

(No Model.)

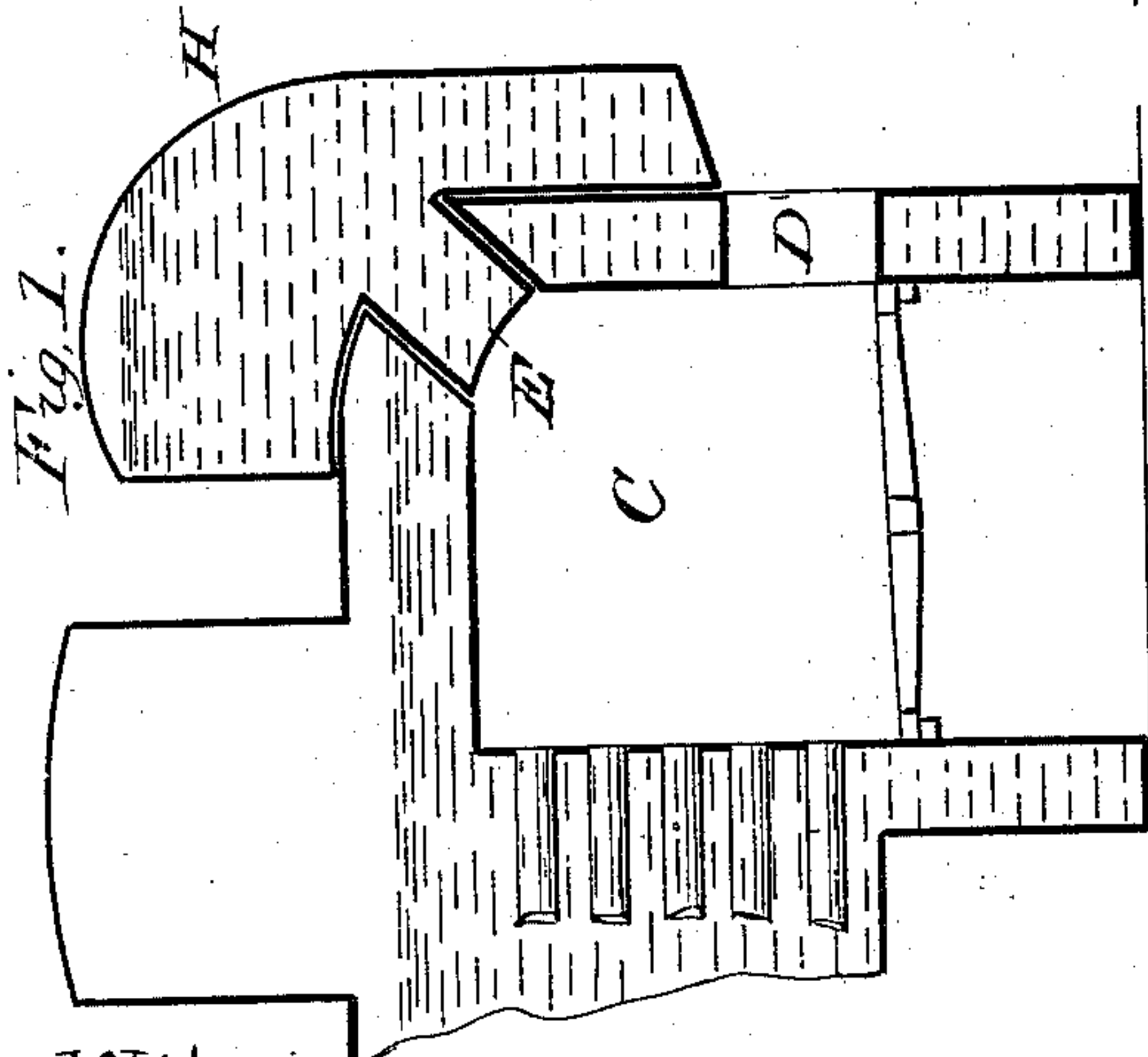
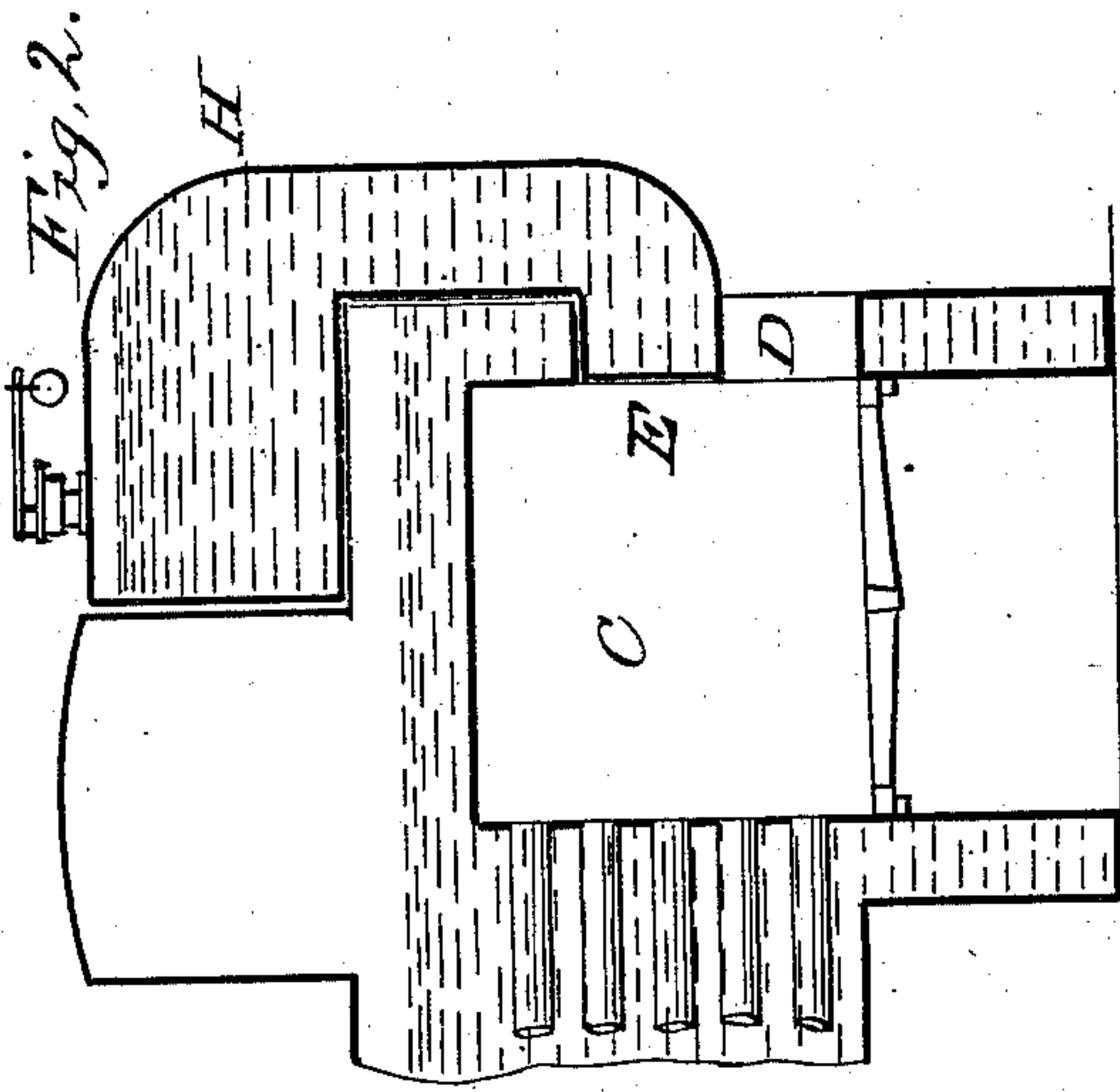
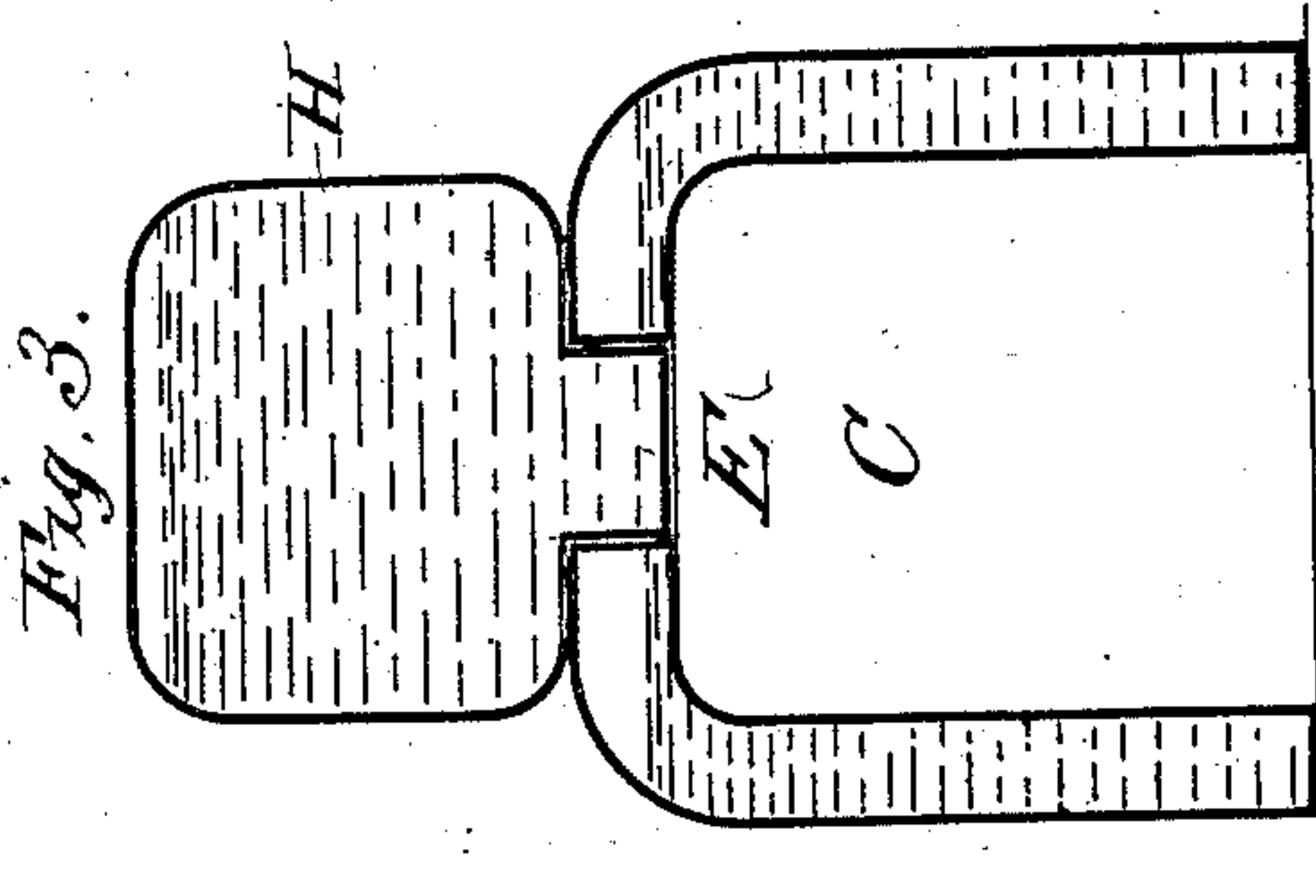
2 Sheets—Sheet 1.

