3 Sheets—Sheet 1.

(No Model.)

T. CRANEY.

EVAPORATING APPARATUS.

No. 531,912. Patented Jan. 1, 1895.

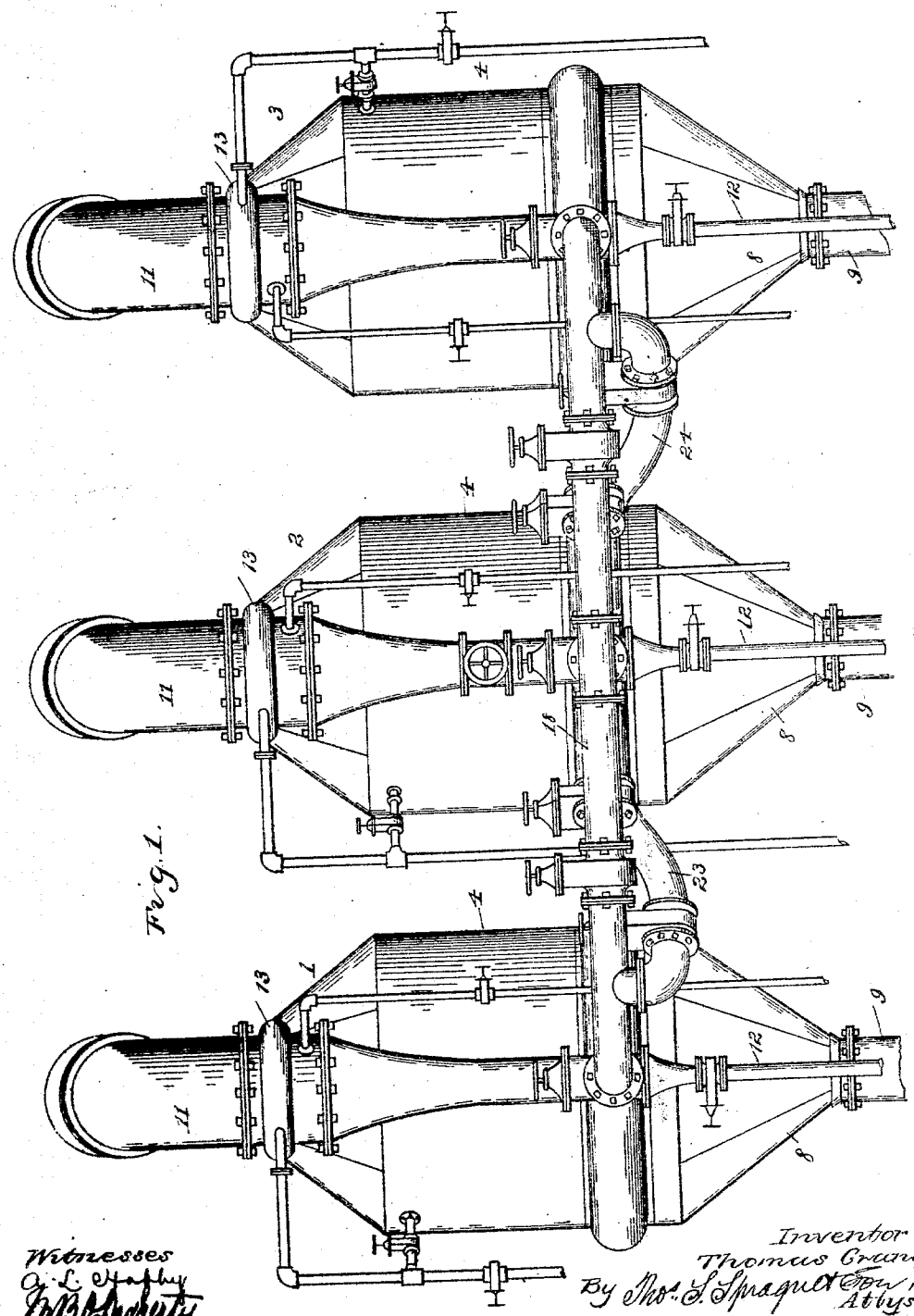


Fig. 1.

