

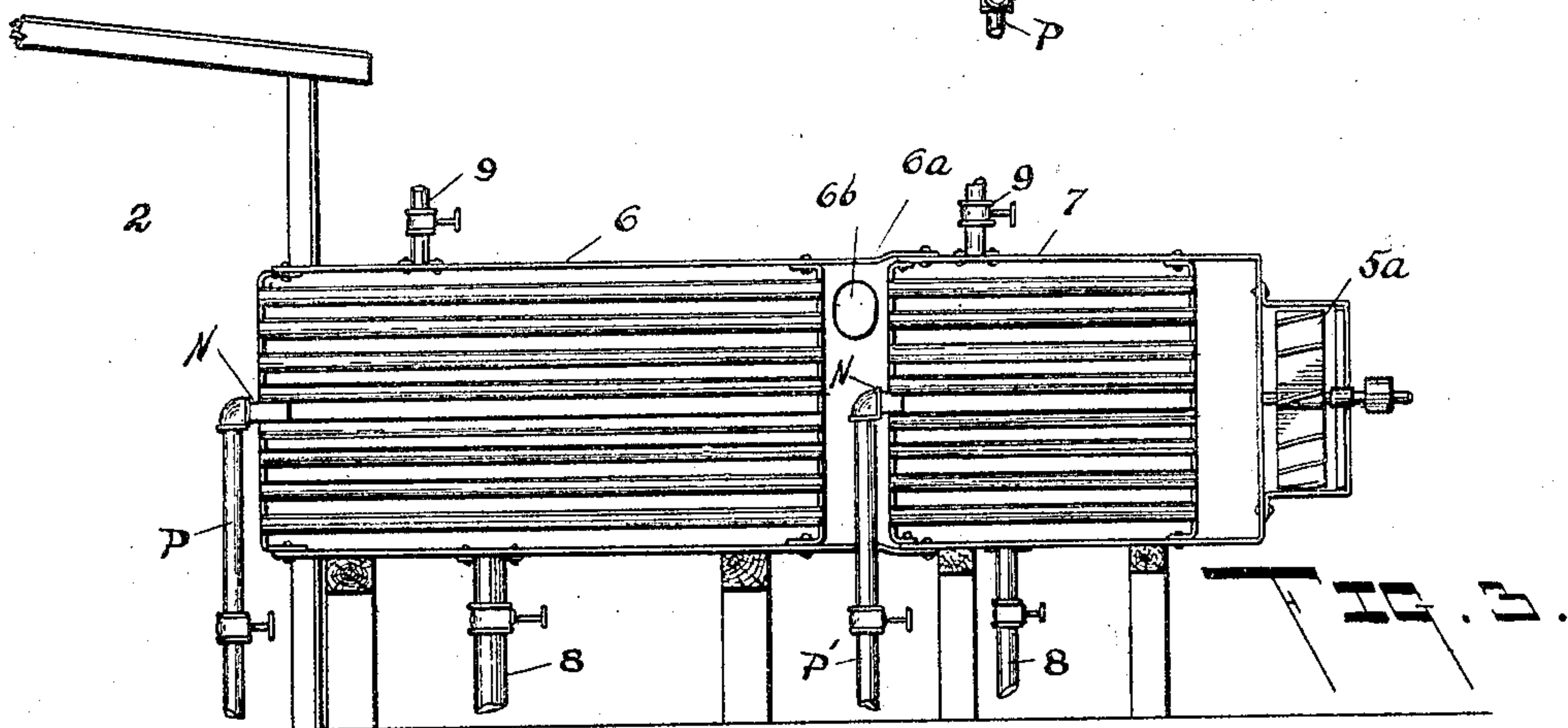
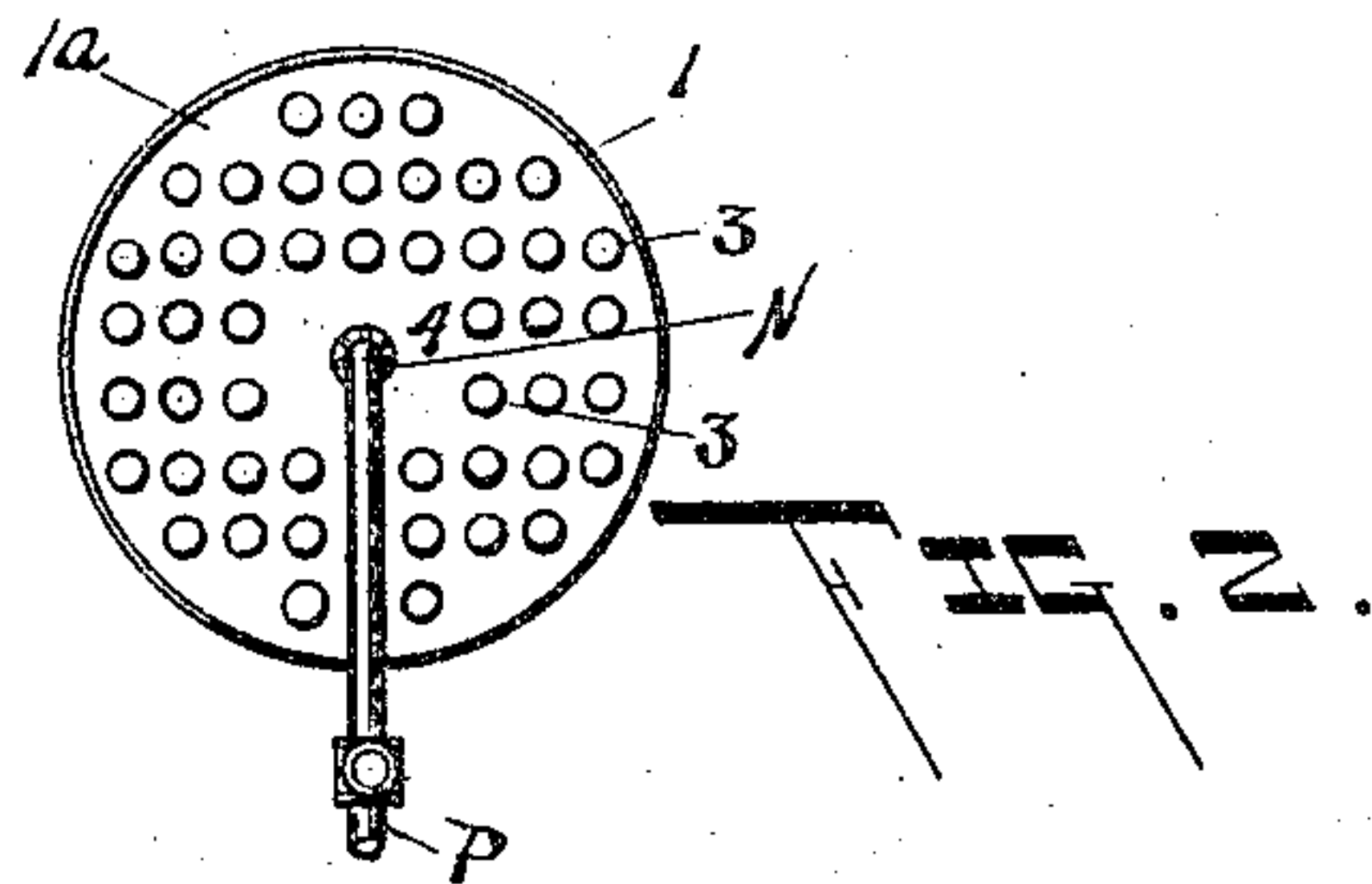
