

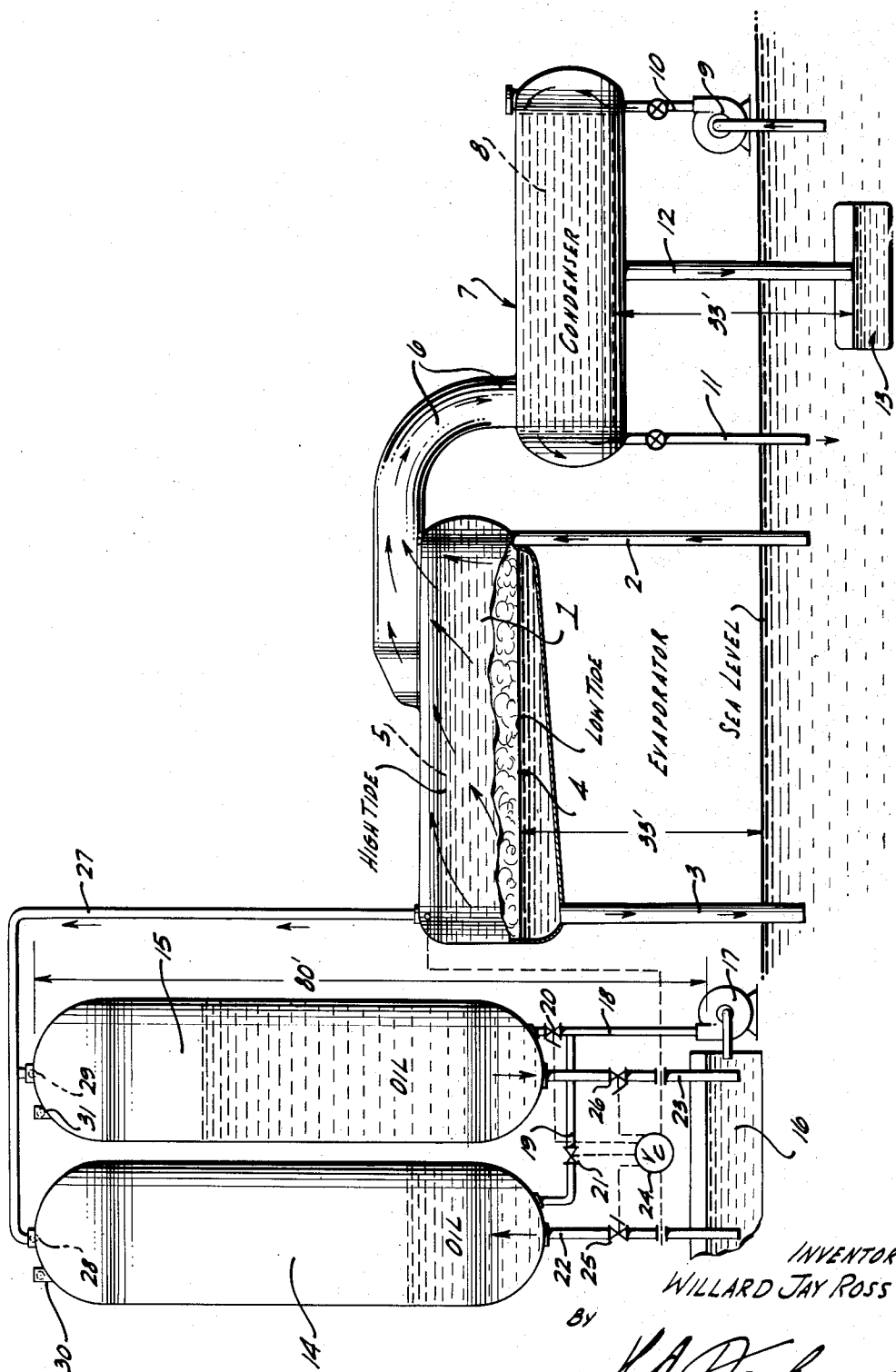
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WATER EVAPORATOR

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WATER EVAPORATOR

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2 Claims. (Cl. 159—1)

This invention relates to a water evaporator which can be used to evaporate sea water for irrigation purposes and the like.

My invention is directed primarily to a simple and economical means of partially evacuating a chamber or evaporator, thereby reducing the boiling temperature of the fluid in the evaporator. More particularly, I provide a simple and economical method of evacuating a chamber by eliminating the usual type of vacuum pumps and other similar devices.

A feature of my invention is the provision of a pair of vacuum cylinders of large volume, these cylinders containing heavy oil or other fluid, the fluid in one cylinder being permitted to flow outwardly while fluid is simultaneously being pumped into the other cylinder.

Another object of my invention is to provide a means whereby a substantial vacuum can be maintained in a chamber by means of the rise and fall of a heavy oil or other liquid in a number of cylinders, each of the cylinders being connected to the evaporator by suitable pipes.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detailed description and the appended claims.

In the drawing:

The figure in the drawing is a schematic side elevation of a water evaporator embodying my invention.

Referring more particularly to the drawing, the numeral 1 indicates a tidal basin, or evaporator, which is a large container including an intake pipe 2, through which water flows into the container and an outlet pipe 3 from which water flows as the tide rises and falls. The pipe 3 becomes the outlet when the tide falls below the entrance point of the pipe 2 in the basin 1. The low tide line is indicated at 4, while the high tide line is indicated at 5. A vapor outlet pipe 6 extends from the top of the evaporator 1, and thence into a condenser 7. The condenser may be provided with a plurality of pipes 8, through which water is circulated. The cooling water is pumped through the pipes 8 by a circulating pump 9, which forces water into the condenser through the pipe 10, and water flows out of the condenser after passing through the tube 8 through the pipe 11. The condensed water flows out of the condenser through the pipe 12, and is collected in a suitable tank 13.

