

(No Model.)

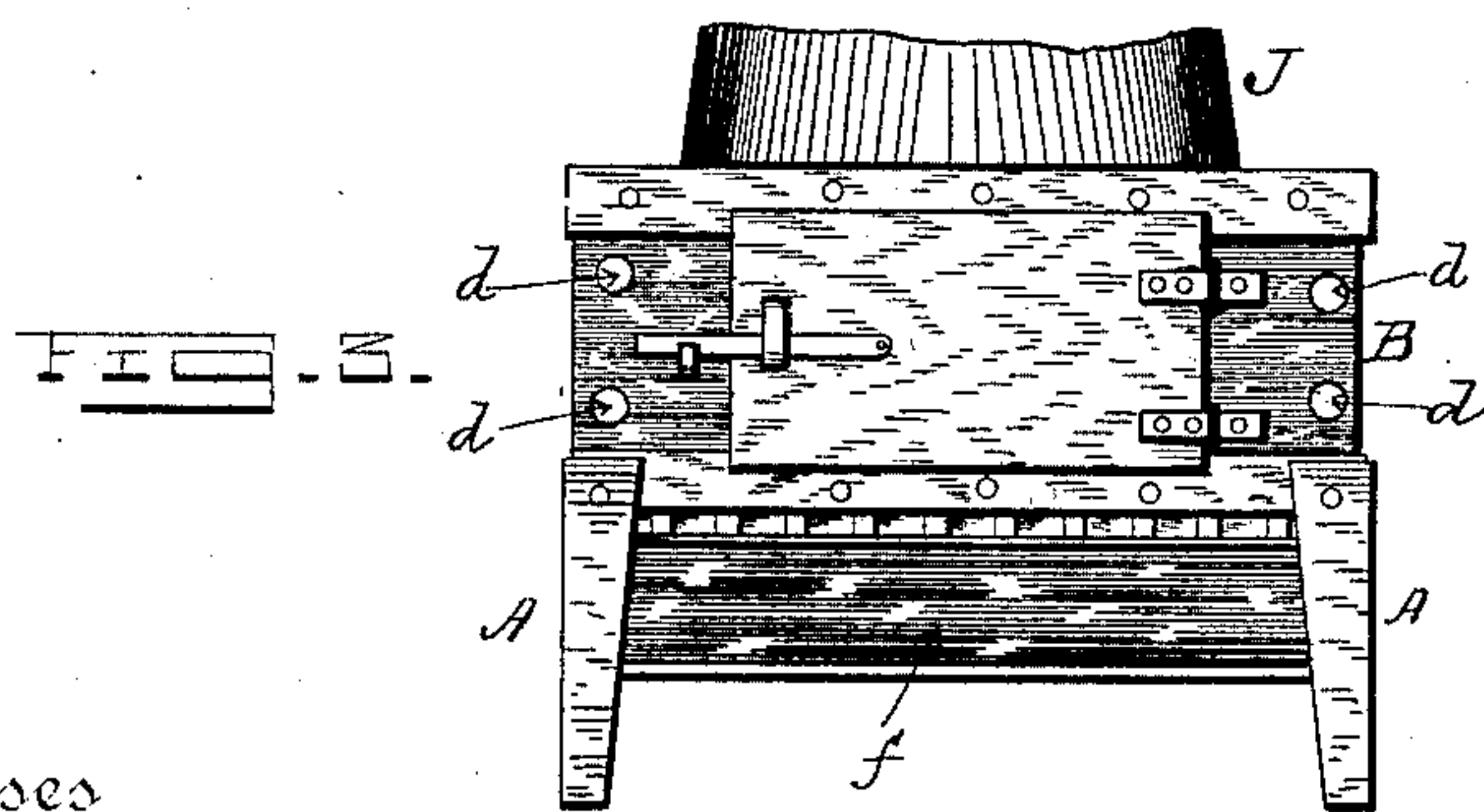
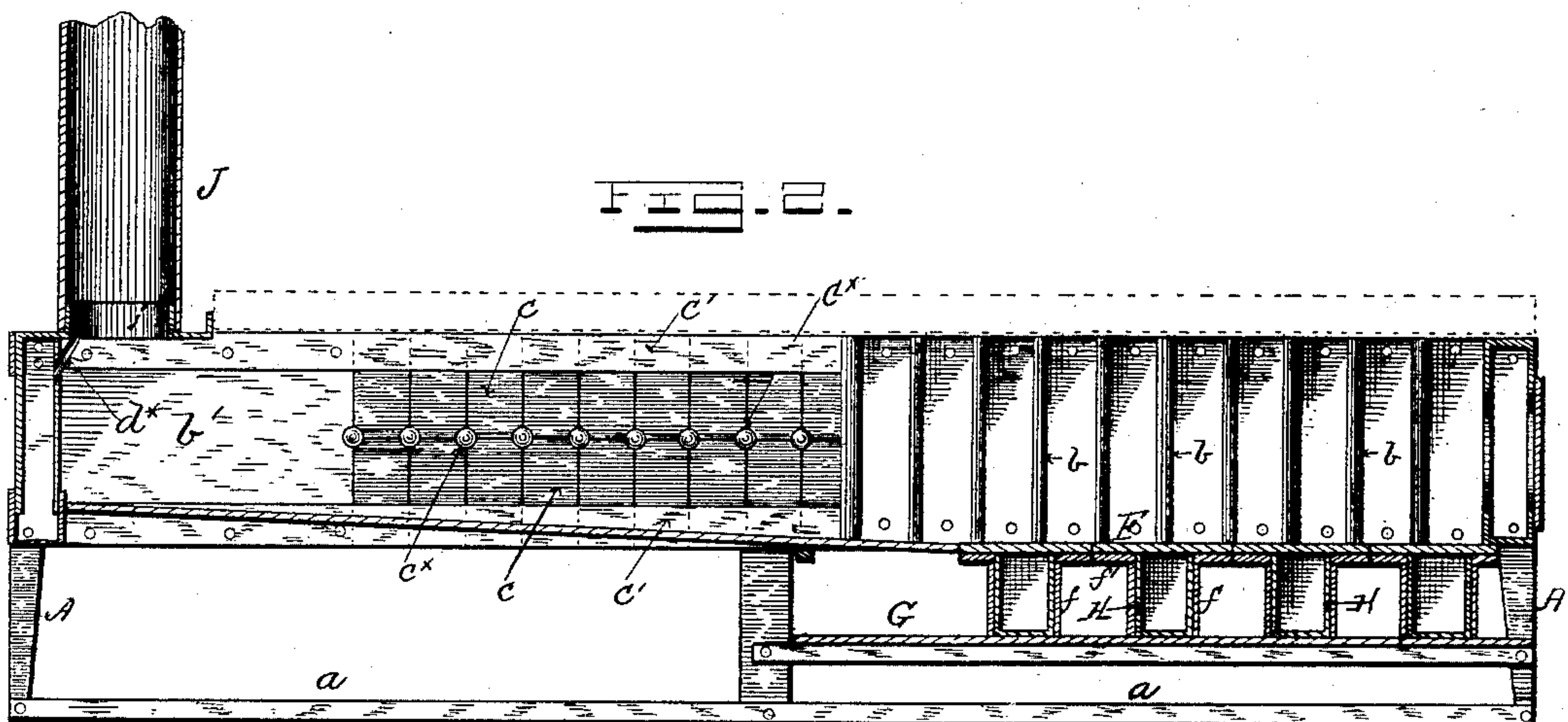
