No. 673,715. Patented May 7, 1901.

D. LAIRD.

FURNACE FOR HEATING DRILLS.

(Application filed June 16, 1900.)

(No Model.) 3 Sheets—Sheet 1.

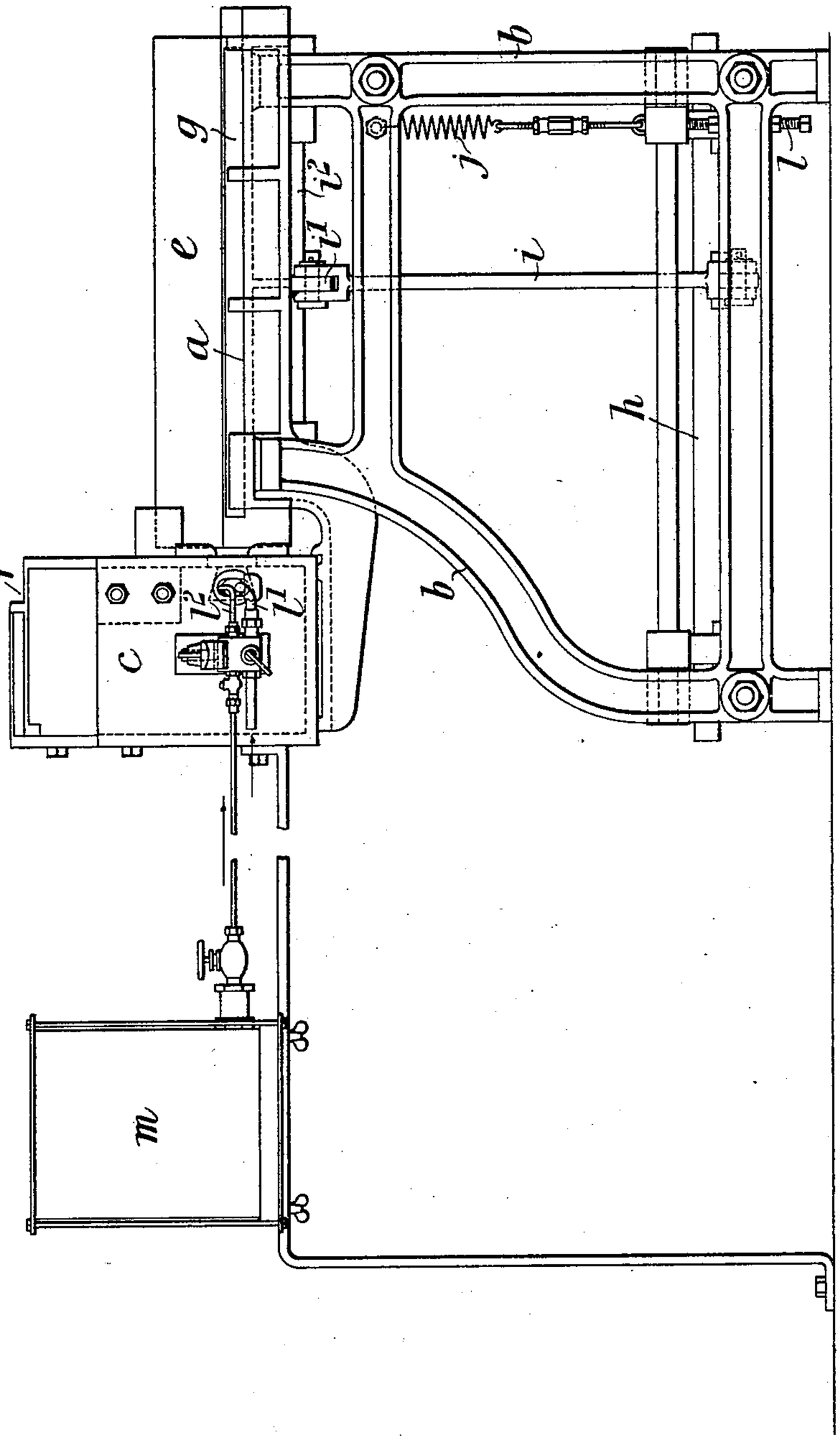

Fig. 1.

