

(No Model.)

F. SHICKLE.  
FEED WATER HEATER.

No. 335,317.

Patented Feb. 2, 1886.

Fig. 1.

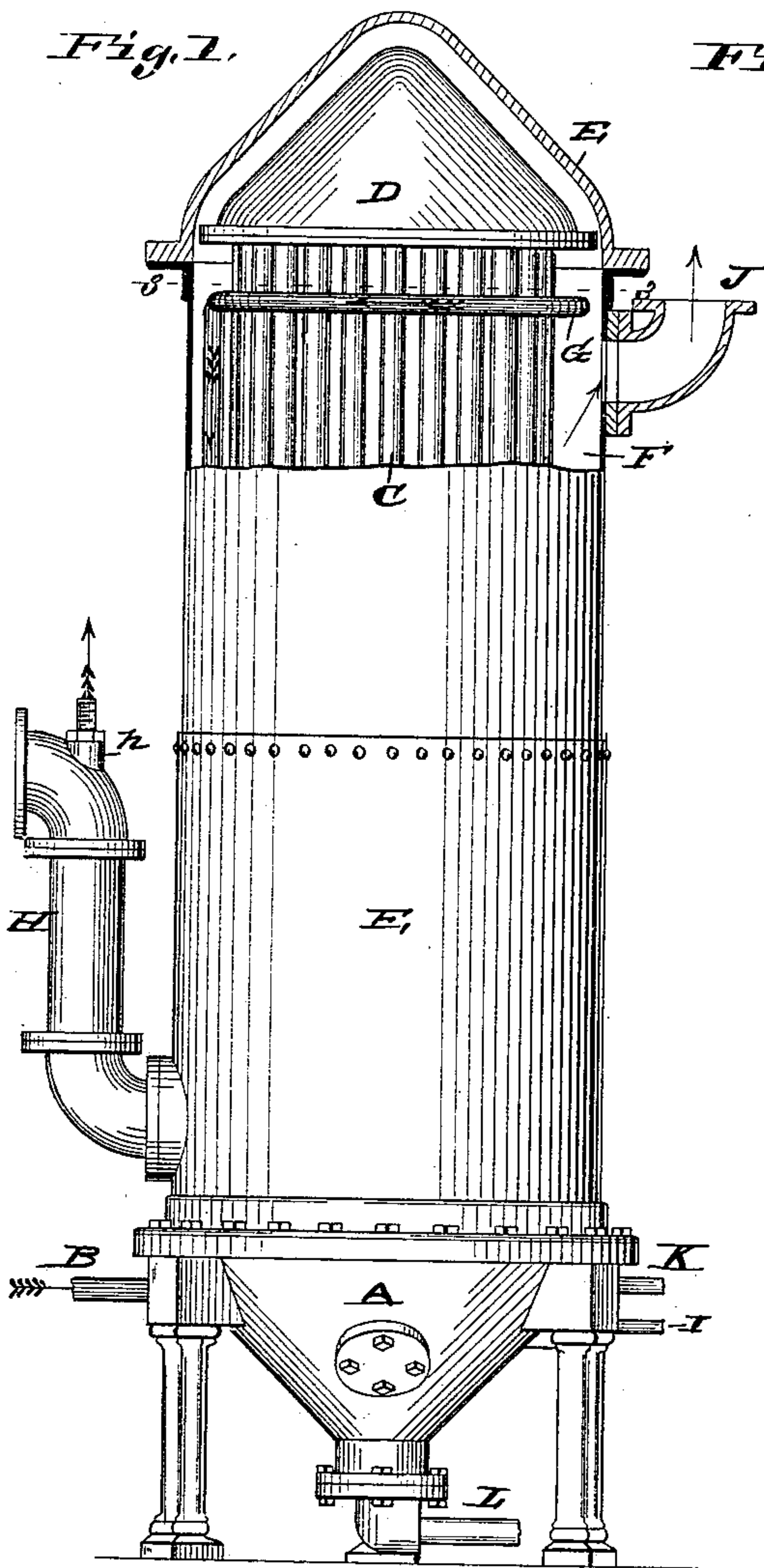


Fig. 2.

