

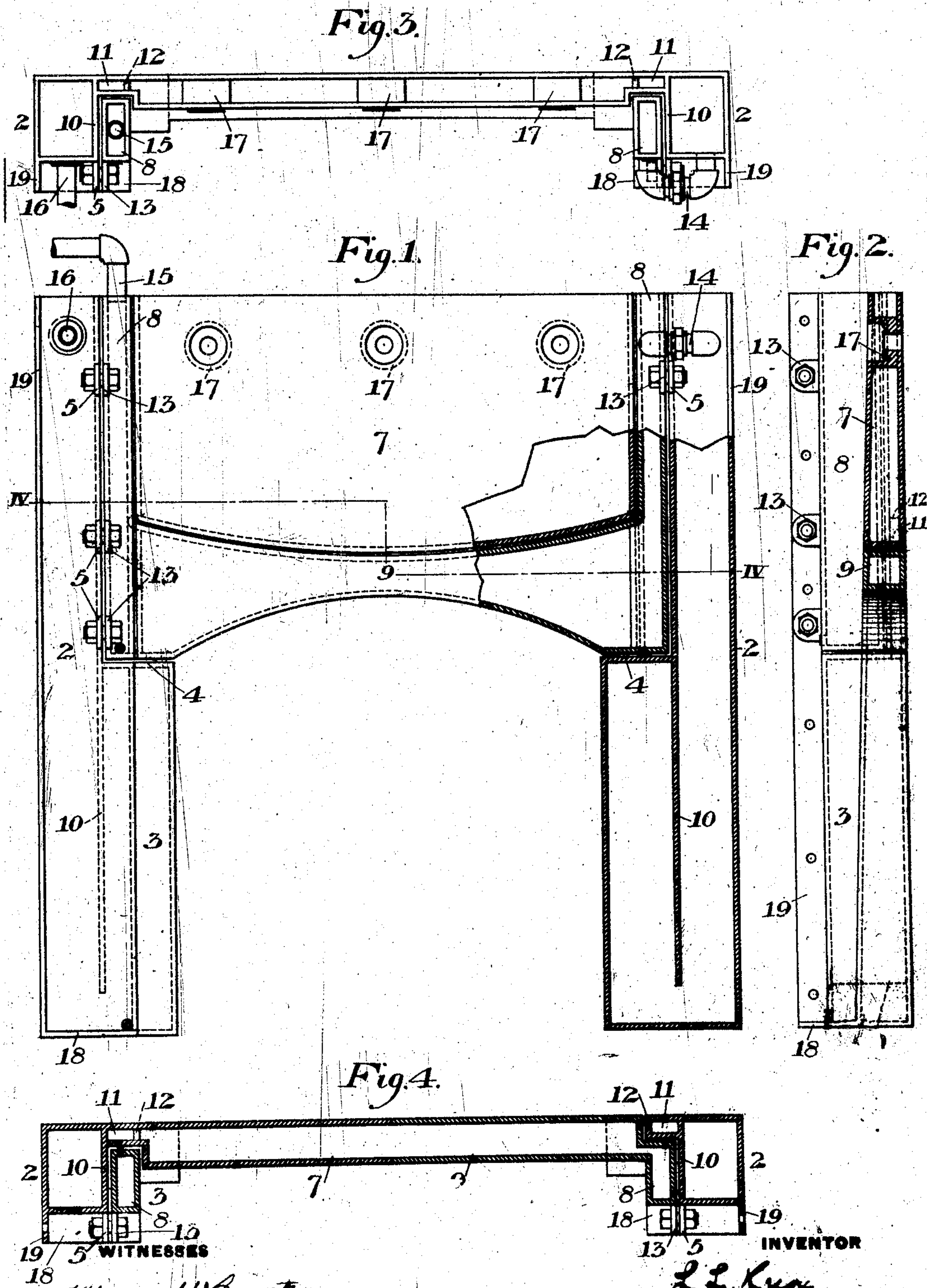
No. 824,184.

PATENTED JUNE 26, 1906.

L. L. KNOX.
WATER COOLED DOOR FRAME FOR FURNACES.

APPLICATION FILED MAY 23, 1904.

2 SHEETS—SHEET 1.



WITNESSES
18

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2 SHEETS—SHEET 2.