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(Application filed June 16, 1900.)

(No Model.) 3 Sheets—Sheet 2.

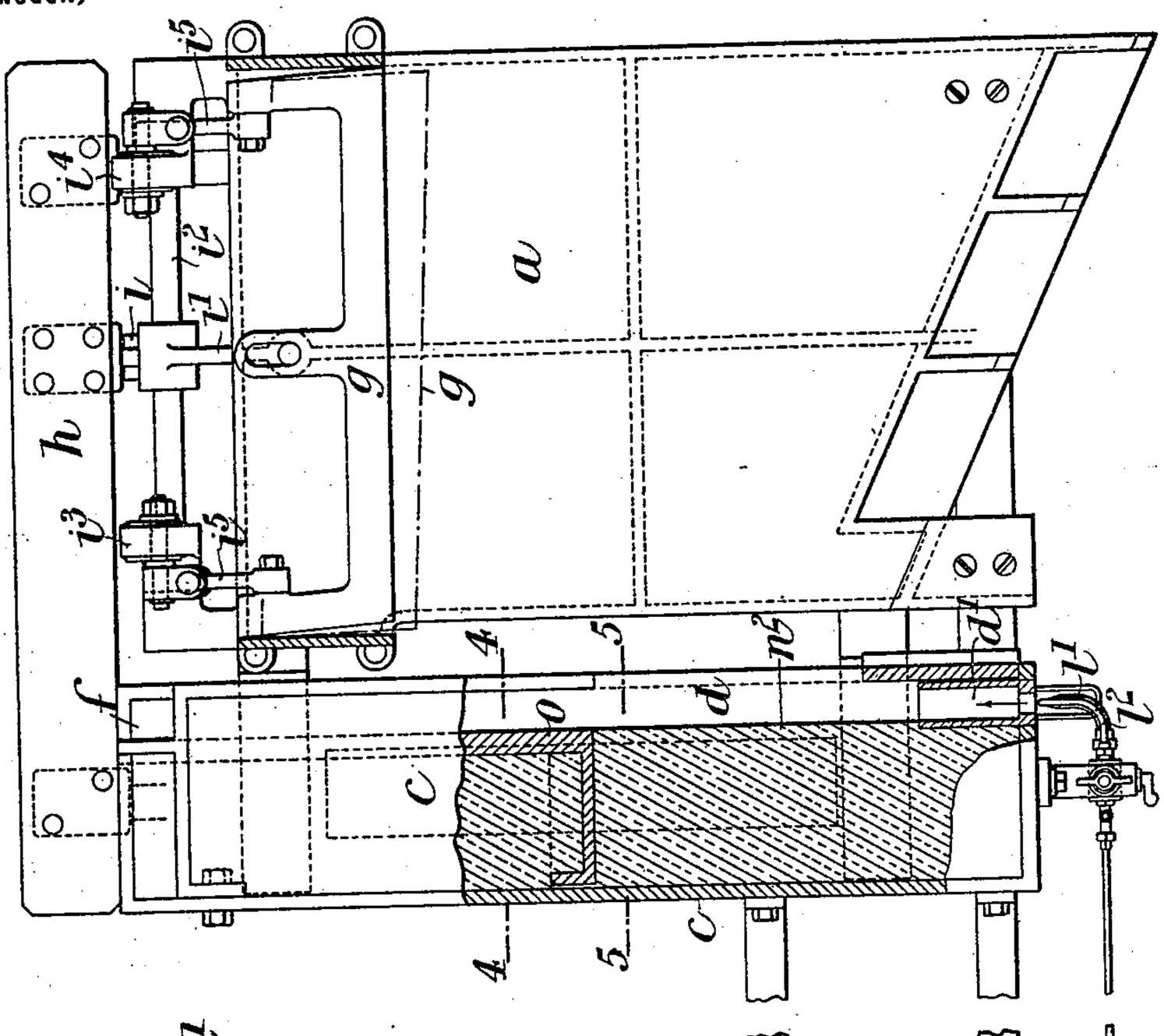


Fig. 2.

