

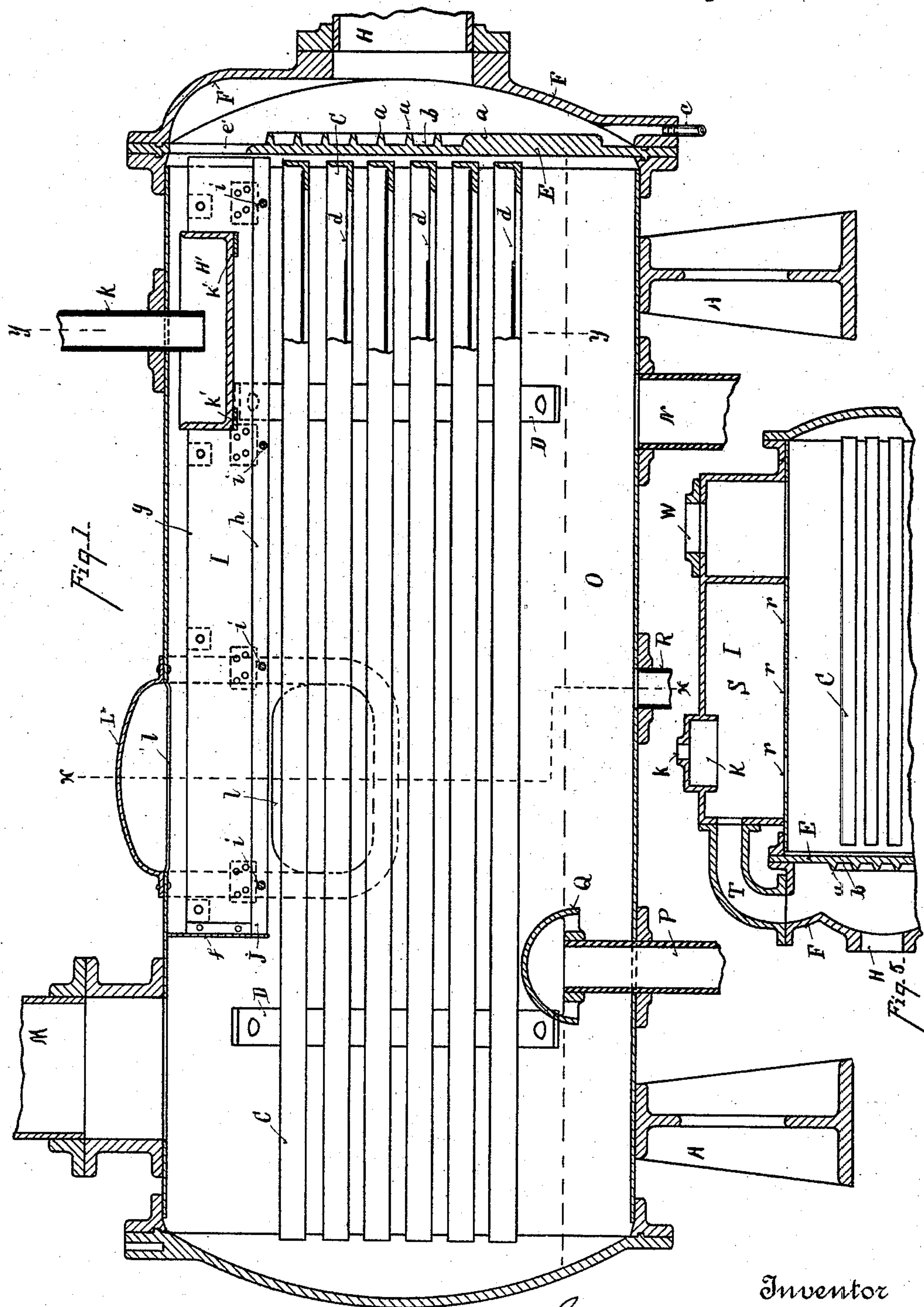
(No Model.)

2 Sheets—Sheet 1.

E. R. STILWELL.
HEATER AND PURIFIER.

No. 540,079.

