

No. 880,511.

PATENTED MAR. 3, 1908.

T. DOWNIE & D. BROWN.  
FURNACE FRONT AND DOOR.

APPLICATION FILED JULY 9, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

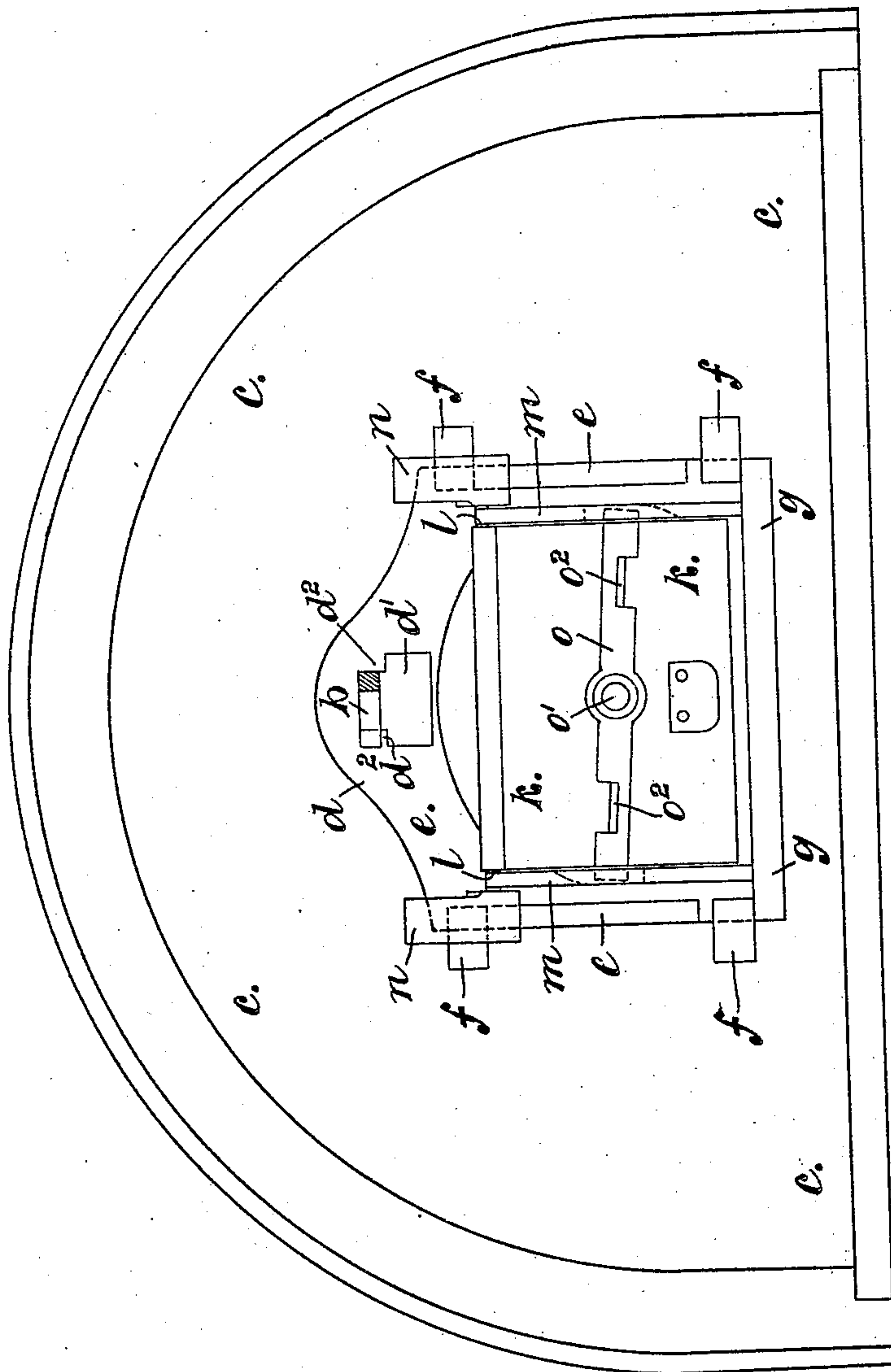
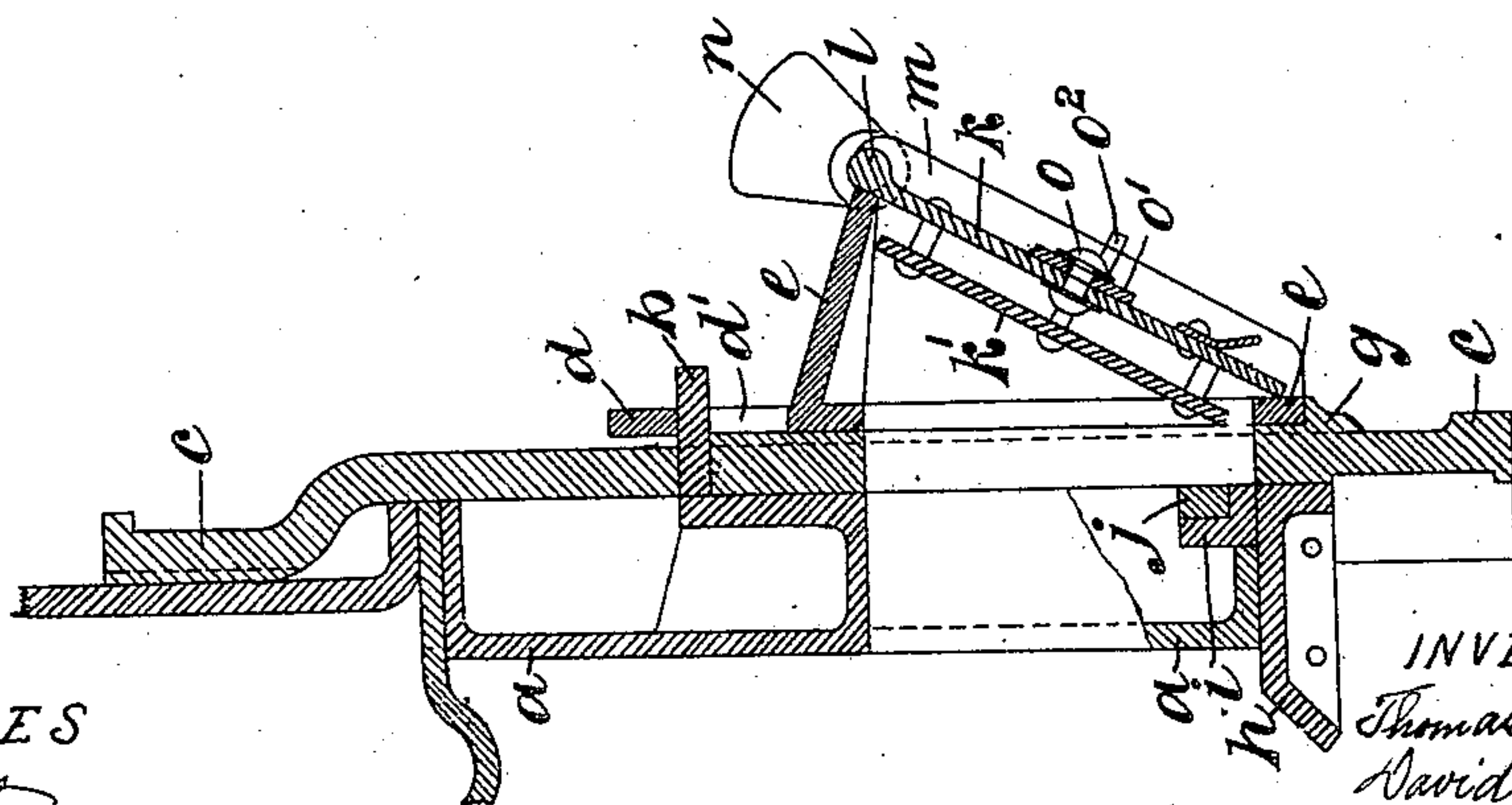


