

(No Model.)

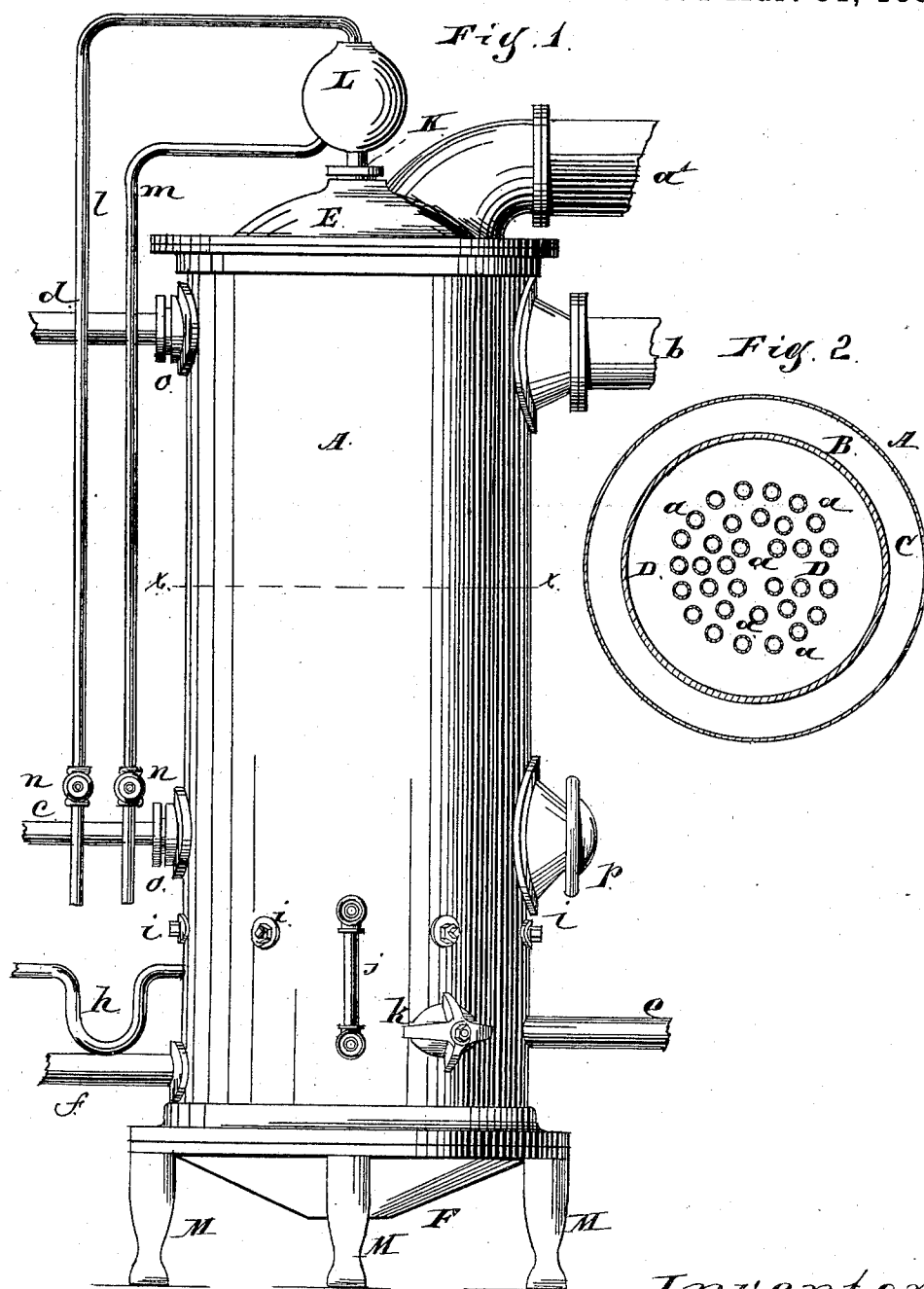
4 Sheets—Sheet 1.

