

(No Model.)

H. W. SHEPARD.
FEED WATER HEATER.

No. 321,541.

Patented July 7, 1885.

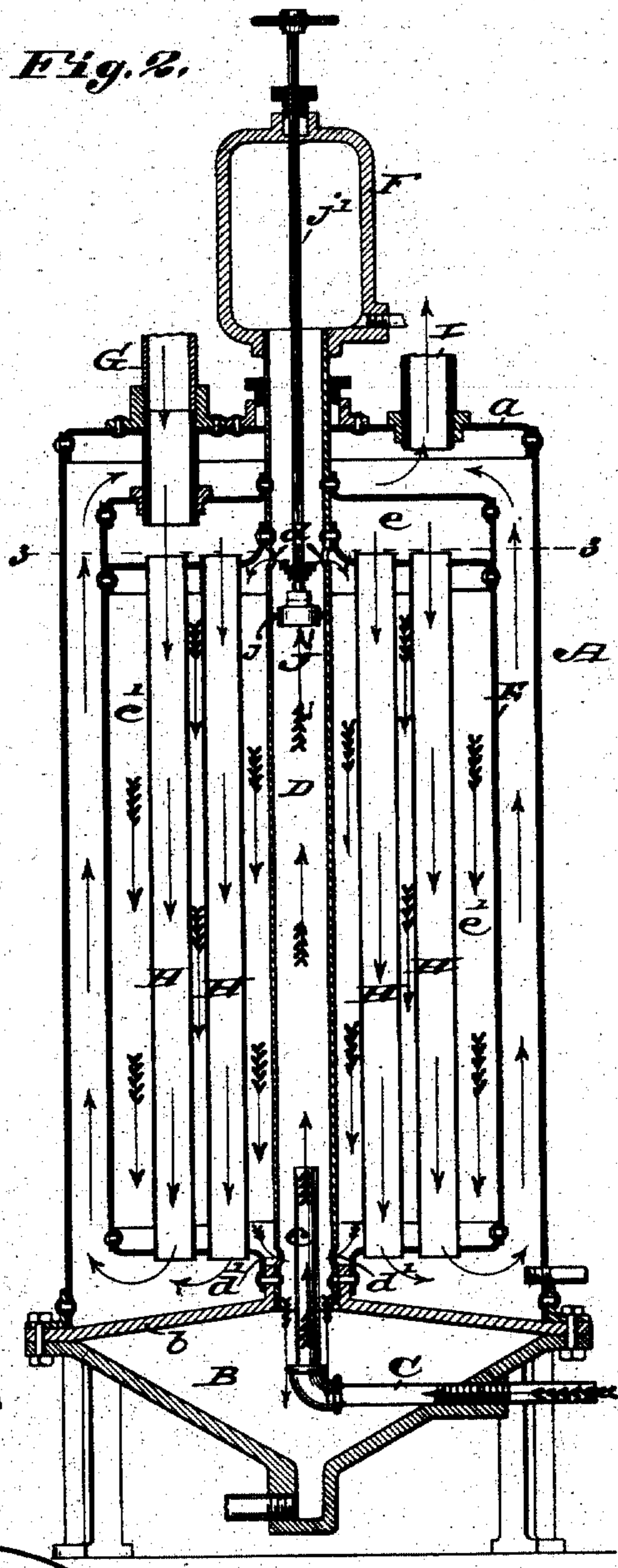
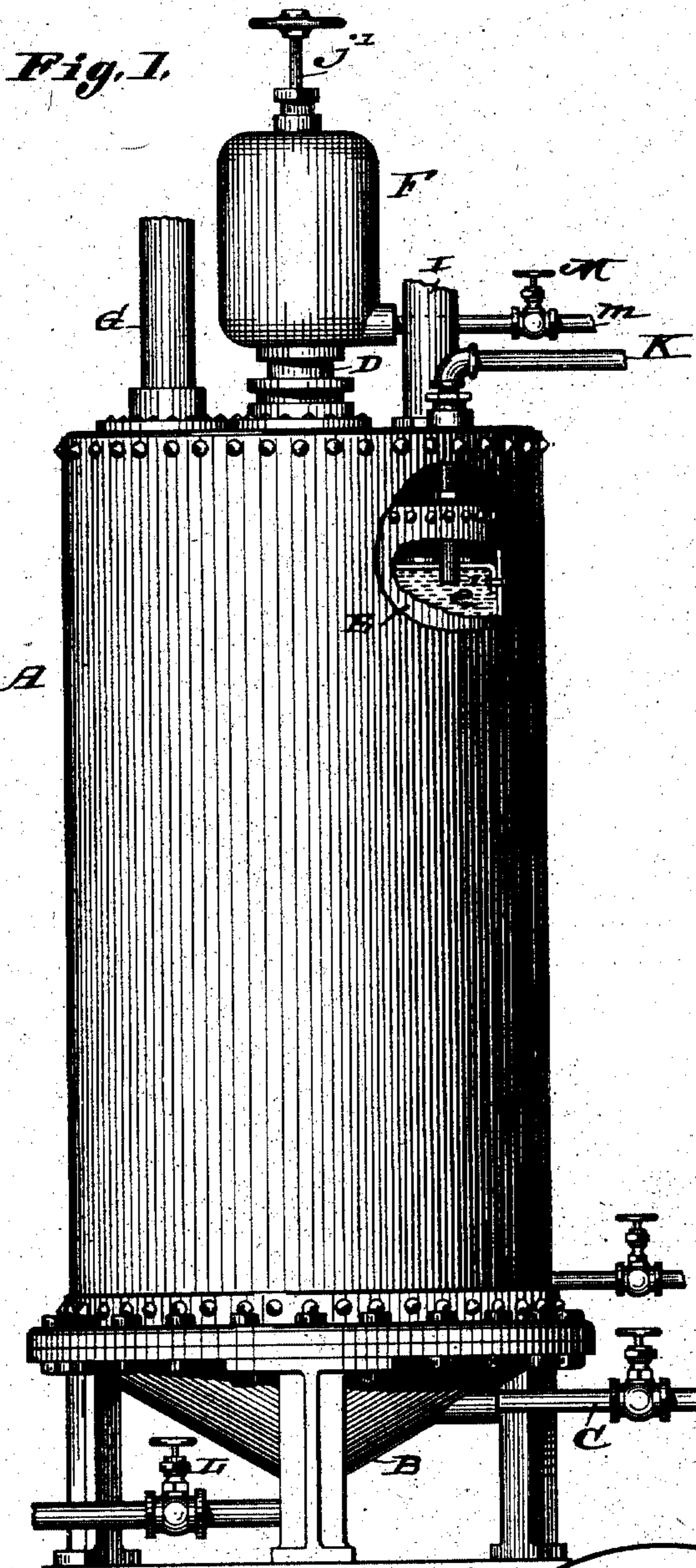
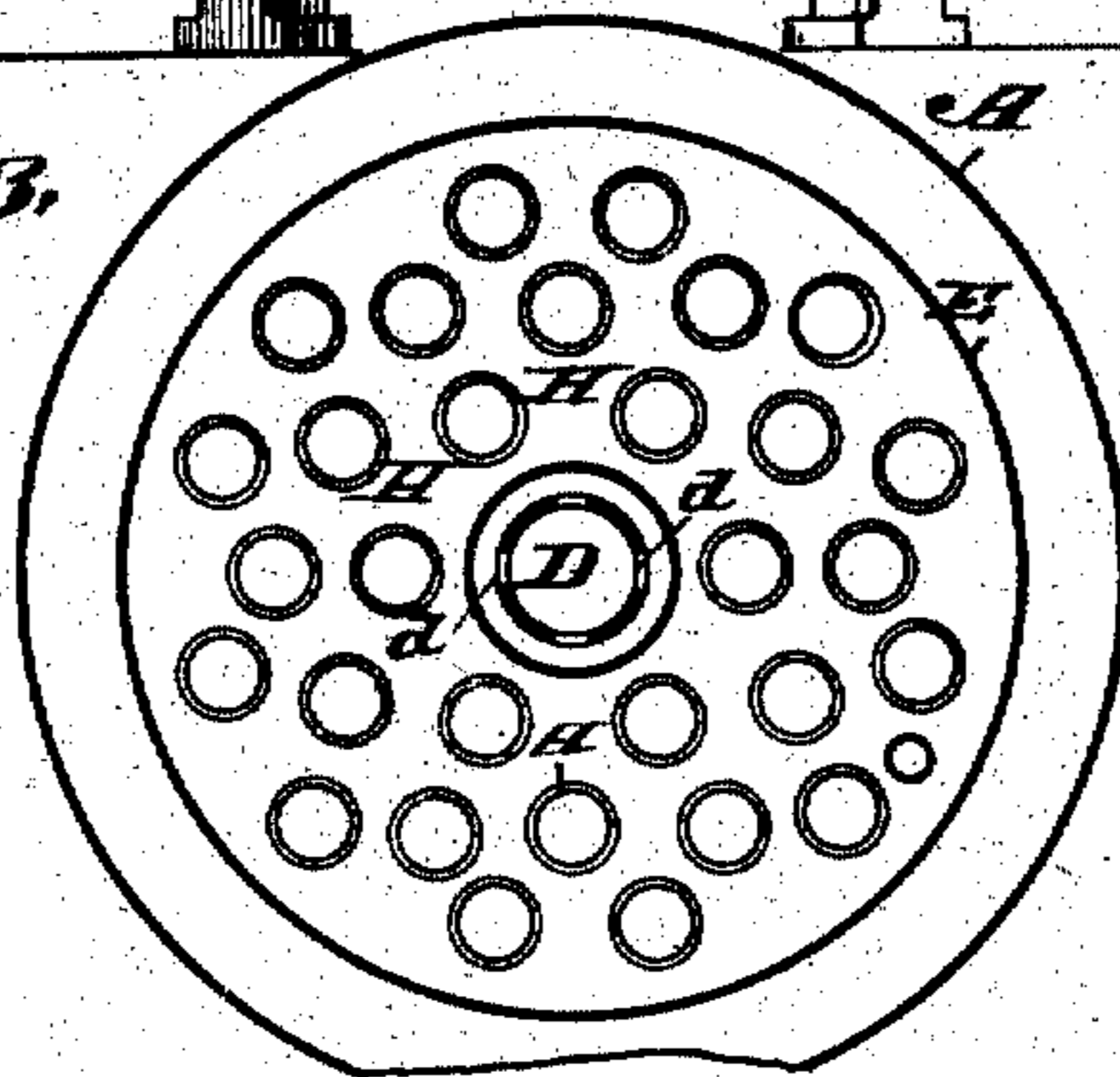


