

(No Model.)

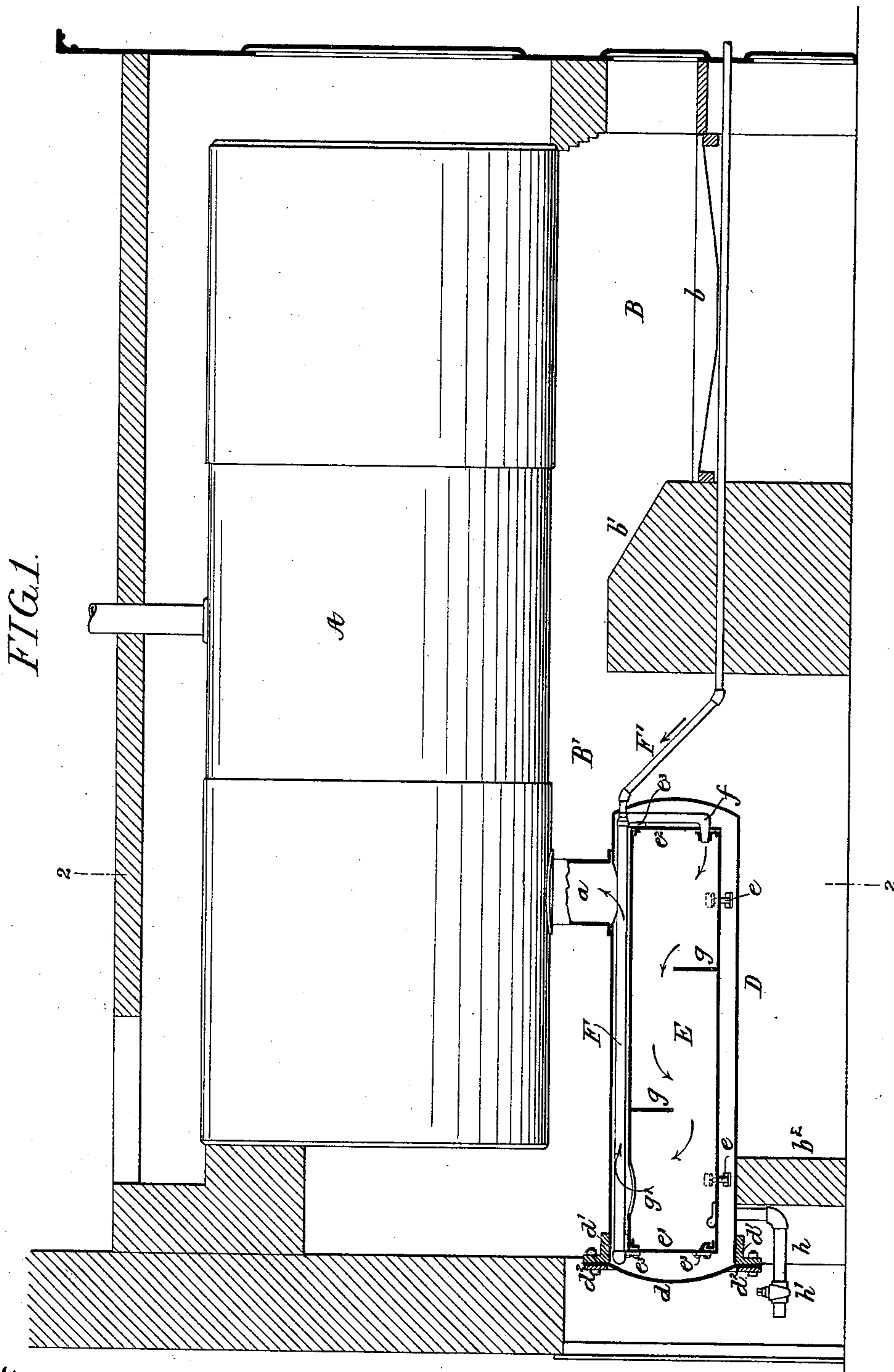
2 Sheets—Sheet 1.

