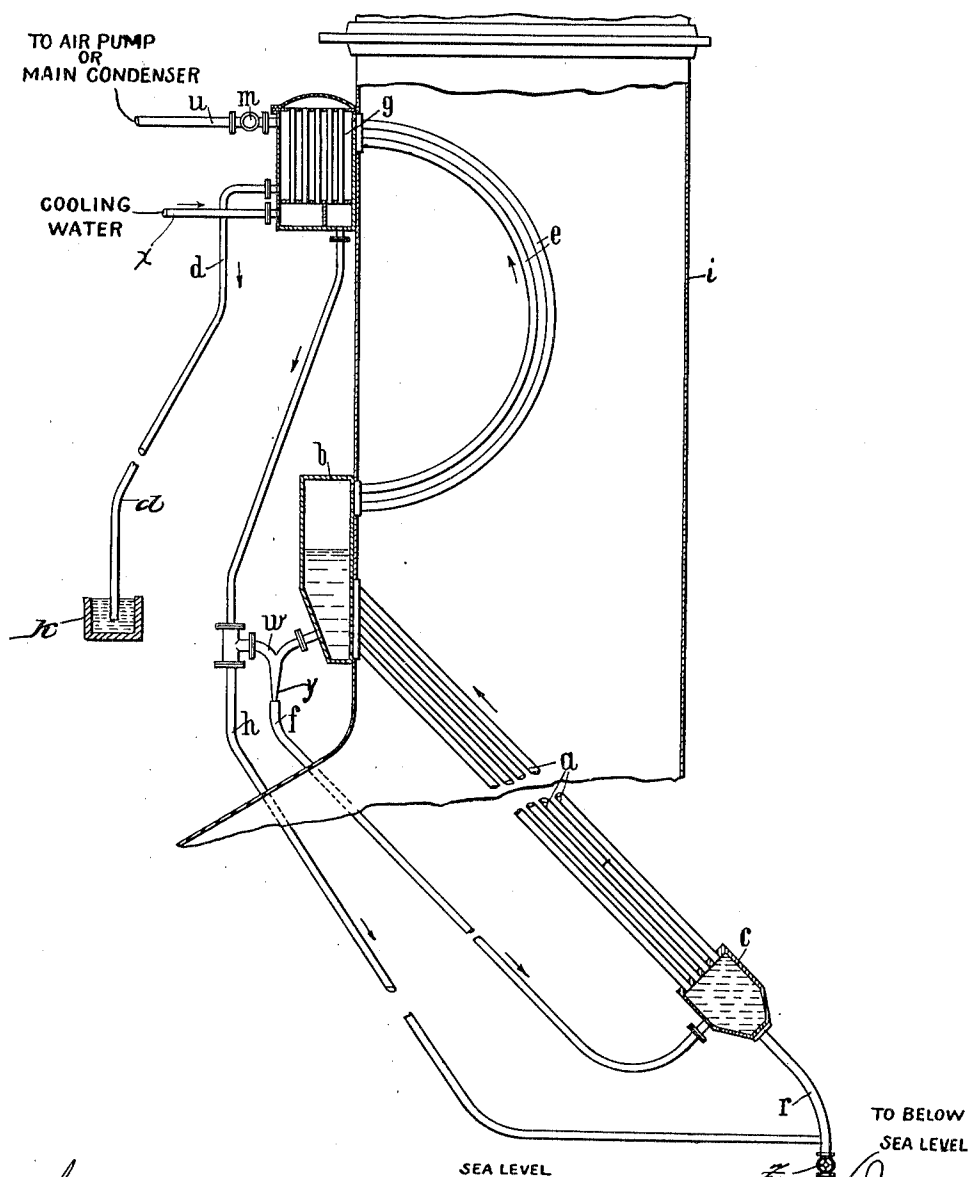


B. BLEICKEN.
 APPARATUS FOR PRODUCING DISTILLED WATER.
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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PRODUCING DISTILLED WATER.

1,102,131

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, BERTHOLD BLEICKEN, a citizen of the German Empire, and residing at Gross-Borstel, near Hamburg, Germany, have invented certain new and useful Improvements in Apparatus for Producing Distilled Water, of which the following is a specification.

My invention relates to apparatus for producing distilled water, in which the evaporation is effected in a partial vacuum.

A primary object of my invention is to provide an evaporator for ships in which the water level shall depend solely on the vacuum in the evaporator and on the height of the latter above the free water-level, and shall be independent of the quantity of water fed to the evaporator, while at the same time an undue increase in the salinity of the water in the evaporator is prevented. It is thus possible to feed more water to the evaporator than is evaporated without any variation in the water-level in the evaporator, the surplus water being returned by a pipe terminating below the free water-level. Owing to the constant excessive feed of water, the percentage of salt in the water cannot increase to any appreciable extent, so that it is unnecessary to periodically blow the excessively salt water out of the evaporator as was hitherto unavoidable in vacuum evaporators such as are used on ship-board. In addition, as an excessive feed of water has no effect on the water-level in the evaporator, the preheated cooling water of the condenser can be discharged at a high velocity into a descending pipe connecting the upper header of the evaporator with the lower one, whereby the circulation in the descending pipe and in the evaporator is considerably accelerated and the efficiency of the apparatus increased as a result. To these ends I provide the evaporator with a brine discharge conduit which terminates below a free water-level.

