

No. 713,288.

Patented Nov. 11, 1902.

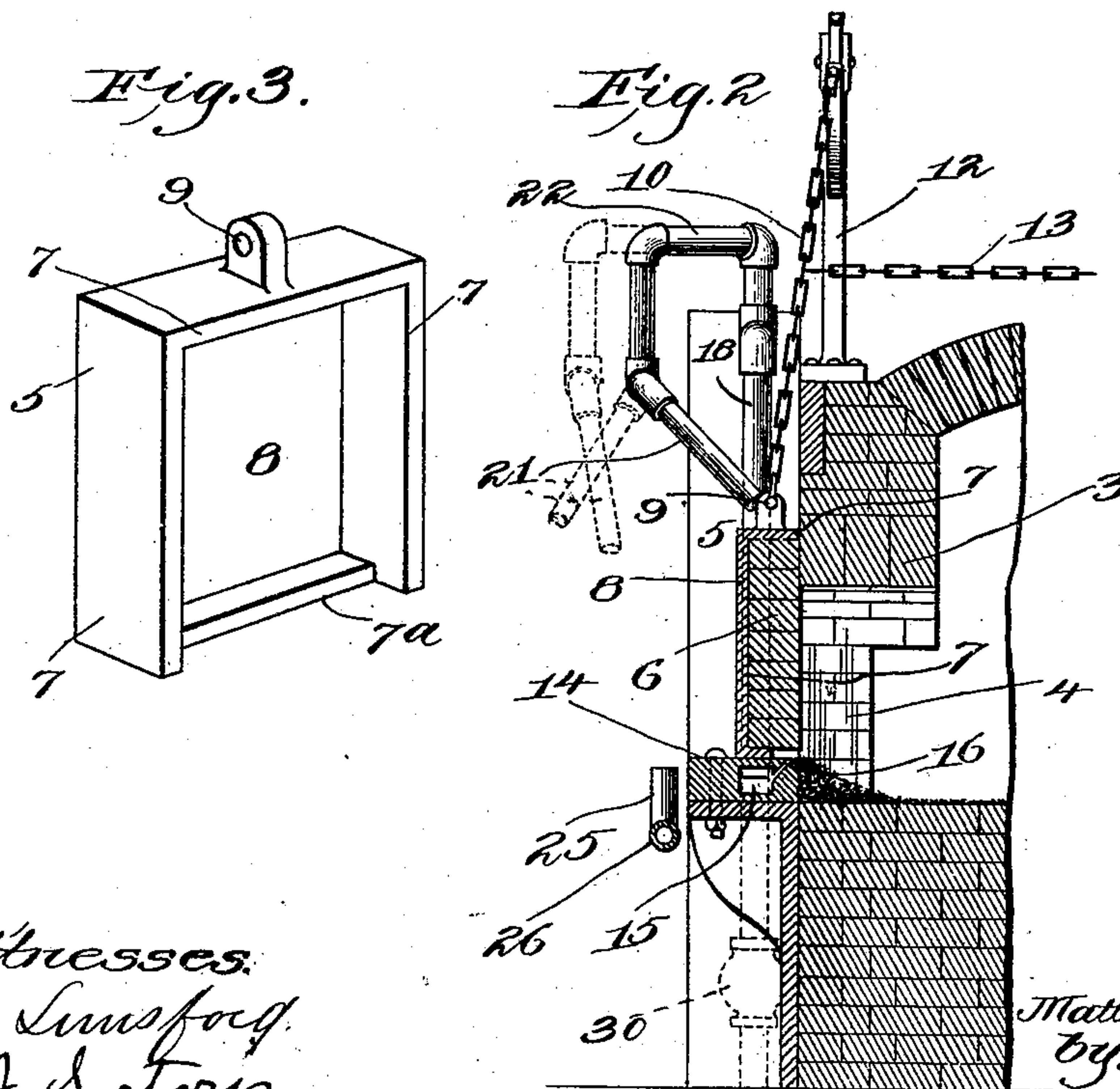