O. ROTHROCK.

HEATER FOR STEAM BOILERS.

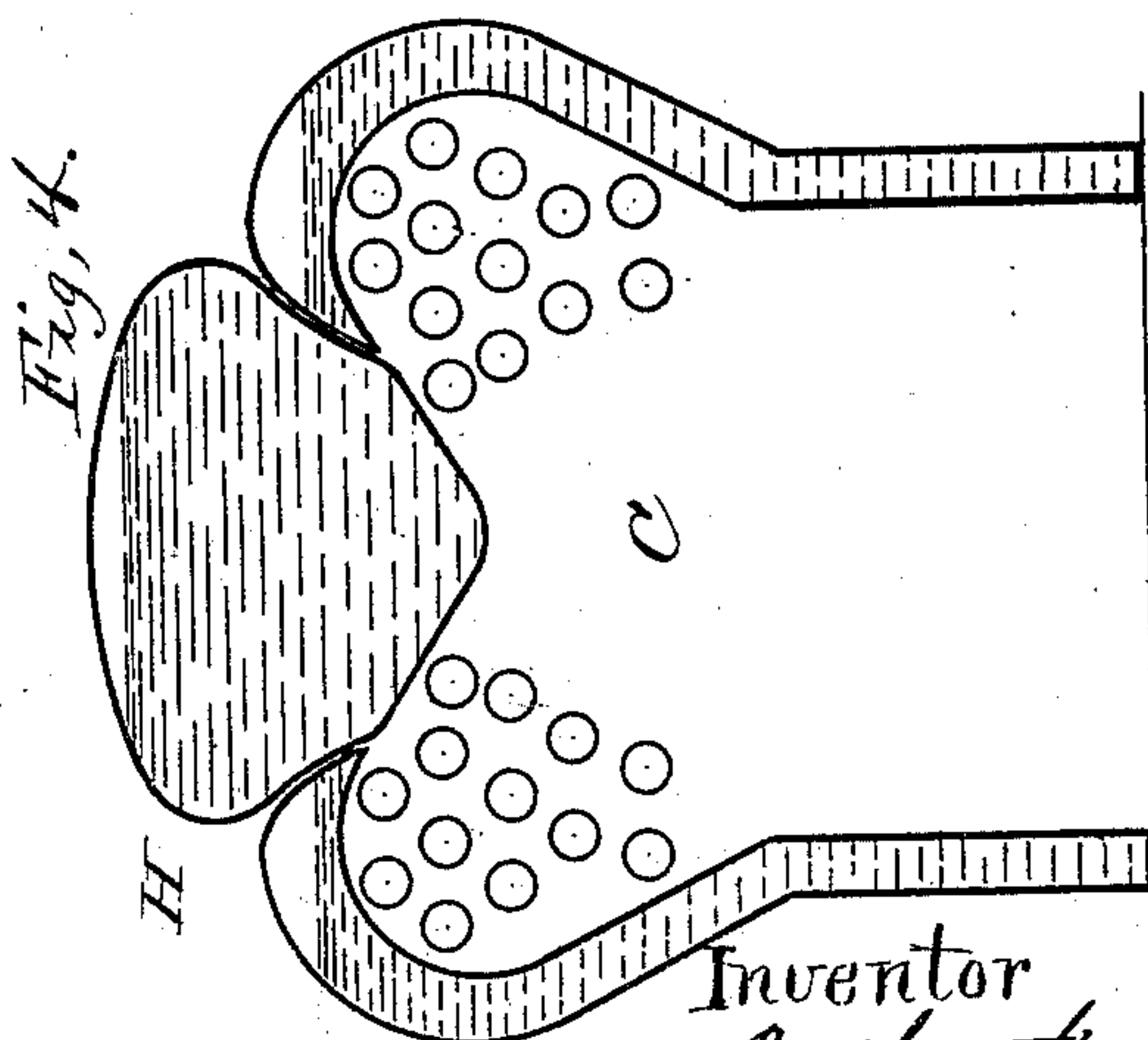