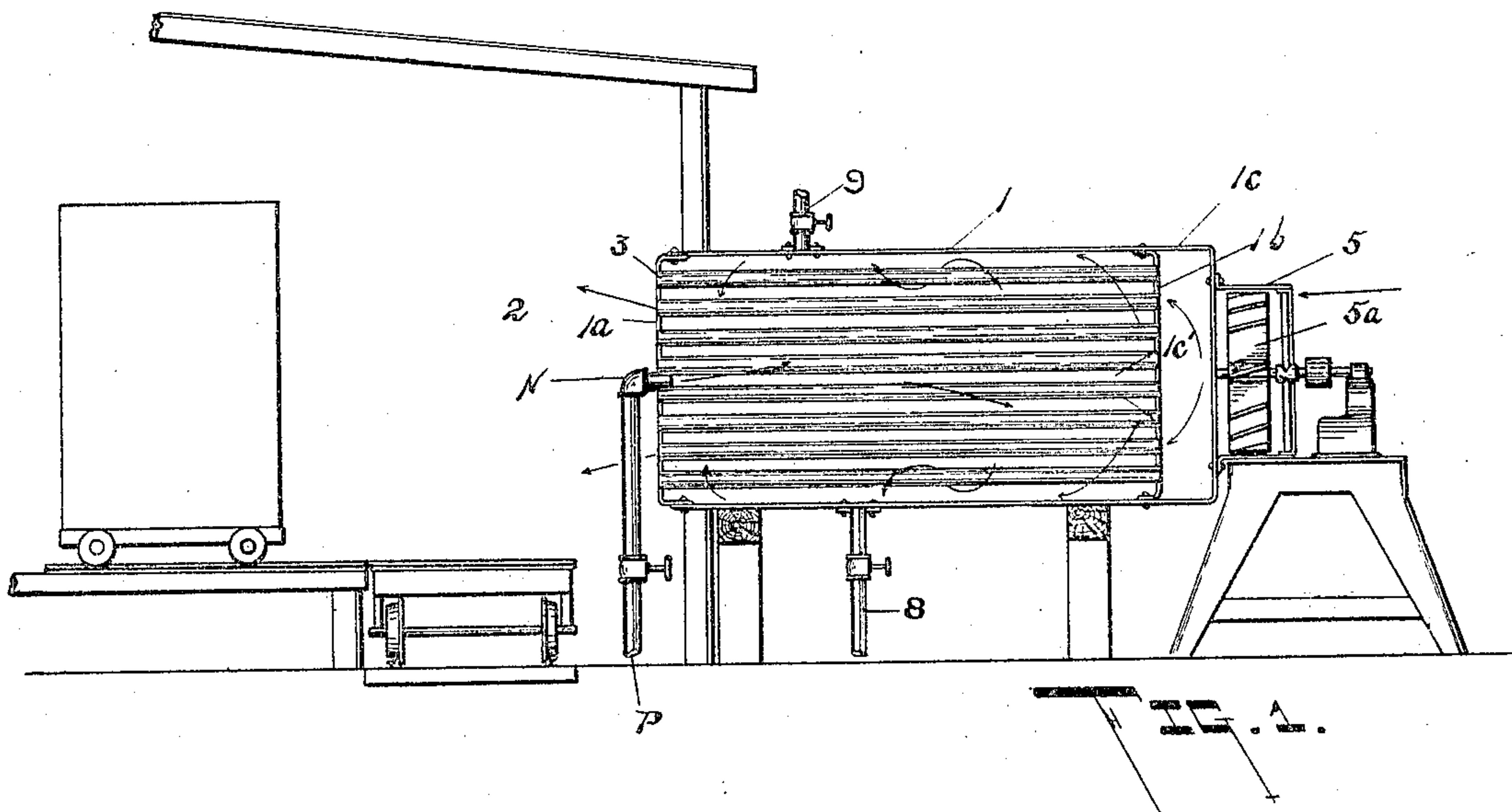
No. 798,116.

