

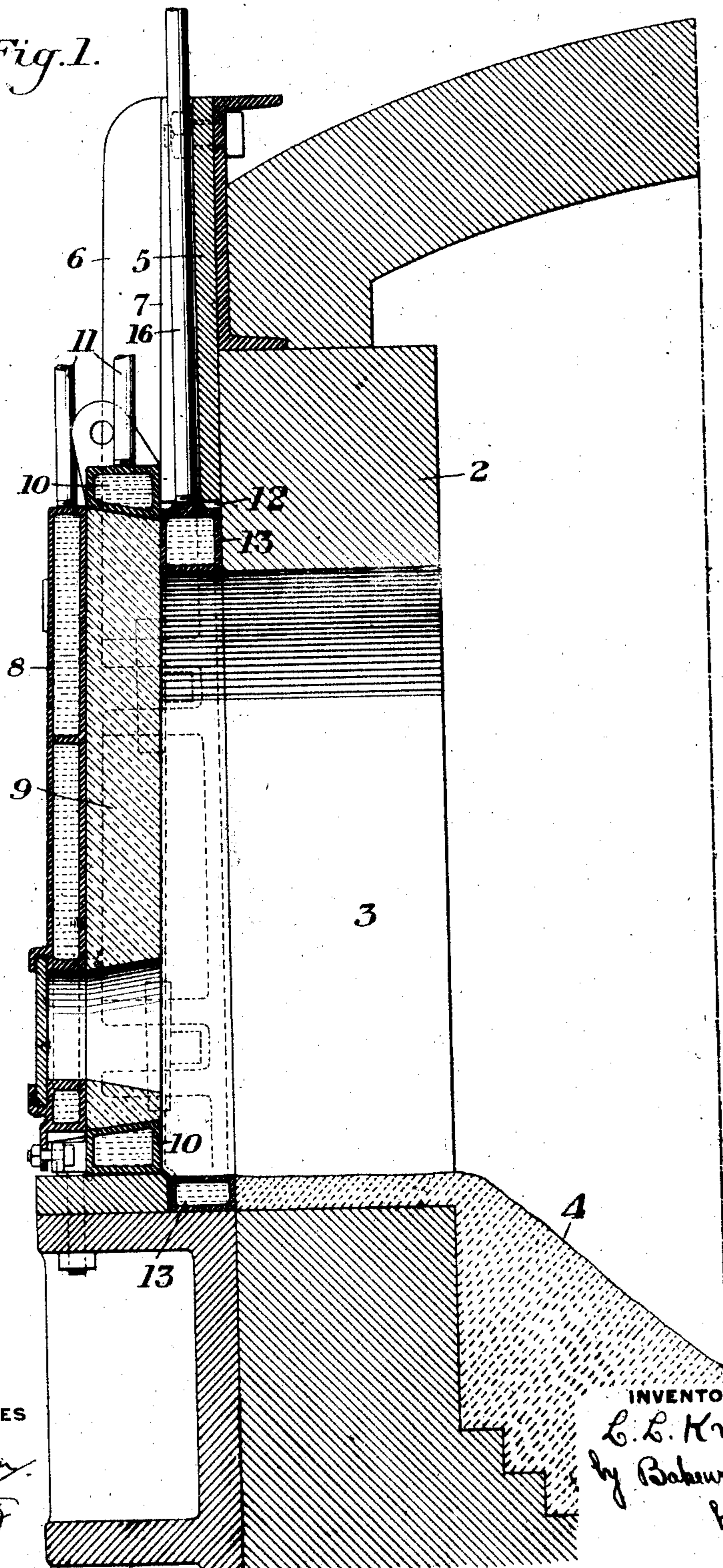
No. 864,752.

PATENTED AUG. 27, 1907.