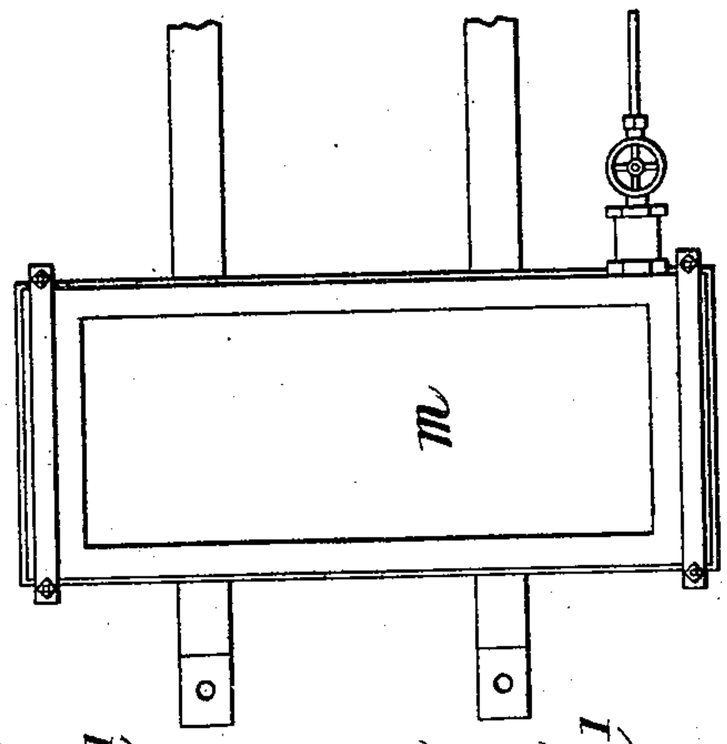


Fig. 7.

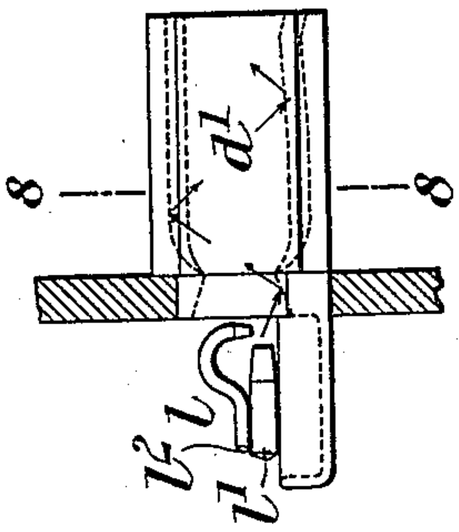


Fig. 8.

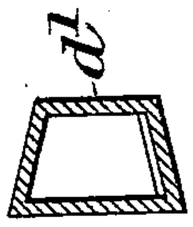


Fig. 6.

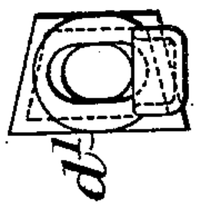


Fig. 4.

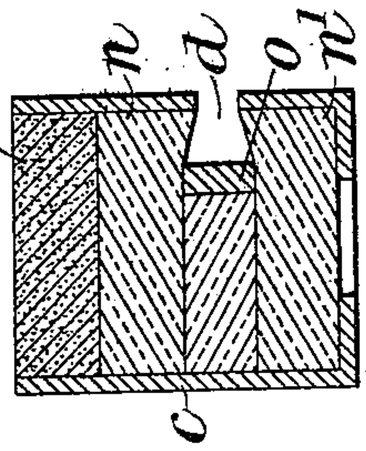
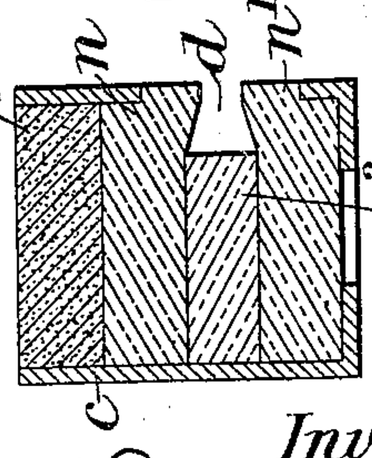


Fig. 5.



