B. WALTER.

AMMONIA CONDENSER.

APPLICATION FILED NOV. 10, 1908.

948,835. Patented Feb. 8, 1910.

Fig. 1.

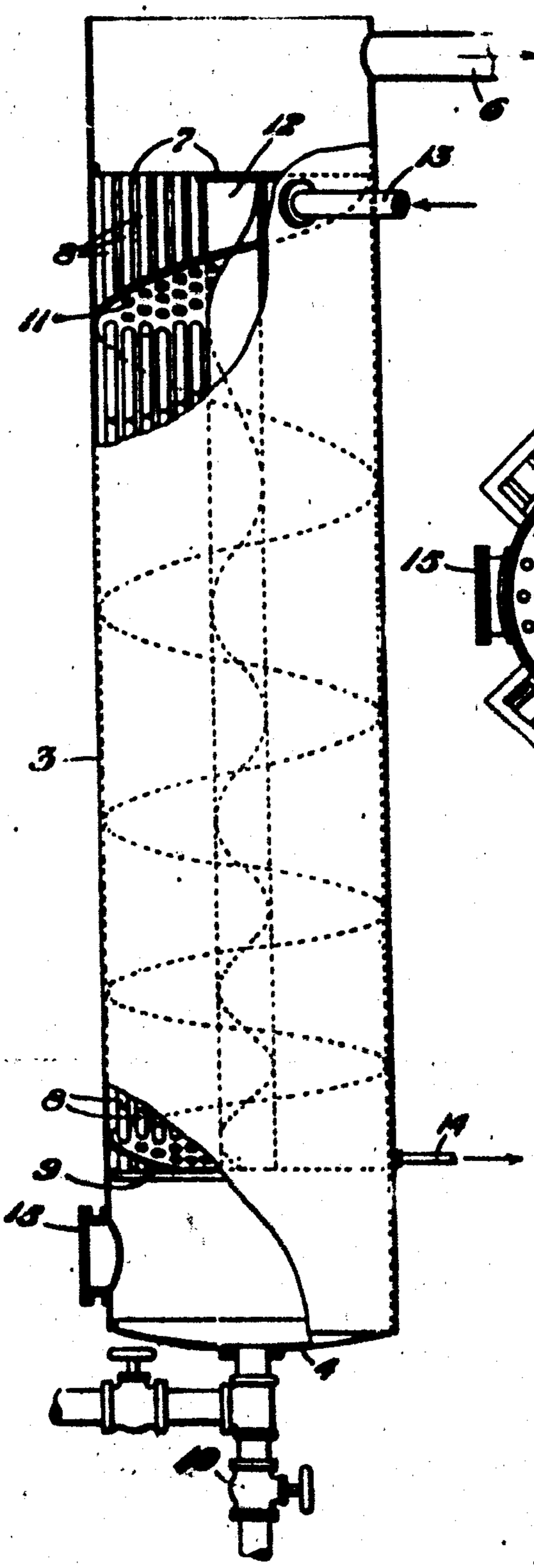
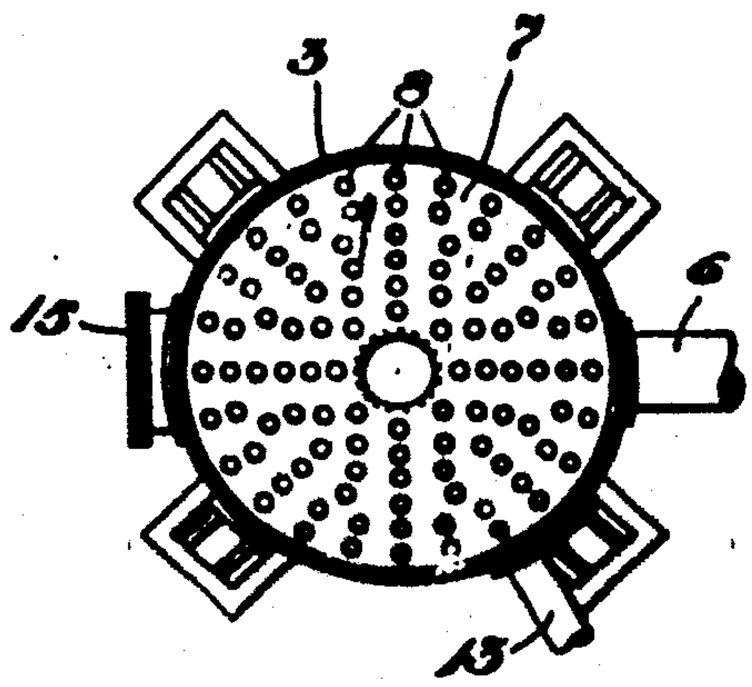


Fig. 2.



Witness:
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UNITED STATES PATENT OFFICE.

BRUCE WALTER, OF PITTSBURG, PENNSYLVANIA.

AMMONIA-CONDENSER.

948,835. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed November 10, 1909. Serial No. 527,850.