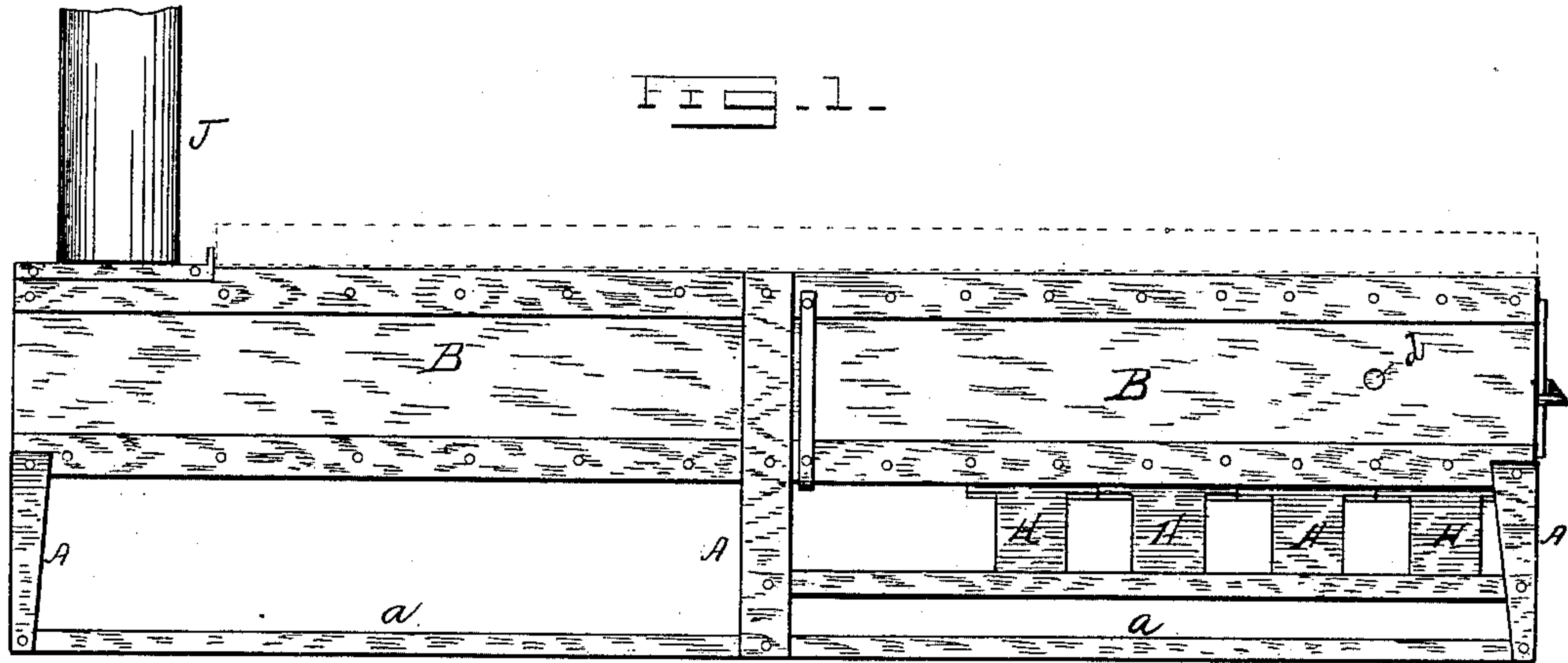
2 Sheets—Sheet 1.

