

(No Model.)

2 Sheets—Sheet 1.

J. HAUSER.
HEATER.

No. 514,145.

Patented Feb. 6, 1894.

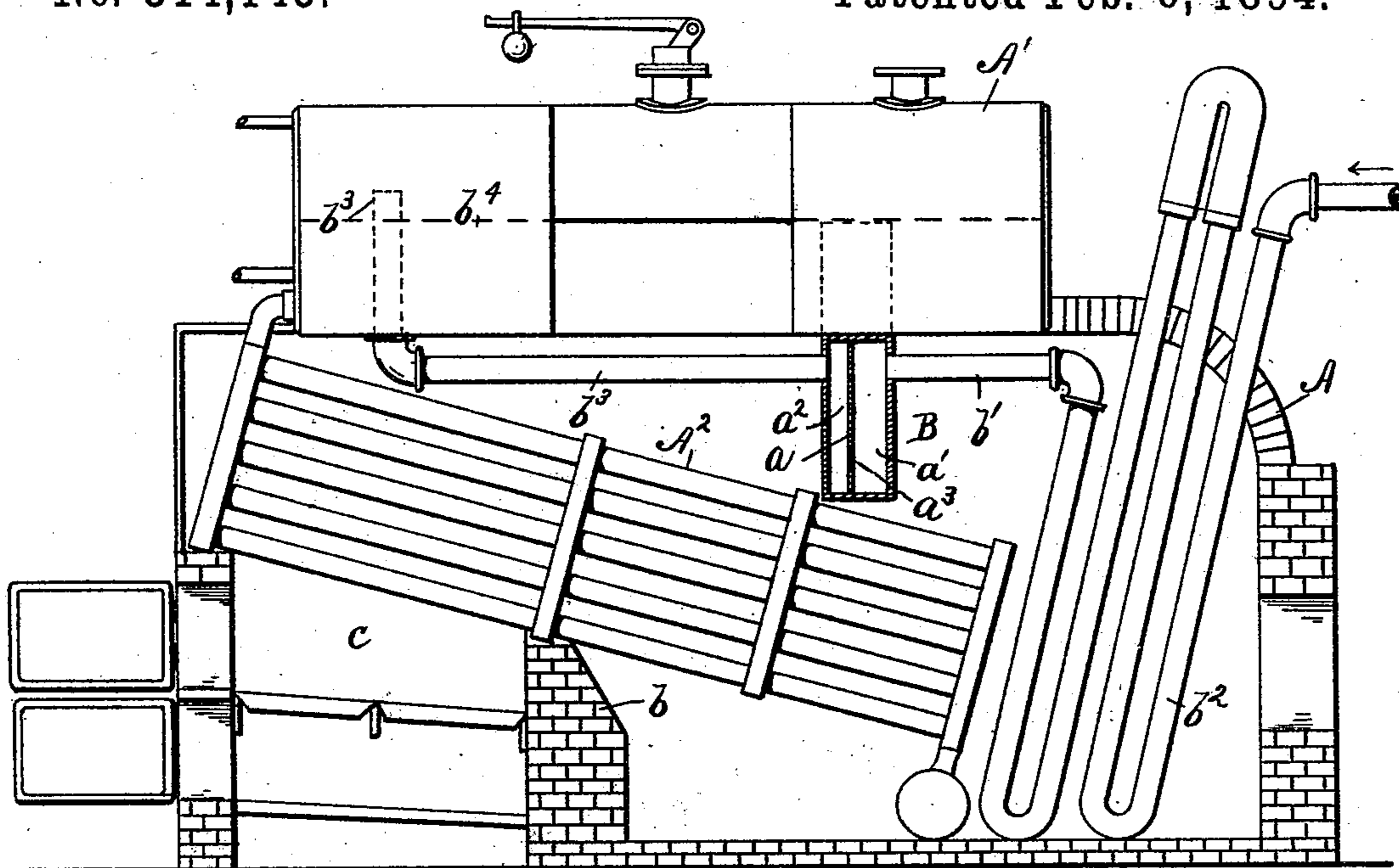


Fig. 1.