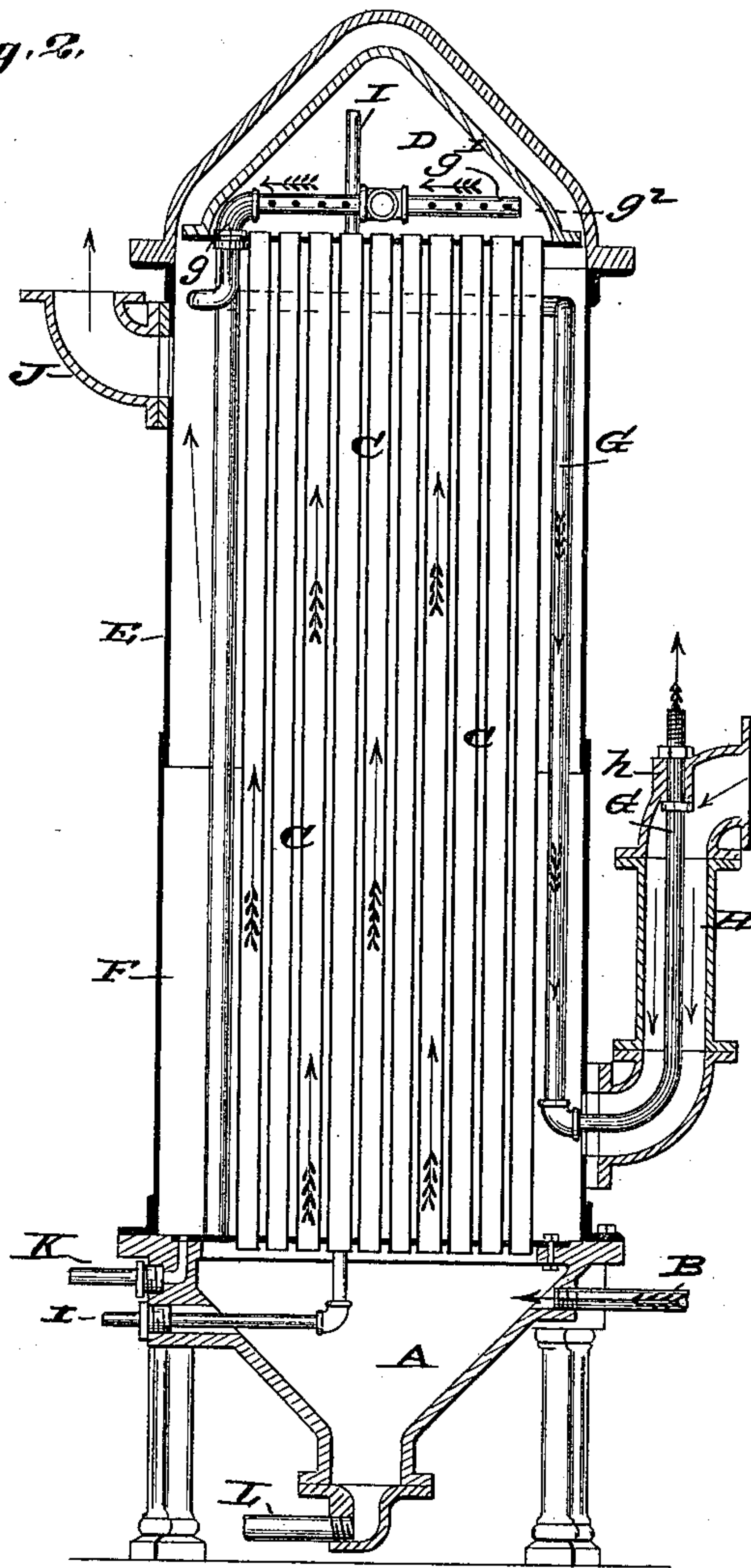


Fig. 3.