Patented May 28, 1895.



Witnesses

W. Miles
Oliver B. Kaiser.

Inventor

Edmund R. Stilwell
By Wood & Boyd
Attorneys

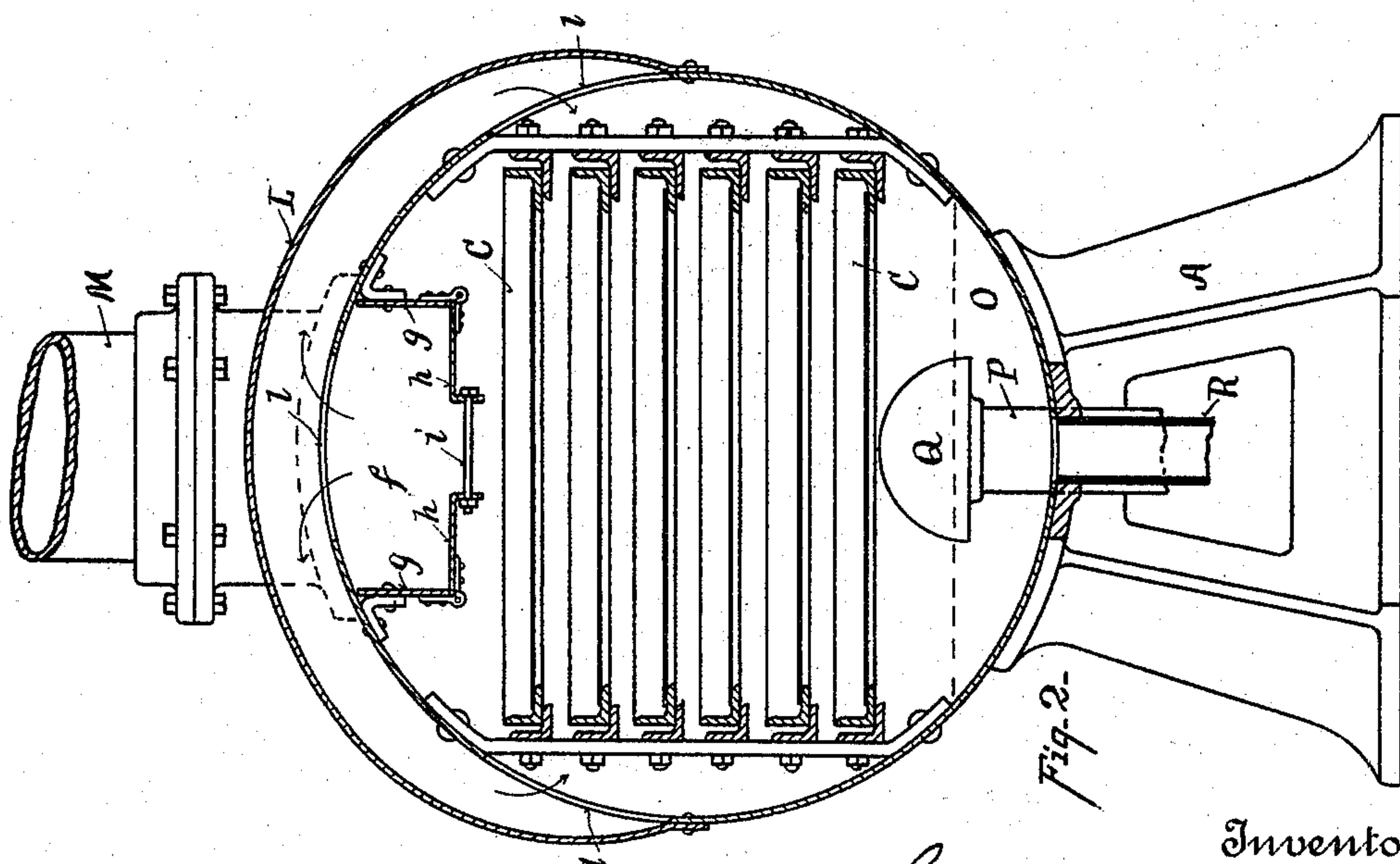
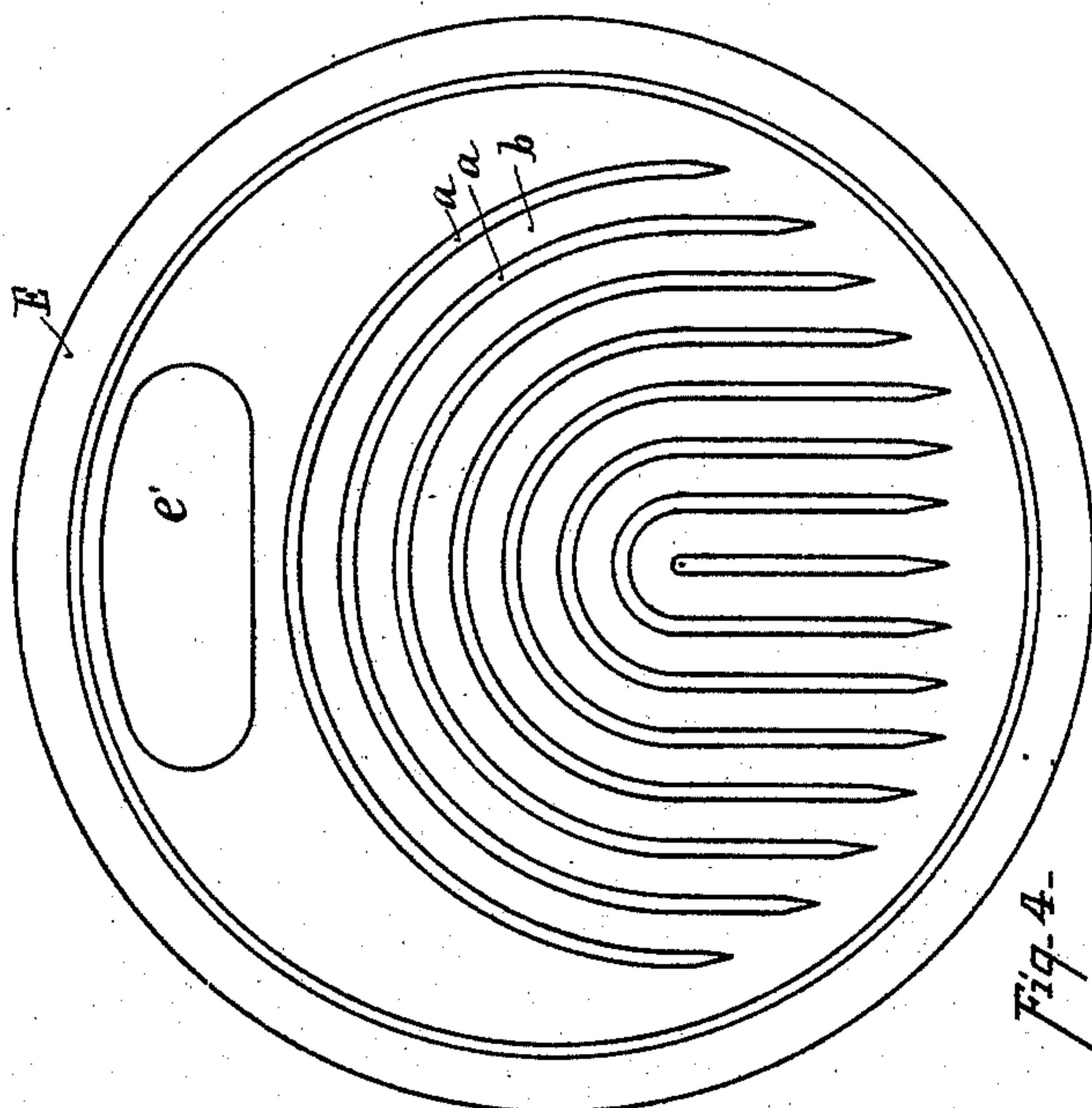
