2 Sheets—Sheet 1.

J. E. WEAVER.

STEAM-HEATER.

No. 182,781. Patented Oct. 3, 1876.

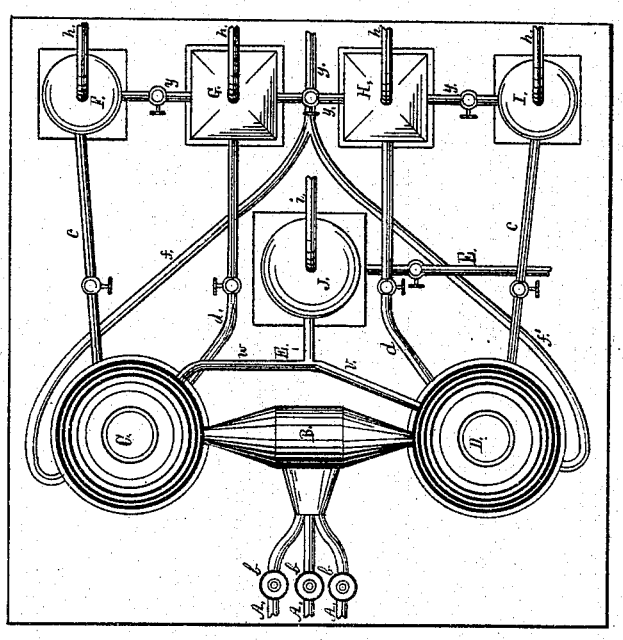

Fig. 1.

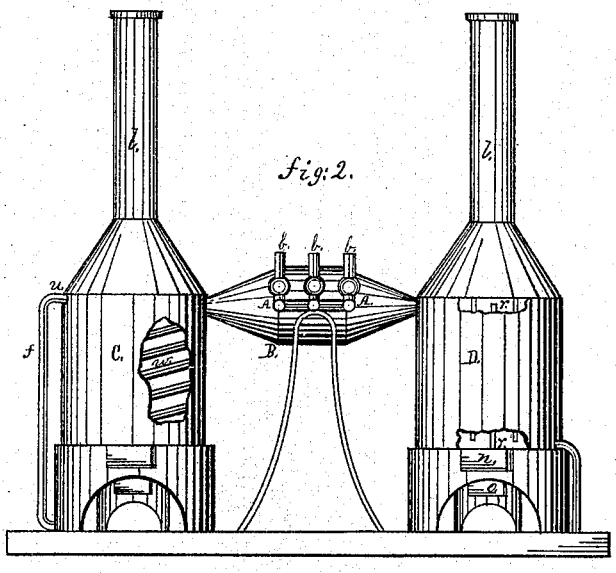

Fig. 2.

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2 Sheets—Sheet 2.

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Fig: 3.

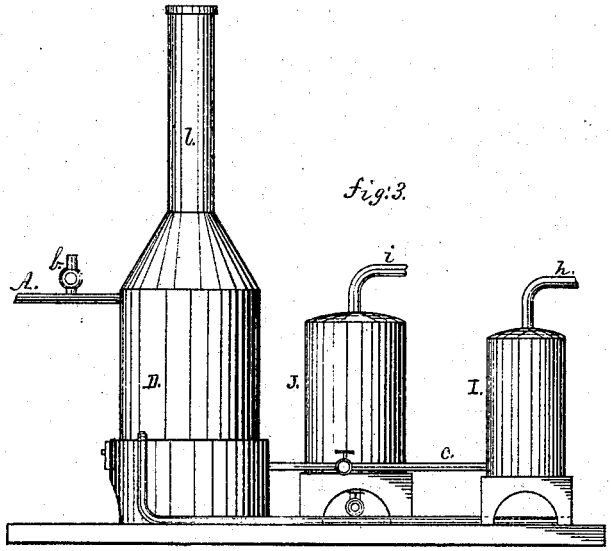


Fig: 4.

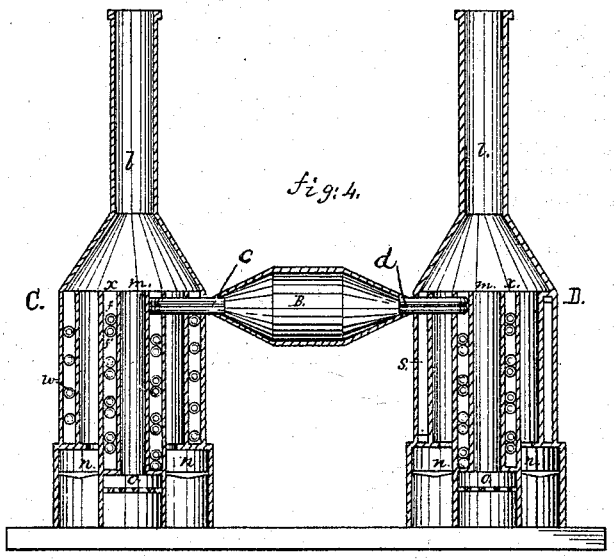


Fig: 5.

