No. 649,750. Patented May 15, 1900.

D. A. QUIGGIN.

PUMP.

(Application filed Aug. 22, 1899.)

(No Model.) 2 Sheets—Sheet 1.

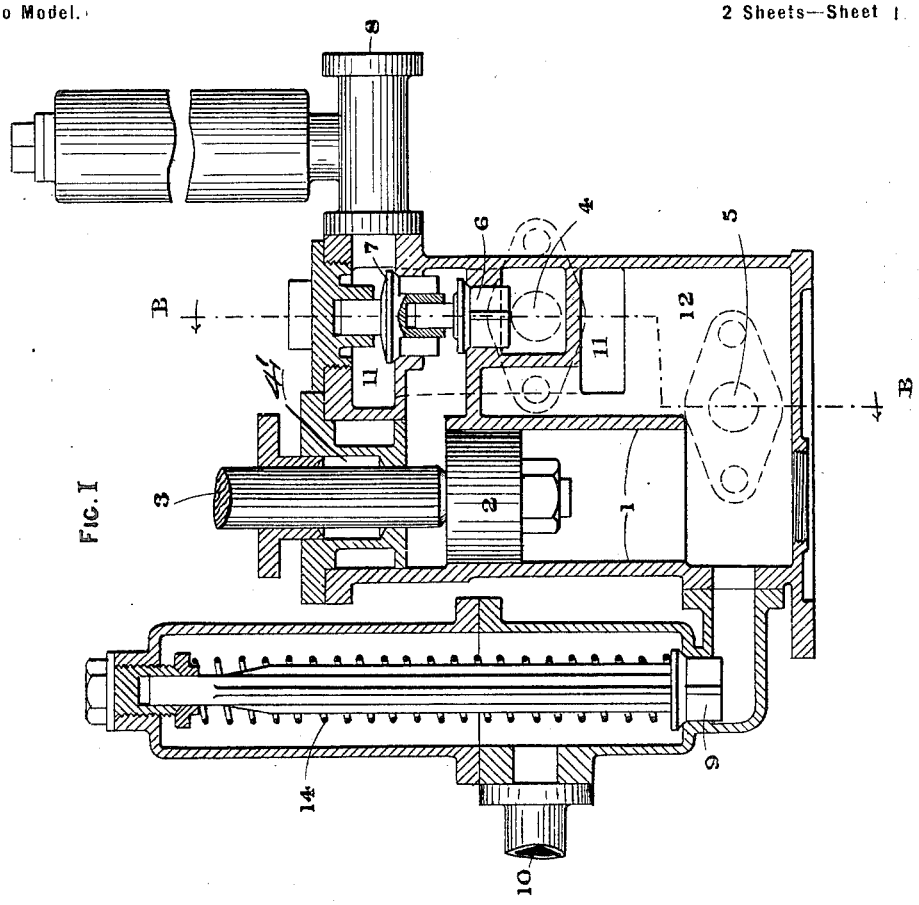

FIG. I

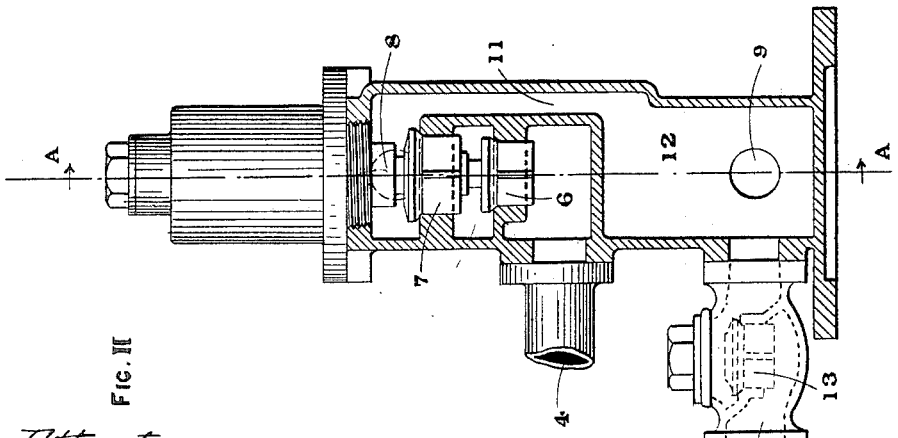

FIG. II

Attest
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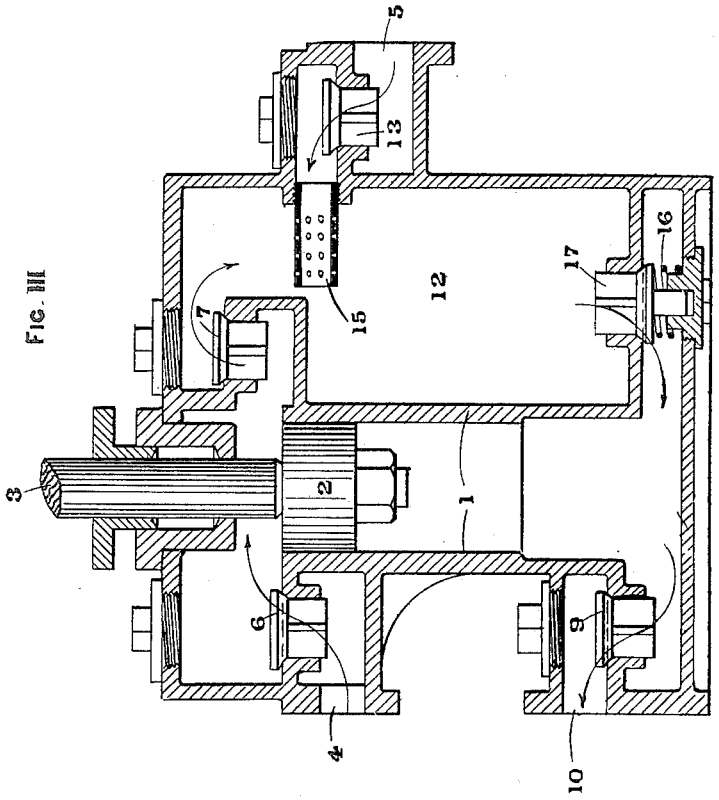
Fig. III



Attest
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UNITED STATES PATENT OFFICE.

DANIEL ARTHUR QUIGGIN, OF BLUNDELLSANDS, ENGLAND.

PUMP.

SPECIFICATION forming part of Letters Patent No. 649,750, dated May 15, 1900.

Application filed August 22, 1899. Serial No. 728,118. (No model.)

To all whom it may concern:

Be it known that I, DANIEL ARTHUR QUIGGIN, a subject of the Queen of Great Britain, residing in Blundellsands, near Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to pumps intended chiefly for use in connection with evaporators for producing fresh water from sea-water. Such evaporators require to be fed with sea-water and also to be brined, so as to prevent undue concentration and the deposition of scale in the evaporator, and it is desirable that the brining should be continuous, and, further, that the brine should be diluted and cooled before being discharged overboard, as hot strong brine is apt to scale up the discharge pipes and valves and to cause objectionable noise and vibration when discharged below water-level.

The object of my invention is to provide a pump of comparatively-simple construction adapted to combine the above functions.

Figures I and II show a form suitable for evaporators worked at a pressure above atmospheric pressure, and Fig. III shows a modification suitable for evaporators working at a pressure below atmospheric pressure. Fig. I is a sectional elevation on the line A A of Fig. II. Fig. II is a sectional elevation on the line B B of Fig. I, and Fig. III is an elevation in medial section.

Throughout the drawings similar parts are indicated by the same reference-figures.