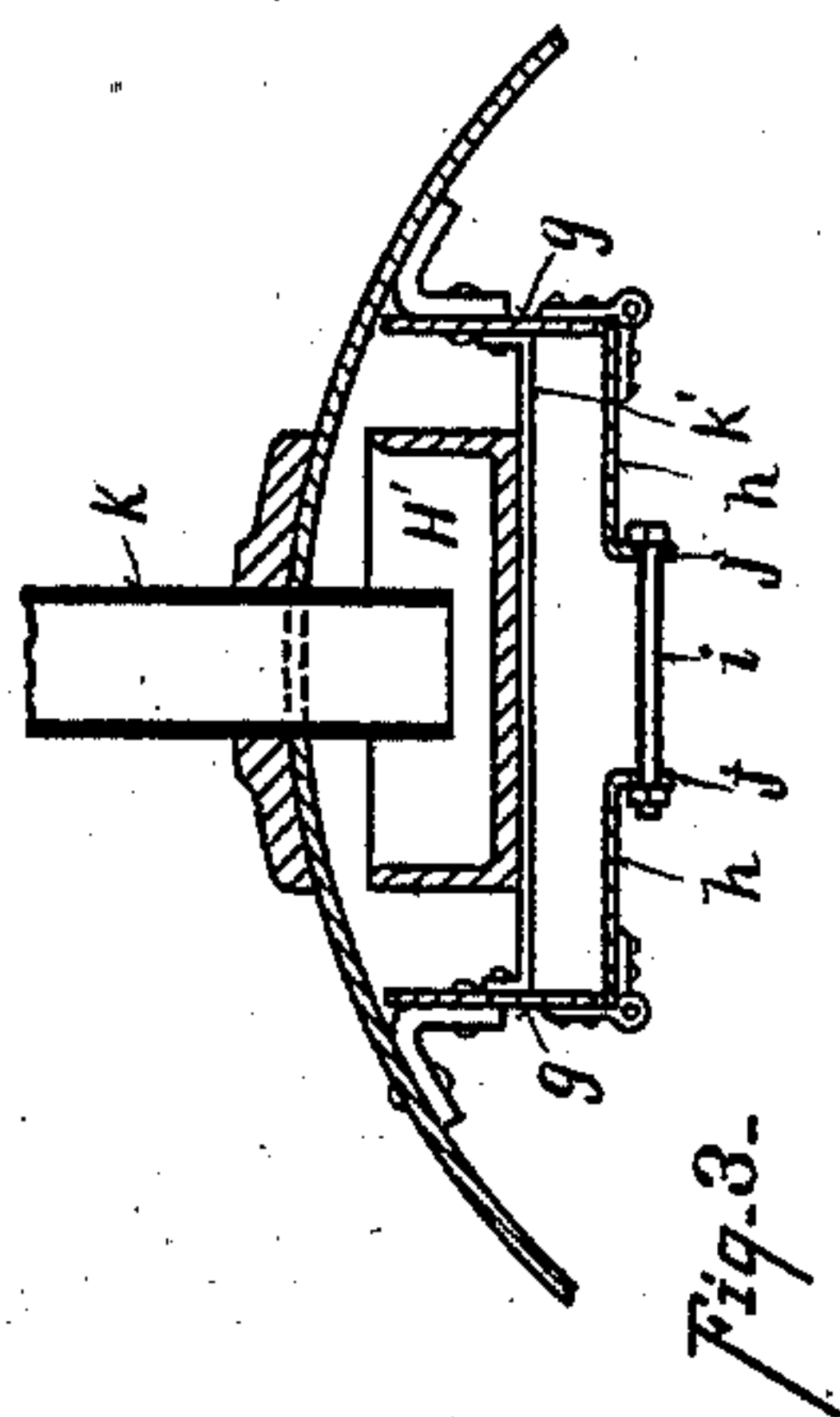
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UNITED STATES PATENT OFFICE.

