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Patented Nov. 5, 1901.

F. RENDERS.  
FURNACE.

(Application filed Jan. 19, 1901.)

(No Model.)

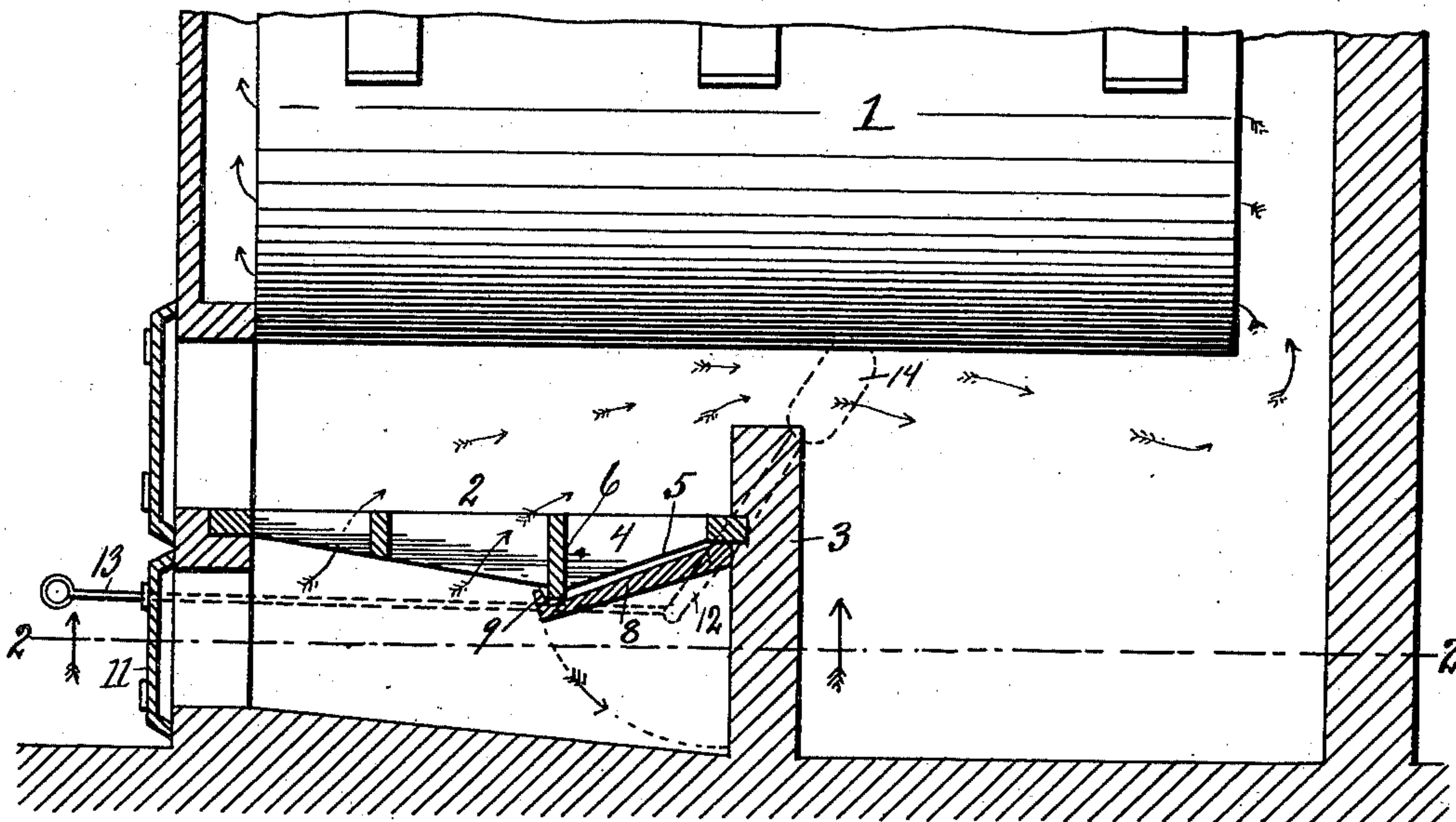


Fig. 1.