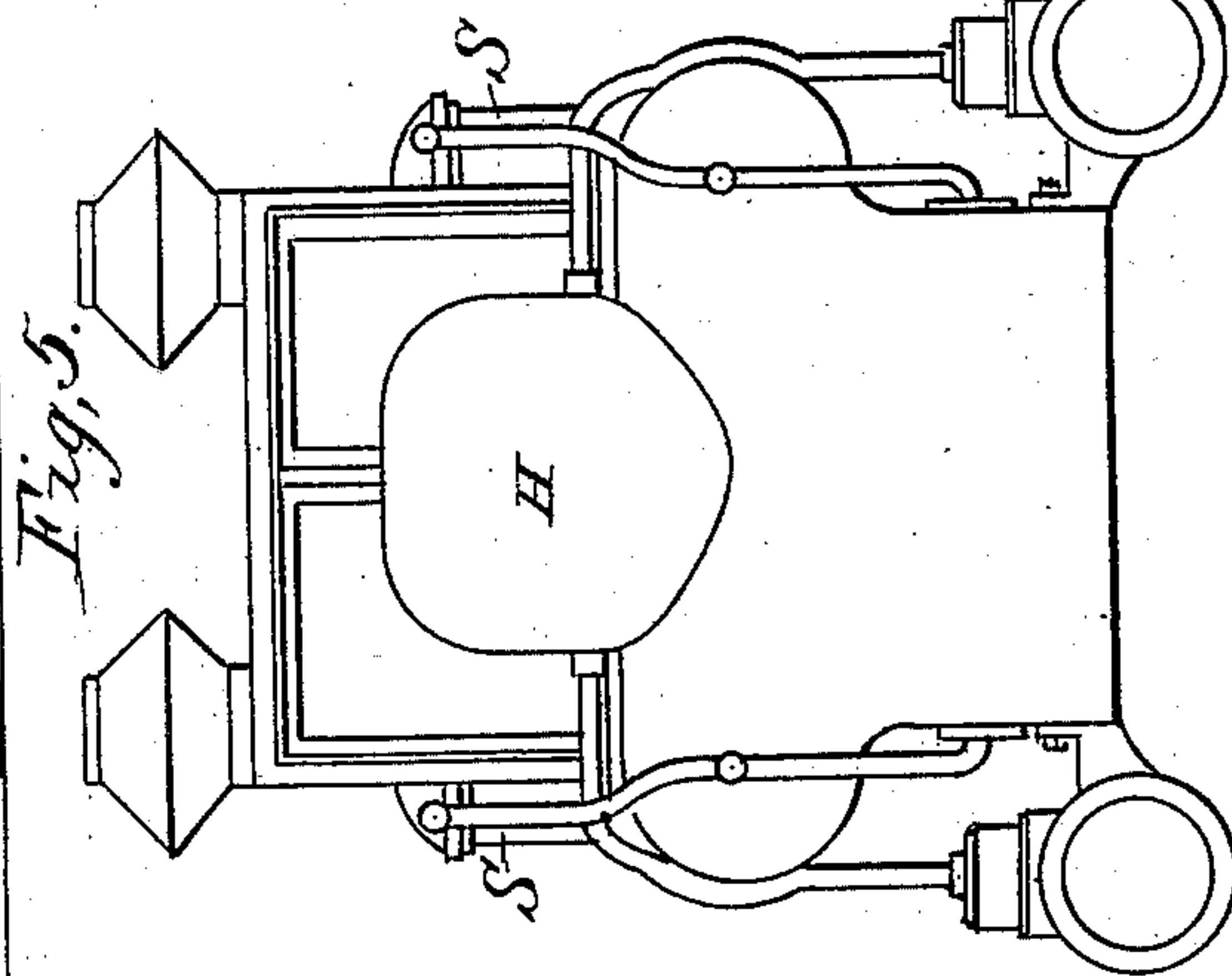
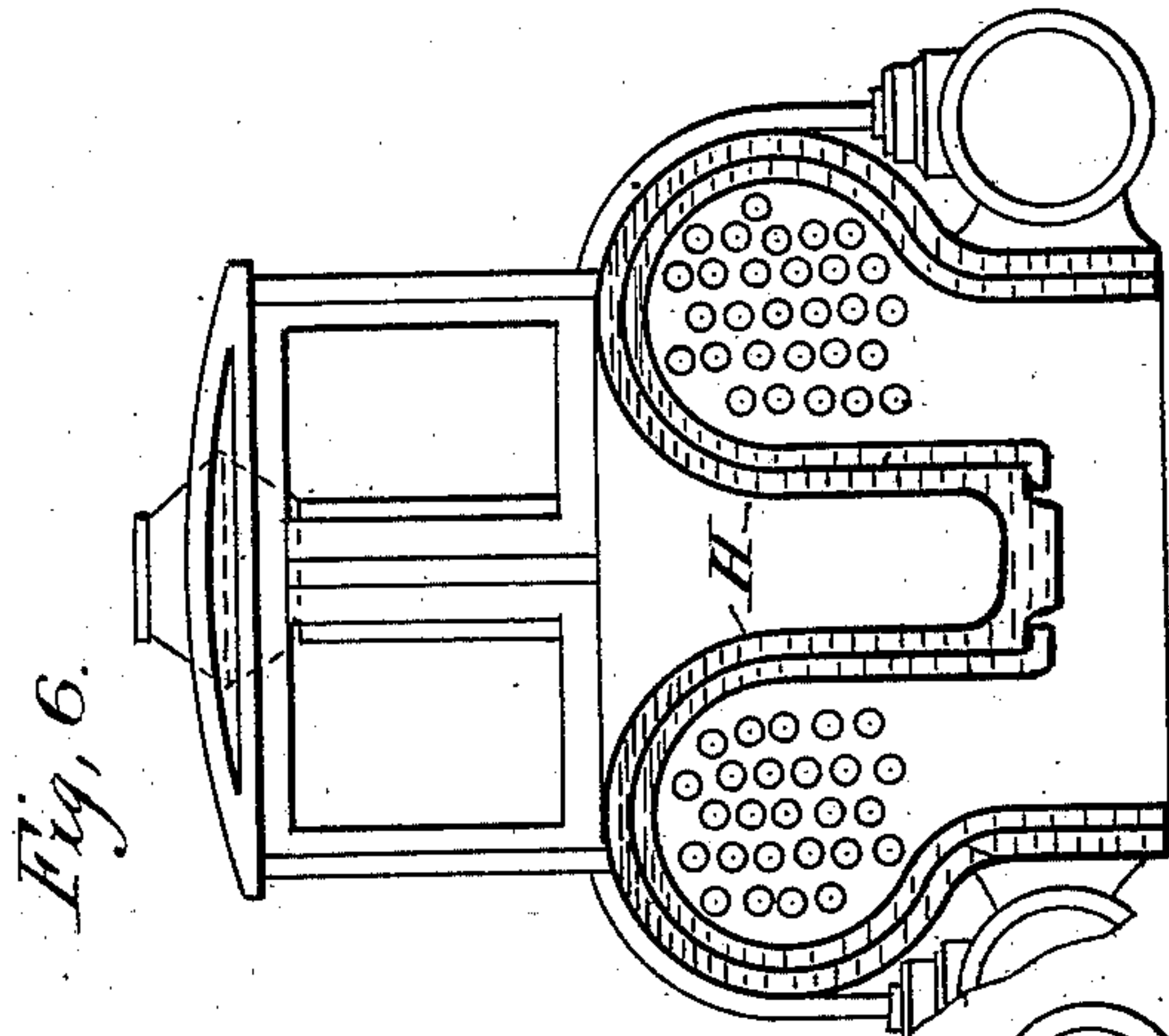
No. 308,855.

