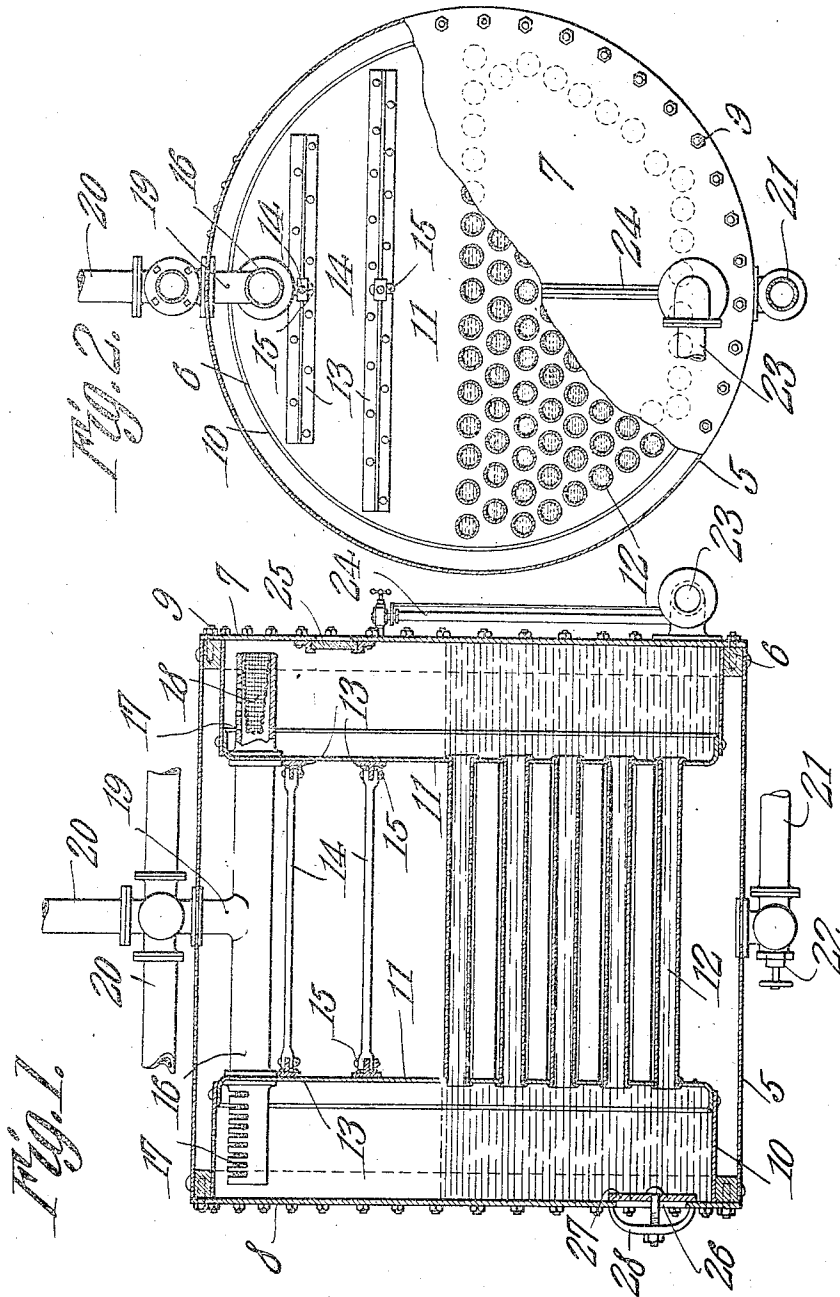


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WATER DISTILLING APPARATUS.
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Patented Oct. 5, 1909.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM H. SHEPHEARD, OF PORTSMOUTH, VIRGINIA.

WATER-DISTILLING APPARATUS.

935,932.

Specification of Letters Patent.

Patented Oct. 5, 1909.

