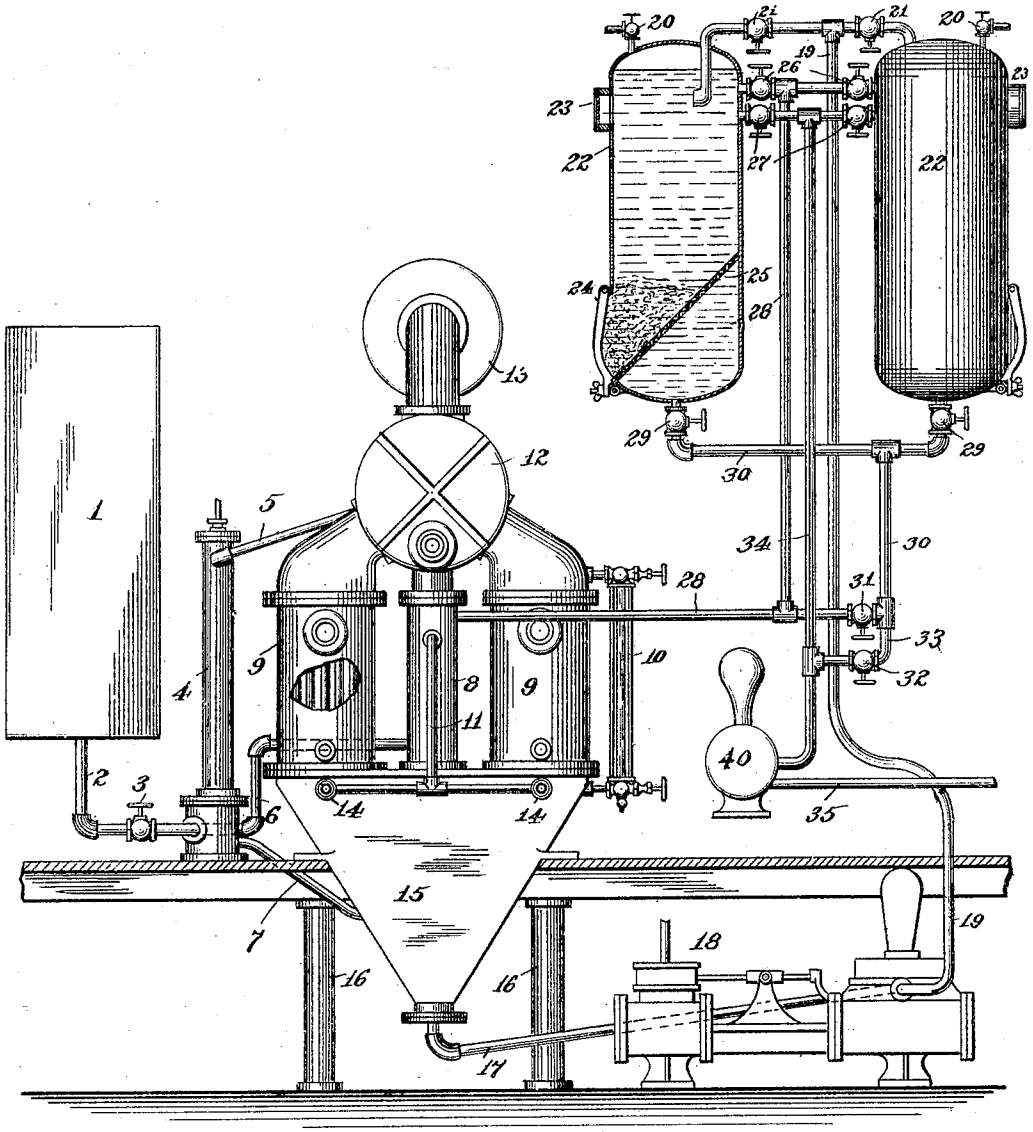
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C. ORDWAY.

VACUUM EVAPORATING APPARATUS.

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VACUUM EVAPORATING APPARATUS.

No. 807,767. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed January 23, 1905. Serial No. 242,296.

To all whom it may concern:

Be it known that I, CHARLES ORDWAY, a citizen of the United States, and a resident of New York city, county and State of New York, have invented certain new and useful Improvements in Vacuum Evaporating Apparatus, of which the following is a specification, taken in connection with the accompanying drawing, which forms a part of the same.

This invention relates to vacuum evaporating apparatus and relates especially to apparatus for evaporating and separating salt and other similar material from solutions, the apparatus being adapted for use as a single or multiple effect.

In the accompanying drawing, illustrating an embodiment of this invention in elevation, parts being shown in section, 1 is a supply-tank containing a thin or unconcentrated liquor, which is supplied to the pipe 2 to the automatic level-gage 4, the valve 3 serving to regulate the supply of thin liquor. This level-gage having the construction and operation referred to in detail in my prior patents is connected with the effect by the pipes 5 and 7 and operates to supply the thin liquor in the desired quantities through the pipe 6 to the jacketed downtake 8. As illustrated, the effect may comprise the uptakes 9, having the usual steam-jacket and heating-tubes and communicating at their lower ends with the liquor-chamber 15, preferably having the pyramidal or downwardly-tapering form illustrated, this liquor-chamber being, as indicated, provided with suitable brackets to support the effect in connection with the pillars 16. The uptakes are also connected with the vapor-chamber 12 and vapor-pipe 13 of usual construction. As indicated, the centrally-located downtake 8 is used to connect the vapor and liquor chambers, this downtake being preferably jacketed, and a circulation of thin liquor taking place through the jacket and entering through the supply-pipe 6, and after being heated by the liquor in the downtake, which is thereby cooled to some extent, this liquor in the jacket passes through the pipe 11 and into the liquor-chamber past the two regulating-valves 14. A suitable gage-glass 10 may be used in connection with the effect, if desired.