EDWIN R. STILWELL, OF DAYTON, OHIO, ASSIGNOR TO THE STILWELL-BIERCE & SMITH-VAILE COMPANY, OF SAME PLACE.

HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 540,079, dated May 28, 1895.

Application filed July 18, 1894. Serial No. 517,927. (No model.)

To all whom it may concern:

Be it known that I, EDWIN R. STILWELL, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Heaters and Purifiers, of which the following is a specification.

One of the objects of my invention is to provide a heater which will effectually purify feed water for boilers by the use of escape steam.

Another object of my invention is to provide improved means for separating the oil from the steam before coming in contact with the feed water.

Another object of my invention is to provide a partition in the heater forming an elevated steam passage which will prevent the overflow of the feed water back into the engine.

Another object of my invention is to provide a heater which can also be used for a receiver for the return of the steam and condensation water from the heating system.

The various features of my invention will be more fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a central vertical longitudinal section of my invention. Fig. 2 is a section on line *x x*, Fig. 1. Fig. 3 is a section on line *y y*, Fig. 1. Fig. 4 is an elevation of the partition-plate and steam-passage. Fig. 5 is a sectional view illustrating a modification.

A represents the frame upon which the horizontal heater B is supported.

C represents a series of pans supported by brackets D. These are of the ordinary construction, the pans having openings *d* at alternate ends to allow of the circulation of the water over the series of pans and for depositing the impurities held in suspension which are given up by the heating of the water.

E represents a partition in one end of the purifier.

F represents an arched head.

H represents an inlet pipe for the exhaust steam.

In order that the partition E may serve as a baffling plate to separate the oil from the

steam, it is provided with a series of arched ribs *a* which spring from the bottom of the plate upward. The steam striking these ribs will lose the oil which flows down in the grooves *b* between the ribs to the bottom of the shell.

c represents a pipe which allows the oil to be drawn off from time to time to prevent undue accumulation.

I represents an atomizing chamber which in the preferred form is formed at the top of the shell of the heater by the end partition *f*, the side partitions *g*, and the bottom sections *h, h*, forming an opening just above the upper pan through which opening the condensation steam and feed water pass on to the first pan. The sections *h, h*, are hinged to the sides *g* and secured into position by bolts *i*, passing through the flanges *j*, of the partition *h*. This is for the purpose of allowing the chamber I to be cleaned. When the pans are removed from the shell of the heater the bolts *i* may be taken out and the sections *h, h*, will drop downward allowing easy access to the chamber I.

H' represents an over-flow box into which the feed water is received from the pipe *k*. *k'* represents brackets on which the over-flow box is supported.

In order to more fully utilize the steam for heating I provide steam conduits leading from the chamber I to the pans underneath. This is preferably accomplished by a segmental shell L secured to the shell of the heater as shown in Figs. 1 and 2, and by providing orifices *l* in the inner shell opposite the pans. Thus the steam which has not been condensed by coming in contact with the feed water is carried from the chamber I into the space occupied by the pans thereby heating the pans and the water circulating over them. M represents an escape pipe from which the uncondensed steam passes out of the heater.

A large portion of the ordinary escape steam is not utilized in heating the feed water and it is oftentimes desirable to utilize this steam in the heating system for buildings. To accomplish this I provide a return pipe N which taps the hot water well O under the pans in the heater. The steam passes from the es-

cape pipe M through the heating system and the condensation therefrom is returned to the hot well through the pipe N.

P represents the hot water feed pipe leading to the boiler feeder. Q represents a hood over the pipe projecting below the upper end of the pipe so as to prevent substances which float on the surface of the water from being carried off by this pipe. Obstacles and floating substances are finally removed by drawing off the water and opening the blow-off pipe R.

It will be readily observed that the partition E effectually shuts off the pan space from the steam inlet pipe except through the opening e' above the pan space. This is very important as sometimes there will be a flood of water (owing to a stoppage in the heating system) which when relieved runs back into the heater. This partition effectually prevents the over-flow back to the engine as it practically enlarges the hot water well to include the space occupied by the pans which is sufficiently large for such accidental occurrences.