J. C. SOTTER.

FEED WATER HEATER AND PURIFIER.

No. 561,032.

Patented May 26, 1896.



Witnesses:
 F. D. Goodwin
 Will. A. Barst

Inventor:
Jacob C. Sotter
by his Attorneys
Horn & Horn

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FIG. 2.

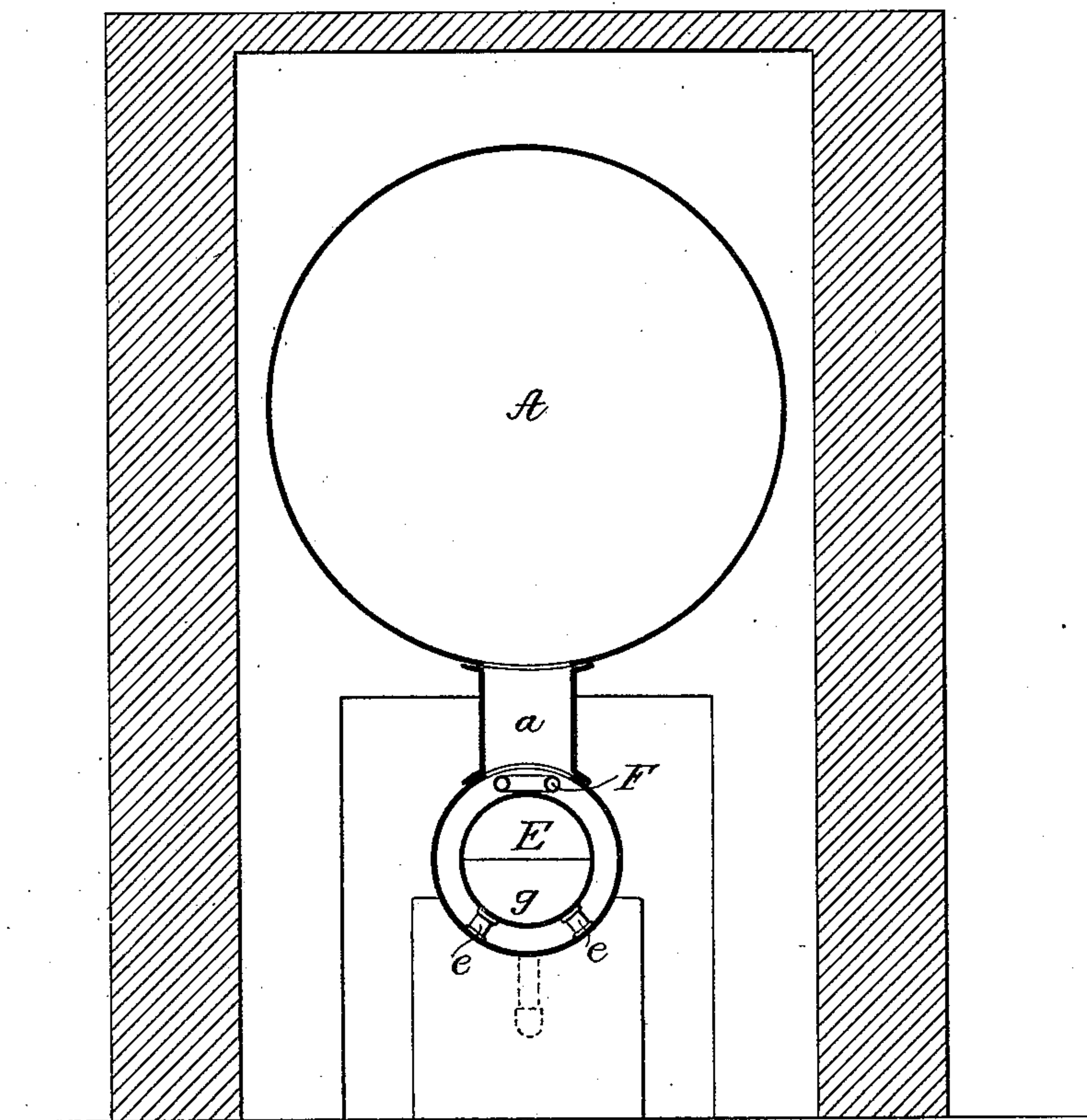
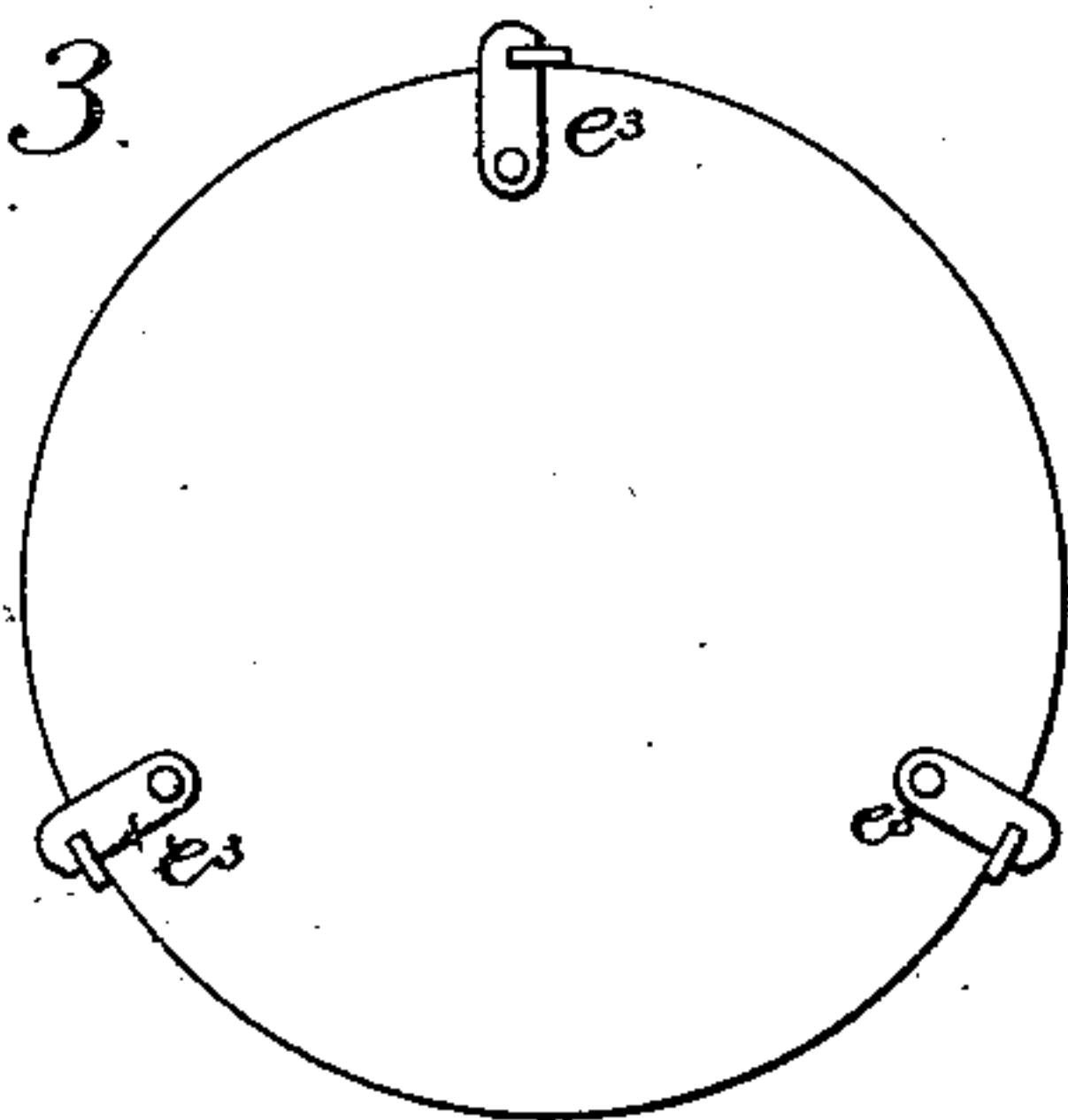


FIG. 3.