PATENTED AUG. 29, 1905.

E. F. ROUSE.

HEATING AND VENTILATING DEVICE FOR DRY KILNS.

APPLICATION FILED MAY 14, 1904.



WITNESSES:

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EDWIN F. ROUSE, OF BAY CITY, MICHIGAN.

HEATING AND VENTILATING DEVICE FOR DRY-KILNS.

No. 798,116.

Specification of Letters Patent.

Patented Aug. 29, 1905.

Application filed May 14, 1904. Serial No. 208,029.

To all whom it may concern:

Be it known that I, EDWIN F. ROUSE, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Heating and Ventilating Devices for Dry-Kilns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention is a heating and ventilating apparatus for dry-kilns; and the improvements relate to certain constructions, arrangements, and combinations of parts in such an apparatus, as will be fully set forth in this specification and pointed out in the claims.

The object of the invention is to provide a simple, cheap, and efficient device for preheating the ventilating-air of a lumber or other kiln, to so arrange the passages through the apparatus that a minimum resistance to the passage of air shall be encountered, to so arrange the heating surfaces or tubes that the greatest heating-surface area shall be distributed through that part of the heater through which the greatest volume of air passes, and to admit steam in the form of a jet longitudinally through the heater where there is the least flow of air, the jet being arranged so that the steam will impinge against the head of the heater nearest the fan and be spread uniformly around the heating-surface of the tubes.

With these objects in view and others which will appear later in the specification my invention consists in the devices illustrated in the accompanying drawings, where Figure 1 is a longitudinal vertical section of the device, Fig. 2 is an end view of the head end of the heater, and Fig. 3 is a longitudinal vertical section of a modified form.

A tubular shell 1 is arranged horizontally with one end communicating with the space 2 to be heated. Extending lengthwise through the shell 1 are tubes 3, by which air may travel through the shell from end to end. The tubes 3 are not spaced uniformly throughout the entire area of the heads 1^a and 1^b; but the central part 4 of the heads is without tubes, as shown in Fig. 2.