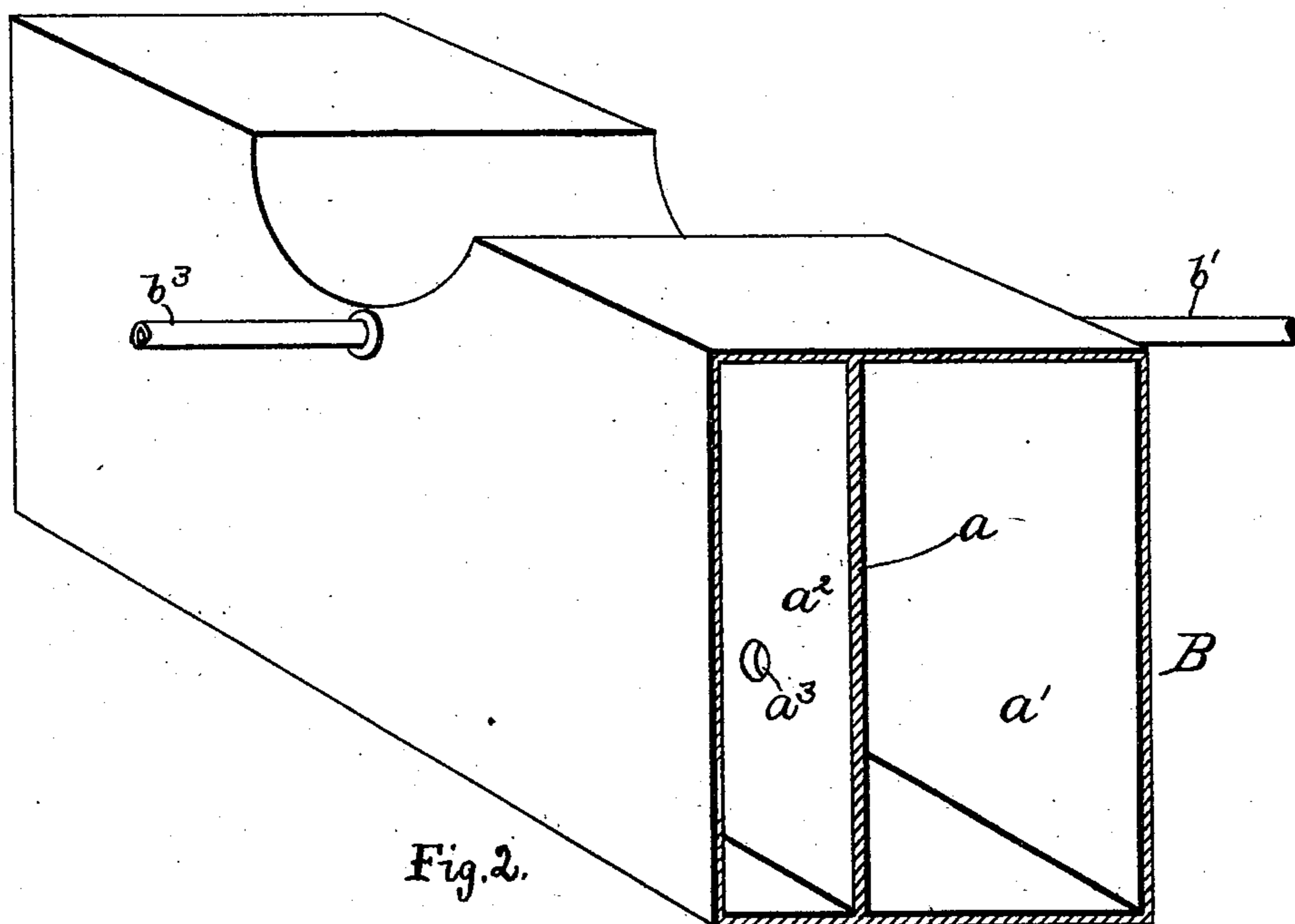


Fig. 2.