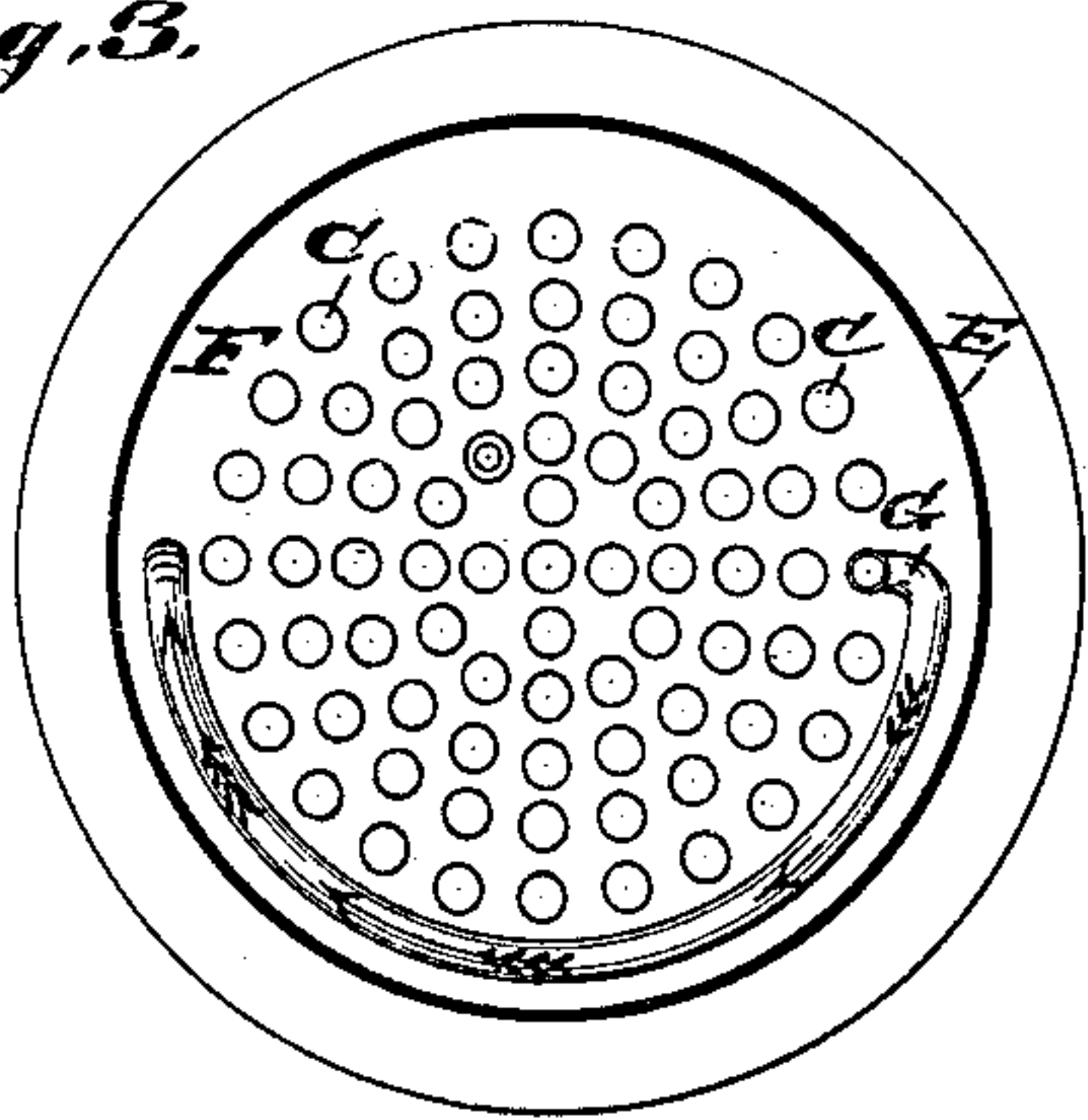