E. WILLIS.

ARCH FOR BOILING SAP SUGAR, &c.

No. 348,938.

Patented Sept. 7, 1886.



Witnesses

C. E. Allen

Inventor

Eben Willis

By his Attorney

J. M. Ketch

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FIG. 4.

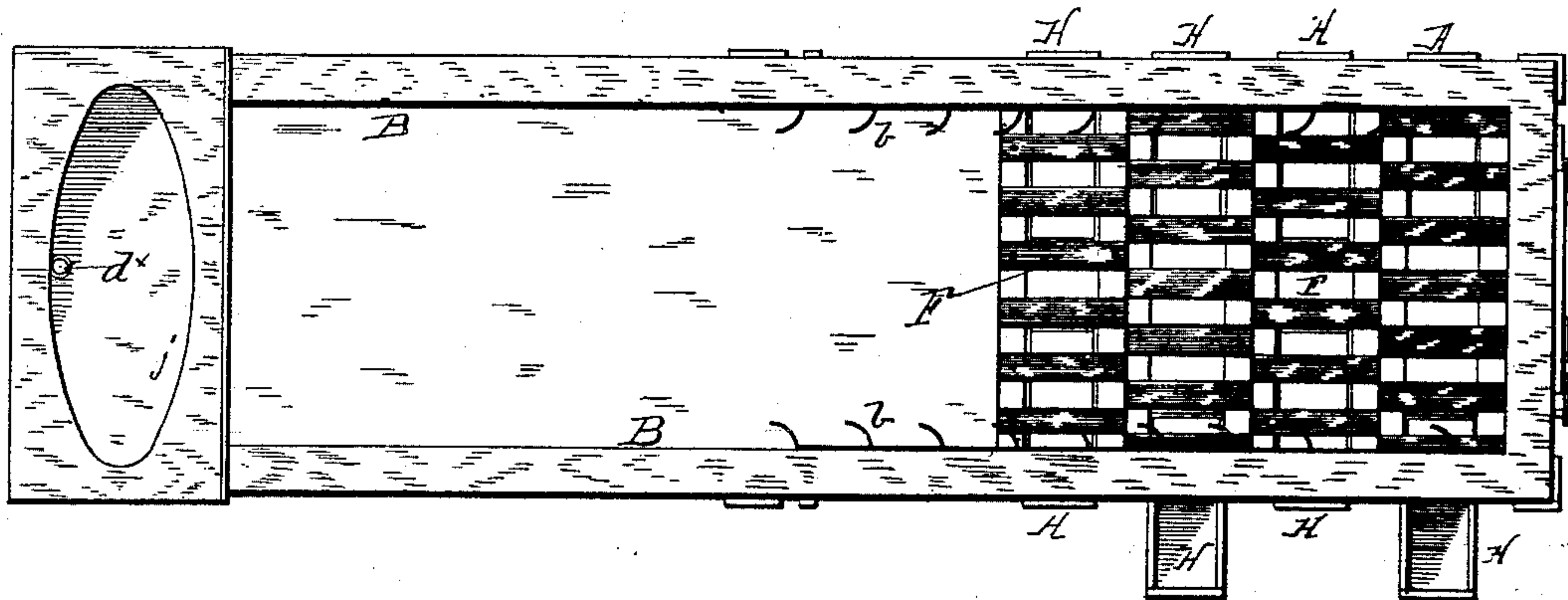
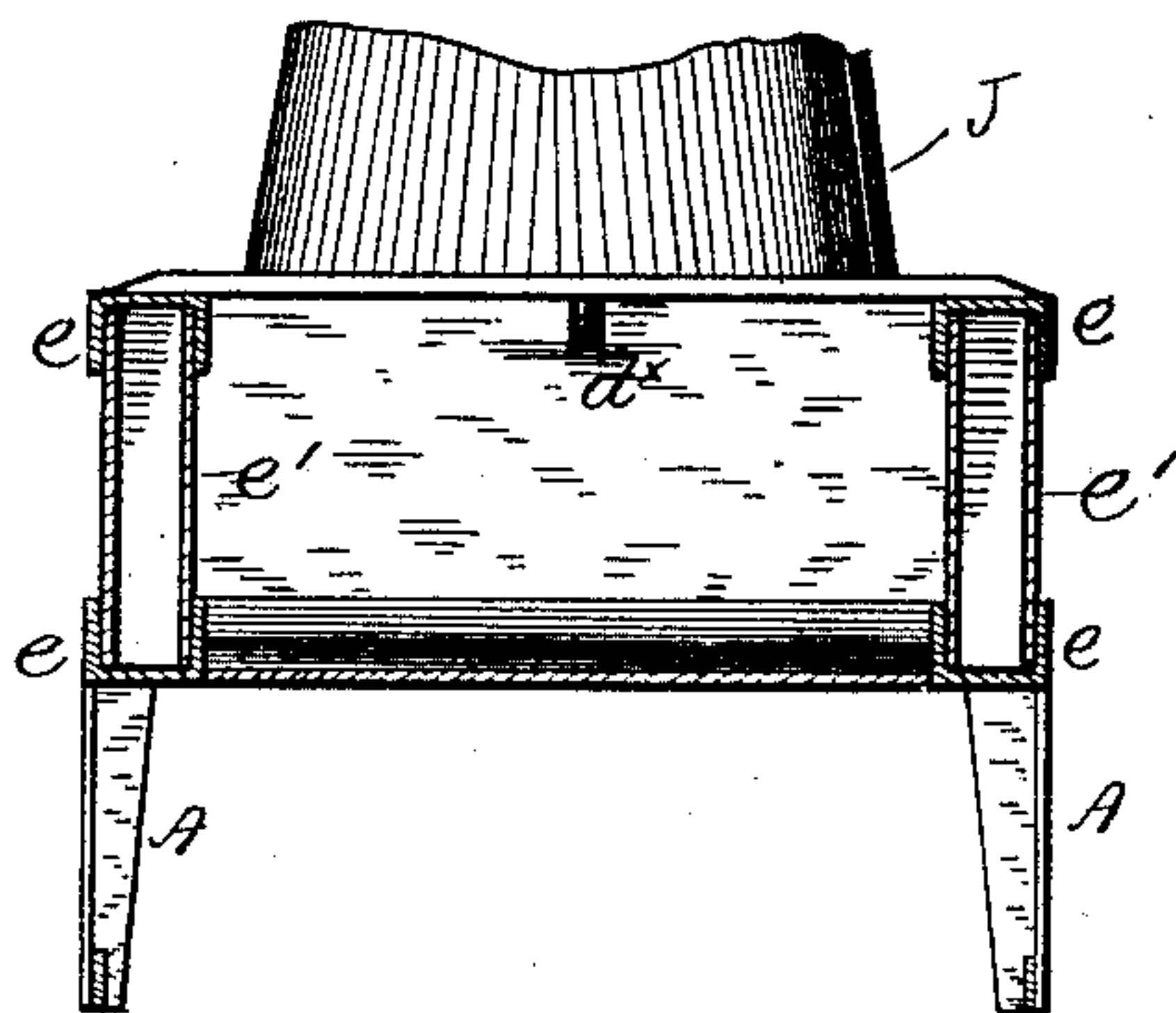