Witnesses.
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No. 673,715. Patented May 7, 1901.

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FURNACE FOR HEATING DRILLS

(Application filed June 16, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 3.

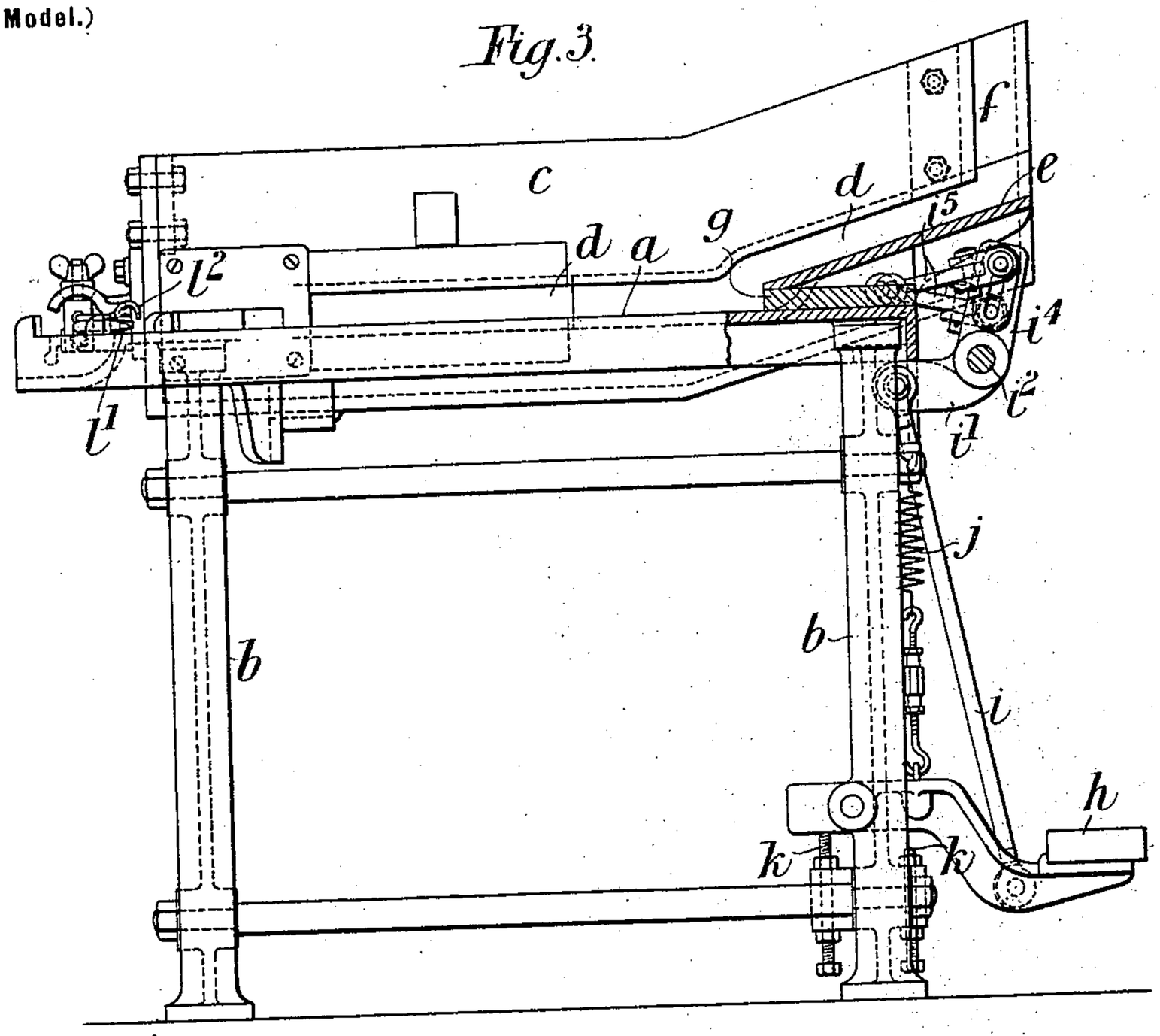


Fig. 9.

