

(No Model.)

2 Sheets—Sheet 1.

J. L. JUDGE.
FURNACE.

No. 367,638.

Patented Aug. 2, 1887.

Fig. 1

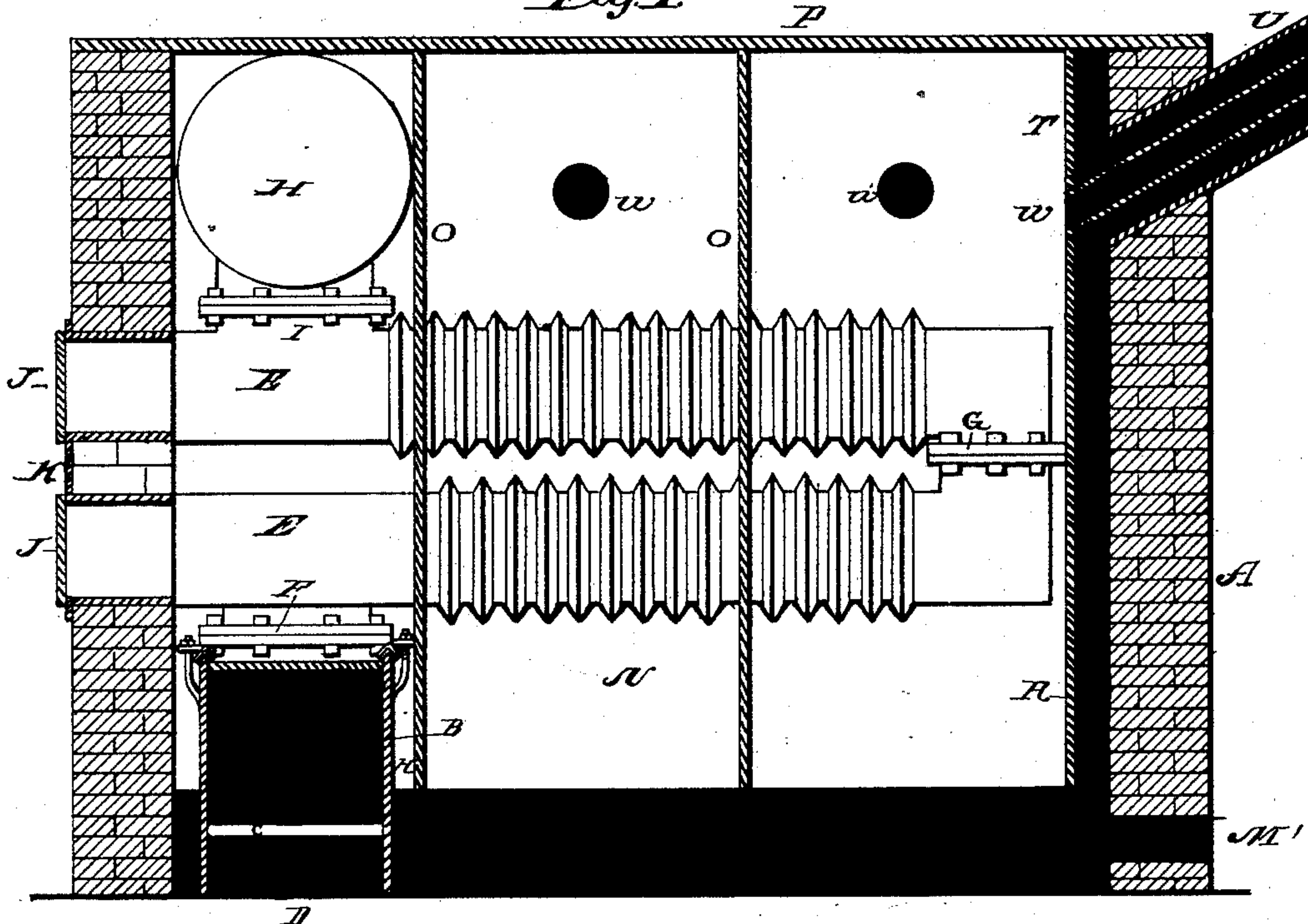
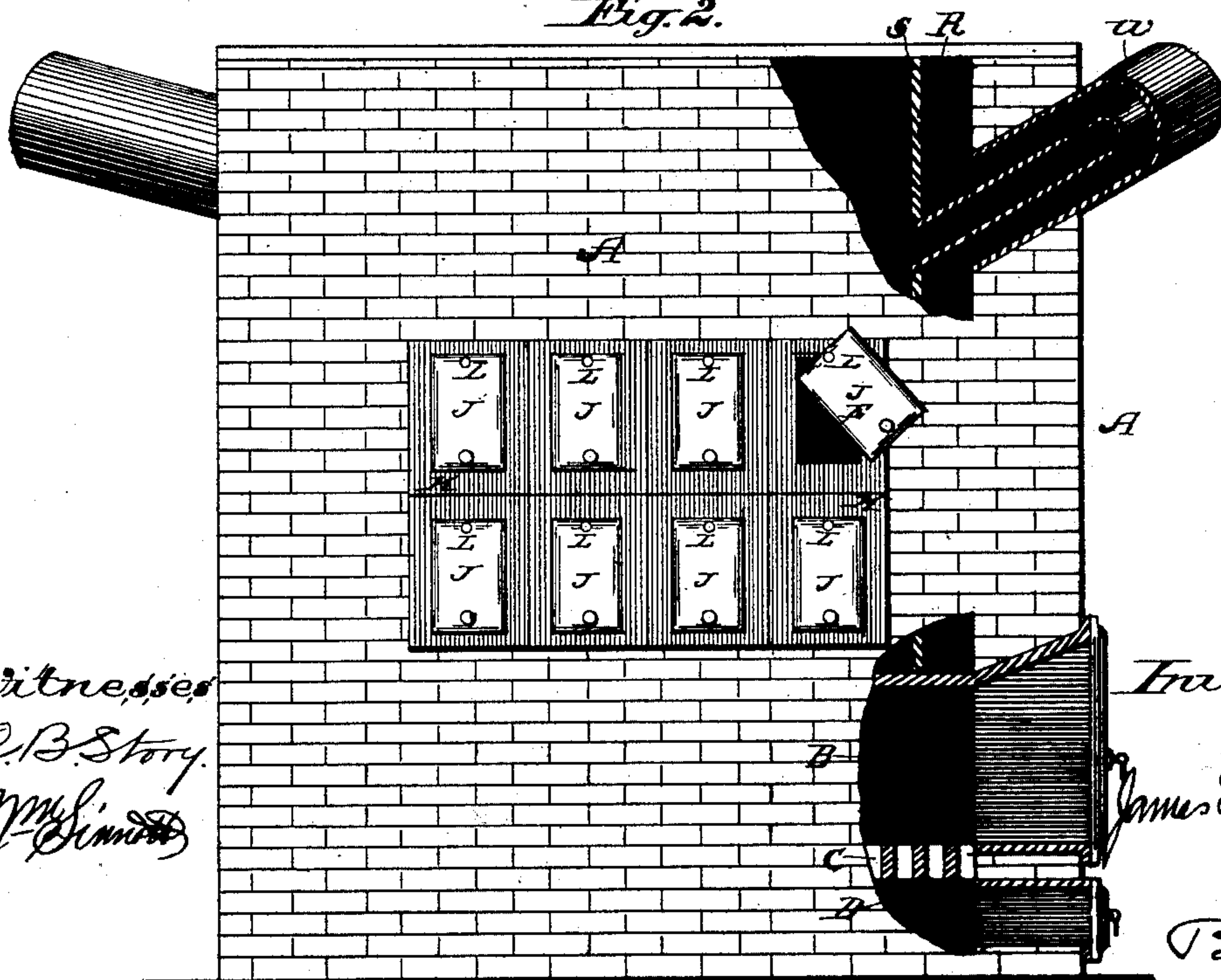


