

*John Howarth's Apparatus for
evaporating, superheating and extracting
Sulphate of lime from Salt brines.*

117290

Fig. 1.

PATENTED JUL 25 1871

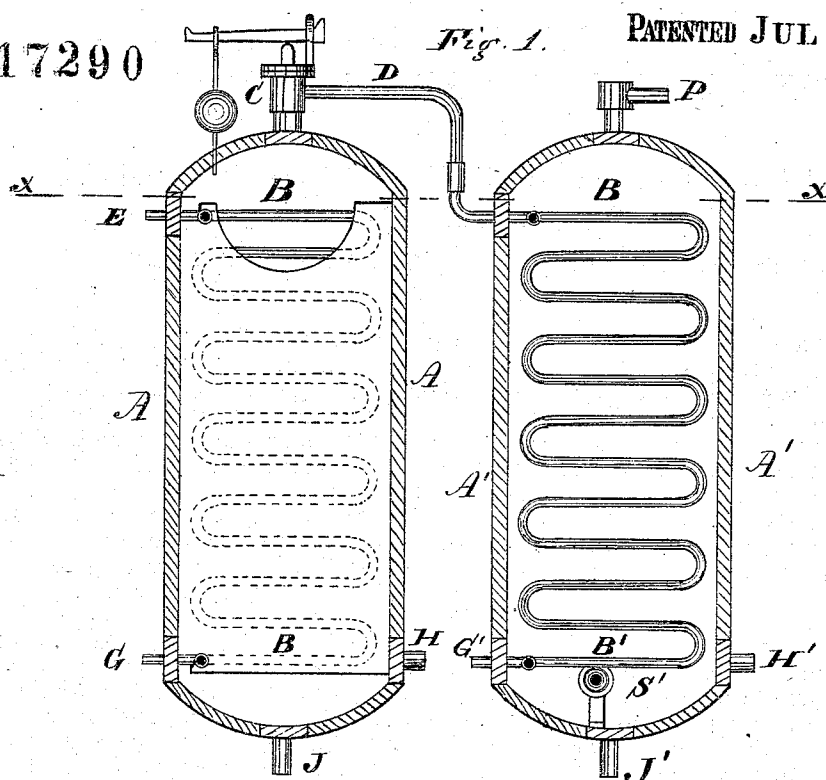


Fig. 2.

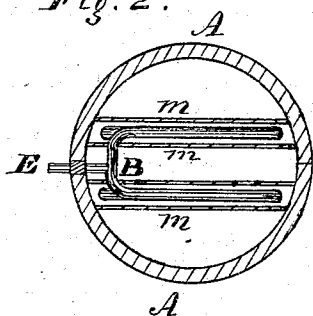
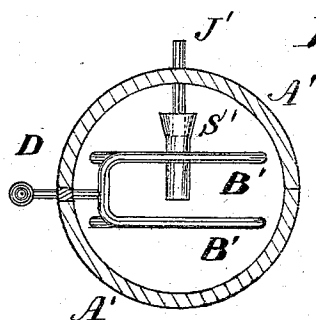


Fig. 3.



Witnesses
M. S. G. Wilde.
Ottwell J. Wood.

Inventor.
John Howarth.

UNITED STATES PATENT OFFICE.

JOHN HOWARTH, OF SALEM, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR EVAPORATING, CONCENTRATING, AND SUPERHEATING SALT-BRINE.

Specification forming part of Letters Patent No. 117,290, dated July 25, 1871.

To all whom it may concern:

Be it known that I, JOHN HOWARTH, of Salem, in the county of Essex and State of Massachusetts, have invented certain Improvements in Apparatus for Evaporating, Concentrating, and Superheating Salt-Brine for extracting sulphate of lime that may be contained in it, of which the following is a specification:

Figure 1 represents a vertical section of tanks A A and A' A'. Figs. 2 and 3 are plan views taken through line *x x*, Fig. 1.

The object of my invention is to extract the sulphate of lime from salt-brines (it being held in solution) by evaporating the brine down to saturation and then superheat it to 280° to 300° Fahrenheit, when a large proportion of said lime will be precipitated from the brine. The details of construction and method of operation will be fully described hereafter.

In the drawing, Fig. 1 represents a vertical section of two vessels placed in a vertical position, made and constructed alike, A A and A' A', each of which have two steam-coils, B B and B' B', placed within them, and which are also shown in plan in Figs. 2 and 3, the same letters being used to describe the same parts in each. These coils have close partitions on each side, leaving a little space between them and the steam-pipe of which the coil is composed, and extending from bottom to top of each coil, inclosing a space between them that will enable the pipes to heat the water between these partitions very rapidly, and thus cause a rapid circulation of the brine from bottom to top of the tanks and precipitating the lime at the bottom, which can be discharged through the pipes J and J'. High-pressure steam is passed into the coil B B through pipe E, and the condensed steam from it is discharged at pipe G. The steam generated from the salt-brine in the tank A A is passed off through the safety-valve C, thence through escape-pipe D into the coil of pipe B' B' in tank A' A', and when condensed is discharged at G'. The steam evaporated from the brine in this tank escapes at P,

to be further utilized, as may be desired. The temperature of the steam entering coil B' is regulated by the pressure of the steam in tank A, which is allowed to escape through the safety-valve C, and thence through pipe D. S' S', Figs. 1 and 2, represent an injector patented by me March 1, 1870, to be supplied with high-pressure steam, which I make use of for superheating the brine to about 300° Fahrenheit after it has been evaporated down to saturation. The highly-heated steam is forced in from a steam-boiler through pipe J' J', Figs. 1 and 3, the brine being drawn in and forced through the injector very rapidly by the steam and combining with the high steam, while the evaporation from the tanks is held back from escaping until its pressure attains sixty-four pounds to the square inch, by loading down the safety-valve to this point. When the steam begins to escape from the tank above this pressure, then the operation is completed and the brine is then discharged at G and G', and a new charge of fresh salt-brine is then again passed into the tanks through pipes H and H' and filled up to cover the steam-coils, and additional brine is forced into the tanks occasionally to keep the coils covered, as the evaporation goes on, in the manner and by the means substantially as described.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The arrangement of steam-coils B B', in combination with the partitions *m m m m*, for the purposes herein described.

2. The combination of injector S' with coils B B', partitions *m m m m*, and cylinders A A', substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN HOWARTH.

Witnesses:

M. S. G. WILDE,
WALDO M. WILDE.