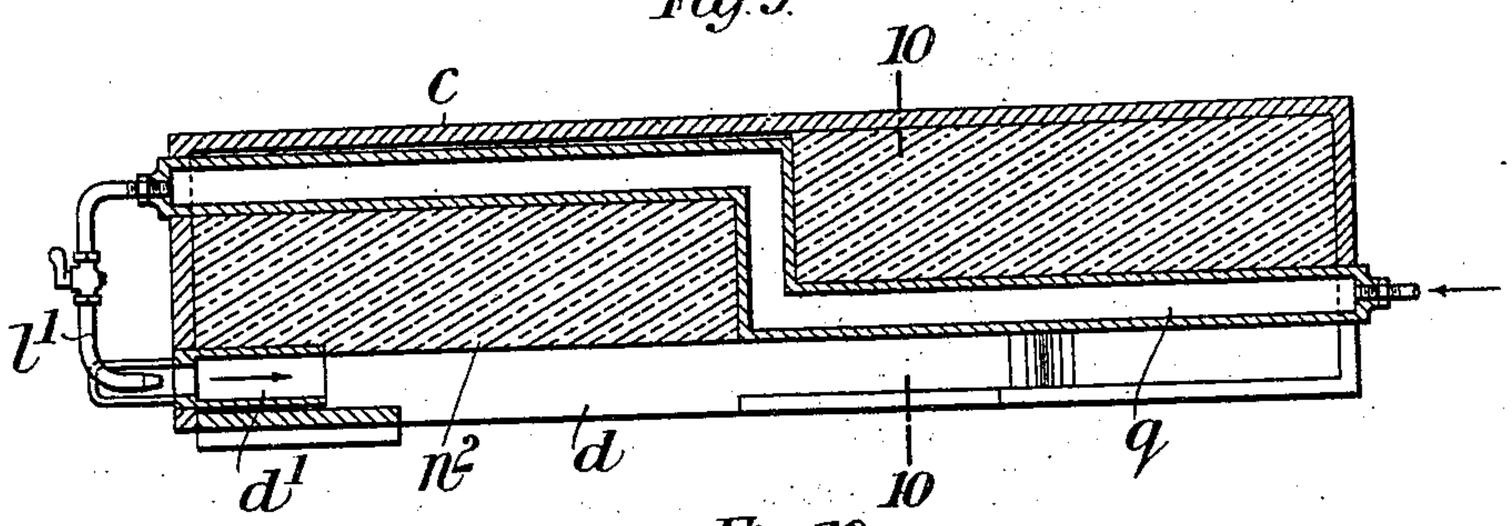
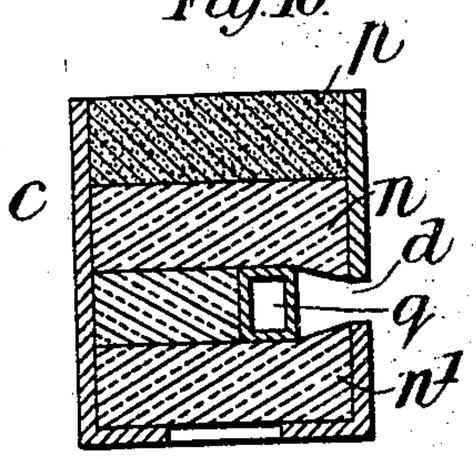


Fig. 10.



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B. W. Brockett.

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UNITED STATES PATENT OFFICE.

DAVID LAIRD, OF FORFAR, SCOTLAND.

FURNACE FOR HEATING DRILLS.