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UNITED STATES PATENT OFFICE.

JACOB C. SOTTER, OF POTTSTOWN, PENNSYLVANIA.

FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 561,032, dated May 26, 1896.

Application filed February 21, 1895. Serial No. 539,252. (No model.)

To all whom it may concern:

Be it known that I, JACOB C. SOTTER, a citizen of the United States, and a resident of Pottstown, Montgomery county, Pennsylvania, have invented certain Improvements in Feed-Water Heaters and Purifiers, of which the following is a specification.

The object of my invention is to construct a purifier and feed-water heater which can be attached to or form part of any of the ordinary steam-boilers, either cylinder or water-tube boilers.

In the accompanying drawings, Figure 1 is a view, partly in section, illustrating my improved purifier and feed-water heater attached to an ordinary tubular boiler. Fig. 2 is a transverse sectional view on the line 2 2, Fig. 1. Fig. 3 is an end view of the cylinder.

A is the boiler of the return-tube type, mounted in the foundation in the usual manner.

B is the fire-pot, having a grate *b*.

b' is the bridge-wall and, *B'* is the combustion-chamber beyond the bridge-wall through which the products of combustion pass to the end of the boiler. Supported within this chamber is a drum *D*, preferably arranged partly below the fire-line, so that the flames will not play upon all portions, but simply upon the upper portions of the drum. The forward end of this drum is connected by a neck *a* to the bottom of the boiler *A*, as indicated, and the rear end of the drum is supported on a pier *b*², or other suitable support. The forward head of the drum is preferably a fixed head, while the rear head *d* is removable, being secured to a flange *d'* on the drum *D* by bolts or other fastenings *d*², so that the head can be readily removed. Supported on two or more saddles *e* within the drum is a cylinder *E*, somewhat less in diameter than the drum, so that it will give sufficient space for the water to circulate between the drum and the cylinder. This cylinder has two removable heads *e'* *e*², and the heads in the present instance are secured to the drum by latches *e*³, which pass into slots in lugs on the cylinder, as shown in Fig. 3. Latches are preferred, as bolts or other fastenings become rusted, and thus prevent the ready removal of the heads, but by simply knocking the latches to

one side the heads can be readily detached from the cylinder.

Between the drum and the cylinder is a pipe *F*, preferably above the cylinder, as shown in Figs. 1 and 2, and this pipe communicates with the feed-water pipe *F'* and has a nozzle *f*, which enters a socket in the head *e*² of the cylinder *E*, so that the feed-water will pass through the pipe *F'*, pipe *F*, and into the cylinder *E*, and when it reaches the cylinder it is warm, so that when it circulates through the cylinder and drum *F* it is in condition to pass into the boiler.

It will be noticed that the pipe *F* is somewhat larger than the feed-pipe *F'*. This is for the purpose of preventing the pipe *F* filling should sediment be deposited in the pipe.