The invention consists in the construction, arrangement and combination of parts described hereinafter and pointed out in the claims.

One illustrative embodiment of the invention adapted to produce distilled water on a sea-going steamer is represented by way of example in the accompanying drawing, wherein:—the figure is an elevation of the whole apparatus.

The evaporator comprises a stack of tubes

a , an upper header b and a lower header c . The tubes a are disposed within the smoke stack i , so that the flue gases impinge on the outsides of the tubes containing the seawater to be distilled. The evaporator is in communication with a pipe r which terminates at its lower end underneath the level of the sea outside the ship. A descending pipe f connects the upper header b with the lower header c . The height of the header b above sea level varies with the loading of the ship, but the level of the water in the header is maintained at a convenient height by regulating the degree of vacuum.

For the purpose of evaporating any water entrained by the steam, additional tubes e are provided for drying the steam, which tubes pass from the upper header b through the stack i to a condenser g , mounted on the latter. By drying the steam, I insure the absence of salt in the distillate. The cooling water for the condenser may be fed to the condenser by any type of pump and is led to the condenser by pipe x . The condenser is provided with the cooling-water discharge pipe h , which is connected to the pipe r and is adapted to discharge the cooling water into the latter.

The pipe h is provided with the branch pipe w which opens in the form of a nozzle y into the pipe f , so that the discharged cooling water is able to enter the pipe f in the form of a powerful jet. The condensation chamber of the condenser is provided with the outflow pipe d . The latter leads to the water seal k which is connected by a pipe (not shown) with a suitable fresh water tank (also not shown). The condenser is connected by the pipe u with an air-pump (not shown) or with an existing main condenser which is also not shown.

The action of the apparatus is as follows:—The evaporator is filled by opening the valve z , whereupon the water rises with a pressure corresponding to the draft of the ship, up to the water-line of the latter. On opening the valve m the main condenser of the air-pump is connected with the condenser g and with the evaporator, the result being that the water to be evaporated rises according to the vacuum in the evaporator. The upper header of the evaporator is arranged so that a sufficiently large evaporating surface is obtained.

Owing to the water in the bank of tubes a being heated it rises in the same and flows

back through the pipe *f* outside the stack *i* into the lower header, an energetic circulation of the water being obtained. One part of the cooling water of the condenser flows 5 through the pipe *h* into the conduit *r*, and another part through the branch pipe *w* in the form of a powerful jet into the pipe *f*, whereby it exerts a suction action on the water flowing out of the header *b* and there- 10 by correspondingly accelerates the circulation.

Owing to its being possible to feed a surplus of condenser cooling-water to the evaporator the enrichment of the brine due to 15 evaporation can be kept within certain limits. As the quantity of cooling water exceeds that of the distilled by 15 to 20 times, there is sufficient water at disposal for feeding the evaporator to keep the percentage 20 of salt in the water to be evaporated equal to the small percentage of salt in the seawater, without the slightest variation in the water-level of the upper header. Since the water-level in the upper header is 25 dependent only on the vacuum in the latter and on the height of the upper header above the level of the sea, all surplus water fed to the evaporator must flow back through the pipe *r* into the sea. In this manner a 30 reliable, continuous and automatic feed of the evaporator is insured without any regulating devices which are liable to interrupt the water feed, as well as energetic blowing off the evaporator without increased consumption of steam and without cooling the 35 evaporator by pressing all the cooling water

therethrough. The distillate formed in the condenser flows away through the pipe *d*, and the water-seal *k*, into the fresh water tanks. 40

I claim:—

1. In apparatus for distilling water, the combination with an evaporator, of a descending pipe connecting the upper portion of said evaporator with the lower portion 45 thereof, a second pipe connected to the lower portion of the evaporator and terminating below the level of the store of water to be distilled, a condenser connected to the upper portion of the evaporator, and a condenser 50 cooling water pipe opening into the upper part of said descending pipe and also delivering below the level of the flow of water to be distilled.

2. In apparatus for distilling sea-water, 55 the combination of an evaporator comprising an upper header and a lower header, and connecting pipes between said headers a condensing chamber connected to the upper header, a descending pipe connecting the 60 upper header with the lower header, a second pipe connected to the lower header and terminating below the level of the sea, and a condenser cooling-water pipe opening into the upper part of said descending pipe and 65 into the second pipe.

In testimony whereof, I affix my signature in the presence of two witnesses.

BERTHOLD BLEICKEN.

Witnesses:

CARL SCHAPER,
EMIL HAGER.