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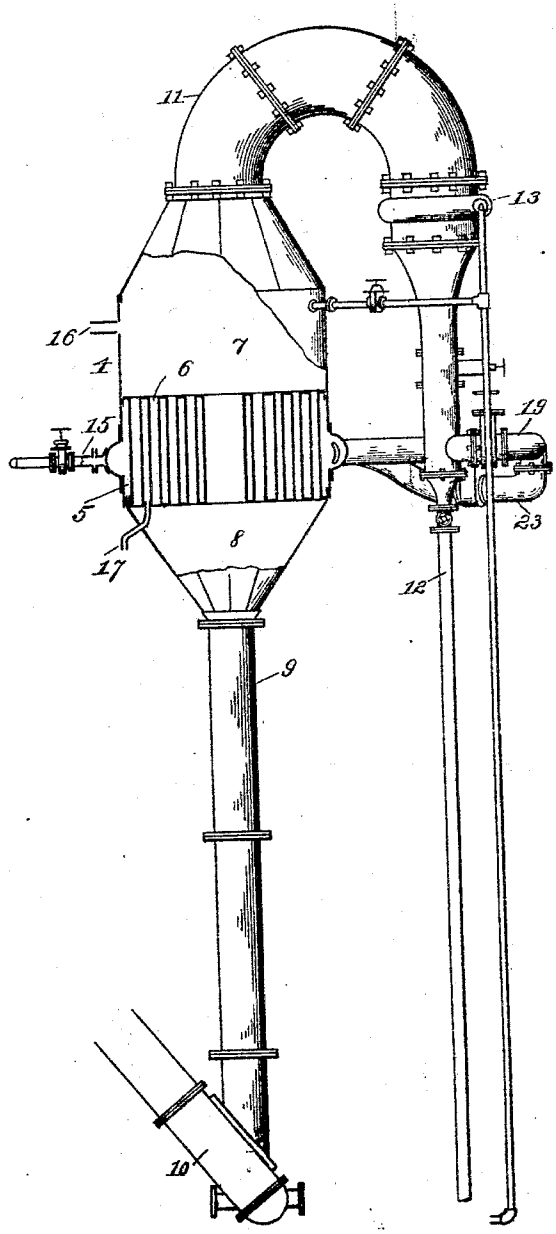
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Fig. 2.



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3 Sheets—Sheet 3.

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EVAPORATING APPARATUS.

No. 531,912. Patented Jan. 1, 1895.

Fig. 3.

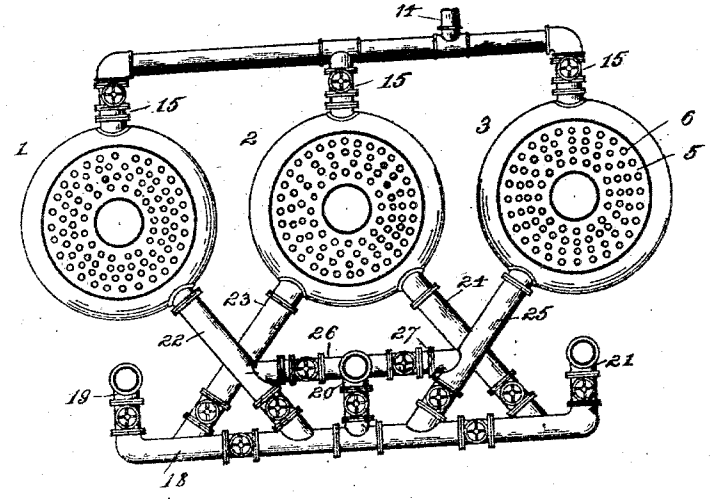


Fig. 4.

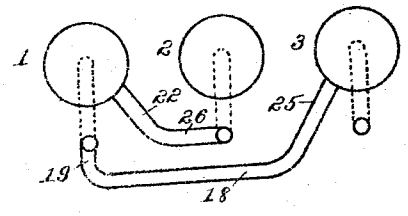


Fig. 5.

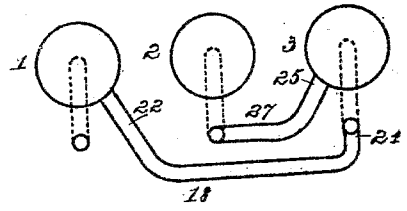


Fig. 6.

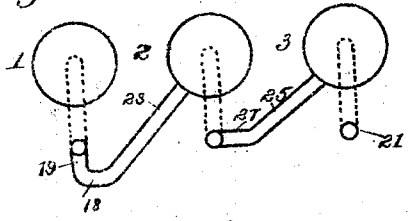


Fig. 7.

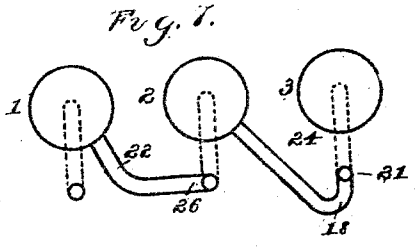
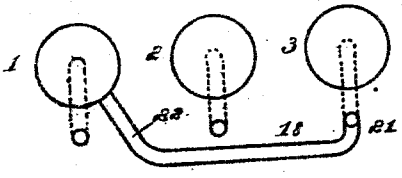


Fig. 8.