Fig. 2.



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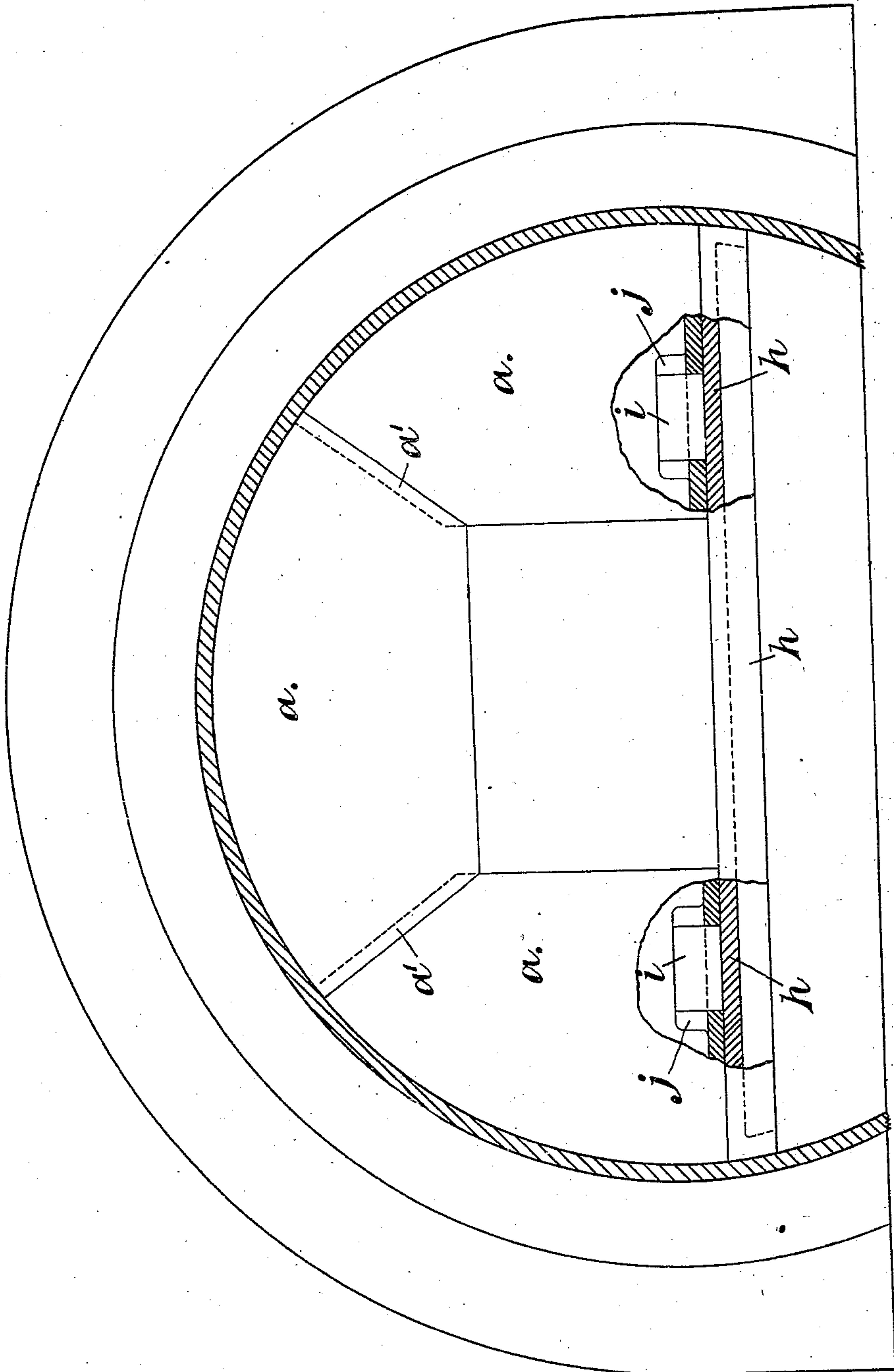
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3 SHEETS—SHEET 2.

Fig. 3.



WITNESSES

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3 SHEETS—SHEET 3.

Fig. 5.

