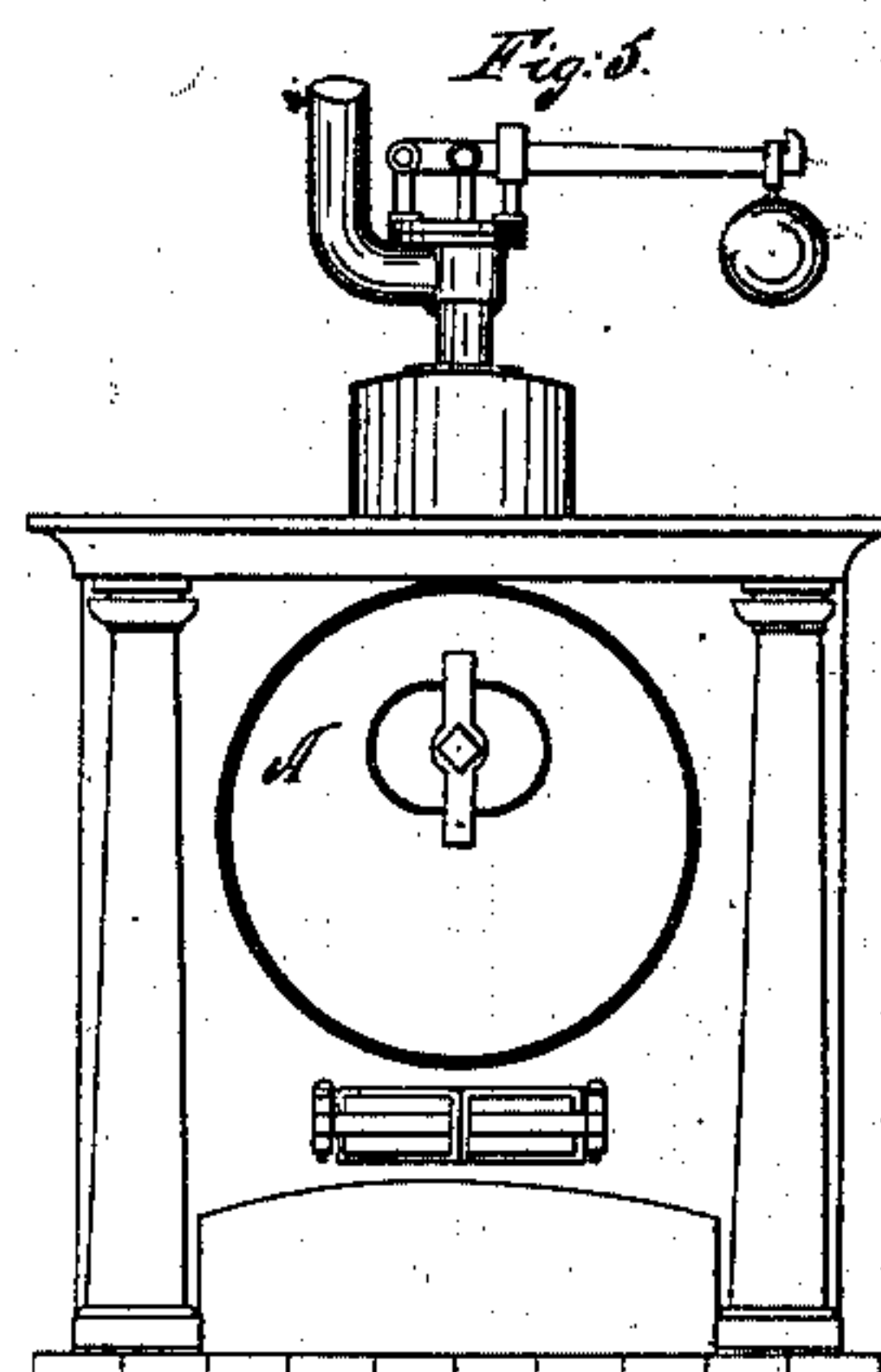