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To all whom it may concern:

Be it known that I, WILLIAM H. SHEPHEARD, a citizen of the United States, residing at Portsmouth, in the county of Norfolk and State of Virginia, have invented a new and useful Water-Distilling Apparatus, of which the following is a specification.

It is the object of the present invention to provide an improved construction of evaporator for use, chiefly, on board ship in purifying sea water, it being necessary, as well known, to separate the salt and other impurities from the water prior to its introduction into the boilers, and the invention aims not only to economize in space but also to provide an evaporator of this class of such construction as to permit of ready removal of the cakes of salt therefrom.

The principle involved in the invention is that of evaporating the water so as to leave the salt and other impurities and then to pass or convey the water to a condenser after which it is introduced into the boilers.

With the above and other objects in view, the invention consists in the construction and arrangement of parts shown in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view through the evaporator, and Fig. 2 is a view partly in side elevation and partly in section.

In the drawings, the evaporator is shown as comprised in part of a drum 5 which is preferably cylindrical and has secured therein, at each end, a packing and spacing ring 6. The drum is further provided, at each end, with a head, the head at one end of the drum being indicated by the numeral 7 and that at the other end of the drum by the numeral 8, both heads being secured in position by means of suitable bolts or other securing devices 9 which are engaged through the heads at the edges thereof and into the said packing and spacing ring 6. A narrow drum 10 is arranged within the drum 5 at each end thereof and these drums 10 are secured each at one end to the respective spacing rings 6 and project therefrom, and form the corresponding head 7 or 8, inwardly and carry at their inner ends heads 11, the said drums 10 together with the respective heads 7 or 8 and their heads 11, constituting water

chambers into which the sea water to be evaporated is introduced.

The two water chambers above described are connected by a plurality of water flues 12 opening at their ends through the heads 11 of the said chambers and establishing communication between the same and the bank of water flues extends throughout an area equal to about one-half the area of the heads 11 and, as is clearly shown in Fig. 2 of the drawings, this area extends throughout substantially the lower half of each head. T-shaped bracing or strengthening bars 13 are secured upon the opposing faces of the heads 11 of the two water chambers in parallel relation with respect to each other and above the bank of flues 12 and connecting these brace bars are tie rods 14 each bifurcated at each end to fit the outstanding flange of corresponding ones of the T-shaped brace bars and having passed through their furcations and through the said outstanding flanges of the bars, securing bolts or other fastening devices 15 it being understood that by this construction the heads 11 of the water chambers are firmly relatively braced and at the weakened point in view of the fact that the bank of flues 12 does not extend throughout the upper half of the area of the heads.

Communication is further established between the water chambers, above the water line, by means of a pipe 16 which extends at both ends into the respective water chambers, at a point near the upper end thereof and above the water line, and the portions of this pipe 16 which lie within the chambers are formed each with a plurality of slots 17 and are fitted each with a conical strainer 18 which is preferably of wire mesh material, as stated, is conical in form, and is so arranged within the respective end of the pipe as to have its major end fitting snugly within the pipe and its minor end terminating at a point directly inwardly of the innermost one of the several slots 17 in the respective ends of the pipes. In other words, these strainers 18 are fitted at their major ends into the end of the pipe and project inwardly axially of the pipe to a distance slightly greater than the distance between the innermost one of the several slots

and the adjacent ends of the pipe. Leading or branching from the pipe 16 at a point intermediate of its ends and extending through the upper side of the drum 5, is a branch pipe 19 from which lead other branch pipes 20, these latter branch pipes 20 extending to suitable condensers for the purpose of conveying the water vapor from the evaporator to such condensers where it is condensed prior to being fed into the boiler.