Fig. 2.



Witnesses

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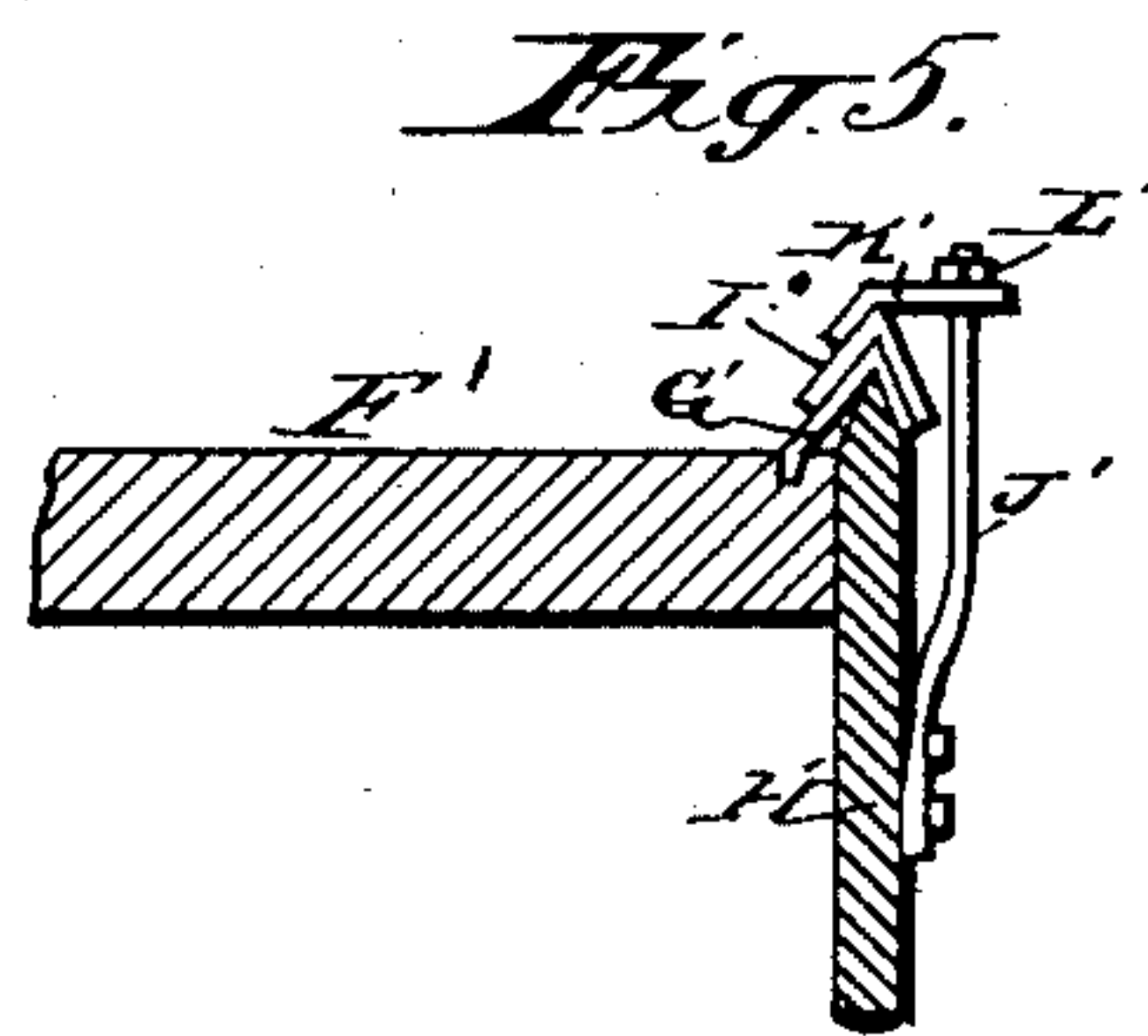