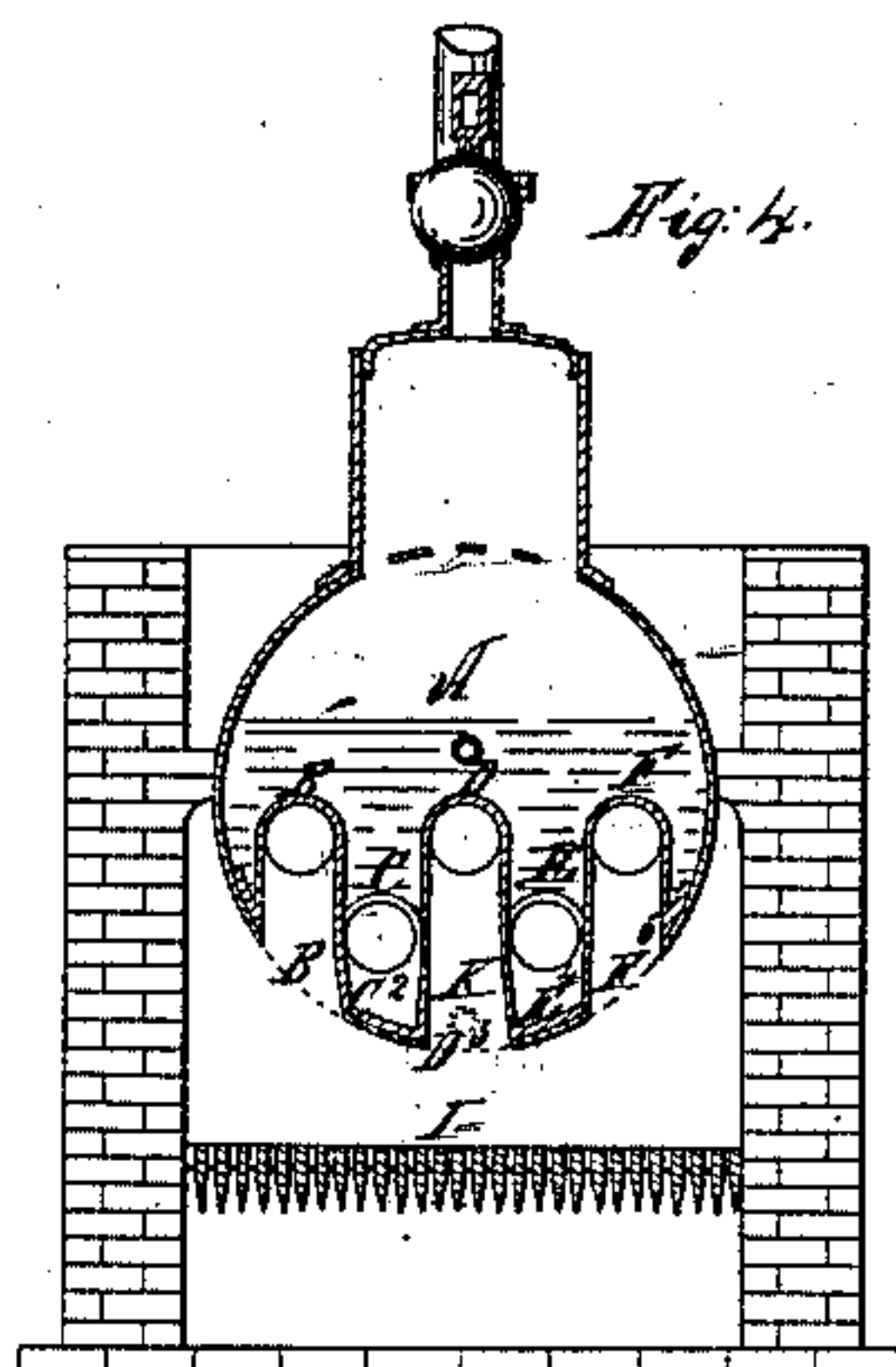
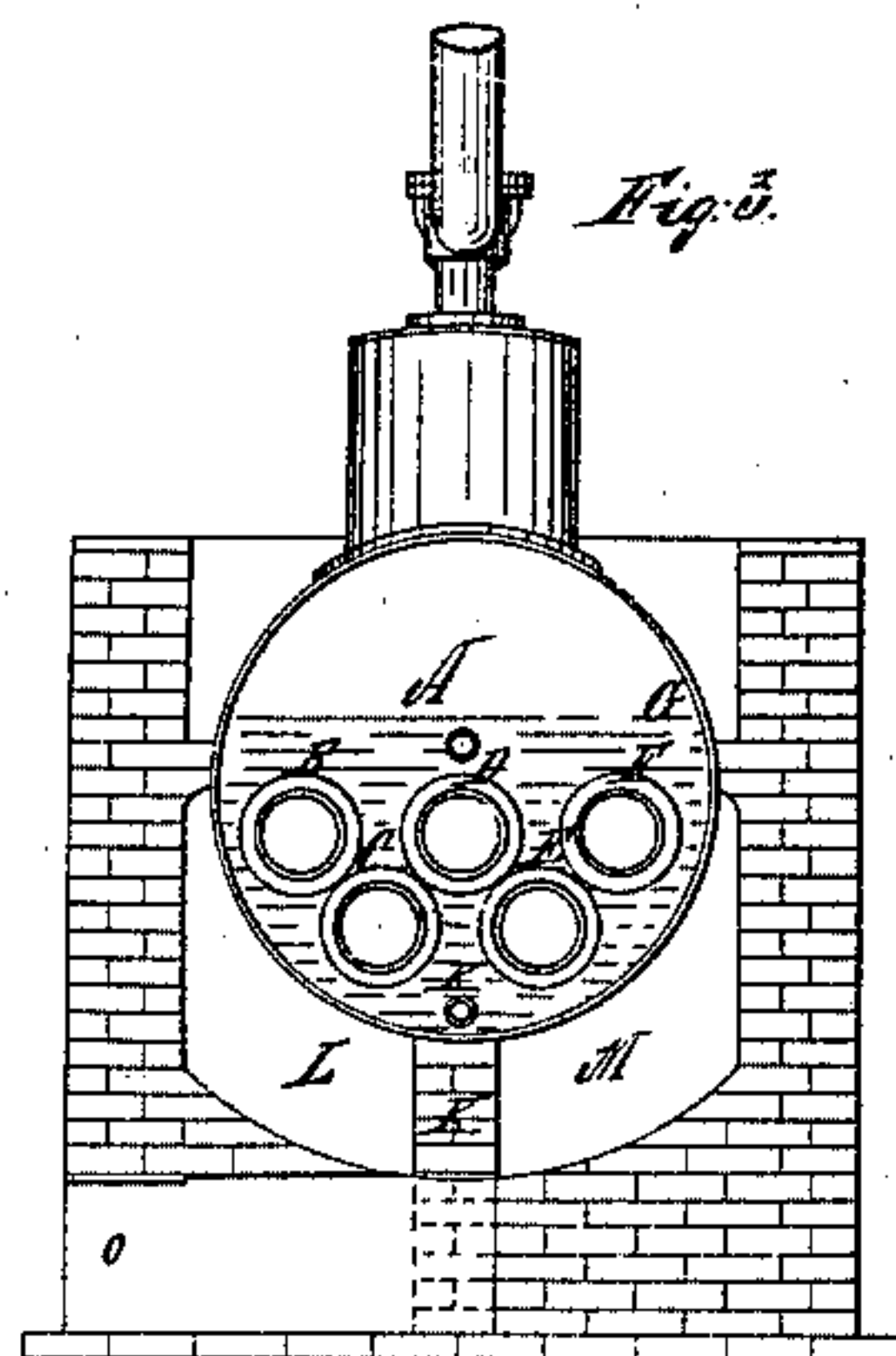