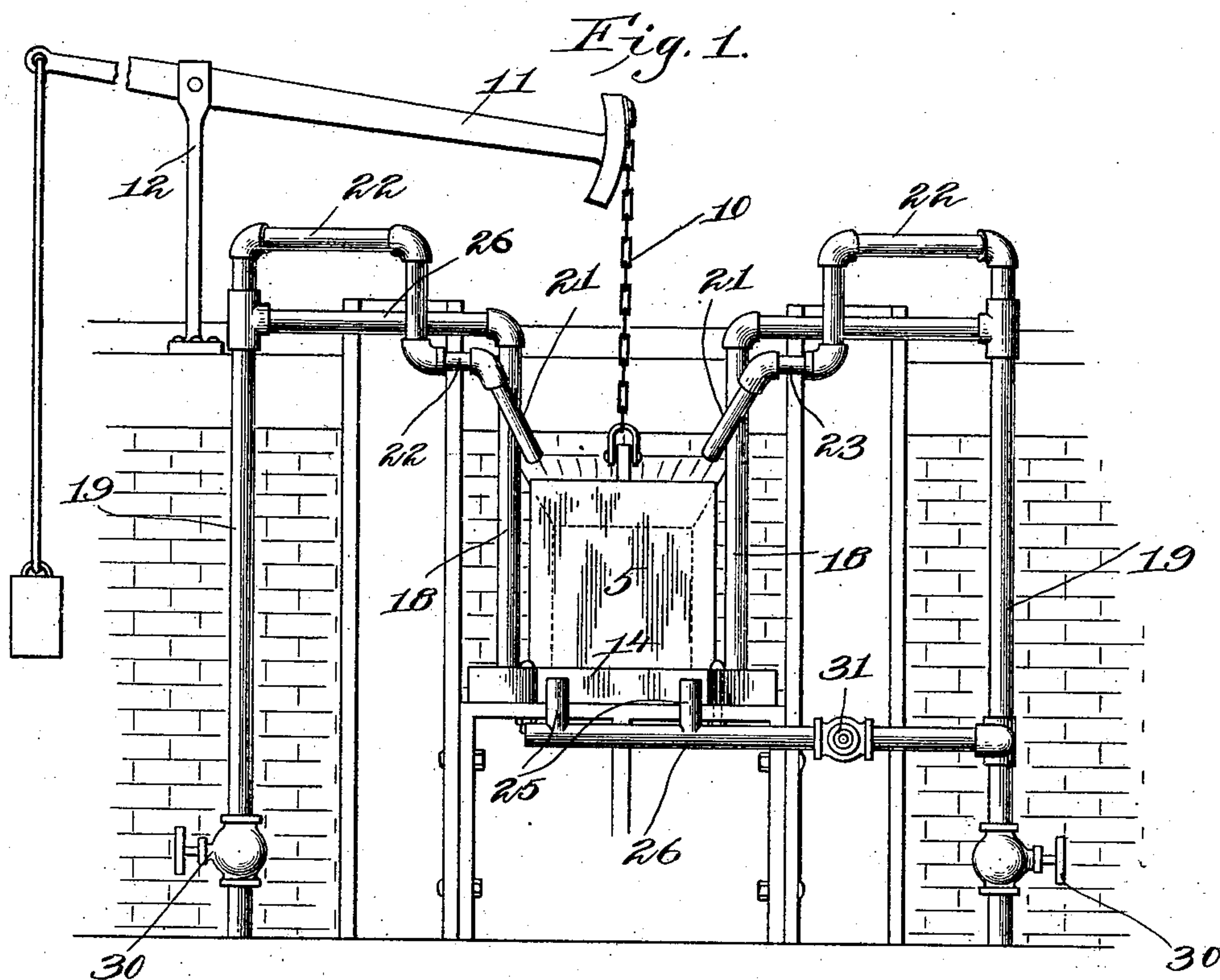
M. CUMMINGS.