Fig. 3.

Attest:
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att'y

UNITED STATES PATENT OFFICE.

HENRY W. SHEPARD, OF ST. LOUIS, MISSOURI.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 321,541, dated July 7, 1885.

Application filed December 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY W. SHEPARD, of St. Louis, Missouri, have made a new and useful Improvement in Feed-water Heaters, of which the following is a full, clear, and exact description.

The improvement relates to the means for settling the impurities of the water.

The annexed drawings, making part of this specification, illustrate the most desirable form of the improved heater.

Figure 1 is a side elevation of the heater, a portion of the outer and also of the inner case being broken away to exhibit the interior.

Fig. 2 is a vertical central section, and Fig. 3 is a horizontal section on the line 3 3 of Fig. 2.

The same letters of reference denote the same parts.

A represents the outer case of the construction. It is closed to the outer air. It rests upon the settling-chamber B, the top *b* of which is preferably the lower end of the case. The water is introduced into the heater through the pipe C, which leads into the settling-chamber B, and thence turns upward through the top of the settling-chamber and into what may be termed the "settling-tube" D. This tube at its lower end opens into the settling-chamber, and it extends thence upward through the inner case, E, through the upper end, *a*, of the outer case, and above the outer case it leads into the scum-chamber F. The portion *c* of the pipe C is smaller in diameter than the settling-tube, and hence there is an annular space around the pipe C, through which the settlings can drop from the settling-tube into the settling-chambers.

