operation of my improvement is as follows, viz: The ammonia-liquor is admitted to the generator 1 by means of the pipe 17, whence it passes into the perforated pipe 16, from which it enters the chamber 10 in the form of fine jets or spray. Being vaporized in the generator, it rises through the tubular casting 18 and receiving-drum 19, and thence it passes through the tubes 26 of the drier 24 into the chamber 28, whence it passes by the pipe 34 to the liquefying-condenser, which is not shown. In its passage

through the drier 24 the gas is dried or relieved of its moisture, which falls back into the producer. The temperature of the drier is regulated so that while it condenses the steam associated with the gas it does not condense the gas itself, which passes on through the pipes 26, chamber 28, and pipe 34 to the condenser.

Thus I am enabled to produce a drier gas and avoid the disadvantage of the water accumulating in the condenser and other parts of the apparatus. The construction by which the ends of the shells of the generator and the drier, together with the edges of the tube-sheets, are drawn or bedded in grooves or heads of those parts enables me not only to produce a perfectly-tight joint, and one which may be kept tight by screwing up the nuts of the securing-bolts from time to time, as may be necessary, but also enables me to remove the heads with ease and quickness for the purpose of making repairs without breaking the joints of the parts containing the ammonia. The whole apparatus is in compact and movable form, the receiving-chamber being supported on the generator and the drier on the receiving-chamber, and all tightly bolted together. The use of the perforated induction-pipe in connection with the generator enables me to introduce the ammonia-liquor in a finely-divided state directly upon the generating-pipes, whereby the gas is generated much more rapidly and thoroughly than when supplied either in a solid stream or allowed to drip onto the pipe from an interposed percolating medium.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the generator with a perforated ammonia induction-pipe arranged therein, substantially as and for the purposes described.

2. The combination, in an ice-machine, of the shell of a vessel containing tubes, with the flanged tube-sheets inserted in the ends, having their flanges terminating flush with the ends of the shell, and grooved heads for receiving the ends of the shell and the flanges, substantially as and for the purposes described.

3. The combination, in an ice-machine, of a tubular shell having flanged heads secured to the ends of the shell by means of longitudinal bolts and nuts, substantially as and for the purposes described.

4. The combination of a generator, 1, provided with tube sheets and tubes, with a steam-pipe, and a steam-dispersing plate arranged in the end of the generator in front of the steam-pipe, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 13th day of April, A. D. 1885.

CHARLES B. LEE.

Witnesses:
AUGUST J. HEUCK,
A. S. JOHNSON.