Opening into the drum 5 at the lower end or under side thereof is a steam supply pipe 21 having interposed therein a cut-off valve 22 it being understood that steam is supplied by way of this pipe to the said drum 5 and circulates around the flues 12. In a similar manner, a water supply pipe 23 opens into one of the water compartments or chambers through the head 7 thereof and the point of communication of this pipe with the said water chamber is preferably at a point near the lower end of the chamber and it is by way of this pipe 23 that the sea water to be purified and evaporated is fed into the evaporator, there being a water gage 24 arranged upon the said head 7 for the purpose of indicating to the attendant, the water level within the evaporator. There is also provided, in the said head 7, a peep window 25 through which the interior of the water chamber with which this head 7 is associated, may be viewed by the attendant. The head 8 of the other water chamber of the evaporator is provided at its lower end with an opening 26 and closing this opening is a plate 27 and spanner 28.

In using the evaporator heretofore described, sea water is introduced into the water chambers thereof until these chambers are filled to the proper degree at which time the water level will be above the uppermost flues 12 of the bank of flues, the water filling all of the flues. Steam is then introduced into the drum 5 through the pipe 21 and circulates around the flues 12, heating these flues and also the walls of the water chambers. This heating of the flues and the walls of the water chambers will result in vaporization of the sea water as will be readily understood and the water vapor will pass into the pipe 16 through both ends thereof and be conducted by way of the branch 19 and any one or all of the branches 20 to suitable condensers (not shown). It will be understood from the foregoing that in passing into the pipe 16 through the end thereof, the water vapor is freed of solid impurities by the strainers 18 inasmuch as it must pass through these strainers and the slots 17 in order to enter into the pipe 16. It will further be understood that the vapor as it leaves the evaporator, through the pipe 16 and its several branches, is free not only from solid par-

ticles of foreign matter but also is free from salt and other impurities which ordinarily render sea water unfit for use in the boiler. It will therefore be understood that the evaporator embodying the invention as heretofore described is particularly well adapted for use on ocean liners although its use is not limited to this particular relation inasmuch as it may be employed in distilleries or in fact any place where it is necessary to purify water prior to use.

As the water is evaporated, the salt and other impurities contained therein are of course deposited in the water chambers and the flues 12 and may be removed therefrom whenever desired, by first removing the head 7 and then, after having removed the caked deposit of salt from the water chamber with which this head is associated, forcing the salt which has been deposited in the flues 12, through the flues and into the chamber with which the head 8 is associated and then removing the salt from this latter chamber through the openings 26. In this manner, the evaporators may be readily and quickly cleaned and the arrangement of parts which permit of this ready and rapid cleaning is further desirable in that economy of space is so apparent, a maximum heating surface being presented to the action of the steam, in a minimum space. Furthermore, it will be understood that by forming the slots 17 in the ends of the pipes 16, a straining area of maximum extent is presented and that for this reason, the water vapor may readily pass into the pipe 16.

What is claimed is:—

1. In an evaporator, a drum, water chambers within the drum, water flues establishing communication between the chambers, and a vapor conducting flue establishing communication between the said water chambers, a straining device arranged in each end of the vapor conducting flue, a water inlet opening into one chamber, and a steam inlet opening into the drum.

2. In an evaporator, a drum, heads removably secured at each end of the drum, water chambers extending inwardly from the said head, the said water chambers being free of connection with the heads, water flues establishing communication between the chambers, a vapor conducting flue establishing communication between the said water chambers, a water inlet opening into one chamber, and a steam inlet opening into the drum.

3. In an evaporator, a drum, water chambers within the drum, water flues establishing communication between the chambers, a vapor conducting flue opening at each end into one of the water chambers and establishing communication therebetween, each end of said water conducting flue being formed with a plurality of slots extending

in a series inwardly from the extremities of
the said flue throughout that portion thereof
which projects into the said water chambers,
a strainer arranged in each end of said vapor
5 conducting flue, a water inlet opening into
one chamber, and a steam inlet opening into
the drum.

In testimony that I claim the foregoing as
my own, I have hereto affixed my signature
in the presence of two witnesses.

WILLIAM H. SHEPHEARD.

Witnesses:

S. J. BROWN,

W. J. CROSS.