W. BARAGWANATH.

HEATING AND PURIFYING FEED WATER.

No. 314,559.

Patented Mar. 31, 1885.



Inventor:

Witnesses:
Albert H. Adams.
B. A. Price.

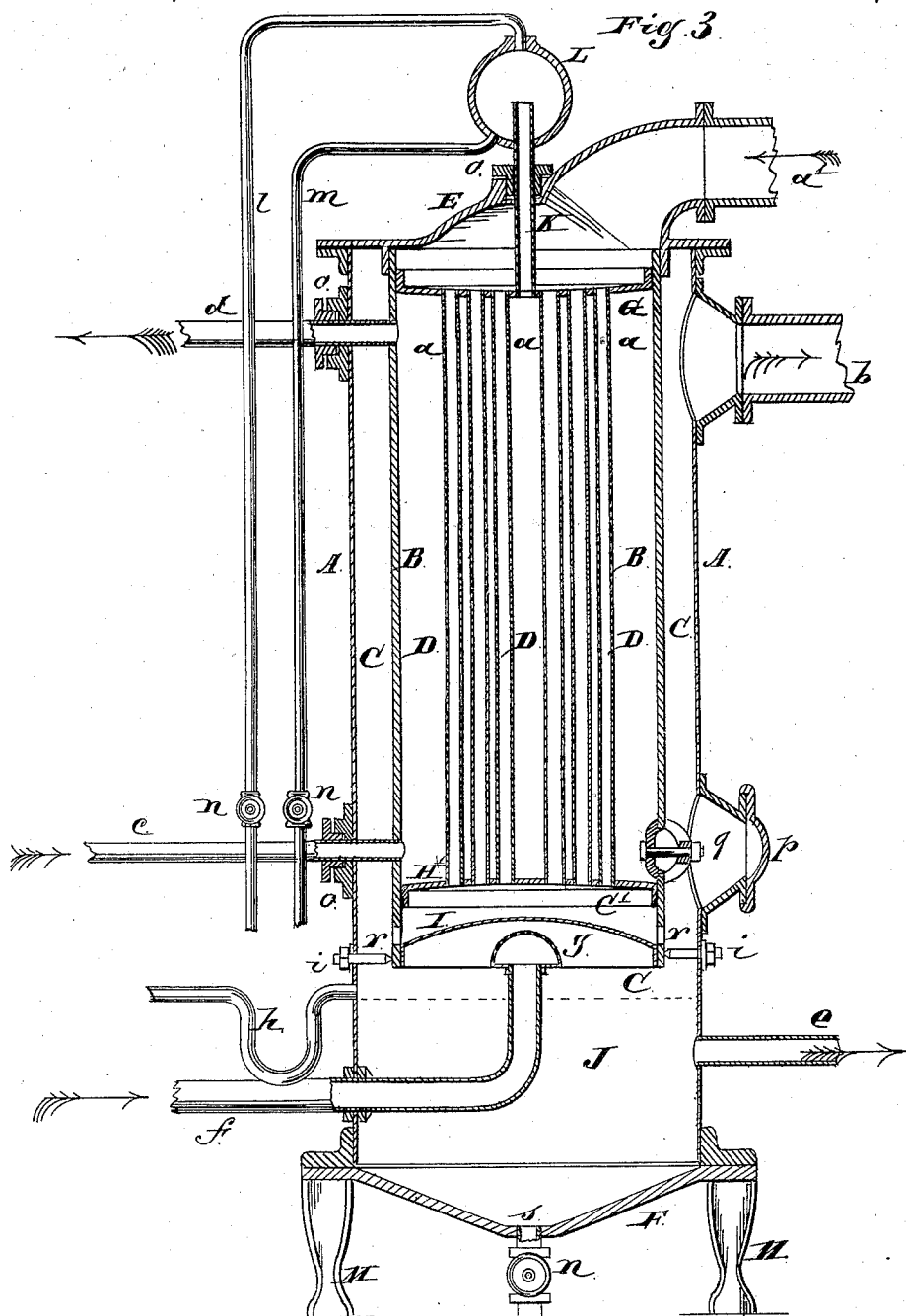
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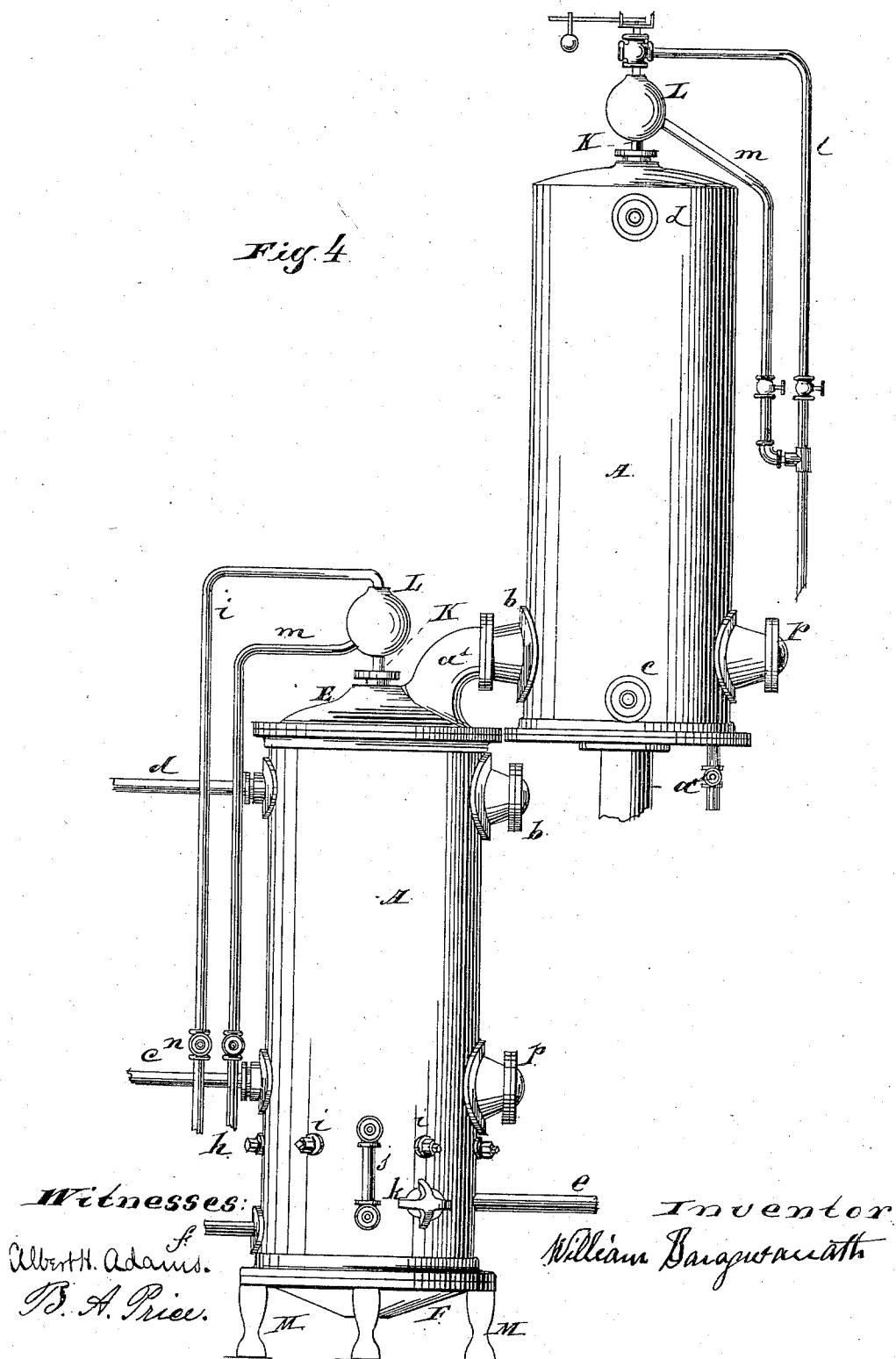