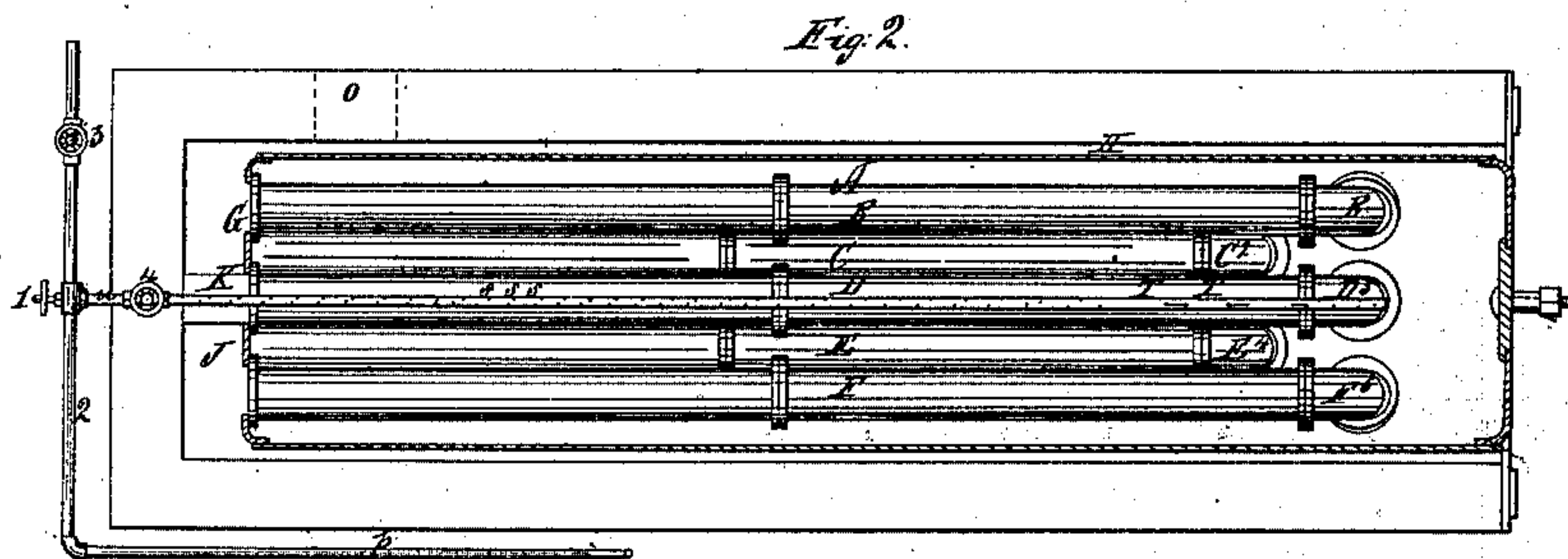