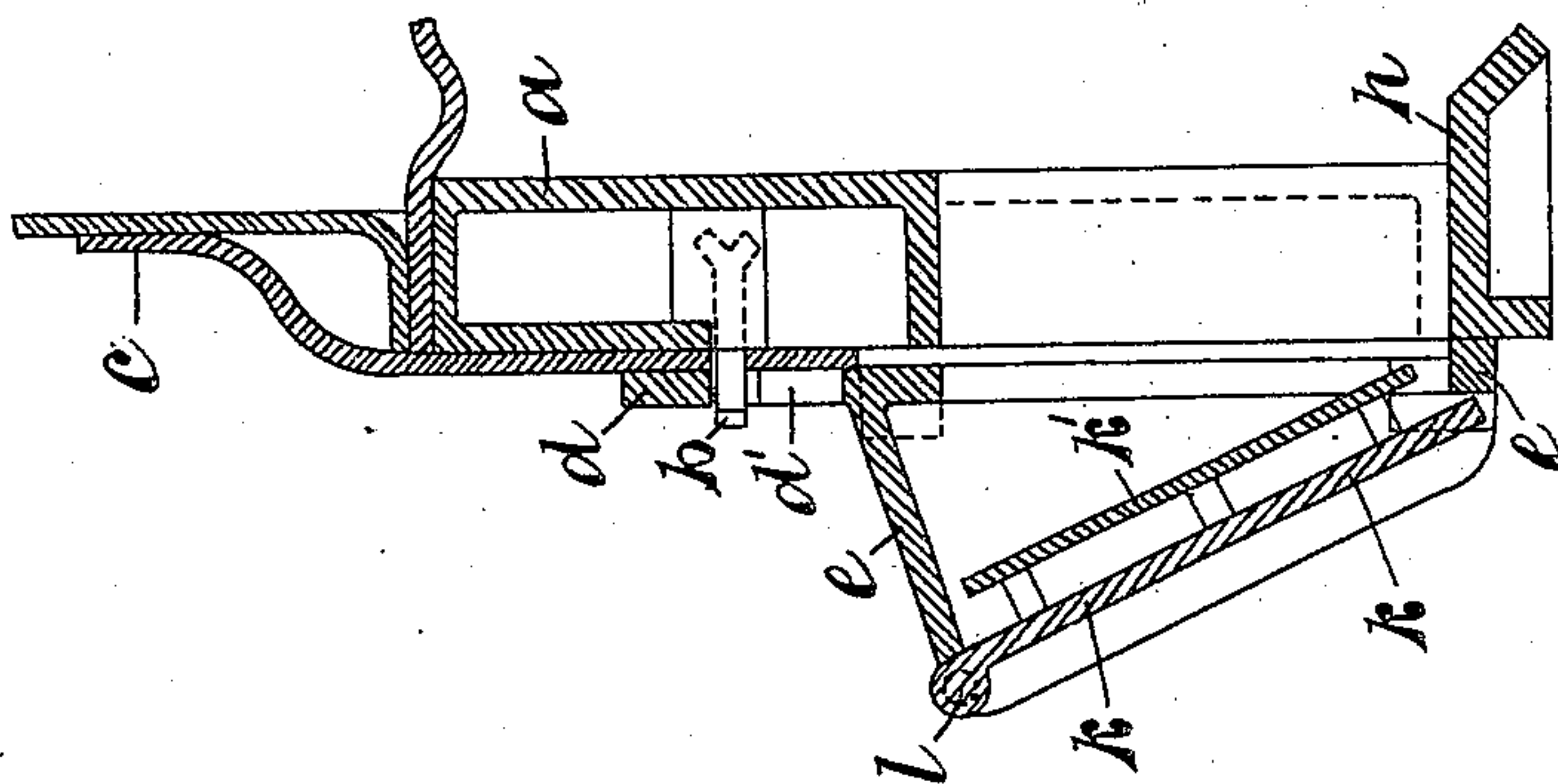


Fig. 4.