DEVICE FOR PROTECTING FURNACE DOORS.

(Application filed Mar. 31, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
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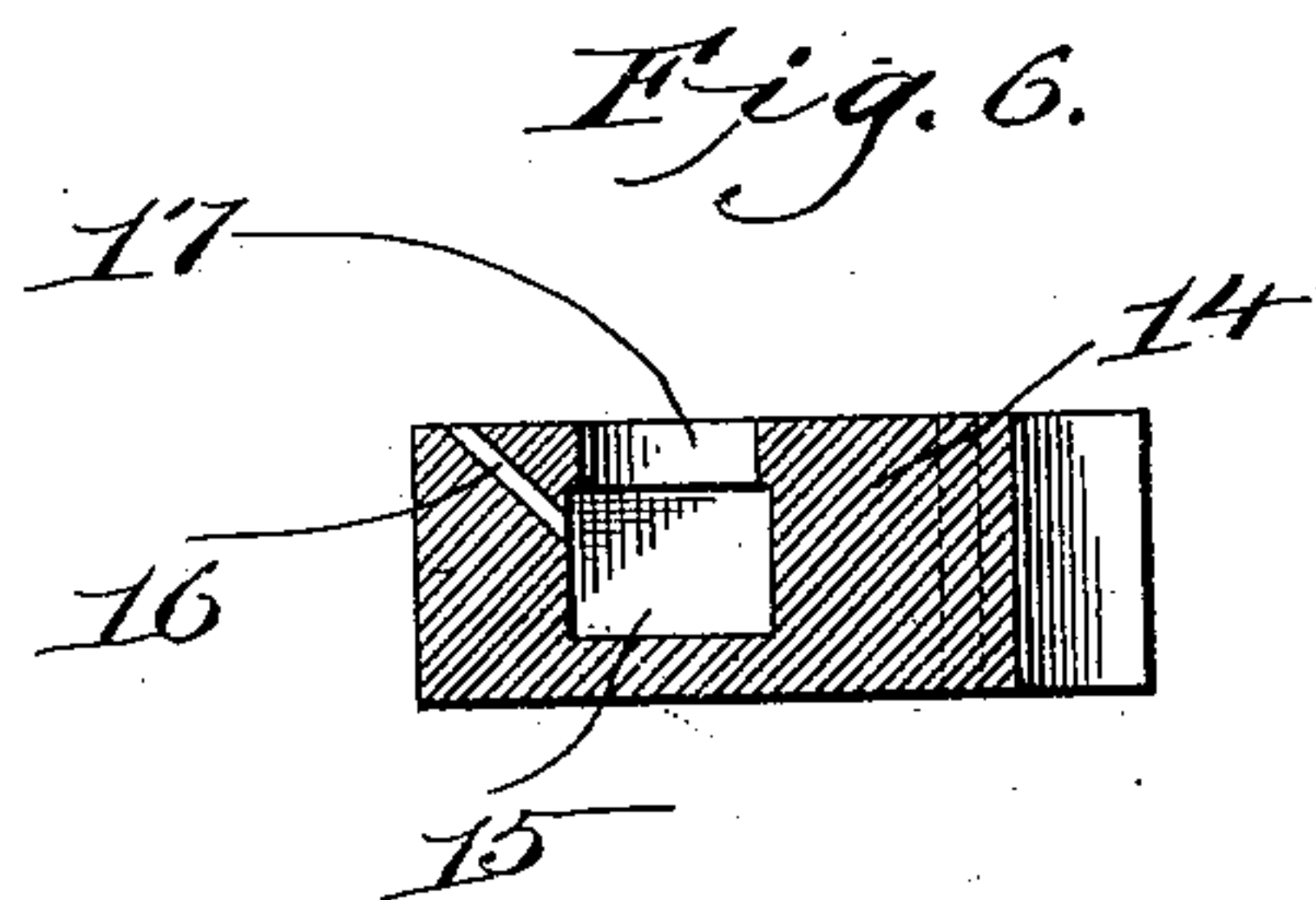
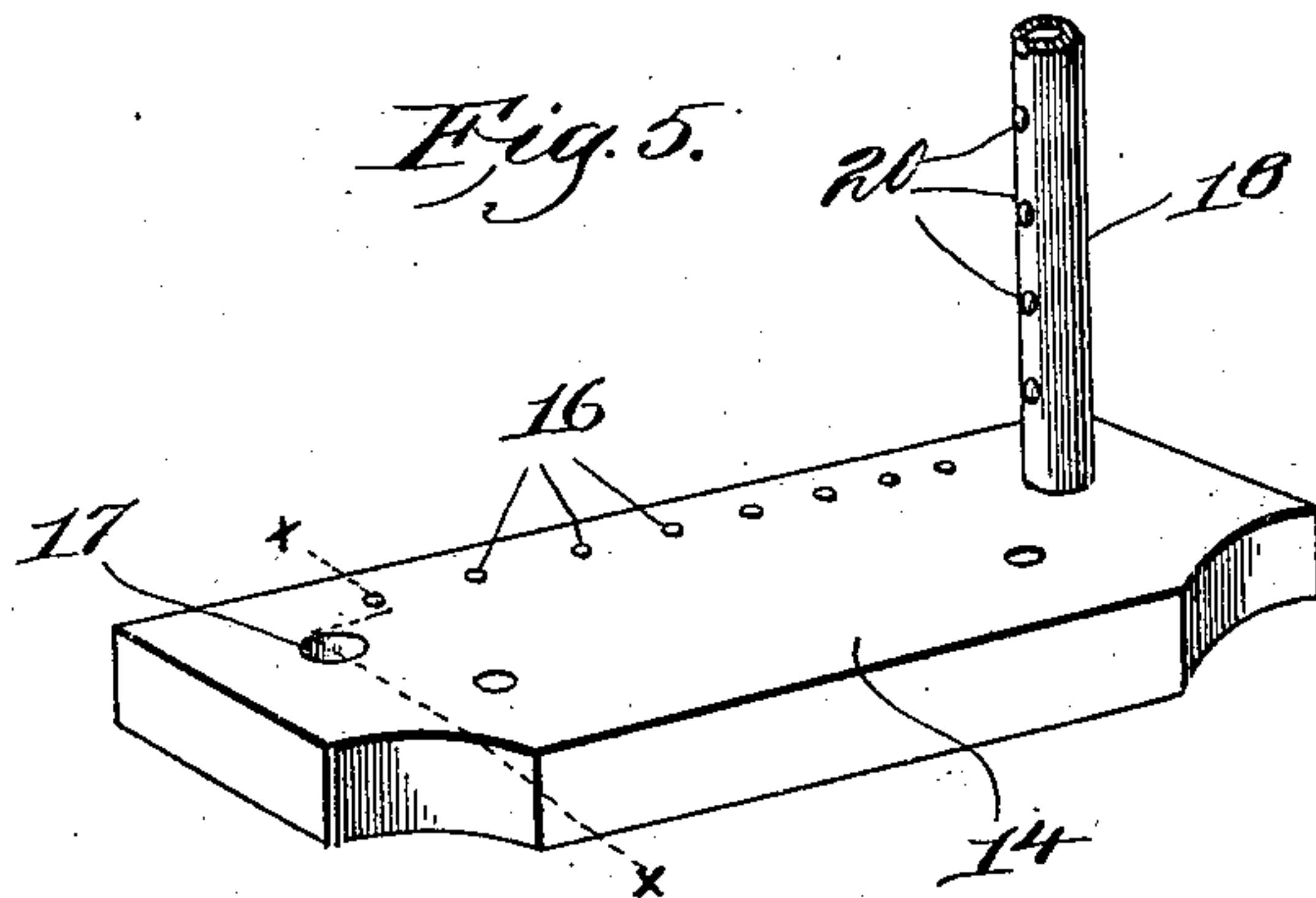