WITNESSES

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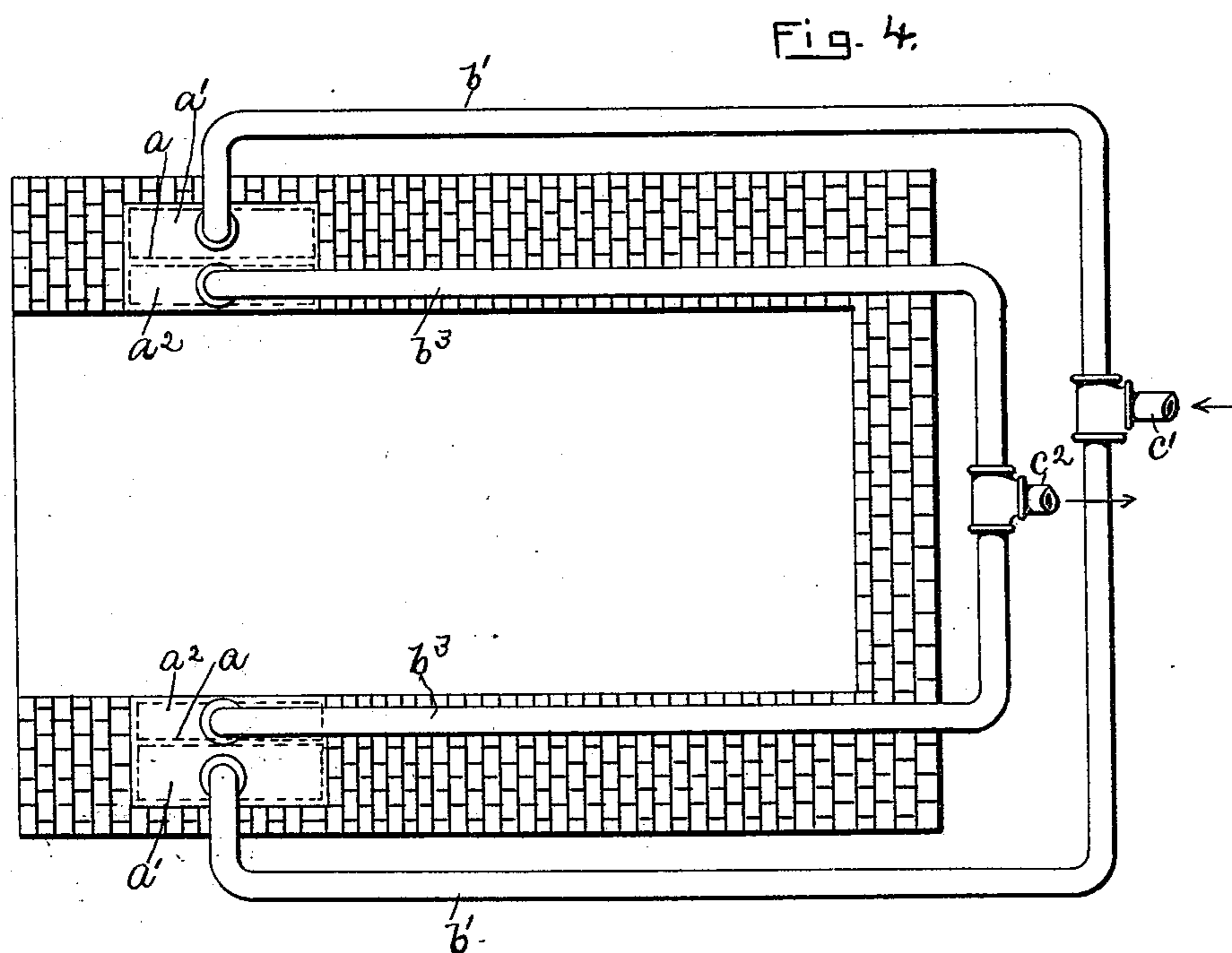
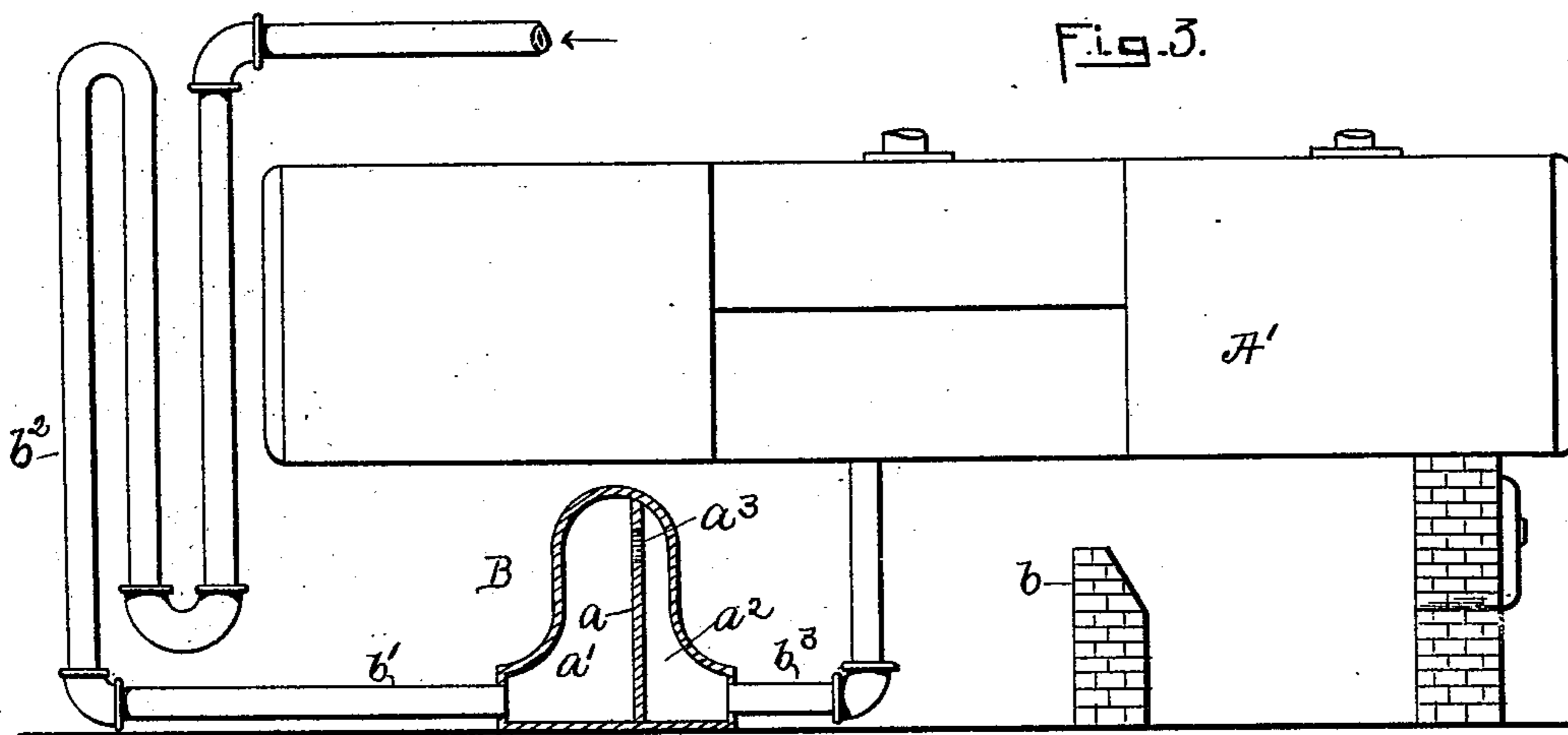
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UNITED STATES PATENT OFFICE.