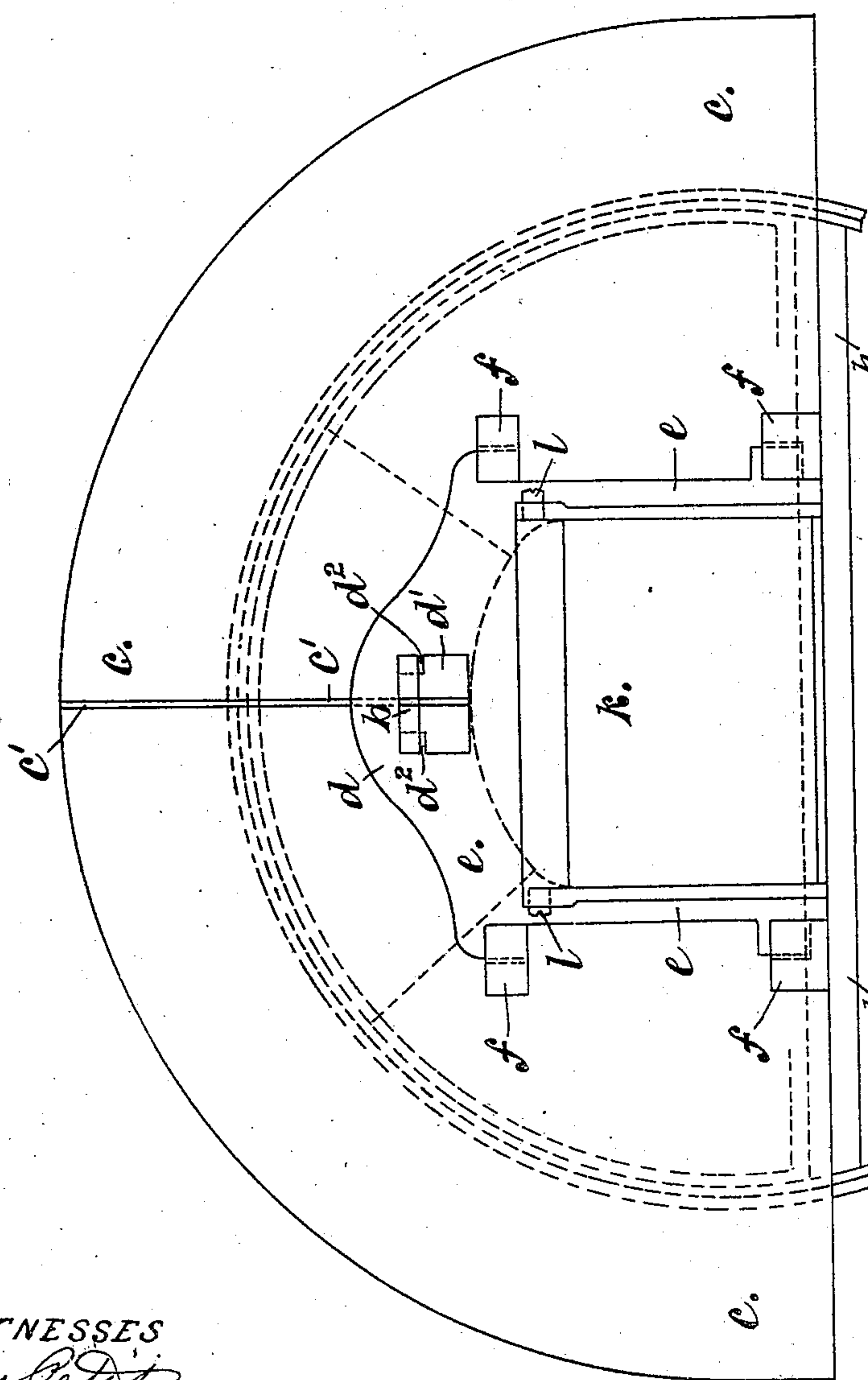
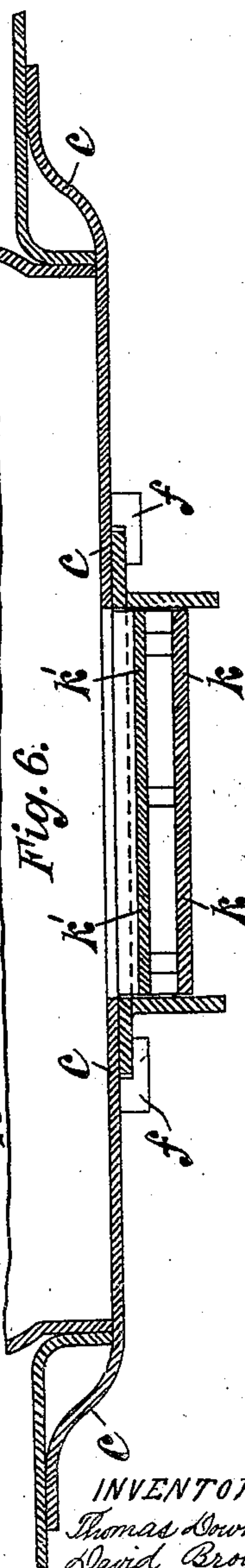


Fig. 6.



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# UNITED STATES PATENT OFFICE.

THOMAS DOWNIE, OF WALLASEY, AND DAVID BROWN, OF BOOTLE, ENGLAND.

## FURNACE FRONT AND DOOR.

No. 880,511.

Specification of Letters Patent.