Patented Dec. 2, 1884.



Witnesses

A. Leo Duffy
Edward C. Ellis



Inventor
Oscar Rothrock
per *J. E. Duffy*
att.

(No Model.)

2 Sheets—Sheet 2.

O. ROTHROCK.
HEATER FOR STEAM BOILERS.

No. 308,855.

Patented Dec. 2, 1884.

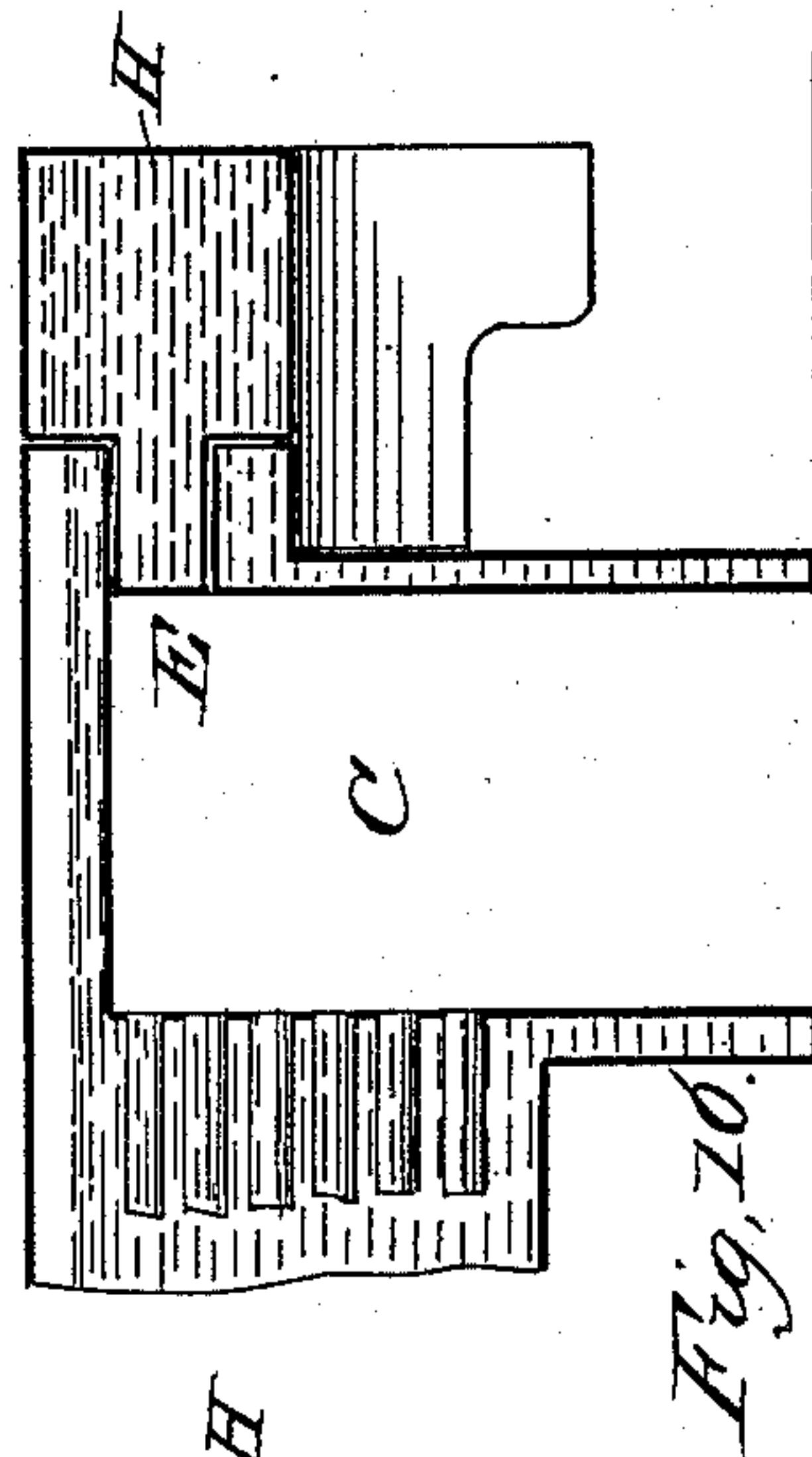
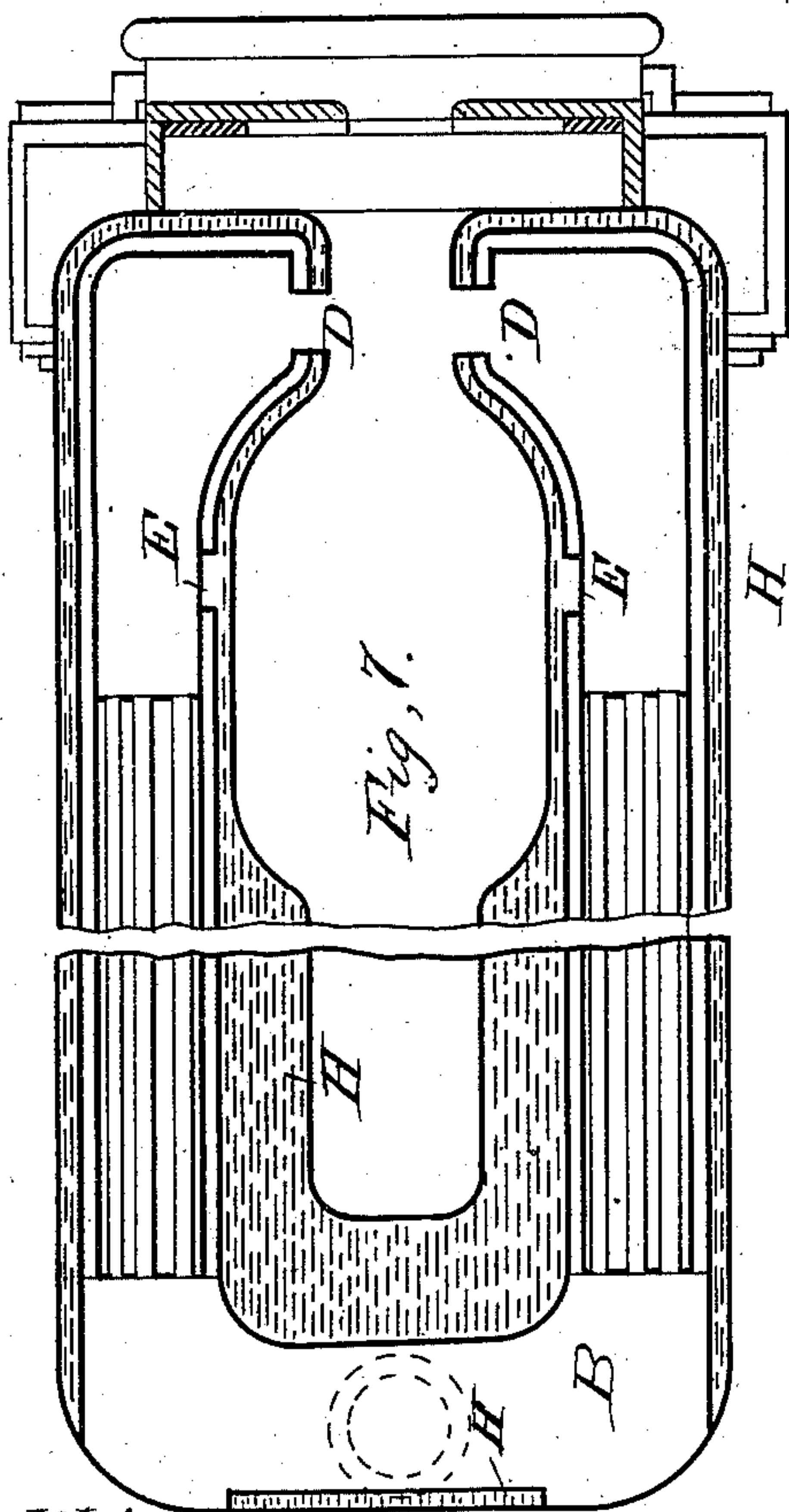