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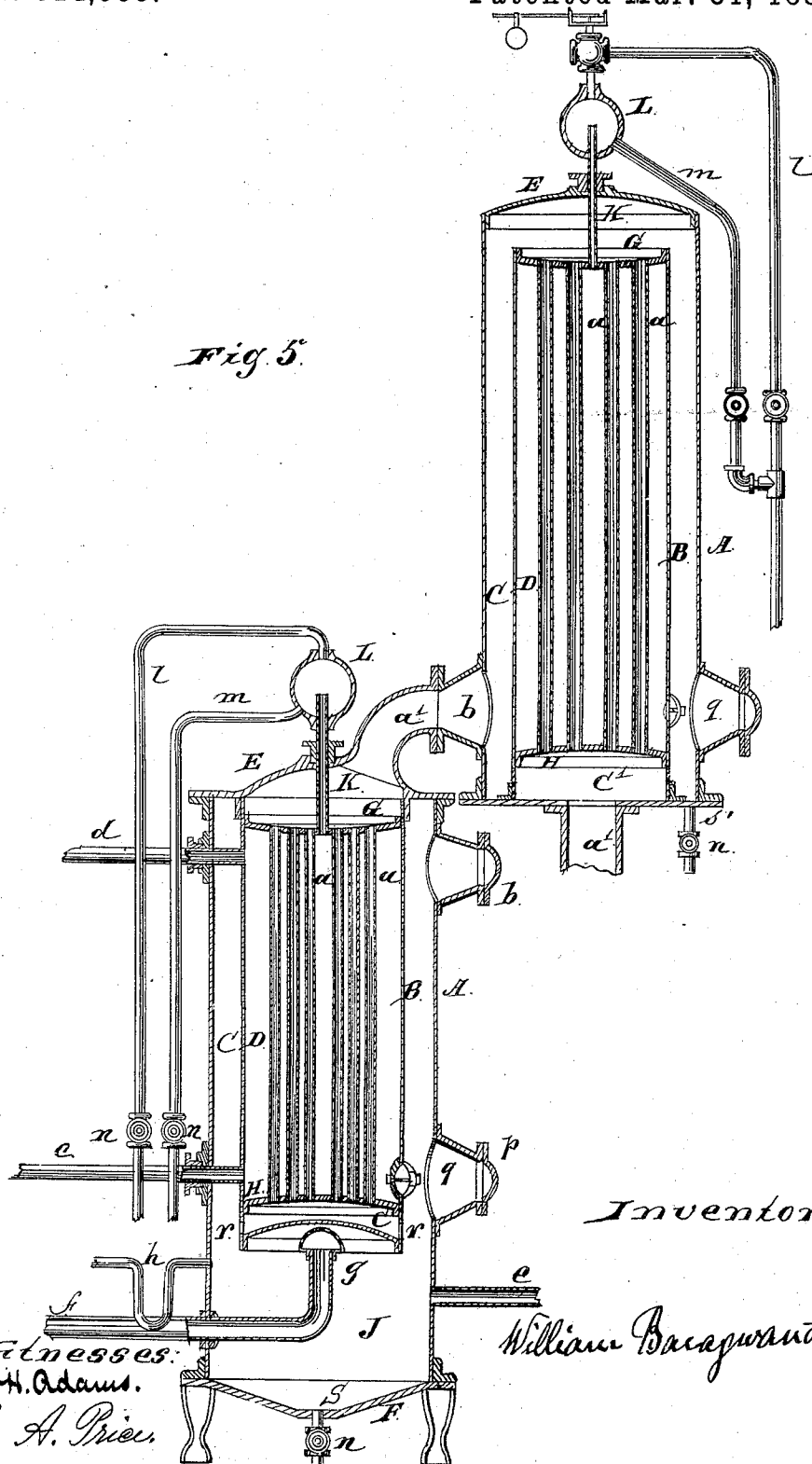
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Fig 5.



