

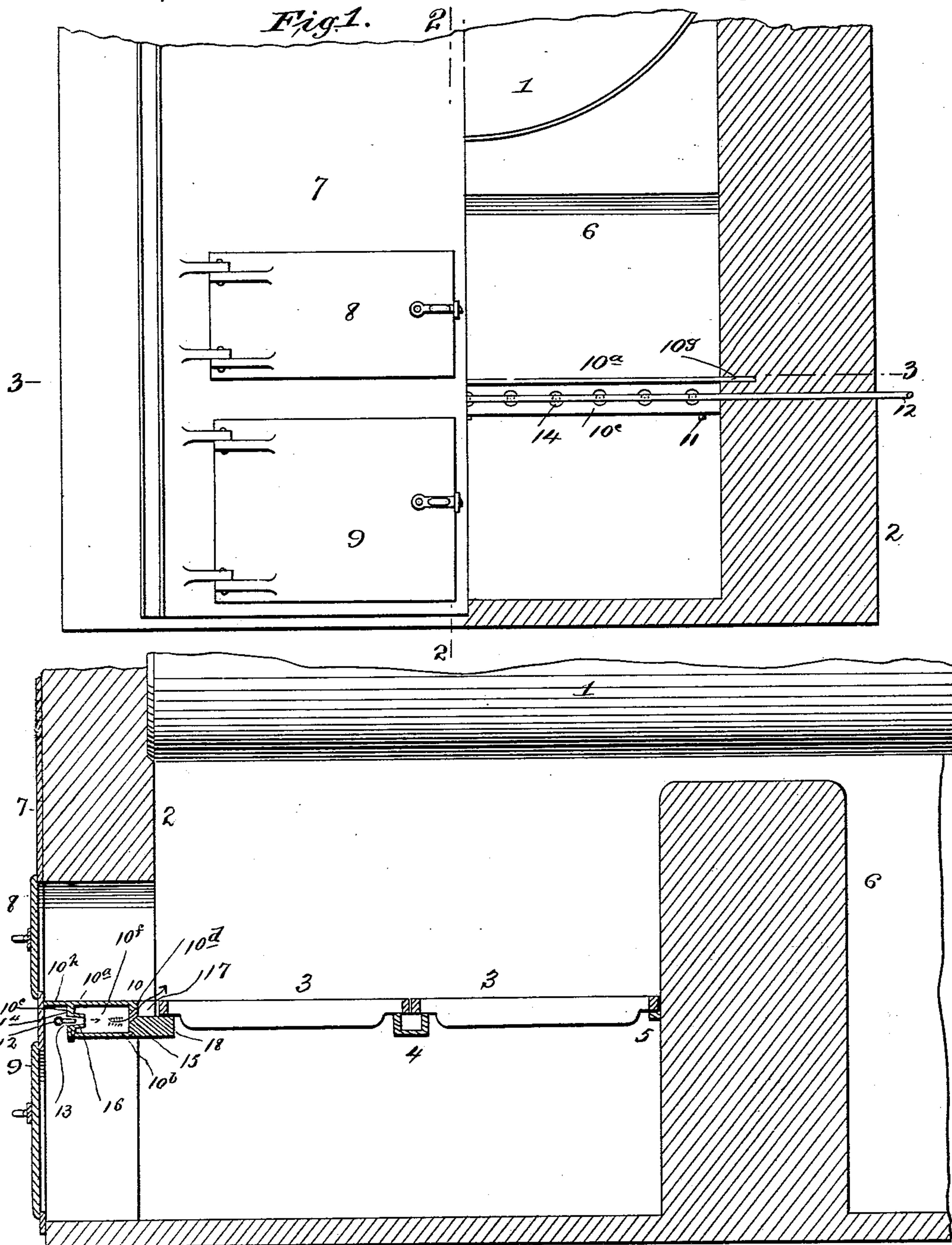
(No Model.)

2 Sheets—Sheet 1.

C. H. EVANS.  
DEAD PLATE FOR FURNACES.

No. 560,026.

Patented May 12, 1896.



WITNESSES:  
*C. W. Benjamin*  
*T. Q. Curtis*

*Fig. 2.*

INVENTOR  
*Chas. H. Evans,*  
BY *T. F. Bourne*  
his ATTORNEY

(No Model.)

