

No. 677,356.

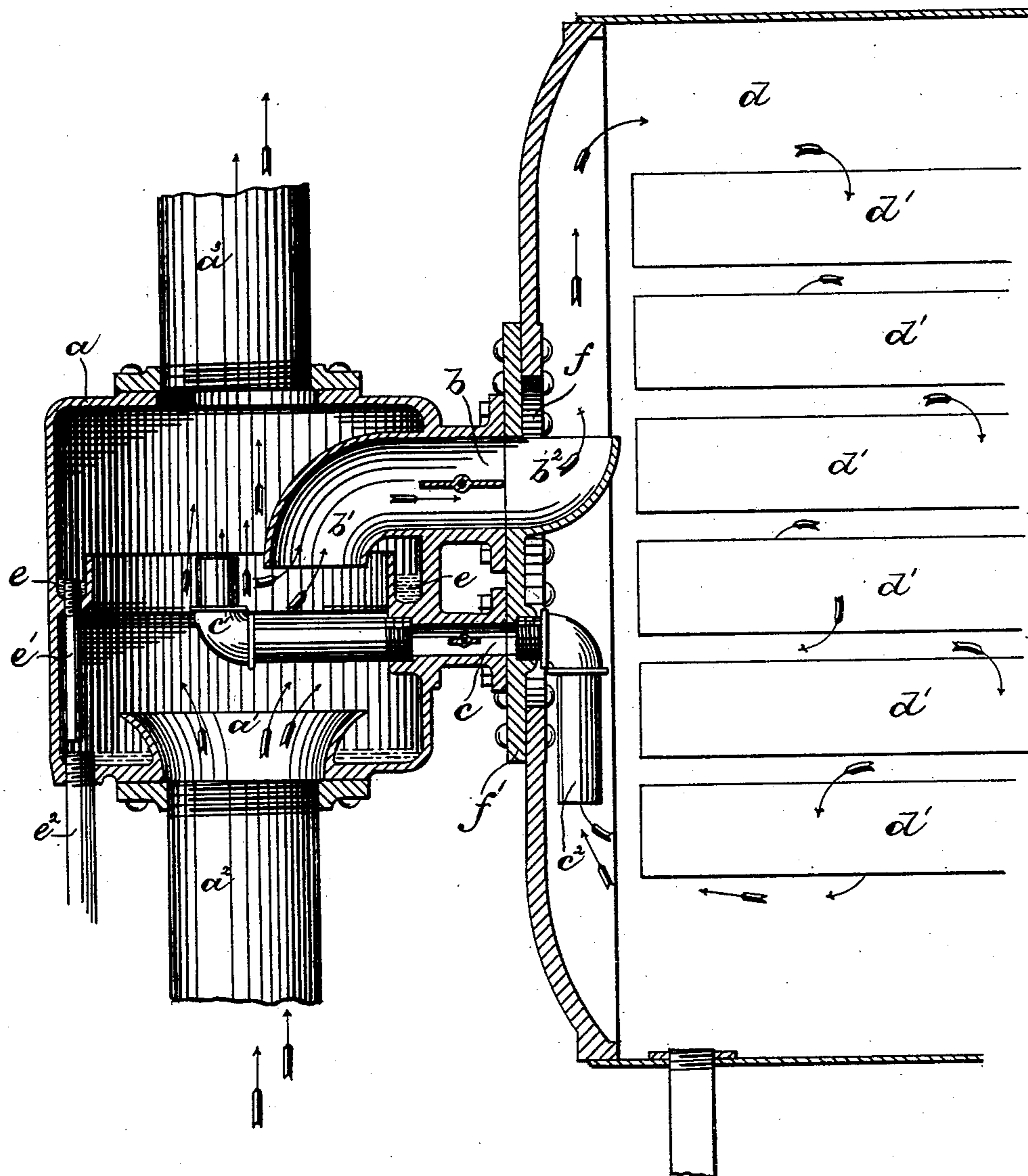
Patented July 2, 1901.

J. J. HOPPES.

INDUCTION CHAMBER AND OIL ELIMINATOR.

(Application filed Mar. 6, 1901.)

(No Model.)



WITNESSES:

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# UNITED STATES PATENT OFFICE.

JOHN J. HOPPEs, OF SPRINGFIELD, OHIO.

## INDUCTION-CHAMBER AND OIL-ELIMINATOR.

SPECIFICATION forming part of Letters Patent No. 677,356, dated July 2, 1901.