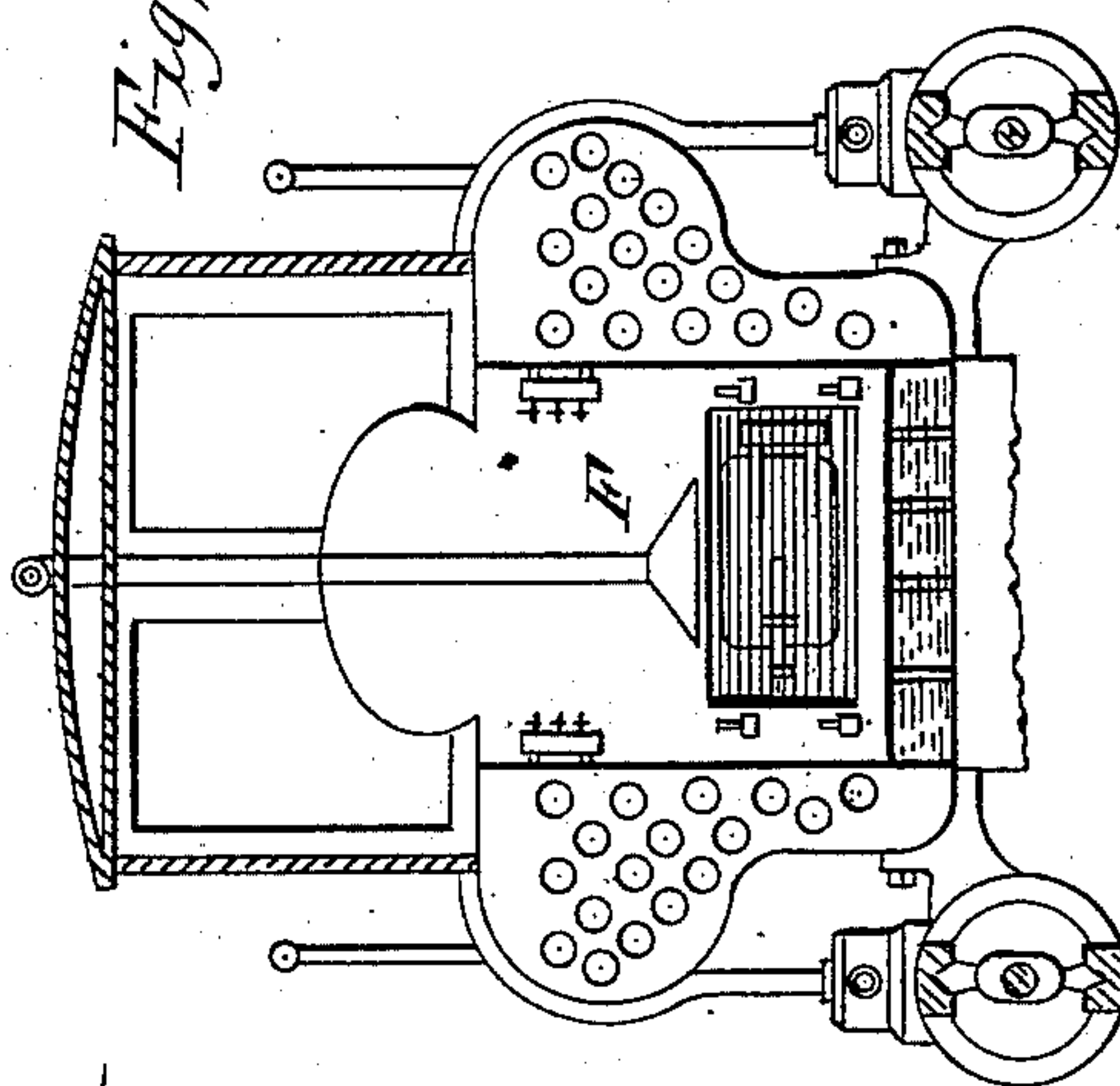
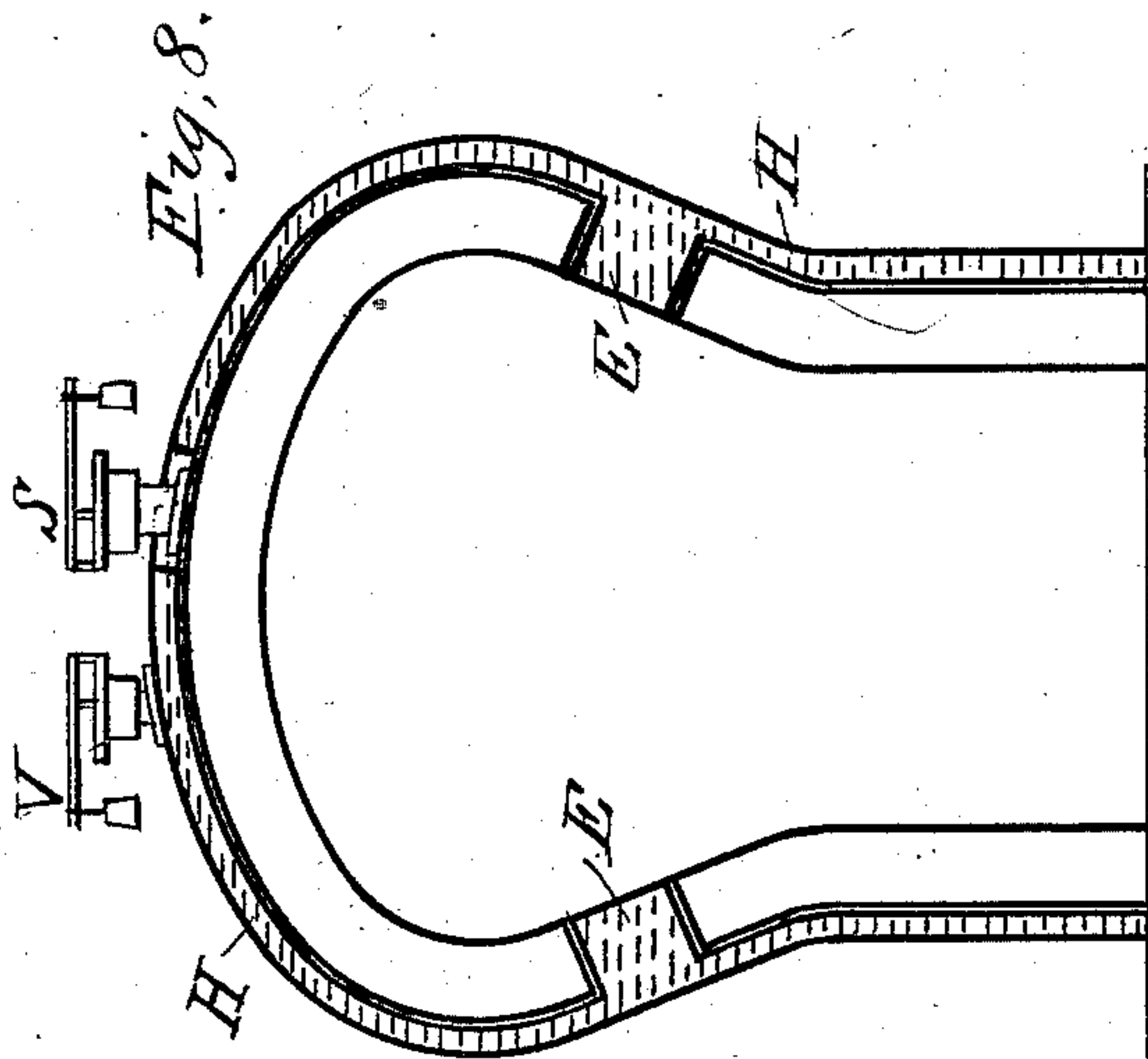
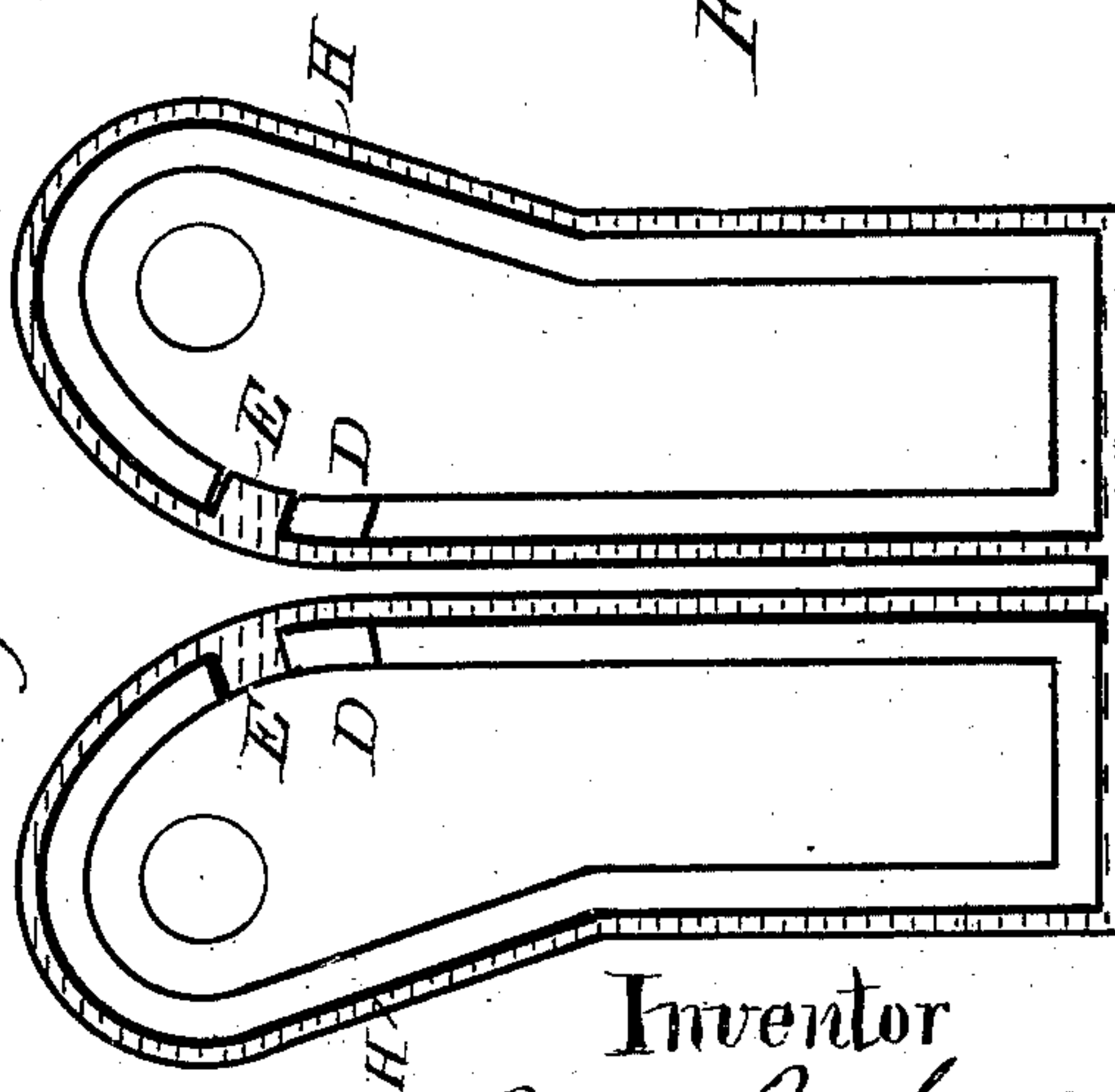