SPECIFICATION forming part of Letters Patent No. 673,715, dated May 7, 1901.

Application filed June 16, 1900. Serial No. 20,549. (No model.)

To all whom it may concern:

Be it known that I, DAVID LAIRD, a subject of the Queen of Great Britain, residing at Canmore Works, Forfar, Scotland, have invented a new and useful Improved Furnace for Heating Drills and the Like by Means of Liquid Fuel or Gas, of which the following is a specification.

My invention relates to furnaces chiefly designed for heating drills such as are employed in mining and like operations preparatory to the sharpening of the same, but also applicable for heating other objects, and to that class of furnace which is heated by the combustion of liquid fuel and wherein the drills are gradually fed forward by mechanical means from the point of introduction to the point of removal, the object of my invention being to provide a furnace of this kind which will be more efficient in operation than furnaces as heretofore constructed and wherein the cost of fuel and of labor for attending to the furnace will be reduced to a minimum.

In the accompanying drawings, Figure 1 is a rear elevation of a furnace constructed according to my invention and adapted to be heated by liquid fuel. Fig. 2 is a sectional plan of the same, partly in section; and Fig. 3 is a side elevation, partly in section. Figs. 4 and 5 are sections on the lines 4 4 and 5 5, respectively, of Fig. 2. Fig. 6 is an end view, and Fig. 7 is a side view, of the portion of the furnace in which the liquid fuel is introduced drawn to an enlarged scale; and Fig. 8 is a section on the line 8 8 of Fig. 7. Fig. 9 is a horizontal section showing an arrangement for heating the air-jet for the combustion of the fuel, and Fig. 10 is a section on the line 10 10 of Fig. 9.

a is a table mounted upon a suitable support—such, for instance, as the framing *b*—and upon which the drills to be heated are laid and upon which they are fed through the furnace.

c is the furnace, which has formed longitudinally in it a channel *d*, constituting the furnace proper and the greater portion of which is in the plane of the table, so that the ends of the drills lying upon the table will project into the furnace. At one end of the table *a* is an inclined portion *e*, and the channel *d* is correspondingly inclined at this part, as clearly shown in Fig. 3, the said channel also having the upwardly-extending portion *f*, through which the cutting ends of the drills are passed when inserting them into the furnace. The use of this vertical portion of the slot *f*, however, is optional, as, if desired, the drills may be laid directly upon the inclined part, the pointed ends being projected into the channel *d*.

The drills on the horizontal portion of the table *a* are gradually moved forward, with their ends in the channel *d*, by means of a pusher *g*, and each time that the drills are so moved and the pusher returns to its normal position a drill drops off the inclined portion *e* of the table onto the horizontal portion thereof. This pusher *g*, which is arranged to slide beneath the inclined portion *e* of the table, is operated from a treadle *h* through the medium of a connecting-rod *i*, attached to an arm i' on a shaft i^2, which shaft carries two arms i^3 i^4, connected by links i^5 with the said pusher *g*. The points of connection between the links i^5 and the levers i^3 i^4 are arranged at different distances from the axis of the shaft i^2, (see Fig. 3,) so that one end of the pusher receives a greater amount of movement than the other end, as indicated by the dot-and-dash line in Fig. 2. The object of this unequal movement of the two ends of the pusher is to provide room for the burred end of the drill next to drop from the inclined table. As each drill occupies more space at the burred end than at the point, it is also necessary that the table should be made longer at the side supporting the heads than at the side adjacent to the furnace, also as indicated in Fig. 2. A spring *j* serves for returning the pusher after it has been operated by the treadle, and adjustable stops *k k* determine the movement of the treadle *h*, and consequently also the pusher *g*. In furnaces for heating articles the ends of which to be heated are larger than the other ends—as, for instance, "star-bits"—the arrangement of the table and of the pusher is reversed—that is to say, the table is widest at the furnace side and the pusher has its longest movement on this side.