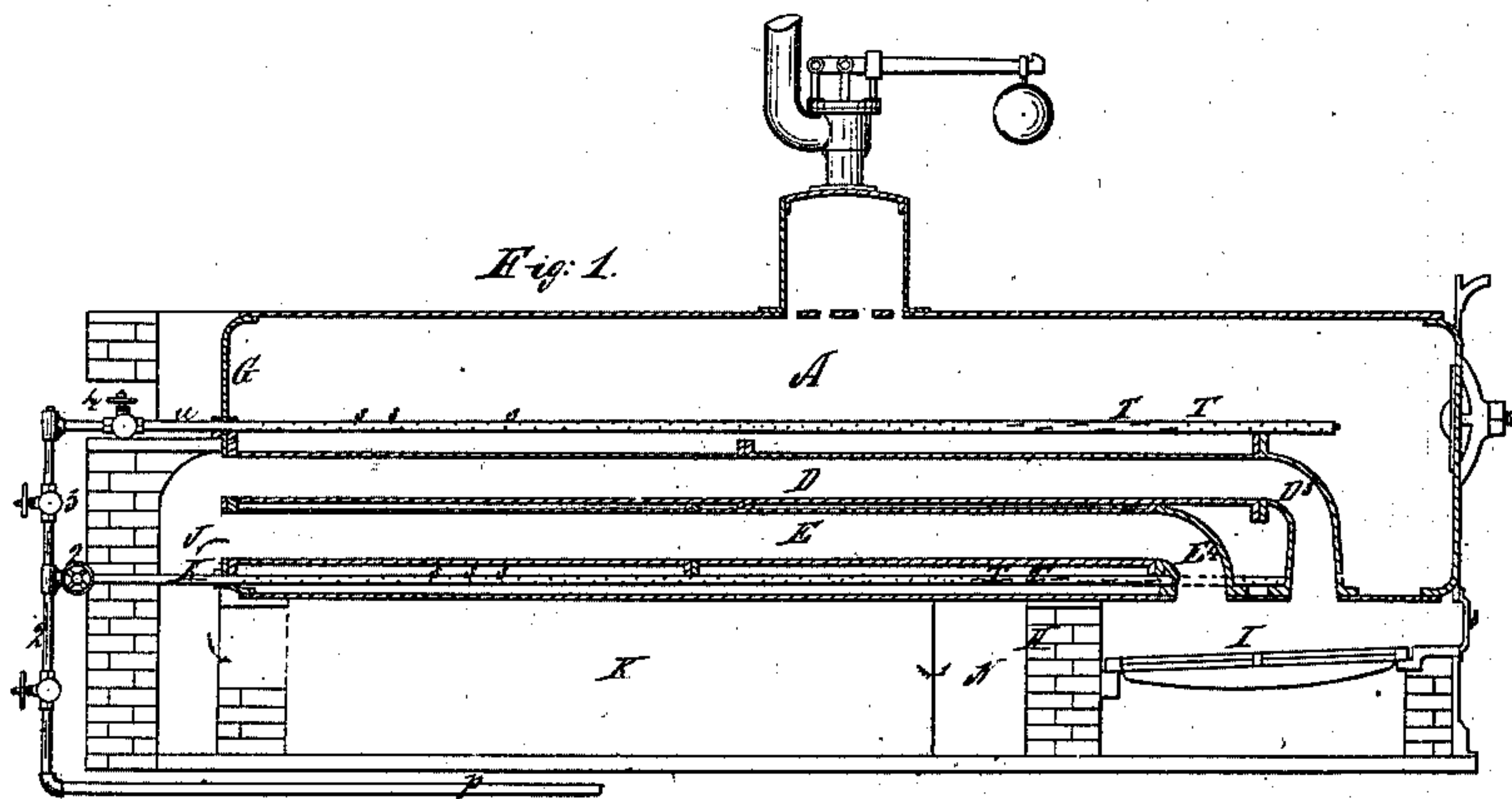