JACOB HAUSER, OF BOSTON, MASSACHUSETTS.

HEATER.

SPECIFICATION forming part of Letters Patent No. 514,145, dated February 6, 1894.

Application filed March 29, 1893. Serial No. 468,181. (No model.)

To all whom it may concern:

Be it known that I, JACOB HAUSER, residing in Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Heaters, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a novel construction of circulating heater for liquids, gases and air, and is especially adapted, among other things, to be used as a feed water heater for boilers.

In accordance with my invention, the heater is constructed so as to form two compartments or chambers communicating with each other by suitable port openings in a wall or partition dividing the said chambers and distributed at various points in the said wall, the heater, when in use, being arranged so that one of the said chambers will be more intensely heated than the other, the more intensely heated chamber forming the outlet chamber for the heater and being for the best results much smaller or of less area than the cooler chamber, which forms the inlet chamber for the heater. The port openings or passages connecting the chambers or compartments are made substantially small or of suitable size as compared with the said chamber, and are substantially widely separated from each other so that the flow of liquor, air or gas from the cooler chamber into the hotter outlet chamber is restricted or checked, and the said openings are distributed at various points in the dividing wall or partition, whereby the liquid, air or gas is admitted into the highly heated chamber at different points in small quantities and is subjected in its divided state to the intense heat in the shallow outlet chamber of the heater, and is therein more energetically acted upon.