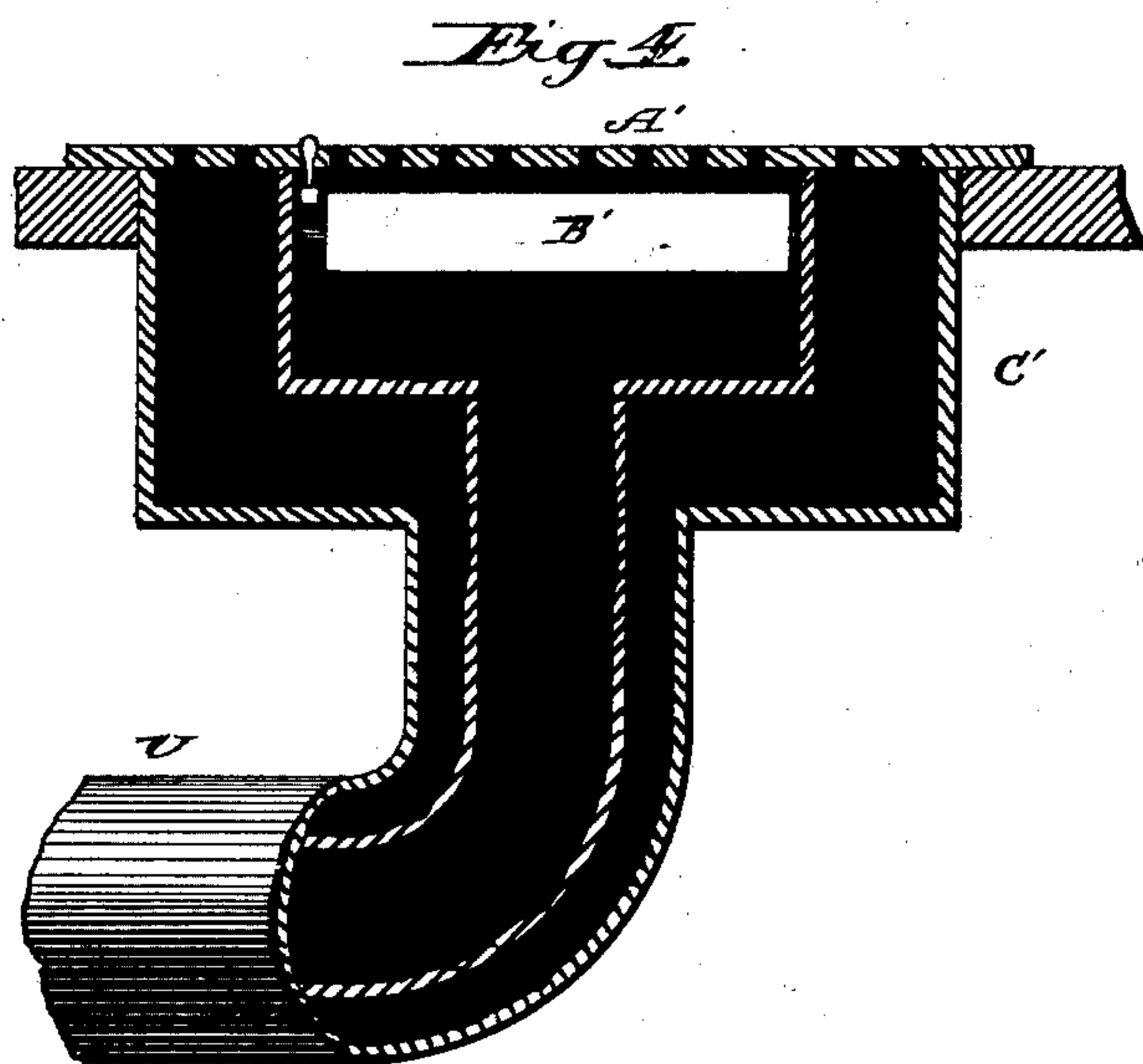
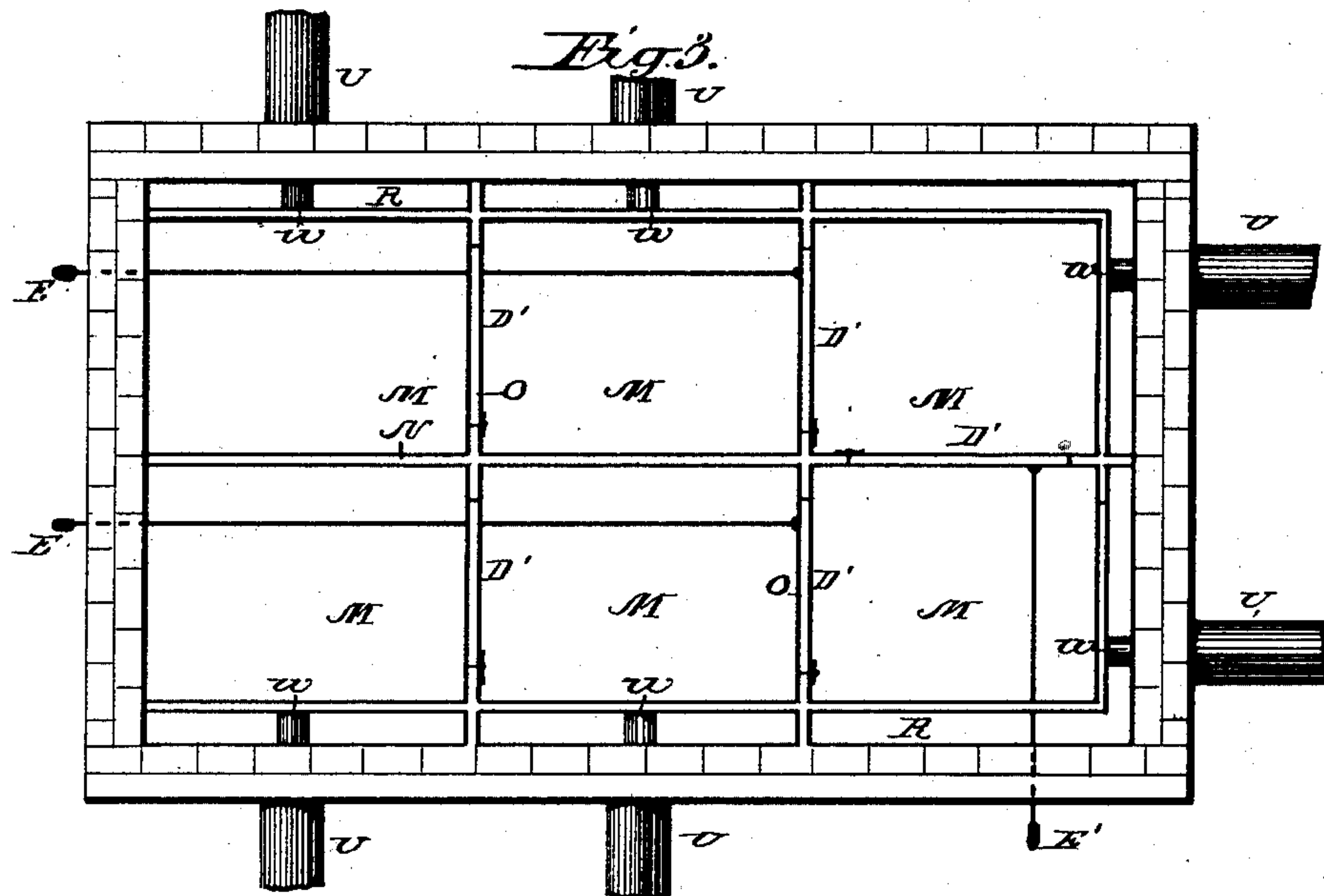
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