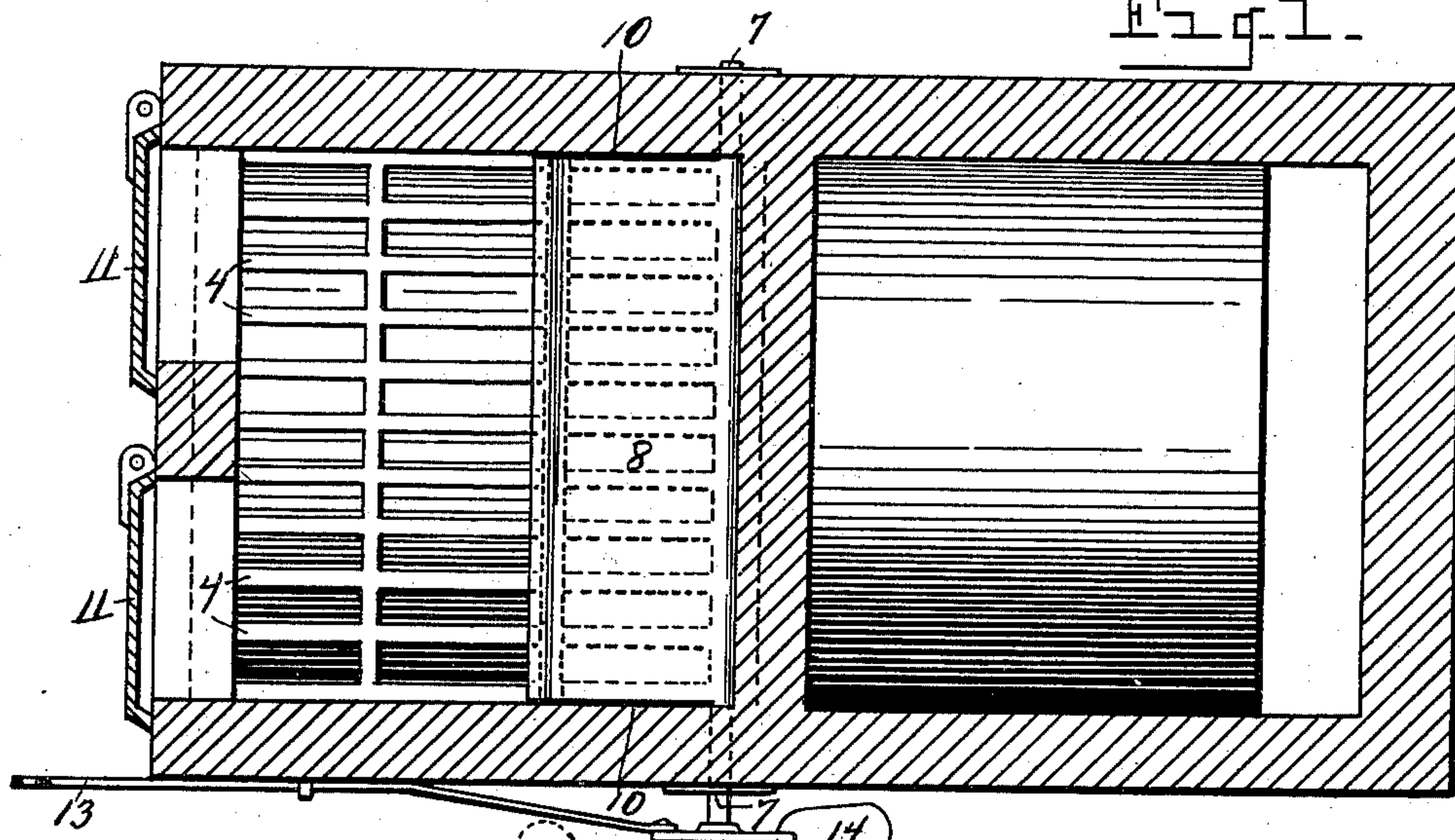


Fig. 2.