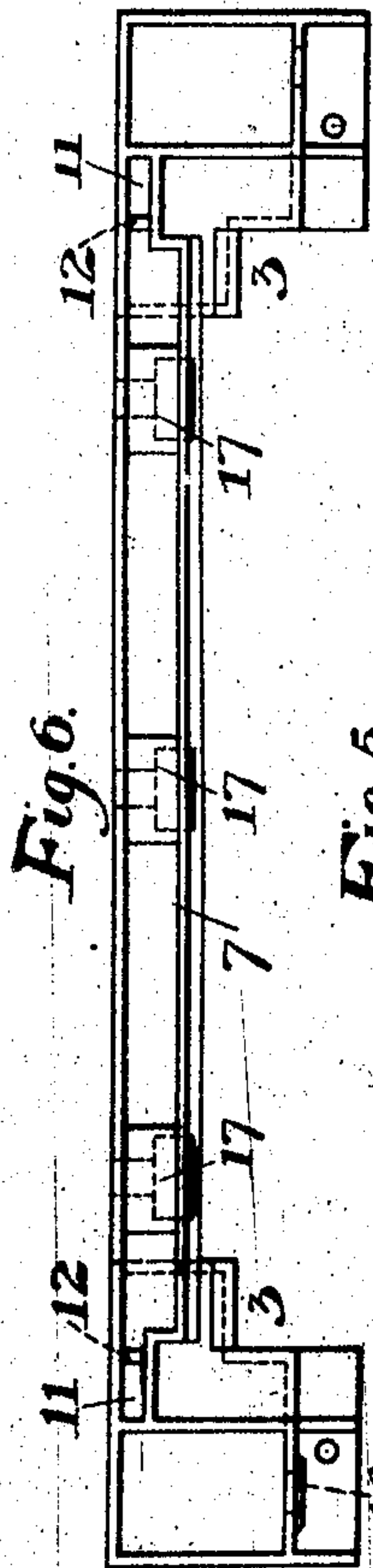


Fig. 5.