The inner case or heater proper, E, contains the compartment *e*, into which the exhaust-steam is delivered by means of the pipe G. The steam passes thence downward through the tubes H H, and at the lower end of the heater proper is delivered into the space between the inner and outer cases, and it finally escapes from the heater at the outlet I.

The heater proper, E, is conveniently held in place by resting its lower end upon the settling-chamber, substantially as shown in

Fig. 2, so as to leave a suitable space between the lower end of the heater proper and the top of the settling-chamber, for the steam to escape from the tubes H H into and by attaching it to the settling-tube, substantially as shown.

Communication is established between the interior of the settling-tube and the interior of the heater proper by means of the perforations *d d'* in the shell of the settling-tube. The perforations *d* are at or near the top of the water-space *e'* of the heater proper, and the perforations *d'* are at or near the bottom of the water-space *e'*. The pipe C extends above the perforations *d'*.

J represents a valve adapted to seat at *j*, Fig. 2, and attached to a stem *j'*, which passes upward through the upper end of the settling-tube and through the scum-chamber, substantially as shown, and by means of which stem the valve can be raised and lowered within the settling-tube, and the valve thereby seated and unseated.

In operating the heater the water is heated by allowing it to pass from the settling-tube through the perforations *d d'* into the water-space *e'*, where it is allowed to come in contact with the tubes H H, and after being heated the water is discharged through the pipe K. As the water passes upward in the settling-tube, the heavier impurities settle past the pipe *c* into the settling-chamber. The lighter impurities pass in part into the water-space *e'*, and the scum collects in the scum-chamber.

When it is desired to clean the heater of its impurities, the valve J is seated, as shown in Fig. 2. The heater is then and by means of a suitable valve, L, Fig. 1, opened at its lower end, whereupon the contents of the settling-chamber are blown out, and the impurities at the lower end of the water-space *e'* are forced through the perforations *d'* into the lower end of the settling-tube, thence into the settling-chamber, and thence past the valve L. When it is desired to clean the heater at the top, the valve L is closed, and the valve M, Fig. 1, is opened. The impurities in the upper part of the water-space *e'*, then pass through the perforations *d* into the upper end of the settling-

tube, thence into the scum-chamber, and thence with the scum are discharged through the pipe *m* past the valve *M*. The heater can thus be cleaned at the top and at the bottom, 5 as desired. The settling-tube also serves, too, as a tie to strengthen the structure.

I claim—

1. The combination, in a feed-water heater, of the heater proper, *E*, and the settling-tube 10 *D*, said settling-tube and the water-space *e'* being connected at the upper and lower ends of the water-space, as and for the purpose described.

2. The combination of the case *A*, the set- 15 tling-chamber *B*, the pipes *C* *G* *I* *K* *m*, the

settling-tube *D*, perforated at *d* *d'*, the heater proper, *E*, the scum-chamber *F*, and the valves *J* *L* *M*, substantially as described.

3. The combination, in a feed-water heater, of the settling-tube *D*, perforated at *d*, the 20 water-space *e'*, the valve *J*, and the scum-chamber *F*, substantially as described.

4. The combination of the water-space *e'*, the settling-tube perforated at *d* and *d'*, and the valve *J*, substantially as described.

Witness my hand.

HENRY W. SHEPARD.

Witnesses:

C. D. MOODY,
JOHN O'BRIEN.

It is hereby certified that Letters Patent No. 321,541, granted July 7, 1885, upon the application of Henry W. Shepard, of St. Louis, Missouri, for an improvement in "Feed Water Heaters," was erroneously issued to said Shepard; that the said Letters Patent should have been issued to the said *Henry W. Shepard and John O'Brien*, said O'Brien being assignee of one-half interest; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 6th day of October, A. D. 1885.

[SEAL.]

H. L. MULDROW,
Acting Secretary of the Interior.

Countersigned:

M. V. MONTGOMERY,
Commissioner of Patents.