FIG. 5.



Witnesses

G. Domet.
C. E. Allen

Inventor

Eben Willis,

By *his* Attorney

J. N. Katz

UNITED STATES PATENT OFFICE.

EBEN WILLIS, OF COLTON, NEW YORK.

ARCH FOR BOILING SAP-SUGAR, &c.

SPECIFICATION forming part of Letters Patent No. 348,938, dated September 7, 1886.

Application filed March 31, 1886. Serial No. 197,262. (No model.)

To all whom it may concern:

Be it known that I, EBEN WILLIS, a citizen of the United States, residing at Colton, in the county of St. Lawrence and State of New York, have invented certain new and useful Improvements in Arches for Boiling Sap-Sugar and for other Purposes; 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.

My invention relates to furnace-arches for boiling sap-sugar and for various other purposes for which such arches are used.

The objects of my invention may be briefly stated as follows: To keep the walls of the arch cool; to provide a brick-lined iron arch in which the bricks shall be held in or upon the iron framing; to provide a corrugated iron lining formed in sections to prevent warping; to provide grates which shall run through to both sides of the arch, thus giving draft on both sides of the arch; to provide ash-pans at both ends of the grates, which shall perform the double function of serving both as ash-pans and as draft-regulators; to provide imperforate troughs or boxes permanently attached to each grate, so that no draft can enter the grates except from the ends thereof, and to confine any ashes or fire which may escape while the ash-pans are removed; to provide spaces or flues between these grate-boxes which shall permit the free passage of air for keeping the supporting and the grate boxes cool. Several minor objects will appear in the general construction and arrangement of parts. To accomplish these ends I proceed to construct and combine the device in the manner set forth in the following detailed description.

The accompanying drawings illustrate what I consider the best means for carrying my invention into practice.

Figure 1 is a side elevation of my improved arch. Fig. 2 is a central longitudinal section of same, and Fig. 3 is a front elevation of same. Fig. 4 is a plan view; Fig. 5, a transverse section taken through the plane hollow wall.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A A are the supports upon which the arch rests. These supports are preferably secured to the body of the arch, to be moved with it, the entire structure being portable and easily removed from place to place. Braces or side bars, *a a*, may, if desired, be run along the base of the device from support to support, as shown. The walls B B, side and rear, are formed of metal, either with a metallic or a brick lining. The arch may be formed with brick lining for part of its length, and metallic for the remainder, and in using the metallic lining I make it partially or entirely corrugated, and apply it in sections. The corrugated form is shown at *b*, Fig. 2, and the plain uncorrugated by *b'*, the same figure. When only a portion of the lining is corrugated, as shown in this figure, I extend it over the fire-chamber or grate surface where the most intense heat is felt. The corrugations, as well as the construction and application of the lining in sections, prevents warping. When made corrugated, the corrugations are preferably in the form of curved shields, which incline backward, so as not to intercept or impede the draft, but at the same time to prevent the access of heat to the walls or lining proper. In case the metallic lining should prove insufficient to withstand the attacks of the heat in the fire-chamber proper, I provide a brick lining, which can be substituted for it.

I am aware that brick-lined arches or furnaces are very common; but I have devised a means for holding the brick in place which is new. This means consists in placing the brick in the metallic sheet and bending or flanging the edges of said sheet over upon the edges of the brick, clamping them securely in place and holding them together. Two or more rows of brick may be held in this way, as shown in Fig. 2, where *c c* represent the bricks and *c' c'* the flanged or turned-over edges of the metallic sheet. In addition to the edge flanges, I may employ both, as shown at *c* c**, with broad heads, to engage the corners of the bricks and hold them together and in the metallic frame. In this way I am enabled to produce a brick lining for arches without the use of mortar.