A tubular extension 1^c is provided at the back end of the shell 1, and the tubular casing 5 of the fan 5^a is attached to it, as shown in Fig. 1, so that air drawn into the fan in the direction indicated by the arrow is delivered

into the chamber 1^c, formed by the tubular extension 1^c, and thence flows through the tubes 3 into the kiln 2.

The chamber 1^c forms a reservoir for the air delivered from the fan and by its cushioning action insures free uniform flow of air through the tubes 3. Steam is admitted to the interior of the shell around the tubes 3 by the steam-pipe P, which may take its supply from a boiler, exhaust from an engine, or other suitable source. The pipe P is provided with an inwardly-projecting nozzle N, that extends horizontally into the shell in the middle of the space 4. The jet of steam discharging from the nozzle into the unobstructed chamber that extends through the middle of the shell shoots to the back end of the shell and impinges against the head 1^b, being thus deflected backwardly and outwardly, as indicated by the arrows in Fig. 1, and entirely filling the shell with rapidly-circulating steam.

It is found in practice that the impact of the jet of steam against the head 1^b and the rapid flow caused thereby greatly increases the efficiency of the tube-heating surface and raises the temperature of the kiln considerably above that obtainable without the jet and impact action above described.

A further advantage is that the force of the jet carries the hottest steam direct to the back end of the shell and forces it into intimate contact with the back head 1^b and the tube-surface near it. Thus the hottest steam is brought in contact with the coldest incoming air, and transfer of heat takes place most rapidly at that point, imparting greater efficiency to the apparatus.

In practice I prefer to use the fan-blower 5^a, through which the air travels axially, as shown in Fig. 1. In this type of blower very little air travels through the fan near the axle, the greatest velocity of air being near the circumference of the fan. By placing the journal of the fan concentric with that of the shell 1 the space 4, in which there are no tubes, is brought opposite the middle of the fan, so that practically the entire force of the fan is efficiently utilized by forcing the air through the annular bank of tubes between the chamber 4 and the shell 1.

In Fig. 3 I have illustrated a modified form of the device in which 6 is a shell similar in construction to that shown in Figs. 1 and 2. 7 is a similar but preferably smaller shell interposed between the shell 6 and the fan 5^a. 6^a is a tubular shell connecting 6 and 7, and

6^b is a manhole or other opening by which access is obtained to the space within the shell 6^a. The pipe P' admits steam to the second shell.

5 This device is especially adapted for use in kilns in which it is desired to use exhaust-steam in the shell 6 and live steam in the shell 7. By regulating the proportion of exhaust-steam to live steam the temperature in
10 the kiln may be maintained regardless of stoppage of the engines that furnish the exhaust-steam.

Each shell is provided with a suitable drip-pipe 8 to carry off the water of condensation
15 and an air-pipe 9, by which the entrained air may be removed from the upper part of the shell.

By the means above described I have produced a simple, inexpensive, and exceedingly-
20 efficient device for forcing heated air into a kiln or other receptacle. All parts of the device are easily accessible for repair, and the steam and air discharges are so arranged that minimum resistance is offered to passage of
25 fluid through them.

What I claim as my invention, and desire to secure by Letters Patent, is as follows:

1. In a heater of the class described the combination of an inclosing shell; series of
30 longitudinal tubes extending from end to end of said shell, said tubes being disposed in annular form within said shell and forming a central chamber; an inlet-pipe at one end of said chamber and adapted to discharge steam

along said chamber; a drip-pipe connected 35 with the bottom of said shell and a fan adapted to force air through said tubes substantially as described.

2. In a heater of the class described the combination of an inclosing shell; a series of 40 longitudinal tubes extending from end to end of said shell, said tubes being disposed in annular form within said shell and forming a central chamber; an inlet-pipe adapted to discharge steam centrally and longitudinally 45 along said chamber; a drip-pipe connected with the bottom of said shell and a fan adapted to force air through said tubes substantially as described.

3. In a heater of the class described, the 50 combination of a plurality of inclosing shells; a series of longitudinal tubes extending from end to end of each shell; said tubes being disposed in annular form within each of said shells; and forming central chambers; a tubu- 55 lar shell connecting the successive shells of the series; inlet-pipes adapted to discharge steam centrally and longitudinally along said chambers; a drip-pipe connected with each shell and a fan located at one end of said se- 60 ries and adapted to force air successively through the tubes of said shells.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN F. ROUSE.

Witnesses:

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A. A. EASTERLY.