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William Baragwanath

Witnesses:

Albert H. Adams.

B. A. Prier.

UNITED STATES PATENT OFFICE.

WILLIAM BARAGWANATH, OF CHICAGO, ILLINOIS.

HEATING AND PURIFYING FEED-WATER.

SPECIFICATION forming part of Letters Patent No 314,559, dated March 31, 1885.

Application filed October 19, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BARAGWANATH, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented certain new and useful Improvements in Apparatus for Heating and Purifying Feed-Water and Condensing Steam, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation of a single heater; Fig. 2, a cross-section on line *x x* of Fig. 1; Fig. 3, a vertical section; Fig. 4, an elevation of the double apparatus; Fig. 5, a vertical section of the apparatus shown in Fig. 4.

The object of this invention is to provide an apparatus for heating feed-water by exhaust-steam, and in constructing the said apparatus so that it may be used as a condenser, or partly as both heater and condenser, as may be desired for the intended situation or use; and its nature consists in the several new combinations of parts, as hereinafter described and claimed as new.

In the drawings, A indicates the outer casing or shell of the steam-jacket; B, the outer casing of the feed-water cylinder or chamber; C C', steam-spaces; D, water-space; E, upper, and F lower, swell or convex end plates or heads; G H, concave end plates of the water-cylinder; I, diaphragm; J, water-space; K, scum-chamber pipe; L, scum-chamber; M, legs or ground-supports; *a*, steam-pipes in water cylinder or chamber; *a'*, steam-inlet pipe; *b*, exhaust-pipe; *c*, inlet-water pipe; *d*, outflow-water pipes; *e*, outflow-pipe for chamber J; *f*, inflow-water pipe for chamber J; *g*, perforated head or rose; *h*, siphon or overflow-pipe; *i*, bolts or projections for holding the lower end of the water-cylinder in position; *j*, water-gage; *k*, hand-hold for chamber J; *l m*, blow-off pipes for the scum-chamber; *n*, hand-valves; *o*, stuffing-boxes or packings; *p*, capped projections or ports by which access is obtained to the hand-plates or rose; *q*, hand-plates for the water-cylinder; *r*, holes or perforations around the steam-chamber C'; *s*, mud-pipe for mud-chamber; *s'*, discharge-pipe for water of condensation.

The cylinders A B are usually made of boiler-iron, and they will vary in size or length according to the situation in which they are to be

placed or the amount of service required, and in connection with the end plates they are provided with suitable flanges for connecting the cylinders and end plates together, as shown. The end plates, E F, are made conical, the lower one being placed so that when in position it will be concave. It is provided at or or near its lowest point with the pipe *s* and valve *n*, for operation in blowing off any mud or sediment which may be deposited at the bottom of the chamber J. The tubes or end plates of the water-cylinder are slightly concave, as shown, the amount of concavity being about one-sixteenth of an inch for a cylinder eighteen inches in diameter and four feet in length, and they are made in this form to provide for the contraction and expansion of the steam-pipes *a*, and when made in this form they prevent the joints between the pipes *a* and these end plates from working so as to leak. The end plate, H, is set up, as shown in Fig. 3, to form the steam-space C', which is formed by inserting the diaphragm I at the end, as shown, the said diaphragm being convex, in order to cause the steam and water of condensation which enter to pass out at the openings *r*. The openings or holes *r* are made around this cylinder and of a sufficient number or size to permit a free outflow of the steam into the annular chamber C. The chamber J is formed by extending the outer or jacket cylinder below the water-cylinder the desired distance. This chamber is provided with an inflow-pipe which is connected with a pump or other proper source of water-supply through which water is forced and sprayed, or partly sprayed, by the rose *g*, against the under side of the diaphragm I, from which it falls into the chamber J, which will stand filled with water to the height of the dotted line in Fig. 3, the outflow-pipe *e* being curved upward, and arranged so that it will not affect the standing of the water in the chamber. When the water passes above this line, the excess will pass out of the siphon or overflow pipe *h*, which will start whenever the water rises above this opening into the chamber J. This siphon overflow-pipe is so arranged at its delivery end as not to furnish a free outflow of steam in case any slight pressure should be applied. Water is passed into the cylinder B through the pipe *c*, and is forced out at the upper end through