My improved heater may be used to great advantage to replace one of the fire-walls of a furnace provided with a boiler, and it is more particularly well-adapted to replace the fire-wall next to the bridge-wall of the furnace, so that one side of the heater may be exposed to the direct action of the flame arising from the fire-box, and its other chamber may be heated by the waste heat, whereby

the water may be fed to the boiler under the best possible conditions. These and other features of my invention will be pointed out in the claims at the end of this specification. 55

Figure 1, is a longitudinal section of a furnace provided with a heater embodying my invention, the port opening being shown on an enlarged scale; Fig. 2, a perspective view in section and on an enlarged scale of the heater shown in Fig. 1; Fig. 3, a vertical section of a modified form of furnace and heater embodying my invention, and Fig. 4, a top or plan view showing the heater as located within the side walls of the furnace. 60 65

Referring to Fig. 1, A represents a furnace provided with a boiler A' of any usual or well-known construction and having the usual appurtenances, the said boiler in the present instance being connected to a bank of water circulating tubes A² located below the boiler and within the furnace, after the manner of the well-known Babcock & Wilcox type of boiler. 70

The boiler A', in accordance with my invention, has connected to it a water circulating heater B embodying my invention and represented in Figs. 1 and 2 as a substantially oblong-shaped box or casing separated by a partition wall *a* into two chambers *a'* *a*², which communicate with each other through a plurality of port openings *a*³ located in the dividing wall or partition *a* at different points, only one of the said port openings being shown in Figs. 1 and 2, it being shown as located substantially near the bottom of the heater. The port openings *a*³ are substantially minute in area or size as compared with the area of the dividing wall *a* and are substantially widely separated, so as to afford an outlet for minute quantities or jets of water from the chamber *a'* into the chamber *a*², which is the gist of this invention, for by reason of this construction, the water admitted into the chamber *a*² is wholly or partially vaporized, depending upon the size of the port openings and the heat of the chamber *a*². The dividing wall or partition *a* is arranged so that the chamber *a*² is shallow and of much less area than the chamber *a'*. 75 80 85 90 95 100

The heater B is represented in Fig. 1, as arranged in the rear of the bridge-wall *b*, and

as taking the place of the usual brick-wall commonly employed in the type of boiler referred to.

The chamber a' , in the present instance, has communicating with it a water inlet pipe b' , herein shown as forming part of a coil of pipes b^2 , which, in practice, may and preferably will be connected with the usual feed water pump, not herein shown. The chamber a^2 of the heater B has connected to it an outlet pipe b^3 communicating with the boiler A' and preferably extended up into the boiler above the water line b^4 , as represented by dotted lines in Fig. 1.

In the operation of the heater as represented in Fig. 1, the water is admitted into the chamber a' from the pipe b' and is substantially cool, but is heated somewhat by the waste heat, on its passage through the coil of pipes b^2 , and the said water passes from the chamber a' into the chamber a^2 through the substantially small or minute port openings a^3 , which are substantially widely separated and which restrict the amount of water admitted into the chamber a^2 . The chamber a^2 , it will be noticed, is in position to be acted upon by the direct heat from the fire-box c and is thereby intensely heated, so that the water admitted into the chamber a^2 of the heater at different points in small quantity or jets through the port openings a^3 is intensely heated, and in whole or in part is converted into steam, which passes through the pipes b^3 directly into the boiler. As the steam passes out of the chamber a^2 , water is drawn from the chamber a' through each port opening a^3 , in a small quantity, and the said water in turn is highly heated and converted into steam, and in this way, it will be seen that a circulation is effected and maintained through the heater. The chamber a^2 is for the best results made very much smaller than the chamber a' , and being more intensely heated, the substantially small body or volume of water admitted into the chamber a^2 through the port openings a^3 , is exposed to the action of the heat in the chamber a^2 , which is highly heated, and consequently the liquid admitted into the chamber a^2 is highly heated, whereas a substantially large body of liquid in the chamber a' is acted upon only by the waste heat of the furnace and is much cooler than the liquid in the chamber a^2 . In this way, a most effective heating of the feed water may be accomplished at a minimum expense. I have represented the heater B in Figs. 1 and 2 as a substantially oblong-shaped box, to take the place of the vertical wall commonly used in the Babcock & Wilcox type of boiler, but I do not desire to limit my invention to any particular form of heater as the latter may be made in any desired shape, provided that the highly heated steam chamber is made much smaller than the larger water chamber. Furthermore, the heater may be used with any desired type of boiler, as for instance, in Fig. 3, I have shown the heater

B as located near the bottom of the furnace at the rear of the bridge-wall b , the inlet and outlet pipes b' b^3 for the heater being connected to it near its bottom, and the port openings a^3 being formed in the partition a near the top of the same. The heater may be used in any desired place or locality where one chamber can be more highly heated than the other chamber, and may be used equally as well for heating liquids, air or gases.