Referring first to Figs. I and II, 1 is the pump-barrel. 2 is the pump-piston, and 3 is the pump-rod, passing through the usual stuffing-box 4'. 4 is the sea-suction or inlet branch. 5 is the brine-inlet branch from the evaporator, fitted with an ordinary non-return valve 13. 6 is the sea-suction valve. 7 and 8 are respectively the feed-delivery valve and branch leading to the evaporator, and 9 and 10 are respectively the discharge-valve and branch for the cooled and diluted brine and lead overboard. The space above the delivery-valve 7 communicates with the space below the piston by the passage 11, which opens below into the capacious pocket 12, thus connecting both sides of the piston when the valve 7 is open. The branches 4 and 5 in Fig. I and the branch 8 in Fig. II, although in front of the plane of section, are indicated conventionally by dotted lines. The valve 9 is loaded by the spring 14 a little in excess of the pressure in the evaporator, and it is to be understood that the feed-pipe enters the evaporator through a check-valve, which is regulated, either automatically or otherwise, so as to maintain a constant water-level therein.

The action is as follows: Assuming the passage 11 and pocket 12 to be full of water, during the downstroke a quantity of sea-water equal to the volume swept out by the upper or annular area of the piston enters the pump through the valve 6. During the following upstroke a quantity of brine equal to the volume swept out by the pump-rod 3 enters by the brine-inlet, no discharge taking place. During the following downstroke the action above the piston is the same as in the previous downstroke; but a quantity of water equal to the whole volume swept out by the piston is now discharged, a portion passing as feed to the evaporator and the remainder being discharged overboard.

As the discharge to the evaporator is at the top end of the pocket and near the incoming sea-water, while the brine enters and leaves near the bottom of the pocket, the feed to the evaporator is practically uncontaminated by the brine, while the latter mixes with and is cooled and diluted by the comparatively-large quantity of sea-water which is not used as feed.

It will be understood that the quantity of brine removed depends upon the volume swept out by the rod 3. The quantity of sea-water with which it is cooled and diluted depends upon the volume swept out by the annulus of the piston, and the quantity of feed delivered to the evaporator (its water-level being maintained constant) is the evaporation plus the brine removed. If the water in the evaporator is to be kept at, say, two thirty-thirds of saltness, then the brine removed should equal the normal evaporation and the feed should be double the evaporation. If the rate of evaporation should diminish, the speed of the pump remaining normal, the effect would be to freshen up the water in the evaporator.

The form shown in Fig. III is intended to meet the difficulty generally experienced in connection with the suction of hot water at a pressure below that of the atmosphere, owing to the formation of vapor. The construction is mainly the same as that already described, the chief differences being in the position and manner in which the brine enters the pocket 12 and the addition of the back-pressure valve 17, and as corresponding parts are figured as before no difficulty will be found in tracing the action. The brine enters by the perforated pipe 15, which is placed right in the thoroughfare of the cold sea-water, so that the brine is cooled immediately it enters the pump, and the formation of vapor in the pocket 12 is prevented. The object of the valve 17 is to continuously maintain as low a pressure as possible in the pocket 12, and its weight is balanced by the light spring 16. There is but a single discharge-passage 10 shown, the sea-water and brine being thoroughly mixed in this form of the apparatus. The discharge through this passage is usually delivered overboard to waste, although, if desired, a portion may be used for feed purposes, as the diluted brine is not much salter than the sea. It will also be noticed that no spring load is now needed for the valve 9, the pressure in the evaporator being below that of the atmosphere.

Although I have for convenience of description specifically referred to the application of my invention to an evaporator, it is to be understood that it is applicable also to other apparatus of the same class.

I claim—

1. A pump comprising a pressure-chamber, a casing, a piston and piston-rod movable in said pressure-chamber, a valved inlet communicating with a chamber at the upper side of the piston above said pressure-chamber, a valved inlet communicating with a chamber at the lower side of the piston said chamber being outside the piston-chamber, the upper and lower chambers being in communication, and a valved discharge-passage.

2. A pump comprising a chamber or casing, a piston and piston-rod, a valved inlet communicating with a chamber at the upper side of the piston, a valved inlet communicating with a chamber at the lower side of the piston, the upper and lower chambers being in communication, and an upper and lower valved discharge-passage, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DANIEL ARTHUR QUIGGIN.

Witnesses:

ROBT. A. SLOAN,

JOSEPH E. HIRST.