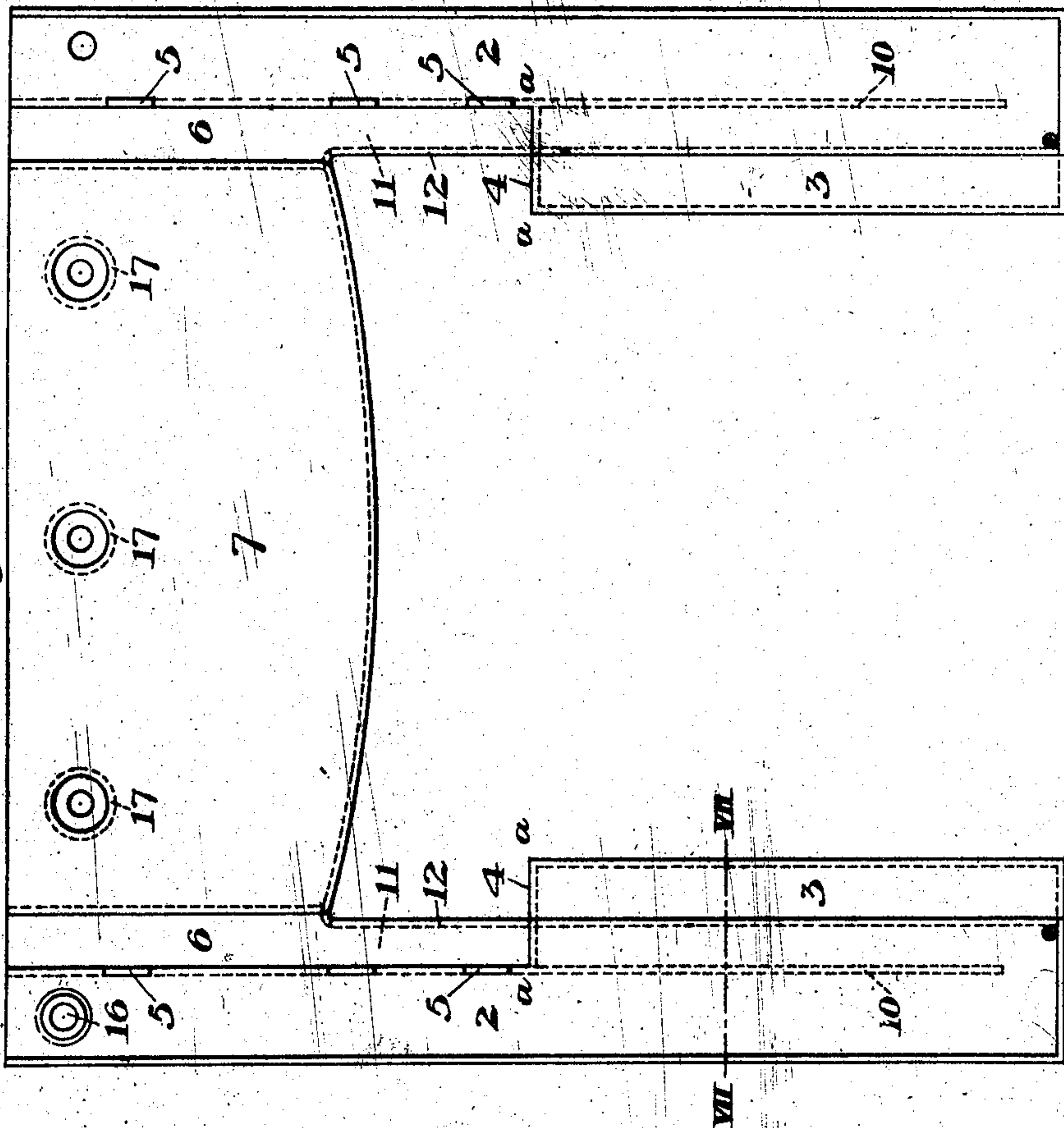


Fig. 9.

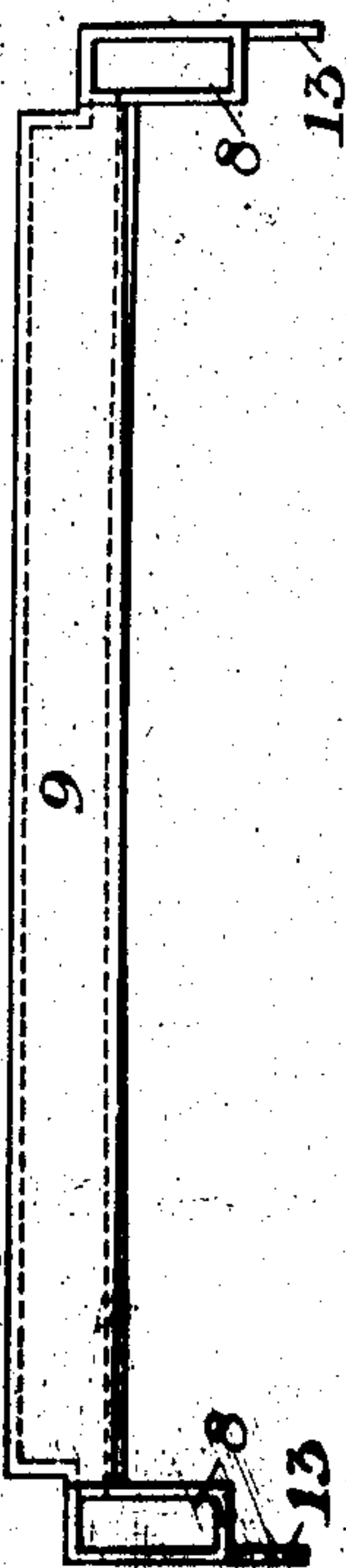


Fig. 8.