the pipe *d*; and in order to use the water from the chamber J, which is partly heated, and impurities allowed to settle, I usually connect the pipe *e* with the pump, which forces the water through the pipe *e* into the chamber B, so as to obtain the benefit of whatever heating may take place in the chamber J while the mud, sand, &c., are settling.

When the device is used solely for heating water, the amount of water passing in through the pipe *f* will be so regulated as not to have an injurious effect as a condenser, it being understood that any and all of these pipes are to be supplied with regulating or cut-off valves at such points as may be convenient for their proper manipulation. The pipes K *c d* are provided with suitable stuffing-boxes, to prevent leakage where they pass through the jacket-cylinder. The pipe K passes through the heads G E, and projects up into the scum-chamber L, as shown, which projection prevents any accumulation within the scum-chamber from flowing back into the water-chamber. The scum-chamber is provided with two overflow or blow-off pipes, *l m*, the upper one, *l*, being designed to carry off light or frothy matters and the lower one, *m*, for carrying off heavier or sedimentary matters. The cut-off or regulating valves for these pipes are shown at *n*. The hand-holes *k, q, and p* are made in the usual manner. The ground-supports M may be in the form of legs, as shown, or they may be of any ordinary mason-work, as may be most convenient for their location.

The device may be provided with a safety-valve arranged to prevent bursting or collapsing, as shown in Figs. 4 and 5. The pipe K may also be inserted or bent so as to locate the scum-chamber at the side, in which case the pipes *l* and *m* will not require all of the bends shown, and when the device is used simply as a condenser these scum-chambers may be omitted. The turning down of the scum-chambers or their omission when used for condensers produces a height which in some locations is a material consideration; and in order to further reduce the height when used double, the upper set of cylinders may be turned so as to be horizontal or nearly horizontal. The upper cylinder does not have or require the chamber J, nor its pipes *f h*, the water of condensation passing out of the pipe *s*, to the pump, or to such place as it may be desirable to have it discharged. Both of the pipes *c* may also be connected with the pump, or the upper one with the lower pipe, *d*. Otherwise the construction of the upper and lower cylinders and their jackets and connections are substantially the same, except for the inlet and discharge ports or pipes for the steam, which in the upper one are arranged in reference to each other as shown; but they may be arranged differently, as may be found most convenient for the place where they are designed to be used, it being understood that hardly any two of these machines are exactly

alike in size and in pipe-connections, as the places which they are to occupy vary so greatly.

In operation steam is admitted to the port or pipe *a'*, from which it passes through the pipes *a* into the steam-space C', from which it passes through the holes *r* into the annular steam-space C, and, in the single device, also into the chamber J and out at the port or pipe *b*. The water of condensation from the pipes *a* in the single device passes into the chamber C' and down into the chamber J, and when used as a feed-heater the water is to be kept in the cylinder B a sufficient length of time to obtain the best results, it being understood that the longer it remains the hotter it will become until the highest degree of heat obtainable is reached, while, when used for a condenser the water will be kept in circulation, so as to keep it full of cold water, and when used as a condenser the pipe *f*, with its perforated head or rose *g*, may also be kept in operation, and by the use of two of these devices, as shown in Figs. 4 and 5, a practically complete condenser can be obtained.

I have shown and described the plates G H as being both of them concave, which is their best form; but it is evident either one may be made plane and the other concave with good results.