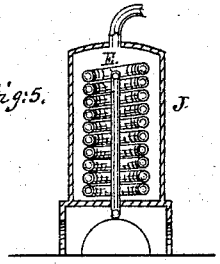
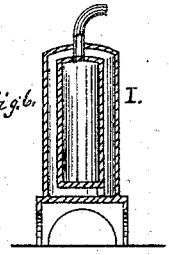


Fig: 6.



Witnesses.
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UNITED STATES PATENT OFFICE.

JAMES E. WEAVER, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN STEAM-HEATERS.

Specification forming part of Letters Patent No. **182,781**, dated October 3, 1876; application filed January 24, 1876.

To all whom it may concern:

Be it known that I, JAMES E. WEAVER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Utilizing Exhaust Steam as a Heating Medium; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to an improvement in apparatus for utilizing exhaust steam for heating purposes; and consists in receiving-chambers, heaters, and pipes, combined and arranged with relation to each other in such manner that the exhaust steam from steam-engines is received and reheated, and subsequently used for heating buildings and for other purposes.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the accompanying drawings, which form part of my specification, Figure 1 is a top view or plan of my improvement. Fig. 2 is a side view of the heaters and receiving-chamber. Fig. 3 is a side elevation of a heater, condenser, and a receiving-chamber. Fig. 4 is a vertical section of the heaters and receiving-chambers. Fig. 5 is a vertical section of the combined steam condenser and heater. Fig. 6 is a vertical section of a receiving-chamber.

In the accompanying drawings, A represent pipes connected with the exhaust of steam-engines, having valves *b*, which will open when the pressure is above fifteen pounds to the square inch. The pipes A communicate with a receiving-chamber, B, having coni-formed ends, which are connected to the heaters C and D, and to the coni-formed ends of the receiving-chamber B are attached pipes *c* and *d*, which pass down through the chambers *x* of the heaters in spiral coils, and, passing out the sides of the heater, communicate with a series of receiving-chambers, marked F G H I, which communicate with each other by means of pipes *y* furnished with valves. J represents the condenser and heating-chamber. E represents the liquid-supply pipe, which passes into the condensing-chamber, forming a coil within it, which pipe, passing upward in said chamber in a coil, then passes down through the center of the coil, and, through the bottom of the condensing-chamber, is connected with branch pipes *w v*, the branch *w* forming a coil in heater C, and the branch *v* communicating with a chamber, *s*, of the heater D. The coil *w*, which passes out of the heater C at *u*, is connected to a pipe, *f*. To the chamber *s* is connected a pipe, *f'*, and the pipes *f* and *f'* form a junction at *g*, and communicate with a boiling-pan when the heating apparatus is used for the purpose of manufacturing salt and sugar. The heaters have two or more furnaces, *n*, connected with a flue surrounding the chambers *x*, which flue communicates with a stack, *l*, and have also a central fire-chamber, *o*, having a flue, *m*, which also communicates with a stack, *l*.

By this arrangement of fire-chambers the pipes *c d* and pipe *w* and chamber *s* are subjected to a great degree of heat. The chambers F G H I have inner and outer walls, with a space between them, which space is filled with pulverized charcoal or other non-conducting material; or said space without any non-conducting material in it will answer the purpose of a non-conductor.

The operation of my improvement is as follows: The exhaust steam passing into chamber B, from it passes through the pipes *c* and *d*, is heated in its passage through said pipes, then passes into chambers F G H I, from which it is conveyed, by means of pipes *h*, to buildings to be heated, or to boiling, settling, and granulating vats when used in the manufacture of salt. The liquid, when the device is used for manufacturing salt, passes through pipe E, and from it, through branches *v*, to the chamber *s* in the heater D, and to the coil in chamber C, and, passing through the coil in chamber C, enters pipe *f*, and the liquid, traveling in a circuitous route up and down in chamber *s* by means of the partitions indicated at *r*, passes into pipe *f'*. The pipes *f* and *f'* forming a junction at *g*, the liquid flows from them into the boiling-pan. The steam arising in the boiling-pan passes, through a pipe marked *i*, into the condensing-chamber J, and will heat the liquid in the coil

of pipe E to a considerable degree. The liquid in the coil will cause the coil to act as a condensing medium for the steam which enters the chamber J. The condensing-chamber J serves the double purpose of condenser and heater.

The skillful mechanic will readily understand from the foregoing description, and by reference to the accompanying drawings, that a single heating apparatus for exhaust steam may be constructed by having a receiving-chamber, as at B, a heater, as at C, and a receiving-chamber, as at F, said heater and chamber being furnished with pipes, as herein indicated. Therefore I wish it understood that I do not confine myself to the precise arrangement of parts as herein described.

What I claim as of my invention is--

1. The pipe or pipes A, having a valve or valves, *b*, chambers B, pipes *c d*, heaters C and D, in combination with a receiver or receivers, substantially as herein described, and for the purpose set forth.

2. The combined heater and condenser J, in combination with the heater D, having a chamber, *s*, through which the liquid flows, substantially as herein described, and for the purpose set forth.

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Witnesses:
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A. H. JOHNSTON.