I preferably make the walls of my arch hollow when metallic lining is used, and provide openings or entrances *d d* for cold air at some

point at or near the front of the arch, and an exit or escape, d^* , therefor in the mouth of the smoke-flue or chimney. The location of the escape-passageway at this point is important and highly advantageous, as the passing hot air, flame, and smoke creates a draft from the escape-opening, thereby causing a rapid flow and active circulation of the cold air in the hollow walls. When a portion of the wall is brick-lined, the opening or entrance d may be placed back of such brick-lined portion; but when the whole wall is hollow the said opening or entrance will be in the front of the arch, and side openings in the wall may also be formed, if desired. Several such openings may be employed.

In constructing or building the hollow metallic walls I provide a bottom and a top cap, as shown at $e e$, Fig. 5, and unite them by side panels or sheets, $e' e'$, same figure, the exterior panel being placed inside the caps or boxes and the internal panel being secured upon the inner external face of the flanges of said boxes or caps; or the hollow walls may be made of one sheet of metal, bent to form both sides, bottom, and top. The front end of the arch is provided with a door, through which the fuel is inserted. Grate-surfaces (marked F) are secured in the forward part of the arch, and extend a suitable distance back, to form the fire-chamber proper. The grate-surfaces are formed with a bottom box or trough, as shown at f , and extend across under the walls of the arch from side to side. They are supported upon a shelf or bench, G, which is sustained by the supports A of the arch. This shelf not only supports the grate surfaces or sections, but also serves as a shield against escaping fire. The boxes or bottoms f are narrower than the grate-sections, and have wings or side extensions, f' , which project from the top thereof and cover the open spaces in the grate, which extend past the body of the box. The grate-sections lie close together alongside and only receive draft from the ends. By reason of the narrower boxes under them an open space is left between each pair of boxes for the circulation of air across through this portion of the arch, to keep the grate-boxes and shelf G cool. The grate-sections may be movable, so as to be taken out when required, or they may be fixed in any convenient or suitable manner. Into the boxes f at each end are placed ash-pans H, which fully close the openings in the ends of boxes f when pushed in to the full extent, thus shutting off the draft entirely. By drawing the ash-pans out more or less a greater or less amount of draft is given. Thus the grate receives draft from both sides of the arch, and the ash-pans, beside serving their usual function, serve as draft-regulators also. The top of the arch receives the pan I, in which the liquid sap is placed for boiling. A suitable chimney or pipe, J, is placed over the escape-

passage j and carried up to any desired height to cause the arch to draw properly.

Modifications within wide limits may be made in many of the details of my device without departing from the spirit or sacrificing the advantages of my invention. Some of such modifications have already been defined; others will suggest themselves to those skilled in the art to which my invention appertains. I will mention others which may be made. I have mentioned or described the parts f as boxes or troughs, but inasmuch as the shelf G is imperforate, they are more cheaply and preferably made without a bottom, the sides simply extending down to rest upon the shelf G, which will form the bottom. The grate-sections may be made of any width desired or found to be convenient. An abutment or vertical flange, b^* , may be formed across the end of the arch on top to receive the pan.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An arch for boiling sap-sugar, having hollow walls provided with metallic lining, having corrugations or guards inclined in the direction of the draft.

2. An arch for boiling sap-sugar, having hollow walls and an opening or openings at or near the front end, and a draft-opening in the pipe or chimney, the inner lining of said walls being provided with corrugations or guards inclined in the direction of the draft.

3. An arch for boiling sap-sugar, having metallic sides provided with turned flanges, as described, and a brick lining or filling, substantially as set forth.

4. An arch for boiling sap-sugar, having metallic lining provided with corrugations or guards inclined in the direction of the draft, as set forth.

5. An arch for boiling sap-sugar, having grate-sections extending entirely across it and receiving draft from both ends, as set forth.

6. An arch for boiling sap-sugar, having grate-sections provided with boxes or imperforate sides narrower than the sections, so as to leave an air-space between each pair, as set forth.

7. An arch for boiling sap-sugar, having grate-sections with the boxes or sides described, in combination with ash-pans inserted in said sections and serving also as draft-regulators.

8. An arch for boiling sap-sugar, having an imperforate shelf or support for the grate-sections and boxes in combination with said sections, as set forth.

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

EBEN WILLIS.

Witnesses:

JAMES SPEARS,
GEORGE W. STUART.