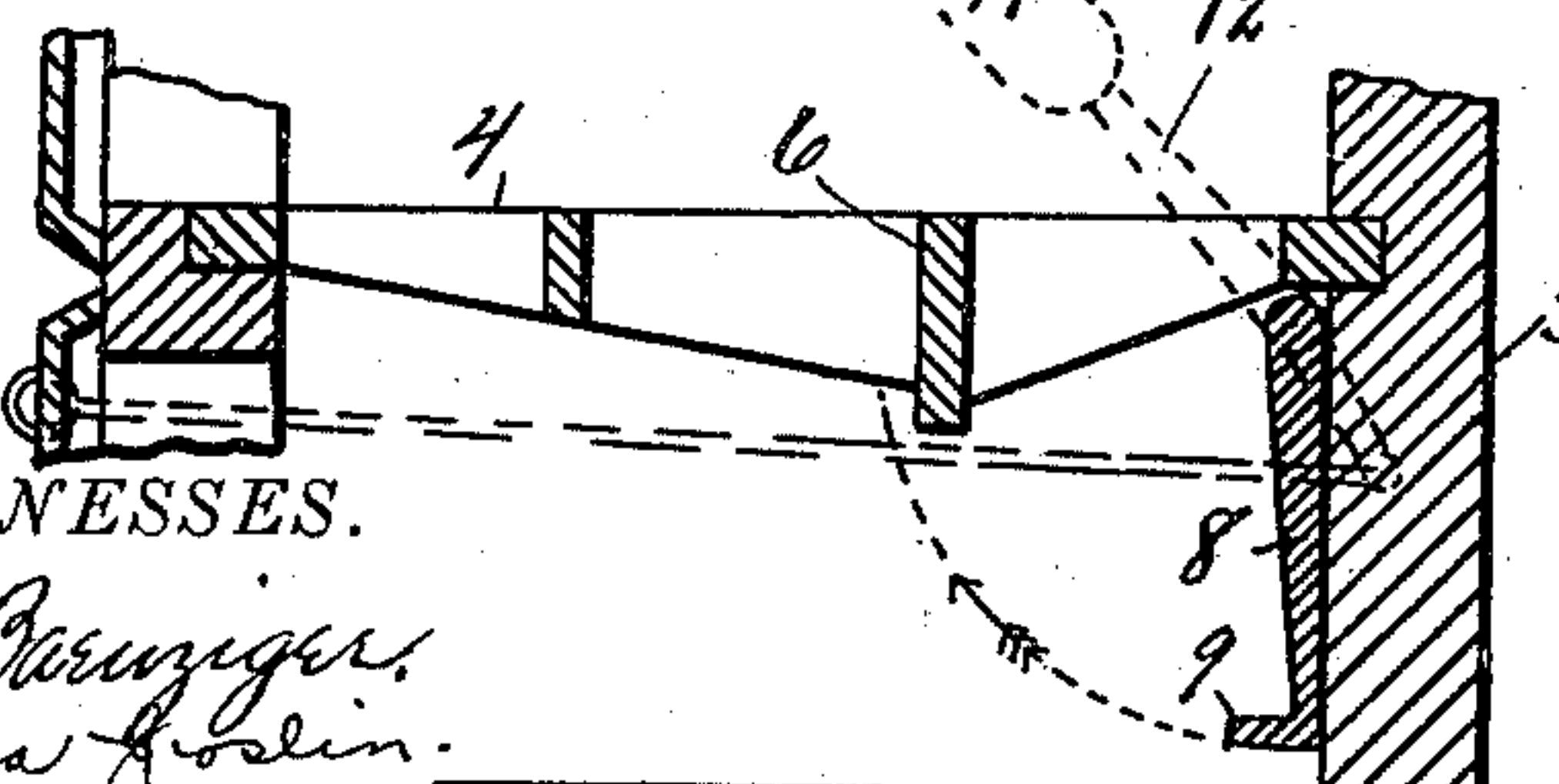


Fig. 3.

WITNESSES.

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# UNITED STATES PATENT OFFICE.

FRANK RENDERS, OF DETROIT, MICHIGAN.

## FURNACE.

SPECIFICATION forming part of Letters Patent No. 685,870, dated November 5, 1901.

Application filed January 19, 1901. Serial No. 43,928. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK RENDERS, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention relates to steam-generating furnaces; and it consists in the construction and arrangement of parts hereinafter fully set forth, and pointed out particularly in the claims.

The object of the invention is to provide simple and efficient means for preventing the strong draft of the furnace from causing an opening through the fuel at the rear of the grate, through which the greater volume of draft will rush, thereby leaving the fuel upon the front of the grate without proper draft, causing it to smoke, resulting in the discharge of a great volume of smoke from the stack of the furnace.

The above object is attained by the device illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view through the grate and brickwork of a furnace embodying my invention, the boiler showing in elevation. Fig. 2 is a horizontal section through the brickwork, as on line 2 2 of Fig. 1. Fig. 3 is a detail in section through the grate and damper employed for regulating the draft therethrough.

Referring to the characters of reference, 1 designates a boiler of any suitable construction.

2 designates the grate, extending from the front to the bridge-wall 3. The bars 4 of the grate are provided with an angular lower edge, forming the rear inclined portion 5. Crossing transversely between the bars of the grate is a partition 6, whose lower edge depends below the grate-bars and which serves to divide the rear section of the grate from the forward portion thereof.