Application filed March 8, 1901. Serial No. 50,077. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN J. HOPPEs, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented certain new and useful Improvements in Induction-Chambers and Oil-Eliminators, of which the following is a specification.

My invention relates to feed-water heaters of the open type, in which the water passes over plates or trays in contact with steam, and more particularly relates to an attachment for producing a positive circulation in the heater and eliminating oil from exhaust-steam. This class of heaters has a steam-space in which the plates or trays are located and are further provided with a water-space at the bottom, in which a certain amount of heated water is retained. The water on being heated expels air and non-condensable gases, which being of greater specific gravity than the heated steam settles in the bottom of the heater and excludes the steam from a large portion of the steam-space, thereby making it partially inoperative. The usual method of overcoming the difficulty is to pass the exhaust-steam through the heater by having the inlet-pipe at one end and the outlet-pipe at the other end, so as to cause a circulation. This arrangement, with its pipe connections, involves considerable expense and is often impractical for want of space; furthermore, the heater being of much greater area in cross-section than the exhaust-pipe of the engine it is obvious that by this arrangement a large portion of the lower part of the heater is not influenced by the current of the steam, and this is more especially true when the outlet is at the top.

The objects of my invention are to overcome these difficulties and the expense thereof and to provide an attachment that will produce a positive circulation through the heater and at the same time eliminate the oil from the exhaust-steam. I attain these objects by the constructions hereinafter described, and shown in the accompanying drawing, in which the figure is a vertical sectional view of my induction-chamber, together with a portion of the feed-water heater, the portion of the drawing representing the feed-water

heater, which forms no part of my present invention, being somewhat diagrammatic in nature.

In constructing my device I employ a chamber *a*, preferably, although not essentially, circular in shape. This chamber is provided with two flanged ports or openings *b c* in the side thereof, adapted to be connected with an opening in the feed-water heater *d*. The port or opening *b* is provided with a pipe which extends into and downward in the chamber *a*, as shown at *b'*, the mouth of which pipe is over the bell-shaped mouth *a'* of the inlet-pipe *a<sup>2</sup>*. I also attach within the feed-water heater at the opening *b* the bowl or elbow *b<sup>2</sup>*, which will tend to direct the steam upward, although said elbow *b<sup>2</sup>* is not necessary to the successful operation of my device. To the port *c* is attached a pipe *c'*, which extends inward and upward in the chamber *a*, having its inner or open end directly under the exhaust-pipe *a<sup>3</sup>*; also, to this port *c* are connected the elbow and pipe *c<sup>2</sup>*, which extend downward within the feed-water heater.

I have shown the ports *b* and *c* provided with common butterfly-valves; but it is obvious that any other style valve might be used or that the device might be operated successfully without such valve, these valves being particularly useful, however, when cleaning the heater, but may under certain conditions be desirable to vary the size of the ports.

In operation the exhaust-steam from the engine (the path of which is indicated by the arrows) enters the chamber *a* through the inlet-pipe *a<sup>2</sup>*. The impetus of the steam upon its entrance to the chamber *a* is such that a portion will pass through the chamber and escape through the pipe *a<sup>3</sup>*. A portion will also be caught in the bent pipe *b'* and conducted to the feed-water heater *d*, where it is deflected upward by the elbow *b<sup>2</sup>*, and circulates among the trays, (represented at *d'*.) As before stated, the non-condensable gases released by the heating of the water through their own weight and the pressure of the hot steam above them sink to the bottom of the feed-water heater, from where they escape through the pipes *c<sup>2</sup>* and *c'*, which afford not only the point of least resistance through which said gases would naturally seek to escape, but they

are also drawn through said pipes by the action of the steam around and above the end of the pipe  $c'$  in its passage from the pipe  $a^2$  to  $a^3$ , which not only heats and rarefies the gases, but also creates a draft or suction through said pipes  $c'$  and  $c^2$ , the gases escaping with the surplus exhaust-steam through the pipe  $a^3$ .

