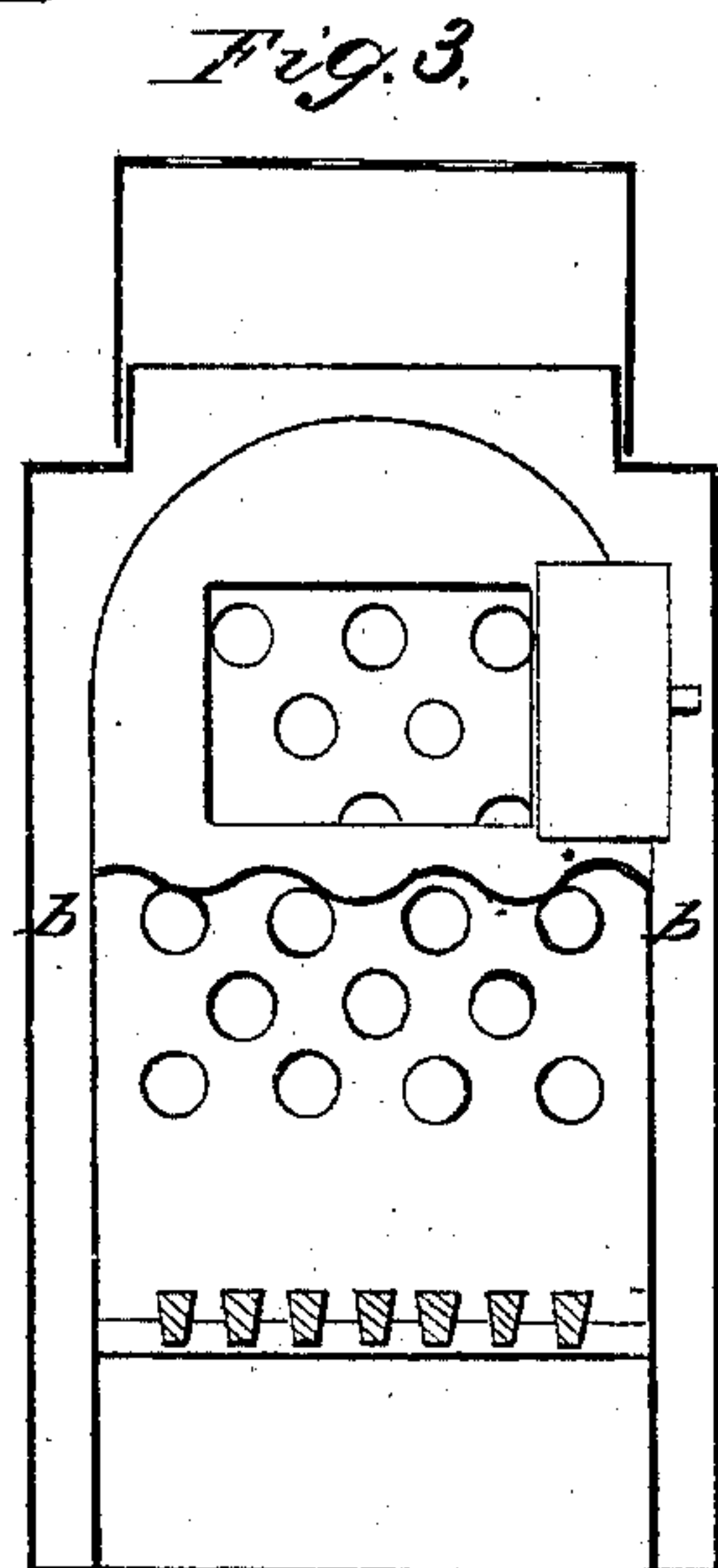
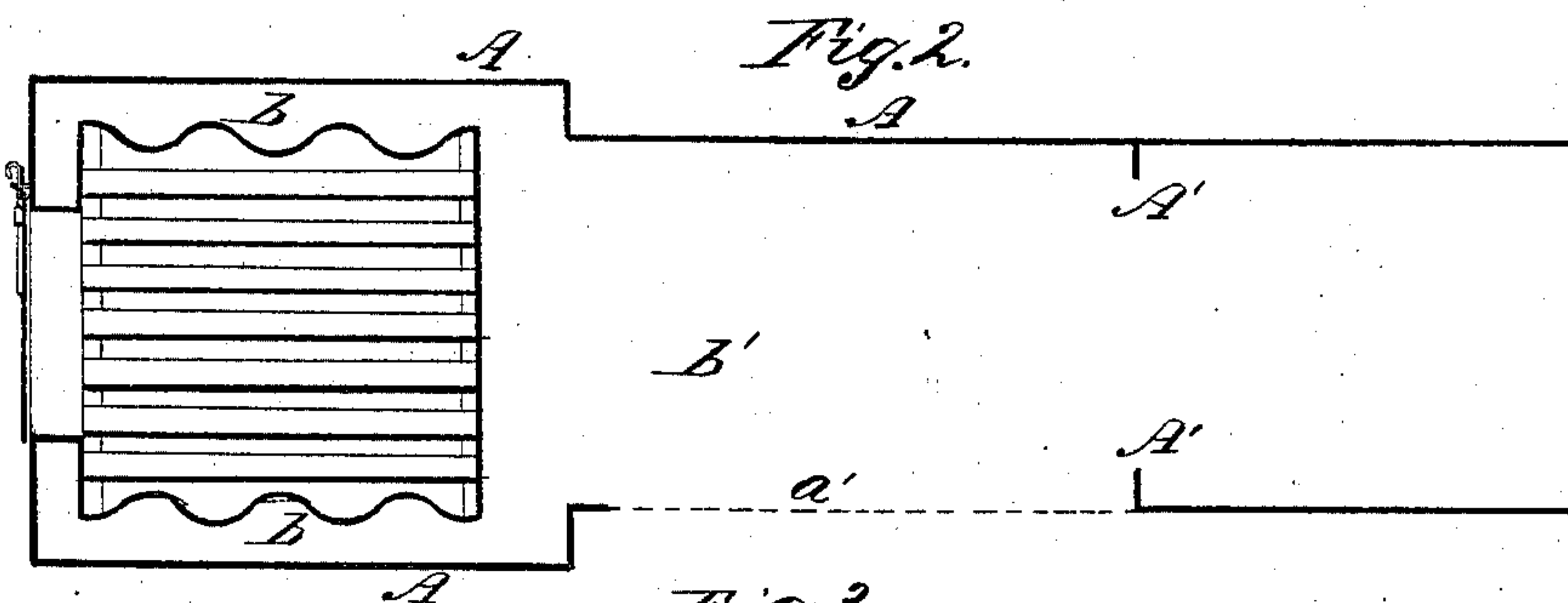