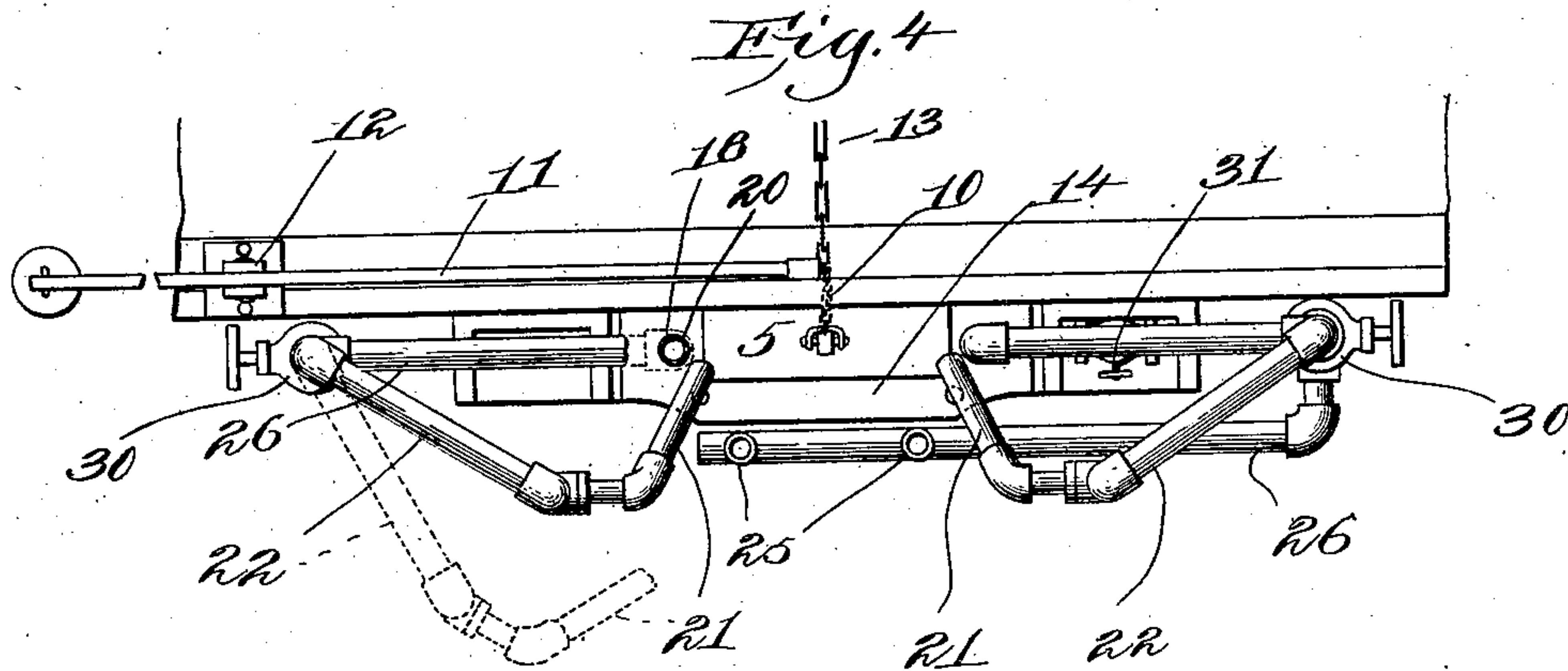
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UNITED STATES PATENT OFFICE.