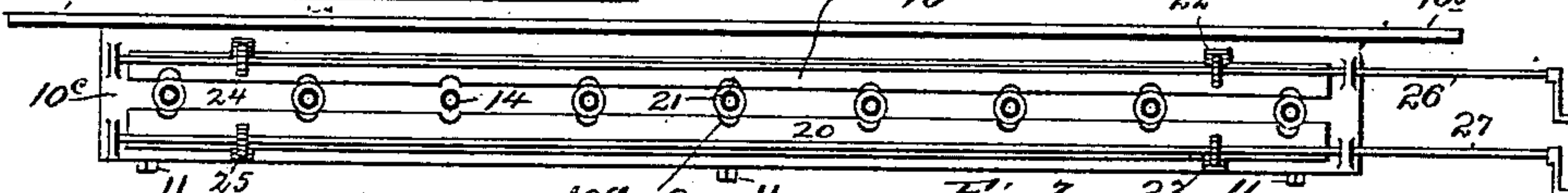
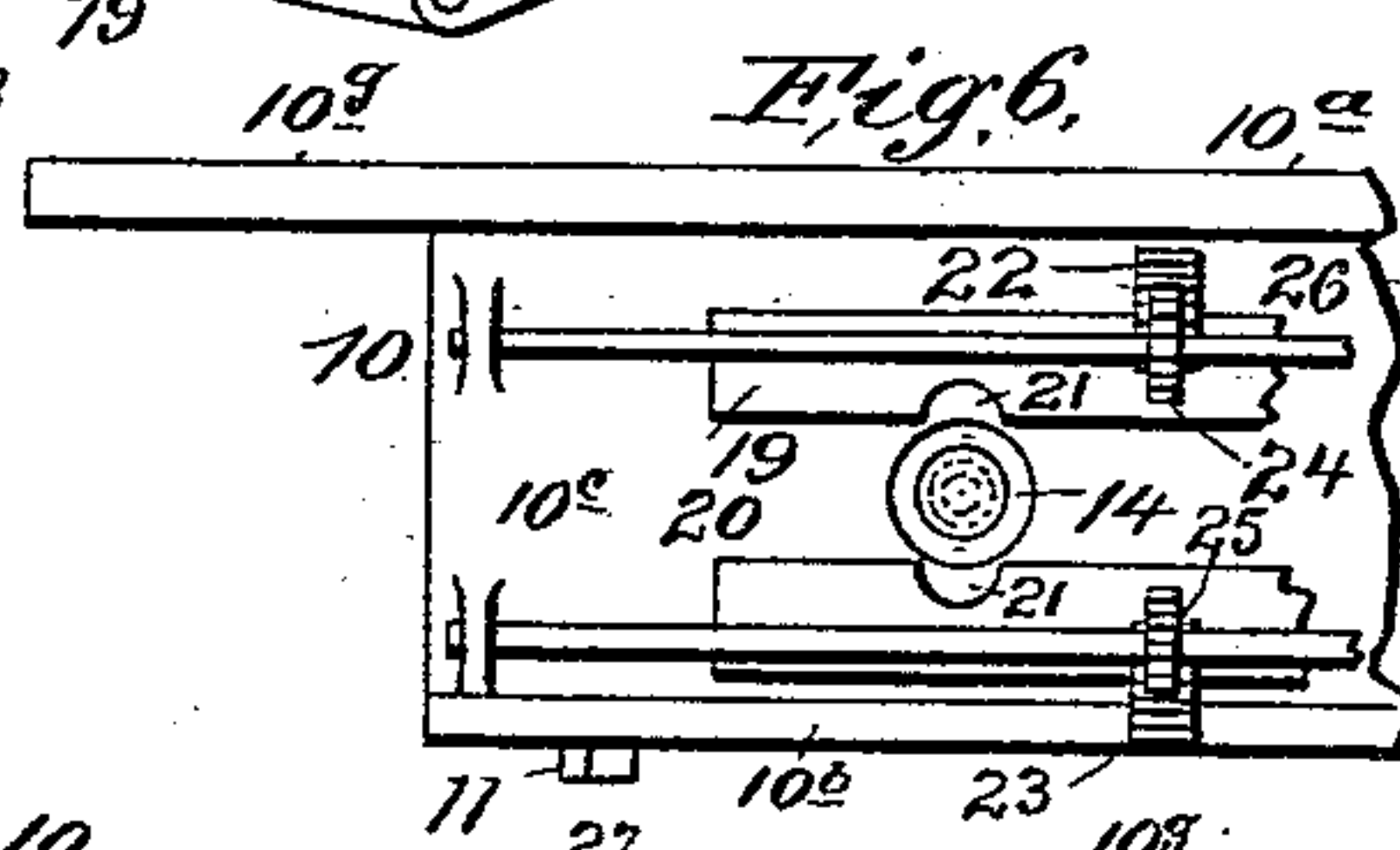