A plurality of closed separating-chambers 22 are preferably used in connection with each effect for effecting the continuous separation of the salt or other crystalline material from the concentrated liquor. Each of these chambers, as indicated, is formed of sheet metal and may be provided with an inclined screen 25, the discharge-door 24 being indicated at the lower part of the chamber for removing the material from time to time. An eye-glass 23 allows the observation of the interior condition of the chamber from time to time, and a suitable valve or vacuum break 20 enables the chamber to be brought to atmospheric pressure when desired. These chambers are preferably operated alternately, and concentrated liquor is taken from the liquor-chamber through the circulating-pipe 17 by means of the circulating-pump 18 and forced through the circulating-pipe 19 past the valve 21, for instance, and through the guarded inlet indicated into the separating-chamber. This inlet, which may have the enlarged elbow form indicated, is preferably so shaped and directed into the chamber that the hot liquor entering through the circulating-pipe is gently discharged in a horizontal direction toward the side of the chamber and away from the outlets. The result is that there is a substantially quiescent body of liquor which may nearly fill the chamber, as indicated, and which allows the gradual settling or deposition of the crystallized material contained in the liquor entering the chamber. This crystalline material gradually settles down through the liquor, which is thus maintained quite free from suspended matter at its upper portions. Suitable outlets are arranged adjacent the normal upper level of the liquor in the separating-chamber, the valved outlets 26 being indicated as connecting with the return-pipe 28, which may discharge this cleared liquor taken from the separating-chamber into the downtake or other part of the effect for further treatment. This is the normal operation of the device, one separating-chamber acting as a quiescent settling-chamber constantly supplied with liquor from the effect through the guarded inlet of the circulating-pipe and constantly having the cleared liquor taken off in the proper quantities through the valved outlet adjacent the upper level of the liquor in the chamber. When, as observed through the eyeglass 23, the level of the crystallized material approaches the upper part of the chamber, the valve 21 in the circulating-pipe is shut and the corresponding valve leading to the other chamber opened, so as to start that chamber into normal operation. The liquor may then be removed from the filled chamber by opening the valve 29, leading into the drain-pipe

30, and allowing the liquor to discharge through the return-valve 31 and return-pipe 28 into the effect or, if desired, by shutting this valve 31 and opening the valve 32 this liquor may pass from the circulating-chamber through the discharge-pump 40 and discharge-pipe 35 into the succeeding similar effect of the multiple-effect apparatus or into further treating apparatus of any kind. Part of this liquor may, if desired, be withdrawn through the valve 27, governing the outlet indicated, which leads into the discharge-pipe 34 and discharge-pump, and, indeed, in some work it is desirable to continuously withdraw some liquor through this valved outlet and discharge pipe and feed it to the succeeding effect of the multiple-effect apparatus, so as to effect a continual feeding of liquor from one effect to the succeeding one of the series. After the liquor has been drained off by gravity from the precipitated salt or similar material in the separating-chamber the vacuum-break is opened and the previously-compacted material is in this manner thoroughly separated from any remaining liquor, and after the valves have been closed this precipitated material may be readily removed through the discharge-door 24, so as to empty the chamber and prepare it for a further separating operation. By first draining off the liquor from the salt and then vigorously acting upon the compacted mass by the vacuum-break, as indicated, this hot crystallized salt may in some cases be so thoroughly dried as to require little, if any, subsequent treatment before shipment as commercial salt.

Having described an embodiment of this invention, which is, of course, merely illustrative, the scope of what I claim as new and what I desire to secure by Letters Patent is set forth in the appended claims.

I claim—

1. In vacuum evaporating apparatus, an effect comprising a vapor-chamber, a liquor-chamber, uptakes and a jacketed downtake, means to supply thin liquor to said effect, a plurality of separating-chambers having screens therein, a circulating-pipe and pump to supply concentrated liquor from said effect to either one of said chambers through a guarded inlet adjacent the top of said chamber, a return-pipe having a valved outlet adjacent the top of said chamber and a valved drain-pipe in the bottom of said chamber, a valved discharge-pipe and pump to discharge liquor from said chamber into a succeeding effect and valved connections between said drain-pipe and said return and discharge pipes.

2. In vacuum evaporating apparatus, an effect, means to supply liquor to said effect, a plurality of separating-chambers, circulating means to supply concentrated liquor from said effect to either one of said chambers to produce a substantially quiescent body of liquor in the same, an outlet-duct adjacent to the top of said chamber and pipes connecting with said outlet and leading to said effect or to a succeeding treating apparatus.

3. In vacuum evaporating apparatus, an effect, means to supply liquor to said effect, a separating-chamber adjacent to said effect, a circulating-pipe to supply concentrated liquor from said effect to said separating-chamber to form a substantially quiescent body of liquor therein, a valved outlet-duct adjacent to the top of said chamber and communicating with a return-pipe leading to said effect, and a discharge-pump connecting with a succeeding treating apparatus and receiving liquor from the upper part of said separating-chamber.

4. In vacuum evaporating apparatus, an effect, means to supply liquor to said effect, a closed separating-chamber having a screen, means to supply concentrated liquor from said effect to said separating-chamber, an outlet-duct in the upper part of said chamber connecting with a return-pipe leading to said effect and with a discharge-pipe leading to a succeeding treating apparatus, a vacuum-break and a valved drain-pipe on said separating-chamber.

5. In vacuum evaporating apparatus, a separating-chamber, an outlet-duct taking liquor from the upper part of said chamber, a circulating-pipe to supply concentrated liquor from an evaporating apparatus to the upper part of said separating-chamber to form a substantially quiescent body of liquor therein to effect the precipitation of material from said liquor.

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