MATTHEW CUMMINGS, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO JOHN B. MORAN, OF BOSTON, MASSACHUSETTS.

DEVICE FOR PROTECTING FURNACE-DOORS.

SPECIFICATION forming part of Letters Patent No. 713,288, dated November 11, 1902.

Application filed March 31, 1902. Serial No. 100,705. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW CUMMINGS, a citizen of the United States, and a resident of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Devices for Protecting Furnace-Doors, of which the following description, in connection with the accompanying drawings, is a specification, like numerals in the drawings representing like parts.

In those forms of furnaces used in connection with the treatment of iron, in which the heat is generated by mixed air and gas or liquid fuel which is forced into the furnace under pressure, the pressure in the furnace is greater than the atmospheric pressure, and consequently the flame and heated gases tend to escape not only through the vent-opening, but through any cracks or openings around the door of the furnace. The heated gases in the furnace not infrequently have as high a temperature as 4,000° Fahrenheit, and at such temperature the oxygen in the gases will very readily attack any iron which may be used in the construction of the furnace and which is not properly protected owing to the chemical affinity between the oxygen and the carbon in the iron. The result is that if the doors of the furnace have iron in their construction these extremely-hot gases will very soon melt the iron unless the said iron is properly protected.

It is the object of my invention to provide a novel device for thus protecting the furnace-doors from the action of the highly-heated gases which are burned under pressure within the furnace.

In accordance with my invention I provide means for throwing jets of air against the inner edge of the door at the place where the cooling medium is most needed.

The door I have illustrated comprises an iron shell or frame filled or lined with fire-brick, and the said door rests upon a suitable iron sill which is chambered or cored out and which is provided with jet-openings arranged to deliver jets of compressed air against the inner lower edge of the door. Extending up either side of the door and leading into the chambered door-sill are pipes through which compressed air is delivered to the door-sill,

and said pipes are provided with perforations through which jets of air are delivered against the inner edges of the sides of the door. Suitable means are also provided for delivering jets of air against the inner edge of the top of the door. Hence when the door is in position jets of air are delivered against the inner edges thereof, the jets of air serving not only to prevent the door from becoming heated, but also operating to balance the pressure in the furnace and drive back any gases which may tend to escape between the door and the furnace. The means for delivering air against the upper side of the door comprises a swiveled nozzle which when the door is opened will be directed to discharge its air into the mouth of the furnace, and since the jet-openings in the sill also deliver jets of air diagonally upward into the furnace-mouth these combined jets operate to prevent the escape of deleterious gases and also to furnish a sort of screen to protect the workman from the heat.

In the drawings, Figure 1 is a front elevation of a furnace embodying my improvements. Fig. 2 is a vertical section of Fig. 1 on the line *xx*. Fig. 3 is a perspective view of the frame for the door. Fig. 4 is a top plan view. Fig. 5 is a detail of the door-sill; and Fig. 6 is a section on the line *xx*, Fig. 5.

The furnace is designated generally by 3 and may be of any suitable or usual construction, it having the mouth or opening 4, which is closed by a door comprising a casing or framework 5, of iron or other suitable metal, which is filled with a lining 6, of fire-brick or similar heat-resisting material. The door-casing 5 has the back portion 8 and the surrounding flanges 7^a, which form a sort of box into which the fire-bricks 6 are placed. The door casing or frame has a suitable eye 9, to which the supporting-chain 10 is secured, said chain being suspended from an operating-lever 11, pivoted upon a suitable standard 12, as usual in this class of devices.

13 is a chain secured to the chain 10 and serving to hold the door against the furnace as it is raised and lowered.

The door rests upon an iron door-sill 14, (shown in detail in Figs. 5 and 6,) and in order to prevent the intense heat generated in the furnace from injuring the door-sill I have

cored or chambered the same out, as at 15, and have provided a row of jet-openings 16, which extend into the chamber and which are placed at such an angle as to be directed toward the inner lower corner of the door, as plainly seen in Fig. 2.

Each end of the door-sill is provided with an aperture 17, leading into the chamber, and a pipe 18 leads into each of said apertures, said pipes being connected to suitable pipes 19, which are in turn connected to any suitable air-compressing device, whereby compressed air is delivered through the said pipes into the chamber 15. The pipes 18 are each provided with a row of perforations 20, so placed as to direct the jets of air which issue therefrom against the inner edge of the sides of the door, as shown in Fig. 4.

21 represents nozzles through which jets of air are delivered against the upper edge of the door, and said nozzles are supported from overhanging pipes 22, connected with the supply-pipes 19.

Each nozzle 21 is swiveled to the horizontal arm 23, so as to swing about a horizontal axis, and the overhanging arm 22 has a swiveled connection with the supply-pipe 19, so that the entire arm 22 can turn about the pipe 19, as shown in dotted lines, Fig. 2.