JAMES L. JUDGE, OF MILWAUKEE, WISCONSIN.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 367,638, dated August 2, 1887.

Application filed July 11, 1884. Serial No. 137,423. (No model.)

To all whom it may concern:

Be it known that I, JAMES L. JUDGE, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Furnaces; 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 ap-

10 pertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in furnaces for burning soft coal; and it pertains to certain combinations and arrangements of the parts, as herein set forth, and distinctly pointed out in the claims.

20 My invention is further explained by reference to the accompanying drawings, in which—
Figure 1 represents a longitudinal section of the inclosing-walls, showing a side view of the flues. Fig. 2 is an end view. Fig. 3 is a top view. Figs. 4 and 5 are details.

25 Like parts are represented by the same reference-letters throughout the several views.

A is the inclosing-wall, which may be made of sheet metal, but is preferably made of brick, as shown.

30 B is the fire-box or combustion chamber in which the coal is burned.

C is the grate to the fire-box, beneath which is an ash-box and air-passage, D.

35 E E are a series of flues which are arranged at right angles to the fire-box, as shown in Fig. 1, having their front ends only extended above the fire-box. The lower series of flues are connected at their front ends to the fire-box by ducts F, while the rear ends of the upper and lower series of flues are in like manner connected together by the short ducts G, and the upper sides of the upper flues are all connected with the horizontal smoke-pipe H by short ducts I. Those connections only

45 which are between the first two flues of the series are shown. The other flues in the series are, however, connected in like manner to each other and to the fire-box and pipe.

50 Fire being started in the combustion-chamber B, the heat, flame, and other products of combustion pass up through the duct F into the front end of the lower series of flues E,

and from thence rearward and up through the ducts G into the upper series of flues E, then forward through the upper series to and up 55 through the ducts I into the smoke-pipe H, through which pipe they escape to the chimney or open air.