P. Atherton,
Flue and Tubular Boiler

N^o 68,934.

Patented Sep. 17, 1867.



Witnesses:
Jos. D. Milligan
Perth.

Inventor:
Peter Atherton

United States Patent Office.

PETER ATHERTON, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 68,934, dated September 17, 1867.

IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, PETER ATHERTON, of Philadelphia, in the county of Philadelphia, in the State of Pennsylvania, have invented an Improvement in Steam-Boilers, and in their apparatus for feeding and cleansing the same; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure 1 is a vertical sectional elevation of a boiler.

Figure 2 is a plan of same.

Figure 3 is a section through the back boiler-head.

Figure 4 is a section through the flues connecting with shell.

Figure 5 is an elevation of boiler front.

Fig. 1 shows an ordinary cylinder boiler, A, fitted with one or more flues B C D E F, connected to the boiler-head G by flanges, secured with screw-bolts or rivets, or any known means, and connected with the bottom of the boiler by means of bends, elbows, or quarter-turns B¹ C² D³ E⁴ F⁵. These bends, elbows, or quarter-turns are bell-mouthed, and secured to the boiler-shell by means of flanges, secured by screw-bolts, rivets, or any other known means. The bearing-wall H prevents the products of combustion passing under the boiler A from the grate I, which therefore finds an outlet, through the bell-mouth flues B C D E F, into the chamber J, in the direction of the arrows. The boiler A sits on a wall or midfeather, K, dividing the space under the boiler into two chambers L and M. The products of combustion, after leaving J, pass along the chamber L, through the orifice N, in the midfeather K, into the chamber M, and escaping into the chimney at O. By this system of flues, passing from over the fire, through the interior of the boiler, the amount of heating surface is largely increased.