Deflectors *g* are arranged in the cylinder *E*, so that the water will take a circuitous course through the cylinder, and in the upper portion of the cylinder is an outlet *g'*, so that the cylinder *E* at this point communicates with the drum. By this arrangement the feed-water is brought into the pipe *F* and is there heated, not by the direct action of the products of combustion, but by the hot water within the drum, and is admitted to the cylinder *E* at such a temperature that it will not deposit to any great extent any of the impurities within the pipe *F*. The pipe *F* may be shortened or lengthened according to the construction of the boiler and the amount of heat required to heat the water to the proper temperature, or the pipe *F'* may be connected directly to the cylinder *E*, dispensing with the pipe *F*. The water in the cylinder *E* is heated also indirectly by the water in the drum and is of such a temperature that when the water escapes from the pipe *F* into the cylinder the impurities—such as lime, for instance—are precipitated, and this precipitation takes place continuously as the water passes through the cylinder and through the drum to the boiler, so that by the time the water reaches the neck *a* the impurities have been separated from the water and the water enters the boiler clear and in condition to be turned into steam.

As the lower portion of the drum is not subjected to the direct action of the products of combustion to any great extent the for-

eign matter in the water may collect in the drum and in the cylinder until it is necessary to clean the purifier, and this can be done without interfering with any portion of the boiler by simply placing the boiler out of service for a short time, after which the head d is detached from the drum, as is also the head e' of the cylinder, when the cylinder can be drawn out from the drum by a hook engaging with the eye e^4 or the flange, as the cylinder is not connected to the nozzle f of the pipe F , the nozzle fitting snugly in the head, and the cylinder can be cleaned and washed and the sediment in the drum can be removed by scrapers. It will be understood that the sediment in this instance is not the hard sediment found in many instances in boilers, as it is not subjected to the direct action of the products of combustion, so that it is readily removed and will not cake and become attached to the drum or cylinder to any great extent.

In some instances there may be a slight caking in the upper portion of the drum, but this can be readily removed by skinning the plates.

I find by practical experiments this apparatus will purify the water to such an extent that the boiler and tubes will remain clear of sediment and that the impurities are practically all removed before the water enters the boiler.

While I have shown the drum arranged longitudinally in respect to the boiler, in some instances it may be arranged transversely where the clean-out opening is at the side, and that the drum may form the mud-drum of an ordinary water-tube or vertical tubular boiler or may be attached to the mud-drum of any boiler without departing from my invention.

It will be understood that the drum as arranged in the drawings acts also as the mud-drum for the boiler as well as a purifier for the water and that I may attach a blow-off pipe h , provided with a suitable valve h' , to the drum, as shown in Fig. 1.

I claim as my invention—

1. The combination in a steam-boiler, of the feed-water heater and purifier, consisting of a drum situated in the combustion-chamber and connected to the lower portion of the boiler, and a cylinder within said drum hav-

ing communication therewith, with a feed-water pipe extending within the drum and communicating with the cylinder, substantially as described.

2. The combination of the boiler, the drum situated in the combustion-chamber below the boiler and connected to the lower portion of the boiler, a cylinder within the drum and a feed-water pipe communicating with the cylinder at one end and the cylinder having communication with the drum only at the opposite end, substantially as described.

3. The combination of the steam-boiler, the drum mounted in the lower portion of the combustion-chamber, a neck forming communication between the drum and the lower portion of the boiler, a cylinder within the drum, a feed-water pipe, a pipe F situated between the drum and the cylinder and connected to the feed-water pipe and to the cylinder, said cylinder being in communication at the opposite end with the drum so that the feed-water will circulate through the pipe F , cylinder E and drum to the boiler, substantially as described.

4. The combination of the boiler, the drum situated in the combustion-chamber and connected thereto, a cylinder therein, a feed-water pipe connected with the cylinder at one end, an opening in the upper portion of the cylinder at the opposite end, forming communication with the drum, baffle-plates in the cylinder so as to make the water travel in a circuitous path as it travels from one end of the cylinder to the other, substantially as described.

5. The combination of the boiler, the drum, the neck forming communication between the boiler and drum, a removable head for the drum, a cylinder mounted within the drum and having removable heads, an opening in the upper portion of the cylinder, a feed-water pipe extending into the space between the drum and cylinder and discharging into the cylinder, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JACOB C. SOTTER.

Witnesses:

WM. A. KNAPP,
H. M. LESSIG.