L. L. KNOX.
FURNACE DOOR FRAME.
APPLICATION FILED DEC. 31, 1906.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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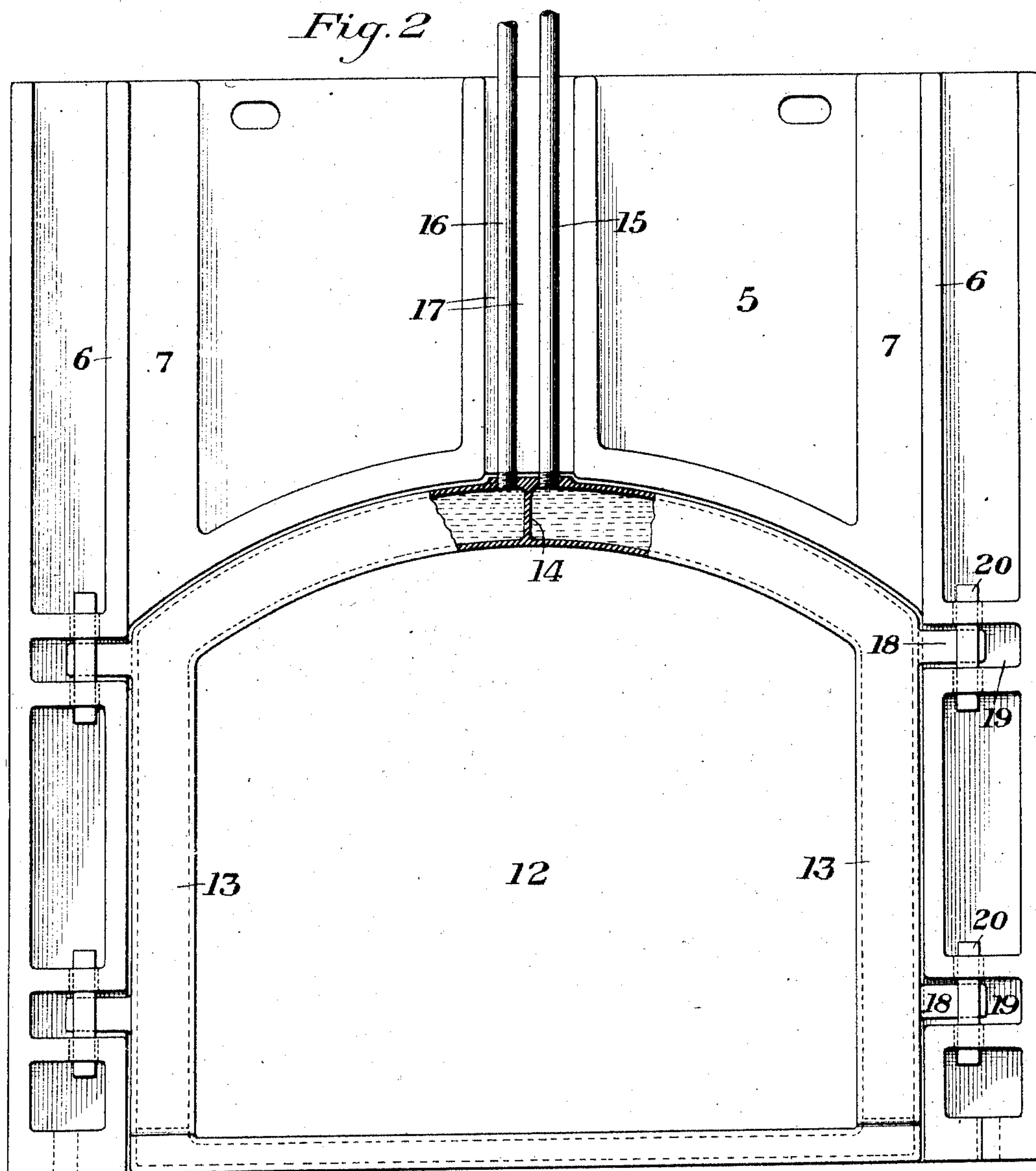
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4 SHEETS—SHEET 2.