To facilitate the cleaning of the flues E E their front ends are extended forward through 60 the wall of the furnace and provided with closely-fitting doors J, which are either hinged to the end flanges, K, of the flues or secured thereto at their upper ends by a pivotal bolt, L, as shown. When it is desired to clean the 65 flues, the doors of the upper series are first opened and a scraper is inserted, the blade of which nearly fills the open space in the flue. This is pushed rearward, carrying before it all the soot and accumulations to the rear end of 70 such flues, when it falls through the ducts G into the rear ends of the lower flues. All the upper flues being thus cleaned, the scraper is inserted into the lower series, and the soot is thereby drawn forward to the duct F, through 75 which it falls into the combustion-chamber, passing through the same to the ash-box below, when it is readily removed with the ashes.

The hot-air chamber through which the flues E E extend is subdivided into six com- 80 partments, M, by the central partition, N, and the two transverse partitions O O. The number of compartments may, however, be increased or diminished, as desired. The several partitions N and O extend from beneath 85 the flues to the top plate or cover, P, as shown in Figs. 1 and 2. Thus it is obvious that all the heat of the radiators is equally subdivided into compartments, so that the several pipes, which are each connected with their separate 90 apartments, can each appropriate its proportional share of heat only.

An air-space, R, is formed upon the respective sides and at the rear of the hot-air chamber between the inclosing-wall A and parti- 95 tions S and T.

The air-space R serves the twofold purpose of reducing the waste of heat from radiation through the wall and as a means of communication from the lower end of the exterior air- 100 ducts, U, whereby cool air may be led from the apartment to be heated down the air-duct U beneath the partitions to the radiating-surface of the flues.

W are hot-air pipes which communicate between the hot-air chamber and the room to be heated, terminating beneath the registers A' in the chamber B'. The exterior pipe, U, terminates at its upper end in the chamber C'. That part of the register which covers the chamber B' is provided with the ordinary device for closing it and controlling the admission of warm air. That part of the register outside of the hot-air chamber over chamber C' is perforated for the passage of air, so that as the warm air is admitted into a room, not otherwise ventilated, through the center pipe, W, the cool air is permitted to pass down to the heating-chamber through the pipe U. When, however, the room is so ventilated that a down current is prevented, the moderately-heated air will enter the room from the exterior pipe, and thus keep up a moderate heat in the room while the center of the register is closed. Both the interior and exterior air-chambers are in constant open communication with the inlet air-pipe M at the bottom of the furnace, as shown in Fig. 1, and as the air in the exterior chamber becomes moderately heated by heat radiating from the vertical walls T and passes up through the exterior pipe, U, it is supplied from below through said pipe M.

D' are doors formed through the partitions above the radiators or flues, by which any two or more of the apartments M may be thrown open to each other, whereby all or any fractional part of the heat contained in the hot-air chamber may, by closing the dampers in the heating-pipes, be thrown into a single room.

E' are rods for opening and closing the doors D'.

The lower end of the duct F is connected to the upper edges of the sides of the fire-box B by the device shown in detail in Fig. 5, in which F' represents the top or cover of the fire-box, upon the upper surface of which the lower half of the ducts F are formed. In casting the cover F' a long narrow strip of sheet-copper, G', is affixed to its upper surface near

its edge, and the upper edge of the sides H' H' are beveled, as shown. The cover being inserted between the sides H', the copper strip G' is turned down over and pressed firmly upon such edge. This done, a V-shaped cap, I', is placed above and upon the copper strip, extending its entire length. A series of brackets, J', are then bolted to the sides of the fire-box, H' H', extending above their upper edges and provided with arms K' and nuts L'. The nuts L' are then turned down upon a screw-cut thread formed upon the upper ends of the brackets J', thus pressing the arms K' down firmly upon the plate or rider I', whereby the copper strip is held down firmly upon the edges of the fire-box and a gas-tight joint thereby formed which will not be affected by expansion.

M' is a duct through which exterior air enters beneath the radiating flues.

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

1. The combination, with a furnace having interior and exterior walls and an air-space between said walls, of the interior pipe, W, communicating with the interior chamber, the exterior pipe, U, communicating with the air-space between said walls, chambers B' and C', and register A', said chamber B' communicating with the room through the central part of the register A', while the exterior chamber, C', serves as a medium of communication through openings in the marginal edge of said register with the exterior pipe, as set forth.

2. The combination, with the vertical walls H' H' of the combustion-chamber, of the cover F', provided with sheet-copper flanges G', V-shaped caps I', series of arms K', and retaining-brackets J', provided with nuts L', all substantially as and for the purpose specified.

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

JAMES L. JUDGE.

Witnesses:

C. T. BENEDICT,
WM. SINNOTT.