In Fig. 4, I have represented two heaters as located within the side walls of the furnace, the smaller chamber a^2 of each heater being exposed to the heat, while the larger water chamber a' is incased within the brick-walls, and is thereby maintained much cooler than the chamber a^2 .

When the heater is located within the side walls of the furnace, the inlet and outlet pipes b' b^3 may be connected to the top of the heater as represented in Fig. 4, or they may be connected in any other desired or convenient manner.

As represented in Fig. 4, the inlet pipes for both heaters are connected to a common supply pipe c' , and the outlet pipes for both heaters are connected to a common outlet pipe c^2 .

I have herein illustrated my improved heater as used in connection with a furnace provided with a boiler, but I do not desire to limit myself in this respect, as the heater may be used independent of the boiler, as for instance, in a system of hot water circulation for houses and like structures, in which case, the outlet pipe b^3 may be connected to the inlet pipe after the manner now commonly adopted in such hot water circulating systems, the vaporizing of the small amount of water in the small steam chamber a^2 of the heater, and the retarding of the flow of water from the much larger water chamber a' into the chamber a^2 through the port opening or openings a^3 , establishing a circulation through the heater and the pipes connected with it.

When the heater is used in a hot water circulating system, the chamber a^2 will be more highly heated than the chamber a' , after the manner above described, or in any other suitable or desired manner.

I have herein shown the water and steam chambers as formed in a single casing or box by a dividing partition having port openings, but I do not desire to limit my invention in this respect, as it is evident, the chambers may be made in independent casings connected together by pipes of substantially small area to correspond to the port openings a^3 , the casing corresponding to the chamber a^2 being made of much less area than the casing corresponding to the chamber a' .

By the term "furnace," I desire to include any construction provided with a fire-box or chamber in which combustion takes place, such for instance, as the fire pot or chamber of a stove.

When the heater is employed with a boiler after the manner shown in Fig. 1, the said

boiler may be filled up to the water line b^4 with water before starting the fire and the water may be forced through the heater, but preferably the boiler will be first filled up to the waterline through any suitable inlet, as for instance, through one of the man holes, and after the fire is started, the supply of water to the boiler may be admitted through the heater solely. When used as a heater pure and simple in connection with a boiler as A' , the ports or openings a^3 admitting the water from the substantially larger and cooler chamber a' into the much smaller and highly heated chamber a^2 , are made substantially small or minute to restrict the flow of water and to admit it into the chamber a^2 in jets, but when the heater is used for the purpose of generating steam direct, in which case it is used as a boiler direct, the port openings a^3 are made much smaller or more minute than in the former case, so that the minute streams or jets of water, admitted from the large water chamber a' into the very much smaller or shallow and highly heated chamber a^2 , may be converted instantly into highly heated steam, but in either case, the essential principle of this invention is preserved, which is the admitting of water into a highly heated small or shallow chamber, from a very much larger and cooler chamber through substantially small or minute ports or openings.

I claim—

1. The combination with a furnace, of a circulating heater comprising a substantially small or shallow highly heated compartment or chamber, and a larger and cooler compartment or chamber separated from one another by a dividing wall extended from the top to the bottom of the heater and provided with a plurality of substantially minute port open-

ings substantially widely separated by which the fluid from the larger and cooler chamber is admitted in fine jets into the shallow and highly heated chamber, substantially as and for the purpose specified.

2. A circulating heater consisting of a substantially large and cooler inlet chamber and a substantially small or shallow and highly heated outlet chamber of much less area than the inlet chamber and communicating with the inlet chamber through a plurality of substantially minute port openings substantially widely separated, whereby the fluid in the larger and cooler inlet chamber is greatly restricted in its passage into the shallow and highly heated outlet chamber and is admitted into said outlet chamber in minute streams or jets, substantially as and for the purpose specified.

3. The combination with a furnace, of a circulating heater located in the furnace and consisting of a substantially large and cooler water chamber and a substantially small or shallow and highly heated steam chamber communicating with the water chamber by a plurality of substantially minute port openings substantially widely separated to restrict the admission of water into the steam chamber, an inlet for the cooler water chamber and an outlet for the highly heated shallow steam chamber, substantially as and for the purpose specified.

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

JACOB HAUSER.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.