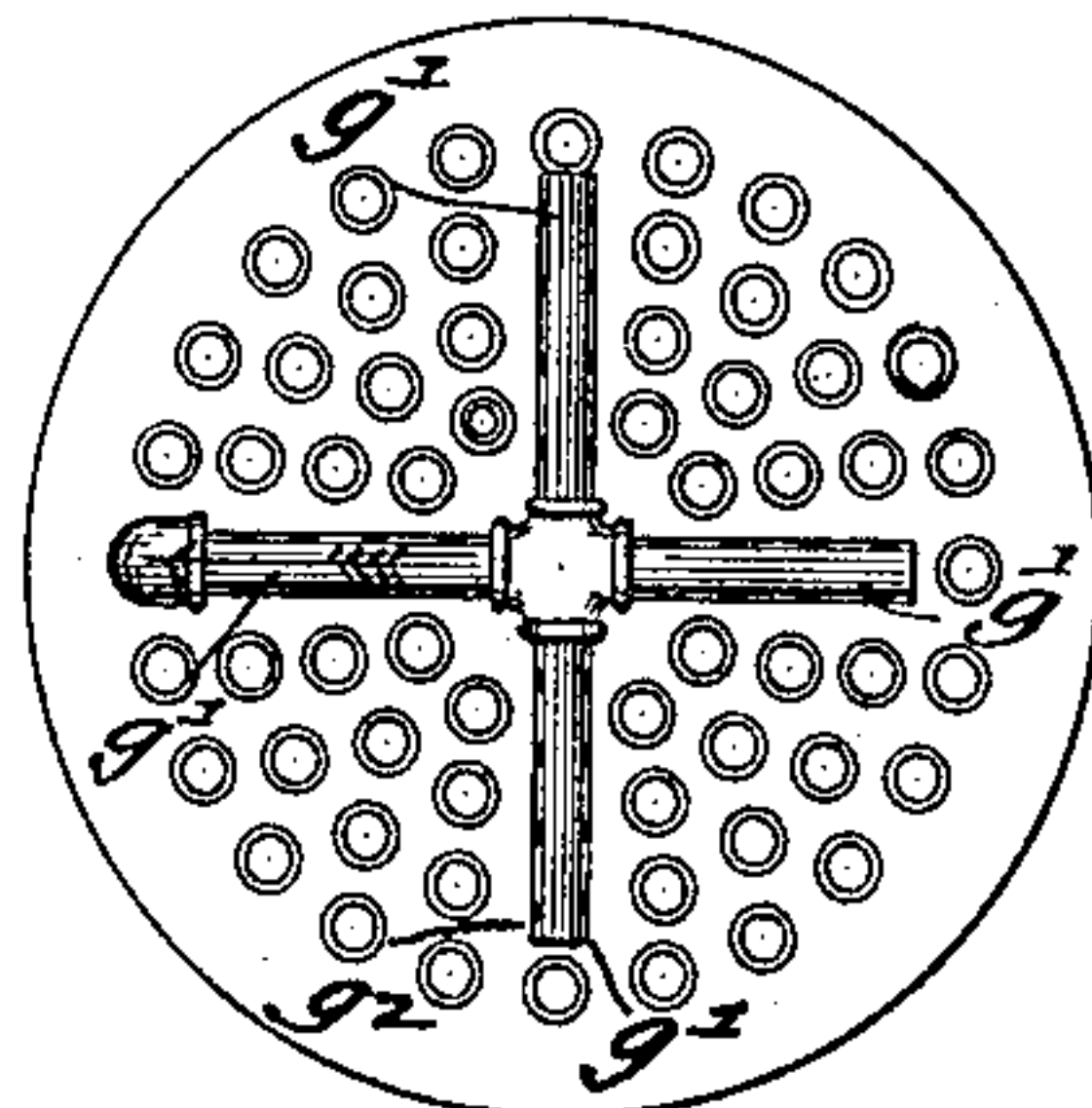