Mode of operation: The steam is admitted through the pipe H. It strikes the baffling plate, and passes up through the opening e' in said plate E into the chamber I where it comes in contact with the water flowing over the sides of the box k . Water is atomized by the action of the steam (before the steam has expanded, and while still containing its greatest heat) a large portion of which is condensed and the water and condensation pass through the opening e in the bottom of the chamber I on to the pans. The surplus steam, if any is left uncondensed, then passes through the enlargement L into the opening or open space under the chamber I.

In Fig. 5, I have shown a modification which consists in placing a secondary shell S on top of the heater which forms the elevated atomizing chamber I in which the overflow box K is placed. T represents an opening in the end of said secondary shell connecting with the space between the end plate E and the head of the shell. r, r , represent a series of orifices pierced through the top of the heater shell for the admission of the steam and condensed water into the heater. W represents the escape pipe through which the uncondensed steam is voided. In this case the entire shell of the heater is closed by the partition E. The overflow box K it will be observed is made of such size and placed in such relation to the elevated atomizing chamber I that it is surrounded on all sides by the steam which effectually atomizes the water and condenses a portion of the steam which passes on to the pans in a heated state. The usual means for automatically closing the feed pipe and return pipe may be employed if desired. I have shown only one over-flow box and only one series of pans. Of course there is an over-flow box provided for each series of pans when

more than one series is employed. The pans are easily removed by taking off the head of the shell which is made readily removable.

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

1. In a feed-water heater, the combination with a horizontal, cylindrical heater, of the vertical partition plate E interposed between the heating chamber and head F, forming a steam space between the partition and head, said steam space communicating with the heater by a single elevated opening formed in the top of the partition, and a steam inlet communicating with a closed atomizing chamber above the steam pans in which is suspended the over-flow box and with a passage communicating through the same for admitting the steam and water into the pans, substantially as described.

2. In a feed-water heater, the combination with the inclosing shell, of the closed atomizing chamber I arranged in the upper portion of the shell, one or more pans arranged beneath the atomizing chamber, said chamber being closed upon all sides excepting the bottom, steam and water inlets communicating with the atomizer, and steam and water outlets leading from the heater, substantially as described.

3. In a feed-water heater, the combination with the inclosing shell, of the closed atomizing chamber I arranged in the upper portion of the shell and having openings in its bottom, the overflow box K suspended in said chamber, one or more pans arranged beneath the chamber, steam and water inlets communicating with said chamber, and steam and water outlets leading from the heater, substantially as described.

4. In a feed-water heater, the combination with the inclosing shell, of the closed atomizing chamber I provided with openings in its bottom and arranged in the upper portion of the shell, one or more pans arranged beneath the atomizing chamber, the overflow box R suspended within said chamber, a water inlet communicating with said overflow box, a steam inlet communicating with the atomizing chamber, steam and water outlets leading from the heater, and a steam conduit leading out through the top of the atomizing chamber, thence around through the shell of the heater into the open space beneath said chamber, substantially as described.

5. In a feed-water heater, the combination with a horizontal cylindrical heater, of the vertical partition plate E interposed between the heating chamber and head F, forming a steam space between the partition and head, and provided with a series of concentric, arched, curved ribs a , and grooves b , the lower portions of said grooves extending downward side by side to a point near the bottom of said steam space, the said steam space communicating with the heater by a single elevated

opening formed in the top of the partition, and a steam inlet arranged opposite said ribs, substantially as described.

6. In a feed-water heater, the combination
5 of the inclosing shell, a series of pans located therein, the closed atomizing chamber I, arranged over said pans and provided with openings in its bottom, the partition plate E arranged in one end of the shell and forming a
10 steam space communicating with the atomizer by an opening in the top of the partition, a steam inlet communicating with said space, a

water inlet communicating with the atomizing chamber, a feed-water pipe P, a steam escape pipe M connected with the top of the heater, 15 and a return pipe N connected with the bottom thereof, substantially as described.

In testimony whereof I have hereunto set my hand.

EDWIN R. STILWELL.

Witnesses:

BENJ. F. McCANN,
M. A. PATTERSON.