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UNITED STATES PATENT OFFICE.

THOMAS CRANEY, OF BAY CITY, MICHIGAN.

EVAPORATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 531,912, dated January 1, 1895.

Application filed March 6, 1894. Serial No. 502,534. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CRANEY, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Evaporating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention consists in the construction and arrangement of a multiple of evaporating pans designed for use as independent vacuum pans or for double or triple expansion evaporating apparatus.

The invention consists in the peculiar construction of the connection between the evaporating pipes and steam chambers of the various pans, whereby the order in which they are used may be varied at pleasure, or whereby any two of the series may be used, cutting out the third one without in any way effecting the continuous operation of the device, all as more fully hereinafter described.

In the drawings, Figure 1 is a front elevation of a series of three vacuum pans embodying my invention. Fig. 2 is a side elevation partly in section. Fig. 3 is a horizontal section on a line directly above the steam chamber. Figs. 4, 5, 6, 7 and 8 are diagram plans showing the circulation of the vapor at different times, the pans being arranged to be used in different series.

In the use of such apparatus, for instance, in the manufacture of salt it frequently happens that it is desirable to change the order in which the evaporating pans are used in double and triple expansion evaporator, and it also often happens in the use of such apparatus in certain localities that the pans have to be cleaned very frequently, and it is desirable to be able to cut out any one of the series temporarily or permanently for cleaning or repairing without disturbing in any way the continuous operation of the remaining pans and my arrangement of connection is intended to permit such use.

1, 2, and 3 are like evaporating pans of the following construction: 4 is a casing. 5 is a steam chamber. 6 are circulating flues through the chamber. 7 is the expansion chamber of the pan, and 8 the settling chamber terminating in the leg 9, which at its foot is provided with a suitable elevator 10, for carrying off the accumulated product. 11 is the vapor discharge pipe from the evaporating chamber, terminating in a vertical leg 12, in which is a suitable condenser 13. 14 is the steam supply pipe. 15 are valved branches therefrom connecting into the steam chambers 5 of each of the pans. 16 is the brine inlet. 17 is the outlet pipe for the water of condensation from the steam chamber. Each of the evaporating pans thus described is complete in itself, but as before described they are provided with connections so that they may be independently operated, or they may be operated in series for double or triple expansion in any desired combination, that is, the live steam may be applied to pan No. 1 and the vapor therefrom used in No. 2 and the vapor in No. 2 in No. 3, or this order may be reversed, and the middle one may be used with the high pressure and either No. 1 or No. 3 for the second or third evaporation, or any of the pans can be cut out and the operation continued in the remaining two.

18 is a longitudial connecting pipe, into valved branches 19, 20 and 21 in which the vapor discharge pipes 11 of the three pans connect. This pipe is connected with the pan No. 1 by the valve controlled pipe 22 and with the pan No. 2 by the valve controlled pipes 23, and 24, and with the pan No. 3 by the valve controlled pipe 25.

26 and 27 are valve controlled pipes connecting the branch 20 with the pipes 22 and 25 respectively and form a cross pipe or by-pass.

Now by examining Figs. 4, 5, 6, 7 and 8 in connection with the arrangement of valves shown in Fig. 3 the different series into which the pans may be combined will readily be understood.

Fig. 4 shows the arrangement in which the high pressure pan is No. 2; pan No. 1 is the second in the series and pan No. 3 the third. Fig. 5 shows the arrangement of the valves whereby the order of the series is through pans No. 2, No. 3 and No. 1. Fig. 6 shows the series No. 1, No. 2 and No. 3. Fig. 7 shows the series No. 3, No. 2 and No. 1 and Fig. 8 shows the series No. 3 and No. 1 with No. 2 cut out.

What I claim as my invention is—

In an evaporating apparatus, the combination with a plurality of independently operative evaporating pans, means for independently heating each pan, vapor discharge pipes for the respective pans, a connecting pipe into which the vapor discharge pipes lead, pipes leading from the connecting pipe into the heating chambers of the pans, a cross-pipe or by-pass connecting an outer pipe which leads from the connecting pipe into a heating chamber with an intermediate discharge pipe, and valves in the pipes, substantially as described.

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

THOMAS CRANEY.

Witnesses:
M. B. O'DOGHERTY,
O. F. BARTHEL.