The flame for heating the furnace is generated at one end of the channel *d* by means of a spray-burner *l*, (shown clearly in Fig. 7,)

which consists of an air-pipe l' and of a liquid-hydrocarbon pipe l^2, the latter being connected with a suitable supply-tank, such, for instance, as the tank m. (Shown in Figs. 1 and 2.) The flame which is generated at this burner will be projected through the furnace to heat the drills therein.

The portion d' of the channel d immediately adjacent to the burner l is inclosed or made tubular, as shown clearly in Figs. 2, 7, and 8, and constitutes a kind of combustion-chamber. The mouth of this combustion-chamber is formed with converging surfaces, so that the gases which strike the said surfaces will be deflected onto the top and bottom of the said chamber d'—for instance, as indicated by the arrows in Fig. 7—the said gases then continuing to travel in this zigzag manner through the length of the said channel d.

In order to minimize the escape of flame through the mouth of the channel d, the top and bottom of the said channel are inclined, as clearly shown in Figs. 4, 5, and 8, so that the gases as they impinge against the said surfaces will be deflected rather toward the back of the furnace than through the mouth. By thus confining the flame in the furnace it will be obvious that a great saving of fuel is effected, while a more uniform heating of the furnace is obtained. It will be obvious that the portion of the furnace nearest to the burner will be hotter than the parts more remote, so that the drills will gradually pass from the cold zone of the furnace into the hottest zone.

In practice I prefer that that portion of the walls of the furnace which is subjected to the greatest heat should be made entirely of fire-brick—for instance, as shown in Fig. 5, wherein n n' indicate top and bottom molded bricks and n^2 an intermediate brick, which forms the back of the furnace. The top and bottom of the furnace, near the cold end thereof, are also advantageously made of fire-brick, as shown in Fig. 4; but the back of the furnace is represented as being formed of a metal plate o.

p indicates rubble or filling of any suitable material.

I sometimes provide that the air supplied to the burner should be heated in order to improve the combustion, and I advantageously accomplish this by forming a channel q behind the furnace proper, as shown in Figs. 9 and 10, a portion of this channel forming the back of the furnace at the colder portion thereof and serving in lieu of the plate o, hereinbefore described.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A furnace for heating drills and the like, provided with a horizontal channel or flue having a solid vertically-disposed back wall and having an opening in its front wall throughout the length of the flue, the top wall of said flue or channel inclining upwardly from the upper edge of said opening toward the back wall of the flue, a burner located at one end of said flue or channel, and a deflector adjacent to said burner, so arranged as to deflect the products of combustion toward one of the horizontally-disposed walls of the flue, whereby the flame and products of combustion will be caused to pass in a zigzag manner through said flue or channel and will be continually deflected toward the back wall by said inclined top wall, substantially as described.

2. A furnace for heating drills and the like provided with a horizontal channel or flue having an opening along one side throughout its length, the top and bottom walls of said channel being inclined upward and downward respectively from said opening to the back wall of the channel, a burner located at one end of said channel and a deflector adjacent to the discharge-opening of said burner and so arranged as to deflect the products of combustion toward one of said inclined walls whereby the flame and products of combustion will be caused to pass in a zigzag manner through said channel and will be continually deflected toward the back of said channel by said inclined walls, substantially as described.

3. A furnace for heating drills and the like, provided with a horizontal channel or flue having an opening along one side throughout its length, the top wall of said channel inclining upward from said opening to the back wall of the channel for deflecting the flame toward the back of the channel, a burner located at one end of said channel, a table adjacent to the open portion of said channel, for supporting the drills, a reciprocating pusher for moving said drills along the table and means for imparting a greater movement to one end of said pusher than to the other, substantially as described.

4. A furnace for heating drills and the like, provided with a horizontal channel or flue having an opening along one side throughout its length, the top wall of said channel inclining upward from said opening to the back wall of the channel for deflecting the flame toward the back of the channel, said furnace having also an air-passage formed therein, a portion of said air-passage being directly adjacent to a wall of said channel, a burner located at one end of said channel provided with an air-pipe connected with said air-passage and means for supplying air to said air-passage, substantially as described.

DAVID LAIRD.

Witnesses:
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THOMAS STARKEY.