Fig. 2



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4 SHEETS—SHEET 3.

Fig. 4.

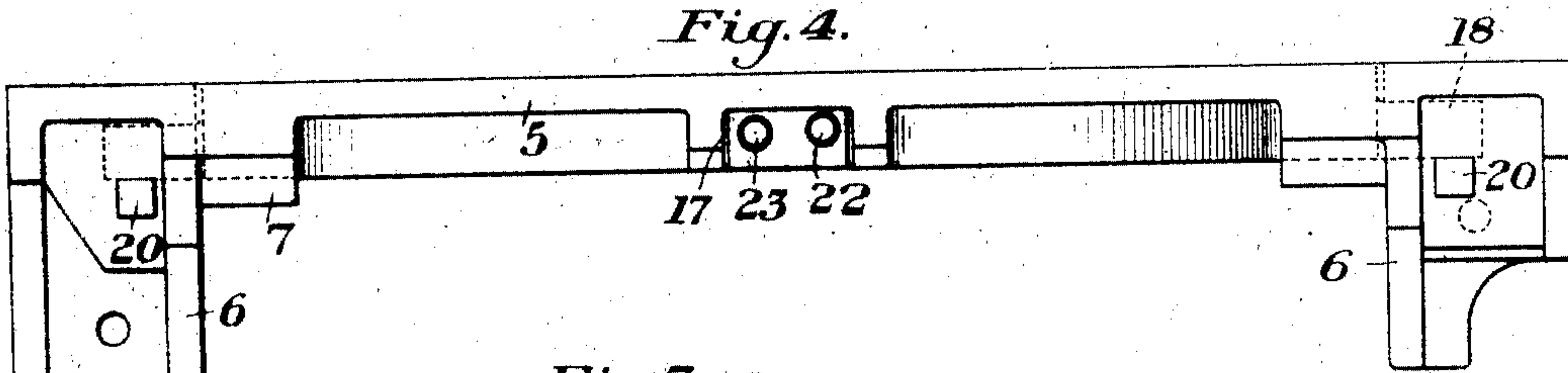
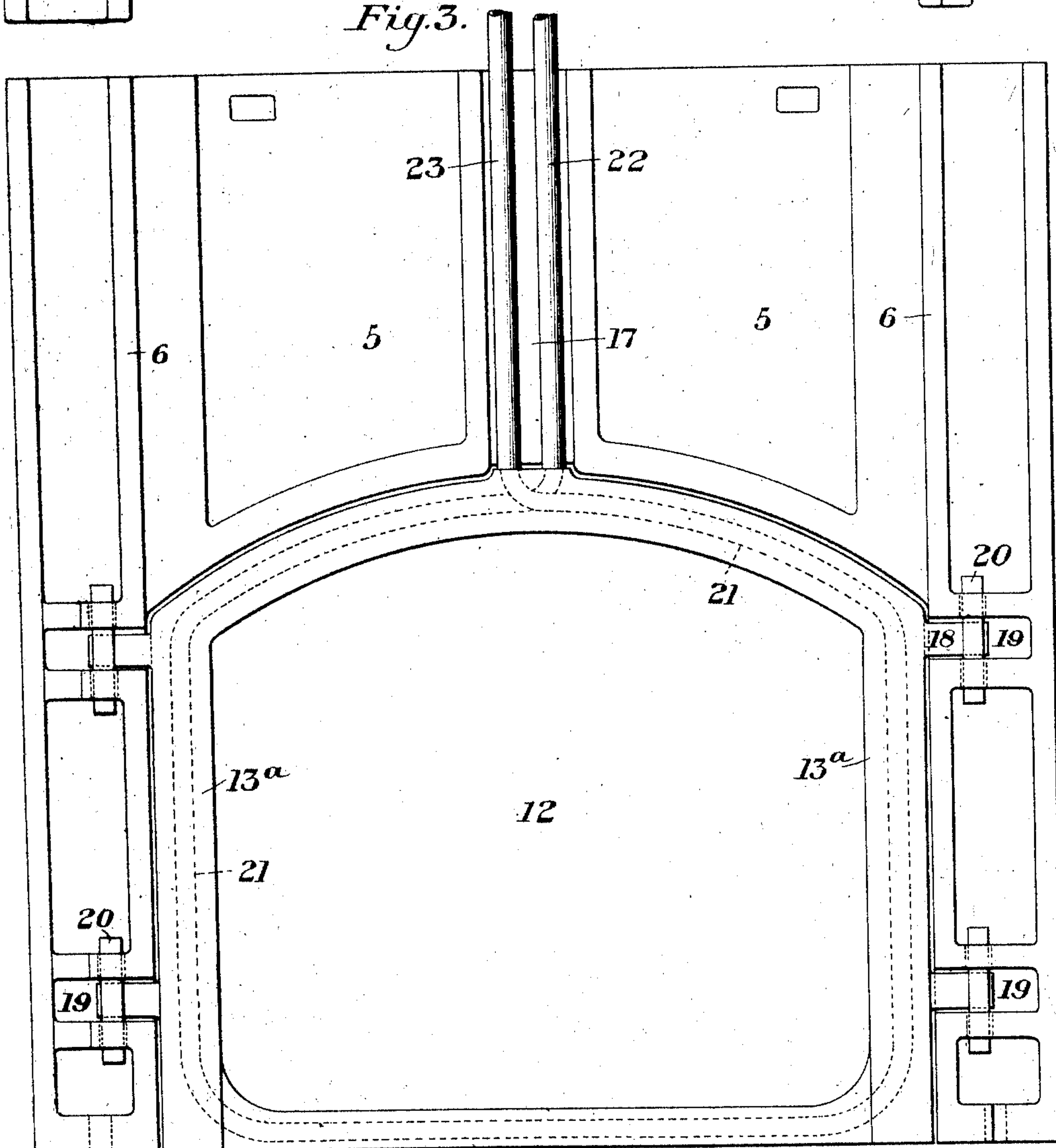


Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 5.

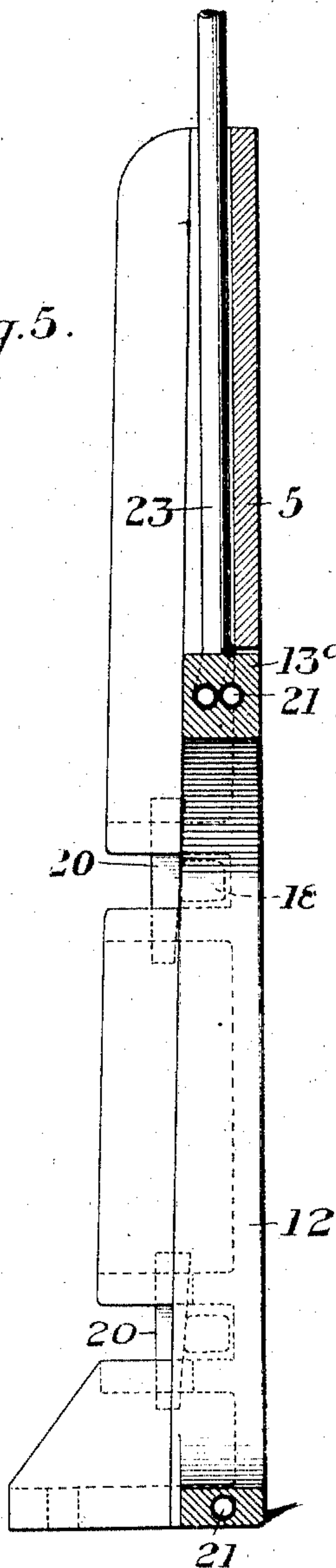
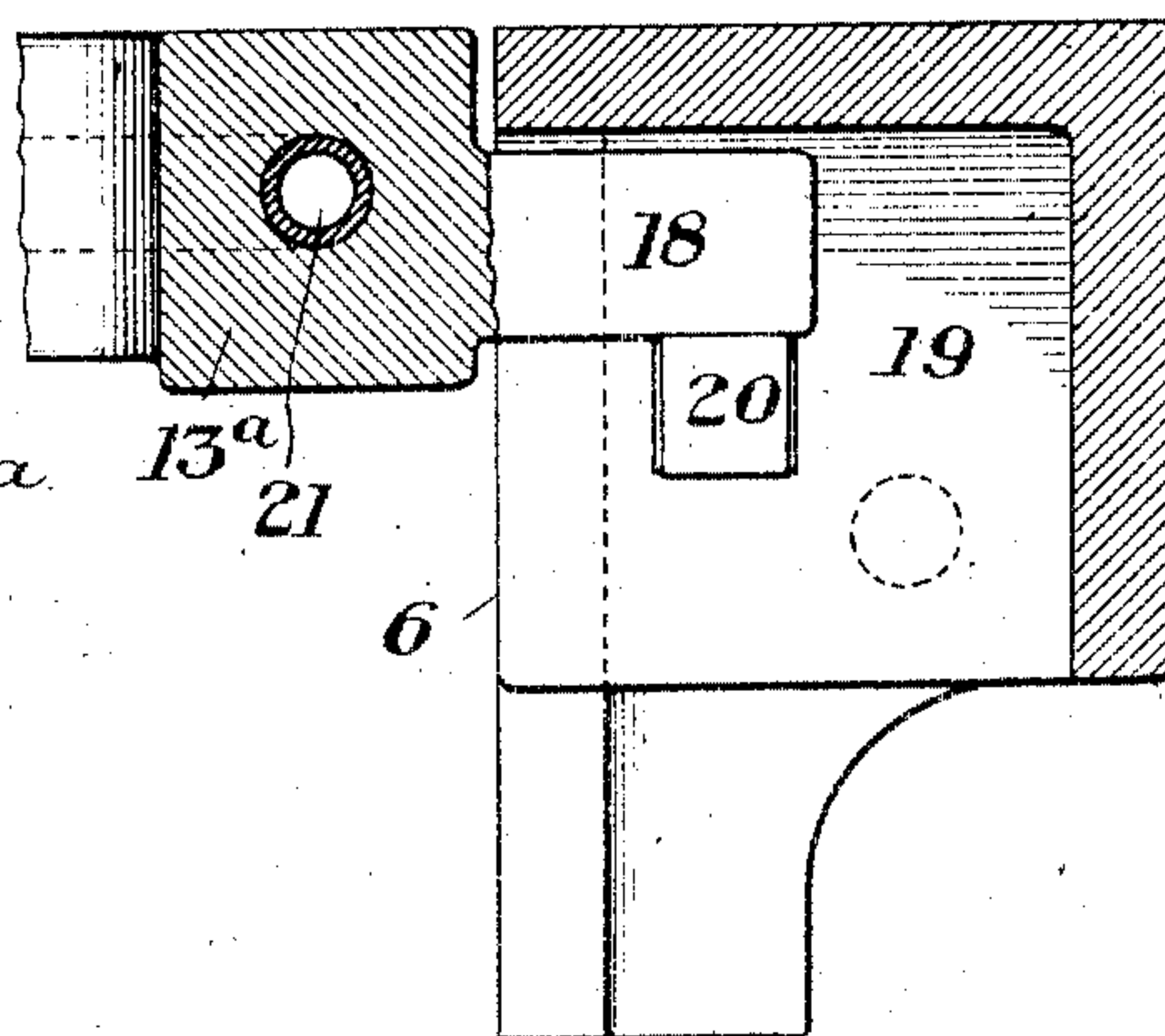


Fig. 6.



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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.

FURNACE-DOOR FRAME.

No. 864,752.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed December 31, 1906. Serial No. 350,219.