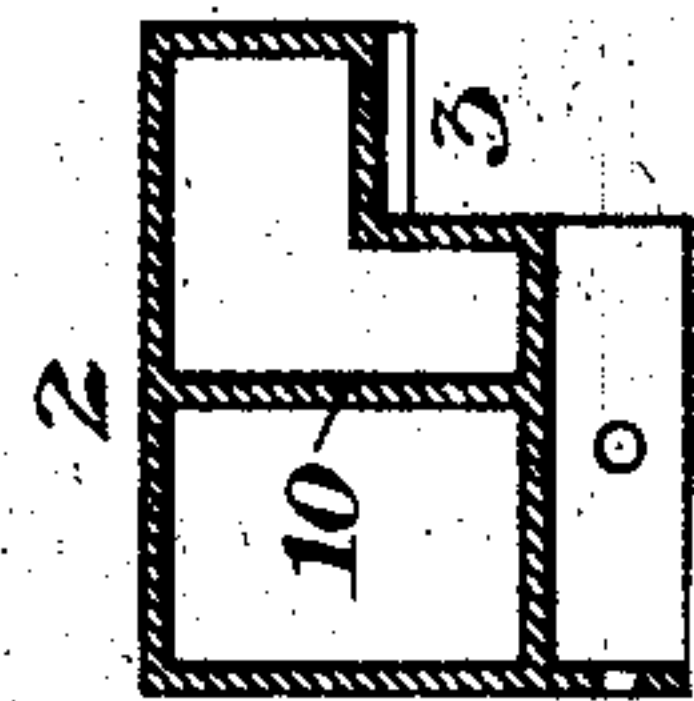
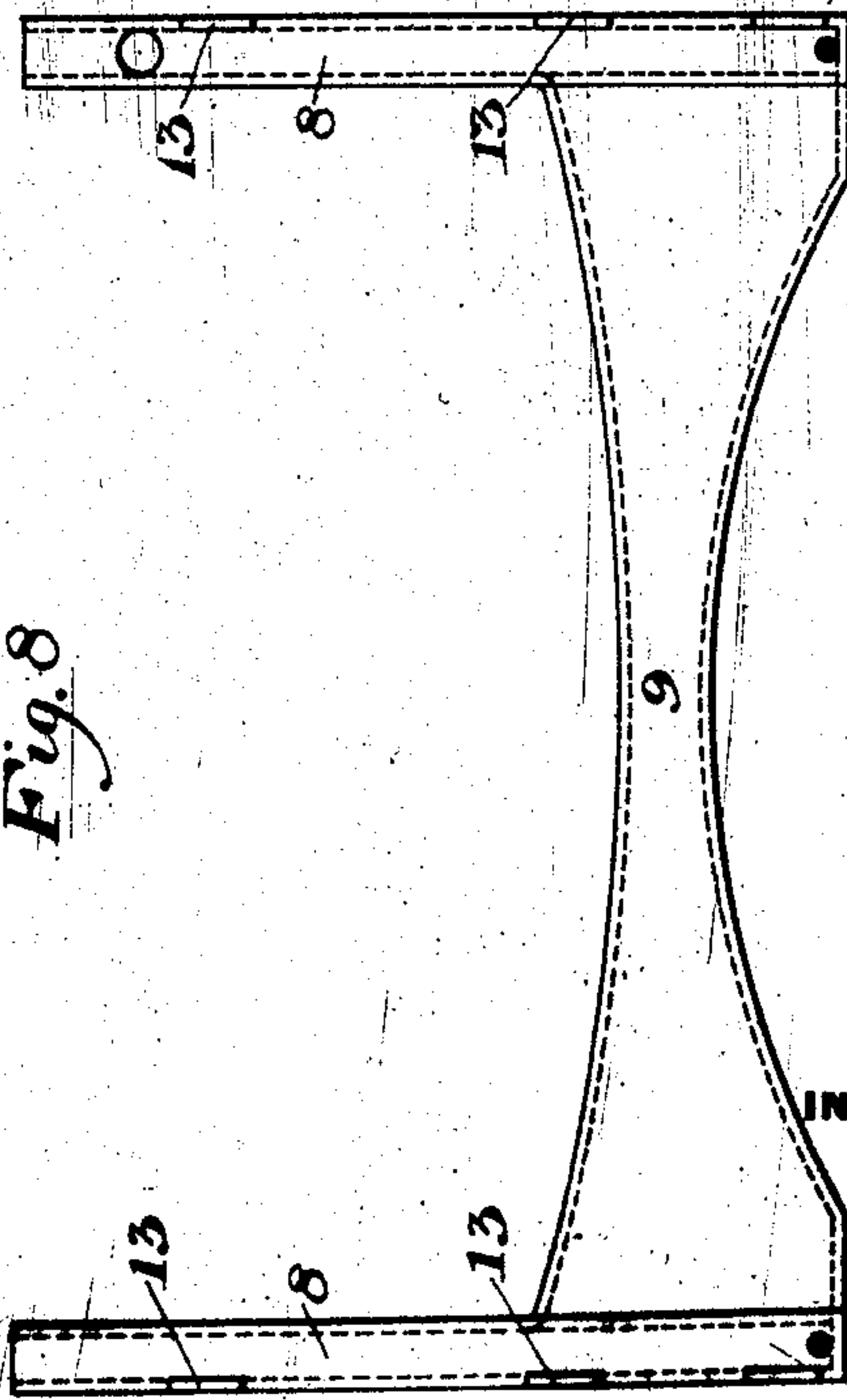


Fig. 7.

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UNITED STATES PATENT OFFICE.