Patented March 3, 1908.

Application filed July 9, 1907 Serial No. 382,863.

*To all whom it may concern:*

Be it known that we, THOMAS DOWNIE and DAVID BROWN, subjects of the King of England, residing at Wallasey, in the county of Chester, England, and Bootle, in the county of Lancaster, England, respectively, have invented new and useful Improvements in or Connected with Furnace Fronts and Doors, of which the following is a specification.

10 This invention has reference to furnace fronts and fittings, and primarily to the fronts and fittings used in connection with internally-fired steam generator furnaces, such as are used in "Scotch" or return-tubular type  
15 of marine steam generators, "Lancashire" steam generators, and other steam generators having similar furnaces; and it relates more particularly to that type of furnace fronts in connection with which internal detachable fittings are employed which serve to shield the front plate or front proper, from the fierce heat of the fire, and which, when burned or destroyed by the fire, can be detached and others substituted.  
25 In a furnace front involving the improvements hereunder the internal protecting detachable portion is made in a plurality of parts, and one or more is or are provided with a projecting part on its inner edge which  
30 passes through the furnace front or front plate proper, and is held in position by engaging it with a holding device on the outside of said front, in the form of a shoe, cotter, or the like, whereby, by sliding, knocking or removing this holding part out of position, when fastened in position, the interior protecting plate or device can be at once removed or replaced, and fresh ones introduced. And the internal protecting parts can be so arranged that one or more of them—say if  
40 three, the top one—will hold in place two side ones, such side ones being held at their lower edges by fitting within a projection or socket piece, or a part of same fitting into a  
45 recess, on or in the dead plate. These protecting parts will be arranged as usual round the door aperture in the front, and this door frame may be held in position by providing it with lugs or flanges, say at the sides, which  
50 are adapted to fit into corresponding gaps or apertures or recesses in lugs provided on the front plate or front.

The door frame itself in the preferred con-

struction constitutes a key or holding means for engaging with the projecting part of the internal protecting device; namely, it may have an opening in an upper projecting part of it, through which the internal protecting device projection passes; and the upper edges of metal at each side of this opening may be adapted to fit in the gaps or the like in said projecting part, so that when the door frame is slid down into position, it also locks in position the internal protecting plates or devices; and conversely, when lifted it unlocks the devices, and they are free to be removed, for renewal or other purpose. These devices may be made of iron, of simple box form, open at their inner edges which come against the inside of the furnace front or front plate proper.

The door employed in the door-way may be of any known suitable kind, and in the case of such door being of the "Martin" type, that is, hinged horizontally at the top, and the system of air supply being a forced or assisted draft, when the door has to be practically an air-tight fit, the doorway may have around it a face on which the edge of the door rests and fits, such face being grooved or recessed to receive and make a tight joint with the door edge; or, conversely, the door may be recessed or grooved around its edges, and the doorway provided with a projection which fits in said recess or groove. And such door, furthermore, may be so arranged or provided with cam-shaped carrying trunnions or a shaft, that when such trunnions or shaft are or is turned in the closing action, it will press the door towards the face.

At the lower edge the door may be provided with a tapered catch, which, when pressed down, fits into a corresponding socket in the frame to receive it, and presses the door up to its face; this catch being provided with a head or part which can be knocked up or down by a stoker's shovel readily. Or, as a modification, the parts of the door frame in which the door trunnions or shaft ends fit and work are inclined on one side, and a space is cut away below at the back, so that the door can move down, by which construction the natural weight of the door acting through its trunnions or supporting shaft on the inclined part of the frame, will press it towards its face or seat.



Or, again, the door may have a hinged cross bar upon it, the ends of which may be adapted to fit in catches or recesses in the sides of the door frame, either one or both of which is or are inclined in opposite directions, so that when this bar is moved in the closing action to engage with the catches or recesses, they will press the whole door up to its face.

In some cases, where forced draft is employed (or otherwise) the internal protecting parts may be separately held in place by separate projecting parts similar to those above described, which pass through the furnace front or front plate proper, and held by engaging devices or means similarly as above described. In such a case, the door frame may have wings at each side through which the said projecting parts pass when fitted, and by means of which, the internal protecting parts at the sides will be held in position.