As thus far described, the apparatus is old and well known in the art. However, to provide an economical apparatus, the evaporator 1 should be maintained at a reduced atmospheric pressure, that is, under a partial vacuum. To accomplish this simply and inexpensively I provide the following structure:

A pair of vacuum cylinders 14 and 15 are mounted vertically, and each of these cylinders is of very large diameter and of very substantial height, so that the fluid therein will drop over a considerable distance, as will be further described.

A reservoir 16 contains a quantity of heavy oil, or other heavy liquid, and this liquid is picked up by the pump 17

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and may be forced into either cylinder 14 or 15 through the intake pipes 18 and 19. Quick acting valves 20 and 21 are provided in the pipes 18 and 19 respectively, and by opening one and closing the other of these valves; fluid can be pumped into either of the cylinders 14 or 15, while the other cylinder is being drained of its fluid. Outlet pipes 22 and 23 are provided in the cylinders 14 and 15 respectively, and these outlet pipes extend into the reservoir 16 for the purpose of returning the heavy oil back to the reservoir.

A vacuum control unit 24 is connected to the evaporator 1 and is actuated by the amount of vacuum maintained in the evaporator. The vacuum controlled unit 24 in turn controls the valves 25 and 26 in the pipes 22 and 23 respectively, that is, the valve 25 is open while the valve 26 is closed, and vice versa.

A pipe 27 extends from the top of the cylinders 14 and 15 and extends into the top of the evaporator 1. A check valve 28 and 29 is provided in each of the cylinders 14 and 15 respectively for the purpose of closing the pipe 27 to a cylinder whenever there is pressure in said cylinders, and opening the pipe 27 to a cylinder whenever there is a vacuum being produced in said cylinders.

Relief valves 30 and 31 are provided in the cylinders 14 and 15 respectively to permit escape of air when fluid rises in the cylinder and to close when the fluid falls in the cylinder.

In operation:

Assuming that the valve 25 is open, the oil or other fluid in the cylinder 14 will start to drain into the reservoir 16. As the fluid column falls in the cylinder 14 a partial vacuum will be drawn therein, that is, water vapor will be removed from the top of the evaporator 1, thus drawing a partial vacuum in the evaporator. The check valve 28 is now open and the valve 30 is closed. At the same time the pump 17 will be forcing oil into the bottom of the cylinder 15 through the pipe 18, since the valve 20 is open and the valve 21 is closed.

The rising column of oil in the cylinder 15 will cause the check valve 29 to close and the valve 31 can open to prevent water vapor pressure in the cylinder. After the column of oil has dropped to the bottom of the cylinder 14, and when the vapor pressure in the evaporator 1 rises, the vacuum control 24 will close the valve 25 and open the valve 26, whereupon the column of oil in the cylinder 15 will drop and oil will be pumped into the cylinder 14 by the pump 17 in the same manner as previously described.

Having described my invention, I claim:

1. A distilling machine comprising an inclosed basin, a pair of vertically arranged cylinders, a pipe extending from each of said cylinders into the top of said basin, a check valve in each of the pipes, a relief valve in each of the cylinders, a reservoir, an outlet pipe extending from each of said cylinders into the reservoir, valve means in each of said outlet pipes, a pump, a branch pipe and further valve means in each branch connecting said pump to both of said cylinders to force fluid alternately into said cylinders, a vacuum control unit operable each time the pressure in the basin reaches a predetermined amount, a pressure pipe extending from the vacuum control unit to said basin to transmit the pressure in the basin to said control unit, and means operatively connecting the vacuum control unit to each of said valve means whereby one of the first mentioned valve means controlling flow from one of the cylinders into the reservoir and one of the further valve means controlling flow into the other of the cylinders via the pump are simultaneously opened while the remaining valve means are successively closed, and successively alternating the remaining with the previously recited valve means at a predetermined pressure in said basin.

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2. A distilling machine comprising an inclosed basin, a pair of vertically arranged cylinders, a pipe connected to each of the cylinders and extending into the top of the basin, a check valve in said pipe at its outlet into each of said cylinders, said check valves closing when pressure occurs in the cylinders, a relief valve in each of the cylinders, a reservoir, an outlet pipe extending from the bottom of each of the cylinders into the reservoir, valve means in each of the outlet pipes, a pump, a branched pipe extending from said pump into each of the cylinders, a valve in each branch of said last named pipe respectively adjacent each of the cylinders whereby fluid is directed into one or the other of the cylinders, said valve means being alternately opened to alternately drain fluid from the two cylinders, a vacuum control unit, a pipe extending from the vacuum control unit and into said basin to transmit the pressure in the basin to the control unit, and operating means extending from the

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valve control unit to each of said valve means and valves to alternately open and close said valve means, and valves whereby one of the first mentioned valve means controlling flow from one of the cylinders into the reservoir and one of the valves controlling flow into the other of the cylinders via the pump are simultaneously opened while the remaining valve means and valve are simultaneously closed, and successively alternating the remaining with the previously recited valve means and valve at a predetermined pressure in said basin.

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