Fig. 4.



Attest:  
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# UNITED STATES PATENT OFFICE.

FREDERICK SHICKLE, OF ST. LOUIS, MISSOURI.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 335,317, dated February 2, 1886.

Application filed April 27, 1885. Serial No. 163,644. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK SHICKLE, 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.

I have heretofore (April 19, 1881, No. 240,278) patented an improvement in feed-water heaters in which the water to be heated and purified is introduced into the heater in a chamber at the lower end of the heater, thence passed upward through tubes into a chamber in the upper end of the heater, and at the upper end of and connected with the tubes, and thence outward from the heater through a pipe which leads from the chamber at the upper end of the tubes and passes upward through a stuffing-box in the outer shell of the heater. The water is heated while within the tubes and by means of steam which circulates around the tubes.

The present heater is, in some respects, similar to the one above referred to, but it differs materially therefrom in this: It is so constructed that the steam used in heating the water shall enter the heater at the point where the heated water is discharged from the heater, in order that the hottest steam shall be applied to that portion of the pipes which contains the hottest water.

In the drawings hereto annexed, and forming part of this specification, Figure 1 is an elevation, the shell being broken away, of the improved heater. Fig. 2 is a vertical section. Fig. 3 is a section on the line 3 3 of Fig. 1. Fig. 4 is a plan showing the upper end of the water-tubes and the pipe into which the heated water is received.

The same letters of reference denote the same parts.

A represents the chamber at the lower end of the heater, into which the water to be heated is delivered by means of the pipe B.

C C represent the various tubes which receive the water from the chamber A.

D represents the chamber above the tubes C C, and in which the water is received from the tubes. The tubes are supported upon the chamber A, and the chamber D is supported upon the tubes, and the tubes and chamber D, saving the connection of the tubes with the

chamber A, are free to expand and contract within the shell E, which, at its lower end, is attached to the chamber A, and serves to inclose the tubes and chamber D and the steam-space F, in which the tubes and chamber are contained, and in which space the steam circulates for the purpose of heating the tubes.

Now, as thus described, the parts are substantially the same as exhibited in the previous construction. In place, however, of discharging the heated water from the chamber D through an outlet extending through the top of the heater it is discharged as follows: G represents a pipe which at its upper end, *g*, is adapted to receive the water from the chamber D. The most desirable form therefor is exhibited in Figs. 2, 3, the pipe being branched at *g' g'*, and the branches being perforated at *g''* to admit the water, substantially as shown. The pipe G leads from the chamber D downward into the steam-space F, and, preferably, well downward to the lower end of the steam-space, and thence the pipe leads into the inlet-pipe H, through which the steam is supplied to the heater, and after passing through a longer or a shorter portion of the pipe H, as is desired, the pipe G leaves the pipe H, as at *h*, at which point a stuffing-box may be used to enable the pipe G to move in the shell of the pipe H in case the parts are contracted and expanded by different degrees of heat; but this is not likely to occur to any marked degree, for the pipe G, where it passes into the pipe H, is made smaller in diameter than the pipe H, substantially as shown, and the pipe G may, after leaving the chamber D, wind around (and as much and as many times as is desired and is practicable) the tubes C before coming to the pipe H, and by reason of this and of the elasticity of the pipe G any movement of the parts C D as they expand and contract within the shell E is distributed along the pipe G, and no strain is experienced at the point *h*, where the pipe G leaves the pipe H. The water becomes more and more heated as it passes through the tubes C, the chamber D, and the pipe G, and that portion of the pipe G which is carried through the pipe H contains the hottest water. Surrounding this portion is the hottest steam, which, entering the heater through the pipe H, circulates

around the tubes C, chamber D, and pipe G, and is finally discharged from the heater through the outlet J.

I represents the pipe through which the scum is discharged from the chamber D, and K represents the outlet for the condense-water from within the steam-space F.

The blow-off for the chamber A is at L.

I claim—

1. The combination of the tubes C, the chamber D, the pipe G, the shell E, and the steam-inlet H, said water-discharge pipe passing out through said steam-inlet, substantially as described.

2. The combination of the chambers A D, the tubes C, the pipe G, the shell E, and the steam-inlet H, said water-discharge pipe pass-

ing out through said steam-inlet, substantially as described.

3. The combination of the tubes C, the chamber D, and the pipe G, said pipe being wound partially or wholly around the tubes before being carried out of the heater, substantially as described.

4. The combination of the tubes C, the steam-space F, the chamber D, and the pipe G, said pipe being extended from the chamber D downward through the steam-space toward the lower end thereof, substantially as described.

FREDERICK SHICKLE.

Witnesses:

C. D. MOODY,

J. W. HOKE.