Fig. 9.



Witnesses:

A. Leo Duffy
Edward E. Ellis

Inventor

Oscar Rothrock
per O. E. Duffy
Atty.

UNITED STATES PATENT OFFICE.

OSCAR ROTHROCK, OF BEECH CREEK, PENNSYLVANIA.

HEATER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 308,855, dated December 2, 1884.

Application filed August 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, OSCAR ROTHROCK, of Beech Creek, in the county of Clinton and State of Pennsylvania, have invented certain new and useful Improvements in Heaters for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The invention relates to feed-water heaters for steam-boilers, and also to serve as reservoirs for carrying an additional supply of water, when applied to locomotives, to that usually carried in the tenders.

Locomotive-engine boilers as at present constructed depend solely for their supply of water upon the quantity carried in their tenders, which for ordinary purposes is usually satisfactory, except in extreme cold weather or in extreme cold climates, when the water in said tenders freezes, as well as the pump-connections thereof, which generally gives great annoyance and subjects the trains to frequent delays. Another exception is when the usual tenders are insufficient to carry water when trains of limited time have to travel long distances without stop, and the delay of taking water at stations belates the trains thus limited to time; and the further advantage of my present invention is that the radiating portions of the boiler are utilized in heating the feed-water to a temperature sufficient to prevent the chilling or lowering of the temperature of the water in the boiler, thus utilizing the heat heretofore wasted, and by this means preventing the wrenching of the tubes and joints of the boiler, heretofore caused by injecting cold water into the boiler, with other advantages, as will hereinafter be more fully explained.