Mounted upon suitable journals 7, which

are supported in the brickwork forming the sides of the ash-pit, is a damper 8, having at its lower edge a right-angled flange 9, which is adapted to engage over the lower edge of the partition 6 when the damper is swung upward to the position shown in Fig. 1. The damper extends transversely of the ash-pit below the grate and its ends are adapted to make a closure against the side walls 10 of said pit, so that when said damper is swung upwardly the draft is entirely cut off from the rear portion of the grate between the partition 6 and the bridge-wall.

In the ordinary construction of grates the draft which enters the ash-doors 11 passes rearwardly until it encounters the bridge-wall 3, when it is deflected upwardly and passes with great force through the rear portion of the grate-bars. The great force of the draft at the rear of the grate, especially after fresh fuel has been supplied, causes it to work an opening through the fuel on the grate-bars, after which the draft will rush through said opening, leaving the fuel upon the forward part of the grate without sufficient draft to support combustion, resulting in the emission therefrom of a large volume of smoke, which cannot be consumed by the small flames at the rear of the grate, allowing the smoke to pass into and escape in a dense volume from the stack and effecting a cooling of the boiler by the rush of air there-through. By the use of my improved draft-regulating damper the draft may be entirely shut off from the rear section of the grate by swinging said damper forward, so that the flange 9 thereof will engage over the lower edge of the partition 6, as shown in Figs. 1 and 2, and the face of said damper will lie adjacent to the inclined edge 5 of the grate-bars, whereby the draft is prevented from passing through the grate only at a point forward of said damper, so that the fuel upon the forward part of the grate receives sufficient draft to freely support combustion, causing a strong flame, which, carried by the force of the air-draft, sweeps over the fuel upon the rear portion of the grate and consumes the gas and smoke arising therefrom.

The damper may be operated in any suitable manner. I have shown in the drawings, however, a weighted arm 12, attached to one



of the journals of the damper and pivoted to a rod 13, passing to the front of the boiler in reach of the fireman. The weight 14 upon the arm 12 when the damper is down assumes the position shown in dotted lines of Fig. 3, whereby the damper is held back against the bridge-wall. By drawing forward upon the rod 13 the damper will be swung forward and the weight 14 will be swung to the rear of the fulcrum of the damper, as shown by dotted lines in Fig. 1, in which position said weight holds the damper closed or in contact with the under side of the grate-bars.

While I have shown the damper as journaled in the walls of the ash-pit, in some instances it may be found necessary to mount the damper directly upon the grate-bars. I do not therefore wish to limit myself to the particular manner of mounting the damper as shown herein.

In the operation of this device when it is desired to replenish the fire the damper is swung forward to the position shown in Fig. 1 and the coal or other fuel distributed over the surface of the grate. The presence of the damper closing the openings through the rear of the grate causes the draft to pass upward through the forward end of the grate, as shown by the direction of the arrows in Fig. 1, thereby inducing a strong flame from the fuel lying forward on the grate, which passes rearwardly and ignites and burns the gas rising from the fuel lying upon the rear portion thereof, obviating the emission of smoke and effecting economy in fuel by the burning of the gases. After the fuel upon the forward portion of the grate has become thoroughly ignited the damper may be swung downward to its normal position, thereby exposing the whole grate to the action of the draft, inducing a proper combustion of fuel over its entire surface.

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

1. In a furnace, the combination of the fire-space, the grate adapted to support fuel and

having suitable openings therethrough, a damper hinged to the under side of the grate at the rear, said damper extending transversely of the grate and adapted to swing upwardly against the under side of the grate-bars to cover the grate-openings and prevent the passage of the draft through the covered portion of the grate.

2. In a furnace, the combination of the fire-space, the grate, a damper located at the rear of the grate, said damper being movable into contact with the under side of the grate-bars to cover and close the openings through the rear portion thereof and means for actuating said damper.

3. In a furnace, the combination of the fire-space, the grate, a transverse partition formed in and dividing the rear portion of the grate from the forward portion thereof, a movable damper adapted to close against said partition and cover the openings through the rear portion of the grate and means for actuating said damper.

4. In a furnace, the combination of the grate having a transverse partition dividing the rear portion from the forward portion thereof, a hinged, or pivoted, damper hung below the grate at its rear end and adapted to swing upwardly against said partition to close the openings through the rear of the grate and an operating-rod connected with said damper for actuating it.

5. In a furnace, the combination of the grate having a transverse partition dividing the rear portion from the forward portion thereof, a damper hung below the grate and adapted to swing upwardly against said partition to close the openings through the rear of the grate, a weighted arm attached to said damper and an operating-rod attached to said arm.

In testimony whereof I sign this specification in the presence of two witnesses.

FRANK RENDERS.

Witnesses:

E. S. WHEELER,  
C. EDNA JOSLIN.