LUTHER L. KNOX, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO MONT MURRAY AND ONE-FOURTH TO H. E. WEISKOPF, OF PITTSBURG, PENNSYLVANIA.

WATER-COOLED DOOR-FRAME FOR FURNACES.

No. 824,184.

Specification of Letters Patent.

Patented June 26, 1906.

Application filed May 23, 1904. Serial No. 209,198.

To all-whom it may concern:

Be it known that I, LUTHER L. KNOX, of Pittsburg, Allegheny county, Pennsylvania, have invented a new and useful Water-Cooled Door-Frame for Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation, partly broken away, showing the preferred form of my door-frame. Fig. 2 is a vertical central section of the same. Fig. 3 is a top plan view. Fig. 4 is a cross-section on the irregular line IV IV of Fig. 1. Fig. 5 is a front elevation showing the frame-body. Fig. 6 is a top plan view of the frame-body. Fig. 7 is a cross-section on the line VII VII of Fig. 5. Fig. 8 is a front elevation of the lintel-casting, and Fig. 9 is a top plan view of the water-lintel.

My invention relates to the class of water-cooled door-frames for furnaces, and is designed to provide a frame in which the lintel may be removed and replaced without removing the frame proper.

Heretofore in water-cooled door-frames the lintel or portion crossing the top of the opening has been formed as an integral part of the frame, and the entire frame must be thrown away when the lintel was burned out. This lintel is subjected both to the greatest heat and to the largest amount of abrasive action during charging of the furnace, and hence wears out rapidly. My invention overcomes this difficulty and provides a water-cooled lintel which may be removed and replaced when injured without changing the body of the frame and without interfering with the continuous operation of the furnace.

The invention also provides for a water connection between the removable lintel and the door-frame proper, so that the same water circulates through the lintel and the door-frame.

In the drawings I have shown the frame as made in two parts, preferably of bronze castings. The frame proper (shown in Figs. 5 and 6) is provided with vertical leg portions 2 2, which are widened out in their lower portions and provided with vertically-extending jogs or shoulders 3 3, which guide the door in its vertical movements. These guide por-

tions extend upwardly from the bottom of the legs to the level *a a*, where there is a horizontal shoulder 4, extending sidewise to the vertical line of baffle 10 and the forwardly-projecting lugs 5, to which the lintel-cheeks are secured. The lower portion of the frame-leg is of the same depth as the outer upper portion, and from the vertical line of the lugs 5 the depth is decreased to form a recess 6, which extends vertically between the lugs 5 and the intermediate cross portion 7 of the frame. These recesses extend down to the level of the ledge 4 and receive the cheeks 8 of the hollow lintel 9. (Shown in Figs. 8 and 9.)

The side legs of the frame are provided with vertical partitions or baffles 10, which extend from the top of the door down to a point near the lower ends of the hollow legs.

From the level *a a* up to the lower corner of the body portion 7 a narrow inclosed channel 11 is provided, which connects the leg with the hollow body 7, the inner wall of this channel terminating at the lower corner of the body 7. The lower edge of the body 7 is preferably curved in outline, and the upper edge of the lintel 9 is correspondingly curved to fit under and against it. This prevents the formation of a steam-pocket in the hollow lintel, since any bubbles of steam will creep along the inclined roof of this lintel and flow out with the water and escape at the open tops of the legs 8 8. The hollow legs 8 project forwardly from the lintel-body and are provided with forwardly-projecting lugs 13, which register with the lugs 5 of the frame-body when the parts are slipped together. These leg portions fit in the recesses 6, and when the lugs are bolted together the parts will be in the position shown in Figs. 1 to 4, inclusive.

The front faces of the jogs 3 and the front faces of the lintel-legs 8 are preferably formed on an incline, as shown in Fig. 2, this giving a continuous upward inward slope on which the door lies, thus causing the door to rest closely against the guides and seal the opening. A water connection is formed between one of the legs 8 of the lintel and the side cheek 2 of the door-frame, preferably by a U-shaped pipe 14, as shown in Figs. 1 and 3, and the water is preferably led into the other

leg of the lintel by a pipe 15 extending down into the open top of such leg.

The water circulation is as follows: downwardly from pipe 15 through one leg 8, across through the hollow lintel 9, up through the other leg 8, thence through the pipe 14 into the upper portion of the cheek of the frame 2, thence down through this cheek or leg to the lower end of the baffle or partition 10, thence up through the inner portion of the leg and through the channel 11 into one side of the hollow body portion 7 of the frame, thence down through the opposite channel 11 and down the inner part of the opposite frame-cheek to a point below the partition 10, and thence up through the outer portion of the leg 2 to the outlet-pipe 16.