To all whom it may concern:

Be it known that I, BRUCE WALTER, a citizen of the United States, residing at Pittsburg, in the State of Pennsylvania, have invented certain new and useful Improvements in Ammonia-Condensers, of which the following is a specification.

My invention is particularly designed to provide a condenser such as used in ice-making plants, which shall be economical in the use of the cooling water and thoroughly efficient in reducing the ammonia gas to a liquid state.

Another object is to provide for readily cleaning the water pipes and generally to cheapen and simplify the construction and increase the efficiency of such condensers.

I have illustrated the invention in one form in the accompanying drawing, wherein—

Figure 1 is a side elevation with some parts broken away, showing a section of the complete condenser; and Fig. 2 is a plan view of the same.

For efficient operation of such condensers it is necessary to provide for intimate contact with the surfaces of the cooling element, and meanwhile to immediately and continuously remove the liquid condensed ammonia from the cooling surfaces. I have also found the efficiency much increased by obtaining a comparatively uniform speed of the flow of the gas. It is also highly desirable to arrange the cooling pipes for easy cleaning, and to provide for downward flow of the gas, while the water flows upwardly, so that the coldest water is in contact with the coolest gas. Thus in the accompanying drawing I have shown a cylindrical shell 3 which is open at the top and closed at the bottom by head 4 and has an inlet 5 for the water, and an outlet 6 for removal of the water by overflow. Near the top of the shell 3 I provide a drumhead 7 which is perforated to receive a series of water pipes 8 fixed therein, and at the bottom a similar perforated head 9; the two heads 7 and 9, with the pipes 8 make a closed space between the heads. By this means it will be seen that it is easy to insert a tool from the top of the shell into these water pipes and clean them out without stopping the operation, though when desired the detritus collected in the bottom of the shell may be removed by way of the valved pipe 10, or the manhole 15.

Between the heads 7 and 9, I provide a metal helicoid 11 which closely fits the shell 3 and a central supporting tube 12, so as to form a continuous closed passage from the gas inlet 13 to the condensed ammonia outlet 14 at the bottom. The helicoid 11 is made with a decreasing pitch from the top downward, so that the passage for the ammonia gas is gradually decreased in volume as the gas decreases in volume, and the surface upon which any condensed ammonia runs downward is gradually lessened in inclination; so that the ammonia gas and liquid, travel at uniform speed toward the cooler portion of the condenser. Meantime by reason of the construction, the gas is forced into intimate contact with a great number of cooling surfaces 8, while any portion which becomes liquefied is immediately carried down on the surface 11 out of the way of the gas.

It will be apparent to those familiar with the art that by this construction I obtain great efficiency by reason of avoiding fluctuations in the progressive cooling of the gas as it travels downward, guided by the graduated helicoid 11, and at the same time increase the efficiency of the cooling pipes by causing the gas to pass several times through all of them, while providing for removal of any condensed parts immediately and preventing the liquid standing still so that it might be again gasified and taken up. It will also be plain that I have a great advantage in allowing ready access to the water pipes for cleaning them out at any time, and without even stopping the flow of water.

In order to take advantage of the fact that the rate of heat transfer in such devices is greater at higher velocities of the gas, I may decrease the inclination of the helicoid still more rapidly so that the velocity of the gas will increase toward the bottom of the condenser. However, in any case it ought not to decrease.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is the following:

1. A condenser comprising a cylindrical shell with two perforated heads and an open space above the upper head, water pipes connecting the heads, and means providing a continuous gas passage between the pipes having a continuous inclined bottom for carrying off the liquid as it is condensed.

2. A condenser comprising a cylindrical shell with two perforated heads and an open space above the upper head, water pipes connecting the heads, and a passage between the pipes having an inclined bottom for carrying off the liquid as it is condensed.

3. A condenser having a series of cooling pipes and means providing a passage between the pipes of progressively decreasing section, whereby a gas of continuously decreasing volume may flow therethrough at a uniform velocity.

4. A condenser having a series of cooling pipes and means providing a passage between the pipes of progressively decreasing section, the bottom of said passage being inclined, to allow the condensed liquid to flow off continuously.

5. In an ammonia condenser, the combination with a series of cooling pipes, of a helicoidal guiding plate perforated by the pipes and arranged to gradually decrease the capacity of the gas passage between the cooling pipes.

6. A condenser comprising a shell with two perforated heads connected by a series of pipes fixed in the perforations of the heads, a continuous plate in the shell, perforated by said pipes and forming a gas channel therethrough, the shell being open at the top for ready cleaning of the pipes, substantially as described.

7. In a condenser comprising a shell and water pipes therein, a helicoid plate fitting the shell and water pipes and forming a closed channel for the passage of gas, said helicoid being variable in pitch proportionately to the contraction of volume of the gas as it condenses in passing therethrough.

8. The combination of a casing, a helicoidal partition in the casing forming a continuous gas passage, and a series of open-ended water pipes passing through the several turns of the partition.

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

BRUCE WALTER.

Witnesses:
F. W. H. Clay,
Chas. S. Lyford.