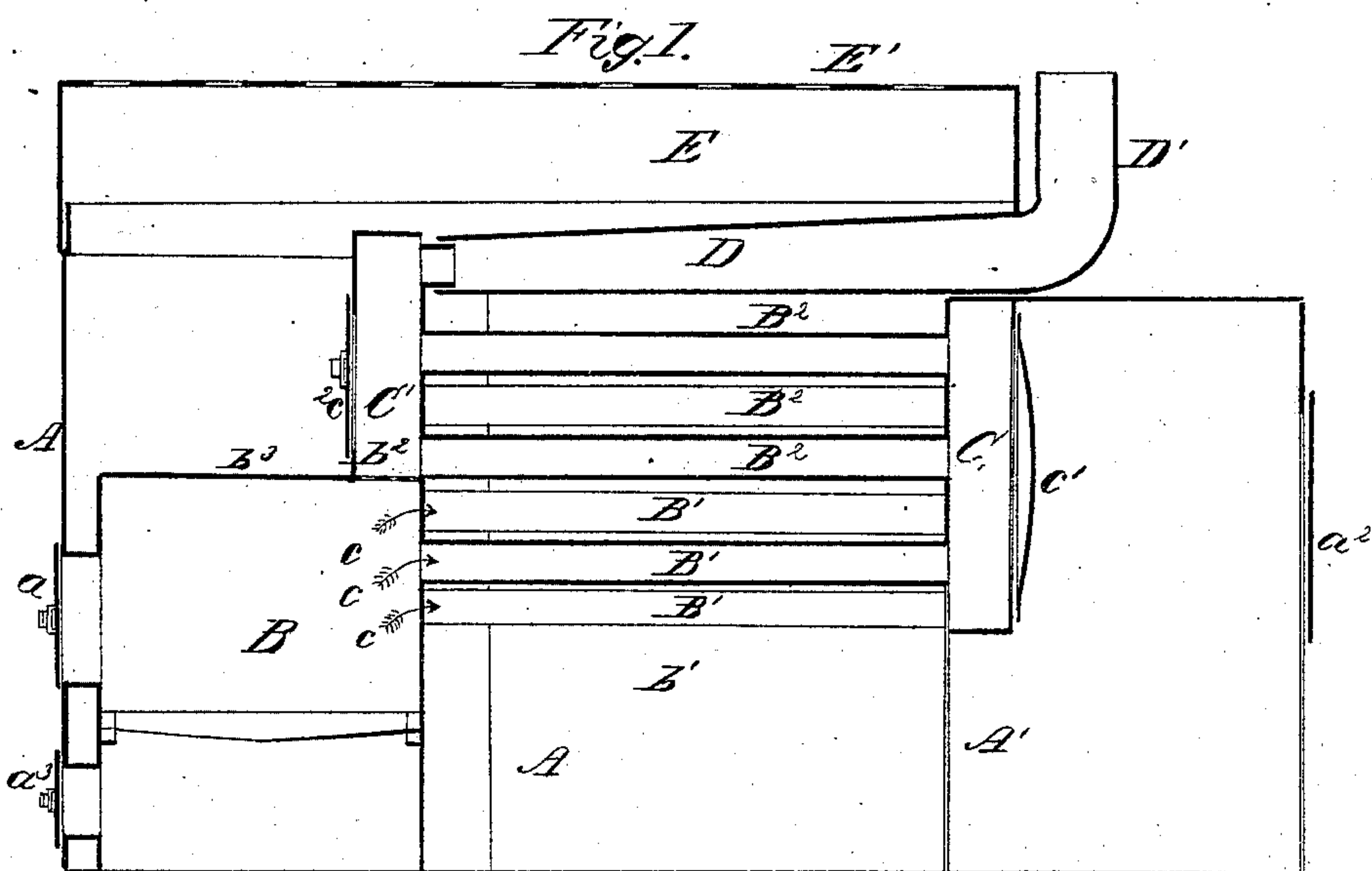