While, as is well known, certain kinds of oil prove a benefit when introduced into the boilers with the feed-water, cylinder-oil, such as would be contained in the exhaust-steam from the engine, would, to the contrary, prove a detriment. The tendency of the oil and the entrained water is to follow the walls of the inclosing parts, and this tendency is greatly assisted by the sudden expansion of the steam upon entering the chamber  $a$ . To collect the oil and moisture from the steam before its admission to the feed-water heater  $d$ , I place about the inner periphery of the chamber  $a$  a flange, forming a gutter  $e$  and having a discharge-pipe  $e'$ , the top of which extends somewhat above the bottom of the gutter  $e$  for the purpose of retaining a certain amount of water in said gutter, since it has been found that the water so held assists in collecting entrained oil and moisture, the surplus oil and water being discharged through said pipe  $e'$  to the bottom of the chamber  $a$ , which is also provided with a discharge-pipe  $e^2$ , the top of which extends above the bottom of said chamber  $a$ , thus retaining also in the bottom of said chamber an amount of water. It will be seen that the exhaust as it passes out of the exhaust-pipe  $a^3$  is also purified and free from oil, which is a desirable feature.

It will be seen that the inlet and outlet ports are connected through a single opening in the head of the heater. This opening may vary with the size of the heater. For the purpose of making it possible to attach any-sized induction-chamber to the several sizes of the heaters I employ an intermediate plate  $f'$ , the variation in the size of the various heaters and induction-chambers being compensated for in the lap of the intermediate plate  $f'$ .

Having thus described my invention, I claim—

1. The combination with the exhaust-pipe of a steam-engine and a feed-water heater, of a chamber in said exhaust-pipe having inlet and outlet ports to said heater, the lower side of said inlet being extended and curved to discharge the steam into the upper portion of said heater, and said outlet being extended downwardly to exhaust air and gases from the lower portion of said heater, substantially as specified.

2. The combination with the exhaust-pipe of a steam-engine and a feed-water heater, of a chamber in said exhaust-pipe having inlet and outlet ports to said heater, the inlet-port for said heater extending in said chamber and opening downwardly partially over said exhaust-inlet to carry steam to said heater,

and the outlet-port for said heater extending in said chamber and opening upwardly above said exhaust-inlet and toward the exhaust-outlet to exhaust air and gas from said heater, substantially as specified.

3. The combination with the exhaust-pipe of a steam-engine and a feed-water heater, of a chamber in said exhaust-pipe, an upwardly and outwardly flaring flange from the exhaust-pipe inlet in said chamber, the inlet-port for said heater extending at one end in said chamber and opening downwardly over said exhaust-inlet to convey steam to said heater, the lower side of the other end of said inlet-port being extended and curved to direct the steam into the upper portion of said heater, said outlet-port of said heater at one end being extended downwardly into said heater and at the other end extended into said chamber and opening upwardly above said exhaust-inlet and toward the exhaust-outlet to exhaust air and gas from said heater, substantially as specified.

4. The combination with a feed-water heater and the exhaust-pipe of a steam-engine, of a chamber in said exhaust-pipe, a bell-shaped exhaust-inlet into said chamber, an annular projection extending around the inner walls of said chamber having upturned flanges forming a gutter, a pipe in said gutter extending from above the bottom of same to near the bottom of said chamber, and water retained in the bottom of said chamber, substantially as specified.

5. The combination with a feed-water heater and a chamber having an inlet and outlet for the exhaust from a steam-engine, of an annular projection extending around the inner walls of said chamber having upturned flanges forming a gutter, a pipe in said gutter extending from above the bottom of said gutter to near the bottom of said chamber, an inlet-port extending and opening downwardly partially over said exhaust-inlet in said chamber at one end and at the other extended so as to discharge upwardly into said heater, an outlet-port extending downwardly in said heater at one end and at the other inwardly and opening upwardly above exhaust-inlet in the direction of the exhaust-outlet, valves in said inlet and outlet ports to cut off steam from said heater and a pipe in the bottom of said chamber to carry off oil and water, substantially as specified.

6. The combination with a feed-water heater and a chamber having inlet and outlet ports to said heater, of an intermediate plate between said heater and chamber whereby only one opening in said heater is required to connect said inlet and outlet ports.

7. The combination with the exhaust-pipe of a steam-engine and a feed-water heater of a chamber in said exhaust-pipe having inlet and outlet ports to said heater, the lower side of said inlet being extended and curved to discharge the steam into the upper portion of

said heater and said outlet being extended at  
one end downwardly in said heater and at the  
other end in said chamber to exhaust air and  
gases from the lower portion of said heater,  
5 and valves to control said inlet and outlet  
ports, substantially as specified.

In testimony whereof I have hereunto set

my hand this 28th day of February, A. D.  
1901.

JOHN J. HOPPES.

Witnesses:

PERCY NORTON,  
CHAS. I. WELCH.