To all whom it may concern:

Be it known that I, LUTHER L. KNOX, of Pittsburg, in the county of Allegheny, State of Pennsylvania, have invented a new and useful Furnace-Door Frame, 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 vertical section showing my improved door frame applied to an open-hearth furnace; Fig. 2 is a front elevation of the door frame; Fig. 3 is a similar view showing a modification; Fig. 4 is a top plan view of the frame shown in Fig. 3; Fig. 5 is a vertical section on the line V—V of Fig. 3; and Fig. 6 is a detail sectional view showing one of the detachable fastenings for the supplemental frame.

My invention has relation to the class of furnace door frames, and is designed to provide a frame which is so constructed that the portions thereof which are subject to destructive heat may be readily removed and renewed when burned out, the parts necessary to be renewed in such cases constituting but a relatively small part of the frame as a whole, so that the renewal may be effected at a comparatively slight cost and without dismantling the furnace or putting it out of commission.

My invention also comprises means whereby the parts of the door frame subject to destructive heat may be protected by means of the circulation of a cooling fluid therethrough.

With these objects in view, my invention consists in a door frame having a main metallic member provided with a door-opening therein, and a supplemental frame member arranged to fit within the said opening and to form a surrounding rim therefor, either wholly or in part, means being provided for circulating a cooling fluid within the supplemental frame member, and for detachably connecting it to the main frame member.

My invention also consists in the novel construction, arrangement, and combination of the parts, all substantially as hereinafter described and pointed out in the appended claims.

In the drawings, in which I have illustrated one form of my invention, the numeral 2 designates the brickwork of an open-hearth furnace, 3 the door opening of the furnace, and 4 a part of the hearth or bottom thereof. 5 designates the main frame member which is provided with the lateral cheeks or flanges 6 and with the raised portion 7 adjacent thereto, said cheeks and raised portions forming guiding surfaces for a vertically sliding door. This door may be of any suitable character; but I have shown it as of the form described and claimed in my pending application Serial No. 209,197 filed May 23, 1904, in which it is composed of a hollow body portion 8, a refractory backing 9, and a hollow surrounding rim portion 10 detachably secured to the body, suitable

connections 11 being provided for circulating the cooling fluid through the body and rim.

The main frame member 5 is formed with a door opening 12 which is somewhat larger than the opening 3 of the furnace in order to receive therein the supplemental frame member 13. This supplemental frame member is a rim-like structure which fits within the marginal portion of the opening 12 against the brickwork 2 of the furnace front, with its outer surface substantially flush with the outer surfaces of the raised portion 7. If desired the frame member 13 may be a solid casting of rim form. I prefer, however, to provide it with an interior water circulating space. This may be effected by casting the rim in hollow form, with a dividing partition 14, to opposite sides of which lead the circulating pipes 15 and 16 respectively. These pipes may be conveniently carried within a vertical channel or recess 17 of the frame member 5, of sufficient depth so that the door may freely slide over them.

The frame member 13 is detachably connected with the frame member 5. This may be effected in various ways. In the drawings, I have shown it as provided with lateral lugs 18 which seat within recesses 19 in the cheek portions 6 and are removably secured therein by means of the keys or wedges 20. By driving out these keys or wedges, the frame member 13 can be easily removed when necessary and a new member as readily inserted.

In the modification shown in Figs. 3, 4 and 5, instead of making the supplemental frame member 13 in the form of a hollow casting, a water circulating pipe 21 is cast therein, the ends of this pipe being extended exteriorly of the casting, preferably at its upper portion, to form the circulating connections 22 and 23. In order that there may be no place in the frame which is not equally protected by the cooling fluid, the embedded end portions of the pipe 21 are preferably crossed where they extend outwardly to form the circulating connections, as shown in dotted lines in Fig. 3.