B. R. HAWLEY.
Hot-Air Furnace.

No. 81,781.

Patented Sept. 1, 1868.



Witnesses.
J. C. Paul
R. Simon

Inventor.
B. R. Hawley
By his Atty.
McKandless & Co.

UNITED STATES PATENT OFFICE.

B. R. HAWLEY, OF NORMAL, ILLINOIS.

IMPROVEMENT IN TUBULAR AIR-HEATERS.

Specification forming part of Letters Patent No. 81,781, dated September 1, 1868.

To all whom it may concern:

Be it known that I, B. R. HAWLEY, of Normal, in the county of McLean and State of Illinois, have made certain new and useful Improvements in Tubular Air-Warmers; and I do hereby declare that the following is a full and clear description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object of this invention is to warm air very rapidly for heating buildings and other like purposes. To accomplish this result a heating-furnace, not altogether unlike a locomotive-boiler, is used, and the air to be heated is passed through the interstices between the tubes, and is there heated very rapidly and economically.

The peculiar details of the invention will more fully appear from the following description.

To enable those skilled in the art to make and use my improved air-warmer, I will proceed to describe its construction and operation.

Figure 1 of the drawings is a sectional elevation of the improved apparatus. Fig. 2 is a sectional plan of the same, taken on the line $x y$ of Fig. 1. Fig. 3 is a transverse sectional elevation taken on the line $x' y'$ of Fig. 1.

The walls A of this furnace may be constructed of sheet metal, and they will inclose within them the fire-box B in such a manner as to leave a narrow heating-chamber, b , between the said outer wall A and fire-box B. This heating-chamber will inclose the fire-box on all sides, except that occupied by the door a , through which fuel is fed to the furnace. The chamber b will be in open communication with the chamber b^1 , as is shown in Fig. 2. Longitudinal flues or tubes B^1 extend from the rear wall of the fire-box to the bridge-wall A' through the top part of the chamber b^1 . A rear breeching, C, connects the bottom flues B^1 with the top ones B^2 , and the forward breeching C' connects the top flues B^2 with the horizontal smoke-flue D, and this discharges

the smoke into the stack D'. The smoke from the furnace escapes with the hot gases in the direction of the arrows c , through the tubes B^1 , into the breeching C, and thence back through the tubes B^1 , and so on through the breeching C' and flue D into the stack D'.

The cold air is allowed to enter the chambers b and b^1 through openings at a^1 , as shown in Fig. 2. As the cold air rises in the chamber b it becomes rapidly heated by its immediate contact with the plates of the fire-box, and that rising from the chamber b^1 passes through the interstices between the tubes B^1 and B^2 , and in like manner becomes heated, as may be required. Both volumes become mingled in the chamber E, whence the heated air may be taken off through the perforated plate E' to heat any apartment; or it may be taken off to distant places in pipes in the usual manner.

The doors $c^1 c^2$ in the breechings C C' and the door a^3 in the rear furnace-wall are for the purpose of swabbing out the flues $B^1 B^2$, so as to clean them from soot. The door a^3 is for the purpose of gaining access to the ash-pit.

The crown-sheet B^3 , that forms the top plate of the fire-box, is corrugated, as shown in Fig. 3, and that portion of it which forms the diaphragm between the fire-box and the chamber of the breeching C' is perforated at b^2 , for the purpose of allowing the flames from the incandescent fuel within the fire-box to pass through the said perforations and ignite the soot and smoke at that point, thereby not only serving to keep the breeching and flues free from soot, but also greatly economizing fuel by consuming the otherwise wasted carbon of the smoke.

Having described my invention, what I claim is—

The diaphragm B^3 , when perforated at b^2 , and otherwise arranged, as herein shown and described.

B. R. HAWLEY.

Witnesses:

M. RANDOLPH,
S. M. RANDOLPH.