When two cylinders are combined, as shown in Figs. 4 and 5, the upper one will be used as a heater, and the steam passing in at the pipe or port *a'* will pass into the chamber C', and through the pipes *a* into the annular steam-space C and out of the pipe or port *b*. This arrangement leaves the upper device to act as a heater, and any water of condensation which may be found therein can be drawn off at the pipe *s'*, which may also be used as a separate blow-off. The steam which passes out at the port or pipe *b* passes into the port or pipe *a'* of the second cylinder, which, in this case, operates only as a condenser, where it is finally and fully condensed as it passes through the pipes *a* into the chamber C' through the holes *r* into the chambers C and J. By maintaining a circulation of water through the cylinder B by the pipes *c d*, and causing the water delivered into the chamber J to be formed into spray or fine divisions by the rose *g* and the diaphragm, or either, the steam will be condensed so as to fall into the chamber J, which will be filled to the proper height with distilled water and the water passing in through the pipe *f*. Any sedimentary matter which may pass through the pipe *f* can be drawn off through the pipe *s* of the plate F. When the lower cylinder is used in this form or as a condenser, merely, the scum-chamber L, with its connecting-pipes K, *l*, and *m*, may be omitted.

The use of the lower cylinder as a condenser will, to a certain extent, warm the contained water, which can be taken by the pump from the pipe *e*, forced into the pipe *c* of the

lower cylinder of the condenser, and taken from the pipe *d* of the condenser and forced into the pipe *c* of the first or upper cylinder, if desired, instead of giving each a separate

5 water-supply.

It will be readily understood that the operation of the lower cylinder, when used as a heater, may be reversed, and that when two are used they may be reversed with slight
10 modifications, which will not change their character.

I have described the apparatus as cylindrical, which is its best form; but it is evident that it may be made angular or square without affecting any of its operations.

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

1. The combination of the lower water-chamber head, *H*, and extended cylinder *B* with the diaphragm *I*, for forming the steam-chamber *C'*, substantially as specified.

2. The combination, within the chamber *J*, of the pipe *f*, having the perforated head or rose *g*, and the diaphragm or plate *I*, substantially as described.

3. The combination of the pipes *e*, *f*, and *h* with the extended jacket-cylinder and head *F* of the water-purifying chamber *J*, substantially as set forth.

30 4. The siphon overflow-pipe *h*, in combination with the water-chamber *J*, substantially as and for the purpose specified.

5. The combination of the jacket *A*, cylinder *B*, suspended within jacket *A* to form space
35 *C*, the heads to cylinder *B*, and pipes *a* connecting the same, the steam-space *C'*, beneath

pipes *a*, the pipe *a'*, opening into cylinder *B* above pipes *a*, and pipe *b*, leading from space *C'*, the pipes *c* *d*, communicating with cylinder *B*, the pipes *e* and *f*, extending from lower part of jacket *A*, and the pipe *f* provided with rose
40 *g*, substantially as described.

6. The jacket *A*, provided with concave heads *E* *F* and pipes *a'*, *b*, *e*, and *h*, in combination with the cylinder *B*, suspended within
45 said jacket to form the spaces *C* and *J*, and formed with the steam-space *C'*, communicating with space *C*, and provided with pipes *c* *d*, the pipes *a* and *K*, steam-chamber *L*, and pipes *l* *m*, substantially as described.

7. The combination of the pipe *f* with the extended cylinder *A* and the diaphragm *I*, substantially as and for the purpose described.

8. The combination of the two shells, each having a cylinder suspended within the same
55 to form a steam-space between it and the shell, a series of pipes in each cylinder, connected at opposite ends to end plates curved on the arc of a circle, a steam-space below each lower end plate, a scum-chamber above each shell,
60 provided with escape-pipes and communicating with the suspended cylinder through a pipe, a water supply and exit pipe to the suspended cylinder in one of the shells, an overflow-pipe and outlet-pipe to the space below
65 said cylinder, and a water-supply pipe thereto provided with a rose at its end, substantially as described.

WILLIAM BARAGWANATH.

Witnesses:

ALBERT H. ADAMS,

O. W. BOND.