The advantages of my invention result from the provision of the comparatively light and inexpensive supplemental frame-member, which can be readily removed and replaced when burned out, and which constitutes the only portion of the door frame which is exposed to destructive heat. Heretofore, these frames have been constructed in a single piece, and when burned out at any portion thereof, it has been necessary to replace the entire frame. This is not only expensive, but it necessitates the stopping of the furnace while the renewal is being made. By making the rim portion of the frame in a separate renewable piece, and by the provision of means such as described for protecting this piece by the circulation of a cooling fluid, I reduce to a minimum the delays and expense of keep-

ing the frames in proper working condition. A further advantage resulting from the use of the shallow separable rim is that substantially all parts thereof are subjected to approximately the same heat. In the frames heretofore employed, those portions immediately surrounding the door opening are subject to a much greater heat than the other portions. This unequal heating causes unequal expansion, which very frequently results in cracks in the frame casting. Such cracks of course destroy at once the usefulness of the frame, and an entire new frame is necessary. This is overcome by the use of the separate rim.

Various changes may be made in the details of construction and arrangement, without departing from the spirit and scope of my invention. Thus, while I have shown the supplemental frame as entirely surrounding the door opening, it will in many cases be sufficient if it form the top and sides only of such opening. The arrangement and place of connection of the water circulating pipes may also be changed.

What I claim is:—

1. A furnace door frame, consisting of a main frame member secured to the furnace wall and having an opening therethrough larger than the opening for the door, and a detachable supplemental frame consisting of a rim-like structure fitting within the said opening and forming the top and sides, at least, of the door opening; substantially as described.

2. A furnace door frame consisting of a main metallic frame member secured to the brick wall of the furnace, and having a door opening therein, and also having guiding surfaces for a door, and a supplemental frame member of rim form removably fitted within the said opening, and also having door-seating and guiding surfaces; substantially as described.

3. A metallic furnace door frame adapted to be secured to the brick wall of the furnace, and having a door opening therein larger than the door-opening in the furnace wall, and a detachable rim portion constructed to fit within the opening of said frame, and having a water circulating space therein; substantially as described.

4. A furnace door frame consisting of a main frame member adapted to be secured to the brick wall of a furnace and having a door opening therein larger than the opening through the furnace wall, and also having for-

wardly projecting cheek portions, and a supplemental frame member of rim form fitting within the said opening and detachably secured to the main frame between the cheek portions thereof, together with means for effecting a water circulation through the supplemental frame member; substantially as described.

5. A furnace door frame having a main member consisting of a casting adapted to be secured to the outer side of the wall of a furnace and formed with a door opening therein larger than the door opening in said wall, and a supplemental member fitting within the said opening and forming a rim therefor, the supplemental member being removable and having a water circulating space therein; substantially as described.

6. A furnace door frame having a main member formed with a door opening therein, a supplemental frame member fitting within the said opening and forming a rim therefor, means for detachably connecting said members, the supplemental member having a water circulating space therein, and pipe connections for said space, the main frame member having a recess or depression to receive the pipe connections; substantially as described.

7. A furnace door frame consisting of a main casting adapted to be secured to the outer side of the wall of a furnace and having a door opening therein, and a supplemental member fitting within the said opening and having a water circulating space therein, and means for detachably securing the supplemental member to the main member, said main casting and supplemental member having door seating portions lying in the same plane; substantially as described.

8. A furnace door frame having a main member formed with a door opening therein, and a supplemental member fitting within said opening and forming a rim therefor, the supplemental member being removable and having a water circulating pipe cast therein, the ends of the pipe being extended to form circulating connections and the main member having a recess or depression to receive the said connections; substantially as described.

9. As a new article of manufacture, a rim structure for furnace door openings, consisting of a rim-form casting arranged to fit within the door opening, and having a water-circulating pipe cast therein with its end portions crossed and extended outwardly from the casting to form water-circulating connections; substantially as described.

In testimony whereof, I have hereunto set my hand.

LUTHER L. KNOX.

Witnesses:

H. M. CORWIN,

GEO. H. PARMELEE.