The object in connecting the nozzles 21 with the pipes 19 by series of swiveled joints is to provide means whereby the nozzle may be pointed in any desired direction and may also be swung out of the way, as shown in dotted lines, when it is desired to open the door.

I will preferably support the pipes 18 so as to allow of their having a turning movement about their axis, thus providing means whereby the direction in which the jets of air issue from the perforations in the pipes 18 may be varied.

From the above it will be observed that all of the cooling jets of air are delivered against the inner edges of the door or at the point where the door meets and engages the furnace, this being the point where the heat which escapes between the door and the furnace would affect the iron casing of the door. These jets of air impinging against the door at its inner edges also serve, because of the force with which they are thrown against the door, to balance the pressure on the inside of the furnace and thus prevent the escape of any deleterious gases around the door.

In practice the force of the air-jets will be such that air will be forced into the furnace through any crevices between the door and the furnace. The air-jets which are delivered from the jet-openings 16 are also delivered into the furnace and serve to assist in the combustion. When the door is raised or opened, the air-jets from the jet-openings 16 as well as the air-jet nozzles 21 serve to screen the workman from the heat, and in order to still further protect the workman I may, if

desired, provide a plurality of nozzles 25, connected to a pipe 26, which in turn is connected to one of the supply-pipes 19, the said nozzles 25 being situated in front of the furnace-door and operating to deliver jets of air across the front of the door. Each of the supply-pipes 19 is provided with a valve 30, and the pipe 26 is also provided with a valve 31, whereby the amount and pressure of air used in protecting the door may be varied, according to circumstances.

While I have illustrated one form in which my invention may be embodied, I do not wish to be limited to the exact details illustrated, as various changes will suggest themselves to those skilled in the art, and consequently I desire to reserve to myself the right to make any and all changes which come within the scope of the appended claims.

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

1. A furnace having a door, a hollow door-sill provided with jet-openings arranged to deliver jets of air against the inner edge of the door, and means to force compressed air into said door-sill.

2. A furnace having a door, a perforated pipe adjacent each side of the door, the perforations in the pipe being arranged to deliver jets of air against the inner edges of the door.

3. A furnace having a door, a perforated pipe at the side of the door, the perforations in the pipe being arranged to deliver jets of air against the inner edge of the door, and means to support the pipe for turning movement, whereby the direction of the jets of air may be varied.

4. A furnace having a door, a hollow door-sill provided with jet-openings arranged to deliver air-jets against the inner edge of the bottom of the door, perforated pipes connected with said door-sill and situated adjacent the sides of the door, the perforations in the pipe being arranged to deliver jets of air against the inner edges of the sides of the door, and pipes connecting said perforated pipes with a source of compressed air.

5. A furnace having a door, a hollow door-sill provided with jet-openings arranged to deliver air-jets against the inner edge of the bottom of the door, perforated pipes connected with said door-sill and situated adjacent the sides of the door, the perforations in the pipes being arranged to deliver jets of air against the inner edges of the sides of the door, and pipes connecting said perforated pipes with a source of compressed air, said perforated pipes being mounted in the sill for turning movement, whereby the direction of air-jets issuing therefrom may be varied.

6. A furnace having a door, a hollow door-sill, provided with jet-openings arranged to deliver jets of air against the inner edge of the door, and a swiveled jet-pipe constructed

to deliver air against the inner edge of the top of the door.

7. A furnace having a door, a hollow door-sill, provided with jet-openings arranged to
5 deliver jets of air against the inner edge of the door, and a swiveled jet-pipe constructed to deliver air against the inner edge of the top of the door, said swiveled jet-pipe and door-sill being connected to the same source of
10 compressed-air supply.

8. A furnace having a door, and a nozzle,

means to support said nozzle over the door, for movement about both a vertical and horizontal axis, and means to deliver compressed air to said nozzle.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MATTHEW CUMMINGS.

Witnesses:

LOUIS C. SMITH,

JOHN C. EDWARDS.

15