Fig. 2 shows the plan of feeding and cleansing boilers. The tube P is connected with the force-pump, or any other means of supplying the boiler with water. The tube Q is connected at right angles with the tube P, and stands vertically, as shown in fig. 1. From this tube Q diverges the tube R, into the lower portion of the boiler A, between the flue D and the inner portion of the shell of boiler, and terminating at the bend, elbow, or quarter-turn D³. This tube R is perforated with holes S S S, of diameter deemed necessary to suit the evaporating power of the boilers, which holes S S S are countersunk or recessed from the outer side of tube, so as to be freed from any clogging or obstruction, and also to distribute the feed-water over a larger surface over the bottom of the boiler. I also use longitudinal slits or slots, widened on the outer surface, as shown in figs. 1 and 2, and marked T T. The feed-water is admitted into the tube R by opening the valves or cocks 1 and 2. The feed-water is forced through the perforations or slits on to the bottom of the boiler in different directions, in accordance with the position of the perforations or slits, thereby keeping the bottom clean, and distributing the feed-water over a large surface, and equalizing the expansion and contraction of the boiler. In blowing off or emptying the boiler, valve or cock 1 is closed, valve or cock 2 opened. Valve or cock 3 is also opened, permitting the exit of water to the atmosphere. The tube U connects with the vertical tube Q, passing through the boiler-head in a line with the water level in boiler, and terminating at the end of flue D, as shown in figs. 1 and 2. This tube U is also perforated or slotted in the same manner as the bottom feed pipe R. This tube I designate the scum tube or pipe, and use for the purpose of freeing the surface water of all impurities that may collect during the generation of steam, and which scum or impurity is so fruitful of priming or lifting of the water into the steam-chamber. I close valves or cocks 1 and 2, and open 3 and 4, blowing the scum or impurities into the atmosphere through the blow-off cock V. I also use this tube U, designated scum tube or pipe, as a water-feed pipe by opening valves 1 and 3, and closing valve 2. I feed on the top of the flues, or, by opening valves 1 2 3, I feed under and over the flues; and, by opening valve 4, I can free the boiler of all foreign matter, both on the surface of the water, and at the bottom of the boiler.

Figs. 3 and 4 show the position of the feed and scum pipes in section in the boiler.

Fig. 4 also shows the position of one or more bell-mouthed bends, elbows, or quarter-turns in section, as fastened to the bottom of boiler.

Fig. 3 represents the flanges of flues in connection with back head of boiler.

Figure 5 represents the front of boiler.

One part of my invention consists in placing into the shell of a steam-boiler one or more flues, composed of wrought or cast iron, or any other known material. One end of said flue is connected, by flanges, sockets, or any other mode of connecting tubes or flues now in use, to the back head of the boiler, the other end terminating in a bend, elbow, or quarter-turn, the mouth or orifice of which is enlarged to more than the body of the flue or tube connected therewith, into what is commonly called a bell-mouth, which bell-mouth is flanged, or by sockets fastened to the shell of the boiler, and so placed that these bell-mouth flues or tubes look over the fire on the grate, and are made the means of conveying all the products of combustion of the fuel through the water surrounding the flues. By this arrangement the heating surface of cylinder boilers is greatly enhanced, and a better distribution of the products of combustion obtained.

The second portion of my invention relates to the distribution of feed-water in boilers by means of tube or tubes, equalizing the expansion and contraction of the boilers, and preventing the accumulation of deposit on the bottom of boilers. The feed tube or tubes are composed of wrought or cast iron, or any known material now in use, and of a capacity in accordance with the evaporating power of the boiler. The feed-water enters this tube or tubes from the pump, or any of the known means of feeding boilers, and is distributed over the bottom of the boiler through holes or slits placed at intervals, and so arranged as to force the water on the bottom of the boiler by countersinking or enlarging the outer orifice of the holes or slits. The water issuing from these is spread out, and prevents the accumulation of sediment or scale on the inner portion of the boiler. These holes or slits, which give free passage to the water entering the boiler, I also use as passages for blowing off the water in the boiler. The holes or slits, being countersunk or enlarged, prevent any substance from filling up or stopping these said passages.

The third part of my invention relates to a similar tube or tubes placed over the flue in a direction with the water line in the boiler. They are also perforated in like manner with holes or slits, countersunk or enlarged on the outside of tube or tubes for the purpose of carrying off the scum or any matter floating on the surface of the water, and which has the effect of causing the water in the boiler to foam or lift into the steam-way or reservoir of the boiler. By opening the valves or cocks, properly placed, these accumulating impurities can be blown out or discharged into the atmosphere, and the foaming thereby prevented. I also use the upper tube or tubes as a feed pipe or tube, thereby preventing the accumulation of mud or scale on the top of the flues, and in emergency reducing quickly the temperature of both water and steam in the boiler.

I do not claim placing flues in boilers, or feeding boilers through tubes, or blowing off the scum from the surface of the water through tubes; nor do I claim the bearing-wall H, or chambers J L M, having openings N O, as I am aware that they are not new, in themselves considered; but having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The arrangement of the bell-mouthed flues B C D E F, bearing-wall H, and chambers J L M, having openings N O, for the purpose of creating an increased amount of heating surface, as herein shown and described.

PETER ATHERTON.

Witnesses:

GEO. SCOTT,
JESSE TAYLOR.