In the drawings illustrating this invention Figure 1 is a front elevation of the furnace front according to it showing part of the locking bar cut away; Fig. 2 is a longitudinal section of same; and Fig. 3 is an internal end elevation partly in section. Figs. 4, 5 and 6 are respectively front elevation, longitudinal section, and sectional plan, showing the invention applied to a furnace front of wrought metal in lieu of cast, as shown in Figs. 1 and 3.

Referring to the drawings, *a* are the internal protecting detachable devices or plates, made up in the case shown in two sets, viz, a central and upper one, and two side wing devices. The central and upper detachable part has provided upon it the projecting part *b*, which passes through the furnace front *c*; and this projecting part *b* is in the form of a flat short bar, with a slot or gap at each side, and it is engaged on the outside by the upper projecting part *d* of the door frame *e*, and held thereby in position; so holding the detachable device *a* in position upon the internal face of the furnace front *c*. And the internal edges of this upper device *a* project at *a*<sup>1</sup> (see Fig. 3), and overlap the upper edge of the lower or wing detachable devices *a*.

The upper part *d* of the door frame *e* is provided with an opening *d*<sup>1</sup>, having a rectangular projecting part *d*<sup>2</sup> at each upper angle; and these parts *d*<sup>2</sup>, when the door frame is placed in position, pass down into and fill the gaps or slots in the sides of the projecting bar *b*. In effecting this connection, the door frame *e* is placed in position, that is, its edges are slid in behind the snugs or lugs *f* on the furnace front; but it is held up some little distance before being lowered to its full position, and the projecting device *a*, carrying the projecting or locking bar *b*, is placed in position, the bar *b* being passed through the opening *d*<sup>1</sup>; and then the door frame is lowered to its full position, whereupon the locking parts *d*<sup>2</sup> move down into the gaps or slots

in *b*, and so engage and lock the internal protector device *a* in place. The lower edge of the door frame *e* will be supported by a ledge *g* on the furnace front *c*.

The wing protector devices *a*—all of which in the case shown are simple hollow castings—are held at their lower edges upon the dead plate *h*, by providing angular upwardly projecting parts *i* on the dead plate, and corresponding apertures in the bottom plate of the devices *a*, with a cross bar *j* just behind these openings. Hence, in fitting these wing protectors *a* in place, they are dropped over the projecting parts *i*, the bars *j* coming behind them, and so holding and locking them in position.

The door *k* shown, is of the "Martin" type, mounted and carried by trunnions *l* fitting into the projecting side plates *m*, namely into gaps or recesses in the upper edge of same; and these trunnions are provided with weights *n*, so placed upon them that when the door is closed, they will press it inwards and keep its lower edge against the face of the door frame *e*; and, conversely, when the door is opened, they will hold it open.

As above stated the means of locking the door in its closed position may take various forms. The one shown in the drawings consists of a cross bar *o*, hinged at *o*<sup>1</sup> to the outside of the door, and the ends of which are adapted to fit in recesses—shown in dotted lines in Fig. 1—in the side bars *m* of the door frame, which are inclined in opposite direction, so that when this bar is moved in the closing action to engage with the catches or recesses, they will press the whole door up to its face.

The bar *o* has projecting parts *o*<sup>2</sup> upon it by which it can be moved about its pivot, that is, struck by the stokers shovel, hammer, or other usual tool.

The door *k* is provided on its inside with an internal shield *k*<sup>1</sup>.

Referring to the construction shown in Figs. 4 to 6, this is generally the same as that shown in Figs. 1, 2 and 3, with the exception that the front *c* is made of steel plate, and is made in halves, being split vertically at the upper part at *c*<sup>1</sup>; and these parts have an aperture at the point where the locking bar *b* comes.

The chief objects and effects of the improvements herein described are already set out in the first part of the specification.

What is claimed is:—

1. In a furnace front internal protecting devices as *a*, a part thereon projecting through the front, and door frame, on the front adapted to engage with the part projecting through the front; substantially as described.

2. In a furnace front, internal protecting



devices *a*, one of which has a projecting bar *b* of the form described, having a recess on each side, and the door frame *c* having an aperture at the upper part through which the said  
5 bar projects, and projecting parts thereon adapted to engage on said recesses; substantially as set forth.

In testimony whereof we have signed our

names to this specification in the presence of two subscribing witnesses.

THOMAS DOWNIE.  
DAVID BROWN.

Witnesses:

SOMERVILLE GOODALL,  
GUY OKE.