Referring more particularly to the drawings hereto annexed, Figure 1 is a sectional view of my heater when used in connection with an ordinary single locomotive-boiler. Fig. 2 shows the heater fitted into the fire-door opening. Fig. 3 shows the heater forming a portion of the upper part of the combustion-chamber. Fig. 4 shows the heater when ap-

plied to a twin boiler. Fig. 5 shows the general arrangement of the twin boiler, heater, &c., combined. Fig. 6 shows the application of the heater when the passage-way extends the entire length of the boiler. Fig. 7 is a horizontal section showing the heater surrounding the boiler on all sides. Fig. 8 shows the heater applied as a jacket to a twin or single boiler. Fig. 9 shows the heater applied to a twin boiler, part entering the fire-door opening. Fig. 10 shows the heater forming the front end of a twin or other boiler, and Fig. 11 shows the heater between the two boilers and extending down and forming a front to the same.

The object of my invention is to provide a heater that will not only supply water of a high temperature to all classes of boilers, but will also serve as a covering to the same.

The invention consists in so constructing and connecting the heater to the boiler that a portion of the direct heat of the combustion-chamber is utilized to heat the water, and also to form a hot-water jacket for the boiler, all of which will be definitely described, and pointed out in the claims.

By my peculiar construction of heater, and the novel manner in which I secure a portion of the direct heat of the combustion-chamber, and the protection it affords to the boiler as a cover, I am enabled to generate more steam than heretofore from the same amount of fuel.

My heater is a reservoir, made of metal and of different forms, depending upon the contour of the boiler, the manner of connecting it thereto, or to the type of boiler to which it is to be applied. The water may be supplied to the heater by means of injection or pumps, and it will have the ordinary gage-cocks and safety-valve. The water may be fed from the heater to the boiler with the same appliances that it has been heretofore fed; but I can use the same injector or pump to supply the heater and connect the top of the heater by a pipe with the steam-space and the bottom with the water-space of the boiler, when the water will enter the boiler by gravity. I would provide the water-pipe with a valve to regulate the flow of water, as the water in the heater should be kept at a greater height than that in the boiler.

In Figure 1 I place the heater H upon the top and front of the boiler, extending it down

to the fire-door. A man-hole or opening of the size required for sufficient heating-surface for the heater is made through the top or end of the boiler leading into the combustion-chamber or furnace C, and into which is inserted the extension E of the heater, which corresponds in size with the opening.

In Fig. 2 the heater is placed upon the boiler, and extends down the front, the extension E entering the fire-door opening, it being made sufficiently large to receive the extension and permit the furnace to be fired. The heater shown in Fig. 8 is placed upon the boiler with the extension projecting into the combustion-chamber.

In Fig. 4 I have shown the application of my heater to twin boilers. The heater is so constructed that it will occupy the space between the upper part of the boilers, and be supported by the same, the extension being formed by the angular bottom of the heater, as shown. Fig. 5 shows the same application of the heater to twin boilers, also the steam-drum S of the boilers, and other connections.

In Fig. 6 I have shown the heater applied to a boiler when the passage-way extends the whole length of the combustion-chamber, the heater covering every part, leaving openings for the doors and for the connecting of the valves, &c. This construction adapts the heater as a hot-water cover for the boiler, and thereby prevents condensation of steam in the boiler and the radiation of heat.

In Fig. 7 the heater of the boiler is on all sides, completely or partly surrounding the walls of the smoke-box B, the gage-cocks, injector or pumps, &c., being conveniently in the spaces or openings provided for them. In this case I have made the heater and boiler together, or, in other words, have used the outer walls of the boiler for the inner walls of the heater; but the heater may be constructed separately, as hereinbefore described and shown.

In Fig. 8 the heater surrounds a twin or single boiler as a covering, with the safety-valve V for the heater and safety-valve S for the boiler.

Fig. 10 shows another manner of applying my heater, an opening being made in the front of the boiler into which the projection E is inserted, the heater covering a part of the front of the boiler, and is adapted to be readily removed when occasion requires.

In Fig. 11 the end of the heater for twin boilers extends down and covers the front of the boiler, an opening being left for the fire-door; or the door may be placed upon the heater; or both boiler and heater may have

doors, an escape-pipe and funnel, F, that carry the gases when the doors are open, being placed on the heater instead of the boiler.

The heaters can be made to keep the temperature of the water very high by enlarging the projecting portion that is in contact with the heat of the furnace. The heating of the water may be continued at all times without danger or trouble.

It will be seen from the foregoing description that my heater can be adapted to any type of stationary, marine, or locomotive boiler, and wherever used will prove very efficient, even if the furnace is made distinct and separate, as in externally-fired boilers, the heater becomes a part of the furnace and boilers.

Having thus described my invention, what I claim is—

1. The combination, with a boiler, of a feed-water heater upon the outside of the boiler, and so constructed that a portion of the said heater will form a part of the fire-box, whereby a part of the direct heat of the combustion-chamber is utilized to heat the water.

2. The combination, with a boiler, of a feed-water heater forming a hot-water jacket for the said boiler, a portion of the walls of the fire-box being formed by the heater, substantially as shown and described.

3. The combination, with a boiler, of a feed-water heater forming a hot-water jacket for the said boiler, and so constructed that a portion of the said heater will enter the fire-box, whereby a part of the direct heat of the combustion-chamber is utilized to heat the water.

4. The combination of the feed-water heater, having an inward-projecting portion, with a boiler having an opening for said projecting portion of the heater, said projection of the heater forming part of the walls of the combustion-chamber.

5. The combination, with a boiler, of a feed-water reservoir or heater adapted to encircle a part or the whole of the boiler, a part of the heater having an inner projection passing through the walls of the combustion-chamber, said projection being exposed to the heat of the furnace, the boiler and reservoir having suitable connections, substantially as described.

In testimony whereof I have hereunto set my hand and seal this 20th day of August, A. D. 1884.

OSCAR ROTHROCK. [L. S.]

Witnesses:

S. M. McCORMICK,
W. H. MOORE.