The assembled frame may be secured in place by bolts extending through integral spacing-blocks 17, which are cored out and provided with front recesses to receive the securing-nuts. These recesses are preferably larger than the nuts to allow application of a wrench for operating them. I also preferably provide forwardly-projecting lugs 18 at the bottom of the cheeks or legs 2 and which are fastened to the bottom sill of the door-opening, and also side ribs 19, extending up along the legs 2 and projecting forwardly, these being secured to the buck-staves of the furnace.

The advantages of my invention result from the use of the water-cooled lintel, which is separate and removable from the water-cooled door-frame, thus allowing for replacing of the lintel without injuring the frame proper and without stopping the operation of the furnace, also from the interconnection between the lintel and the frame, by which a continuous circulation is maintained through the lintel and frame. The curved roof of the lintel prevents the formation of a steam-pocket, and the lintel may be easily removed and renewed. It will be noted that the top of the door-frame proper and the tops of the lintel-legs are open, thus allowing the escape of any steam that may form in the entire frame. The top of the door may be closed, in which case it should be curved in the same manner as the roof of the lintel and the connecting-pipe 14 lead vertically instead of horizontally and be provided with a blow-off valve. In such case the outlet-pipe should lead through the closed top of the door to prevent the formation of a steam-pocket above it.

The frame is preferably formed of copper or a high copper alloy containing about ninety-eight per cent. or over of copper. Such an alloy will not crack under heat, and its use enables the weight of the frame to be made very much less than that of cast iron and steel. The entire frame may be made in more than two parts. The shape and size of the parts may be varied, as well as the water connections between them, and many other

changes may be made in the form and arrangement of the parts without departing from my invention

I claim—

1. A water-cooled door-frame having hollow water-cooled legs with closed lower ends, a removable water-cooled lintel detachably secured between the legs and water-circulating connections between the lintel and the legs whereby said legs connect through the lintel; substantially as described.

2. A door-frame having a hollow top portion with hollow depending legs, a hollow lintel extending across the top of the opening between the legs, and connections for circulating water through the lintel and the door-frame; substantially as described.

3. A water-cooled door-frame having depending hollow legs with closed lower ends, at least one of said legs having a baffle arranged to give a return pass to the water, and a removable hollow lintel secured to the frame and having connections arranged to circulate the water from one leg through said lintel to the other leg; substantially as described.

4. A door-frame having a hollow transverse top portion and hollow depending legs, a hollow lintel extending across the opening below the upper part of the frame, and water connections between the lintel and the frame to provide circulation through both of said parts; substantially as described.

5. A door-frame having a hollow water-cooled lintel with a curved or inclined roof to prevent the formation of a steam-pocket therein; substantially as described.

6. A door-frame having a removable hollow lintel with a curved or inclined roof and open-topped side legs, and means for circulating water therethrough; substantially as described.

7. A hollow water-cooled door-frame and a hollow removable lintel having hollow side legs forming a part thereof, said parts being secured together by forwardly-projecting lugs; substantially as described.

8. A hollow water-cooled door-frame with an open top, and a hollow water-cooled lintel removably secured thereto, having open-topped side legs; substantially as described.

9. A hollow water-cooled door-frame with an open top, and a hollow water-cooled lintel removably secured thereto having open-topped side legs, and water connections between the door and lintel to provide for a continuous water circulation through both parts; substantially as described.

10. A hollow water-cooled door-frame having an open top, and a hollow water-cooled lintel removably secured at the upper part of the frame-opening; substantially as described.

11. A hollow water-cooled door-frame having hollow legs with longitudinal inner baf-

lies projecting from the wall, whereby the water contacts with the walls of the legs in both the up and down portion of the circuit; substantially as described.

5 12. A hollow water-cooled door-frame having hollow legs with vertically-extending baffles therein said baffles being integral with and projecting from the walls to cause the water to contact with said walls in both the
10 up and down pass; substantially as described.

13. A hollow water-cooled door-frame hav-

ing hollow legs with vertically-extending baffles therein, a removable hollow lintel, and water connections between the inner parts of the frame-legs, the lintel, and the hollow
15 frame-body; substantially as described.

In testimony whereof I have hereunto set my hand.

LUTHER L. KNOX.

Witnesses:

H. M. CORWIN,
JOHN MILLER.