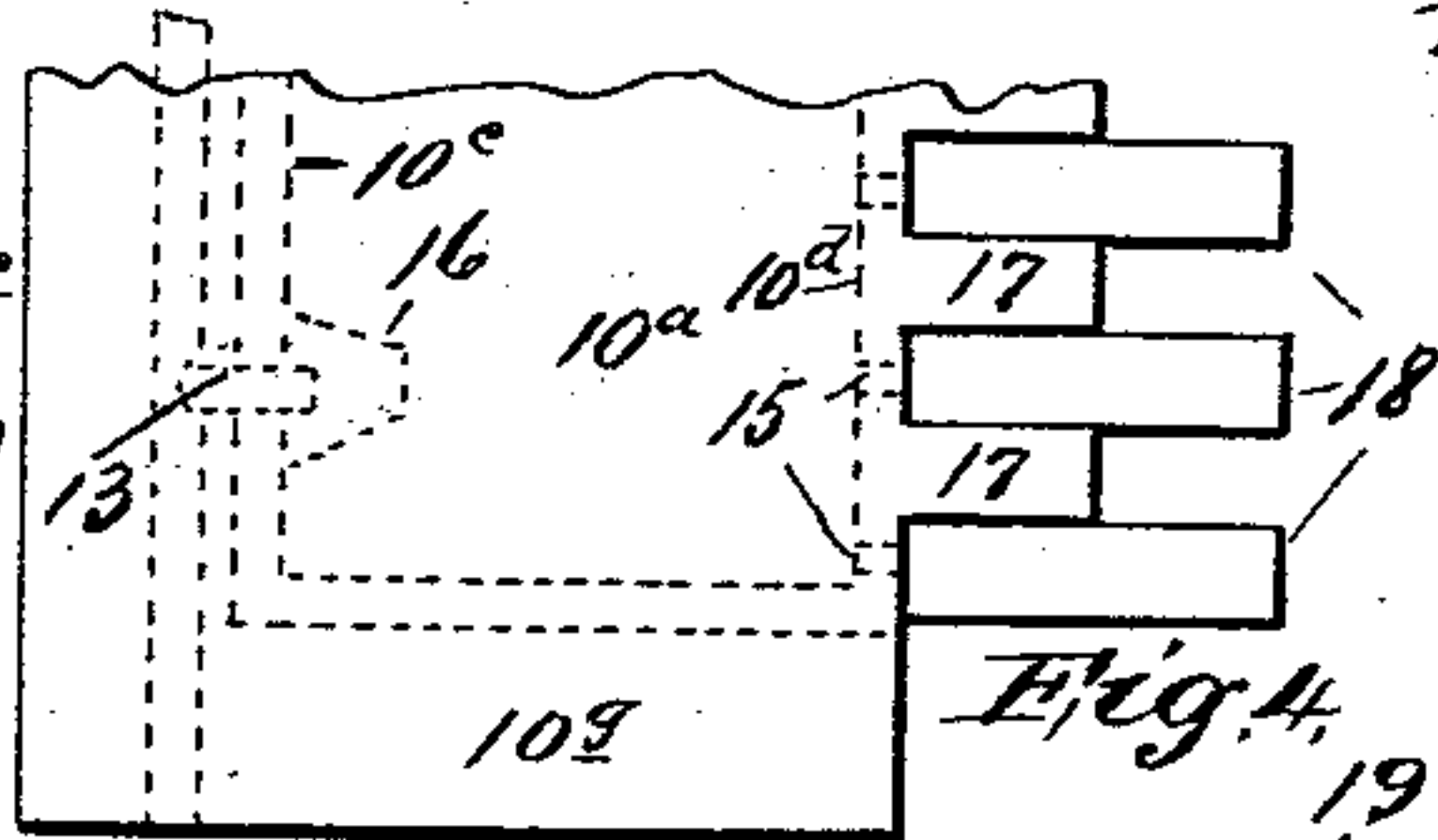
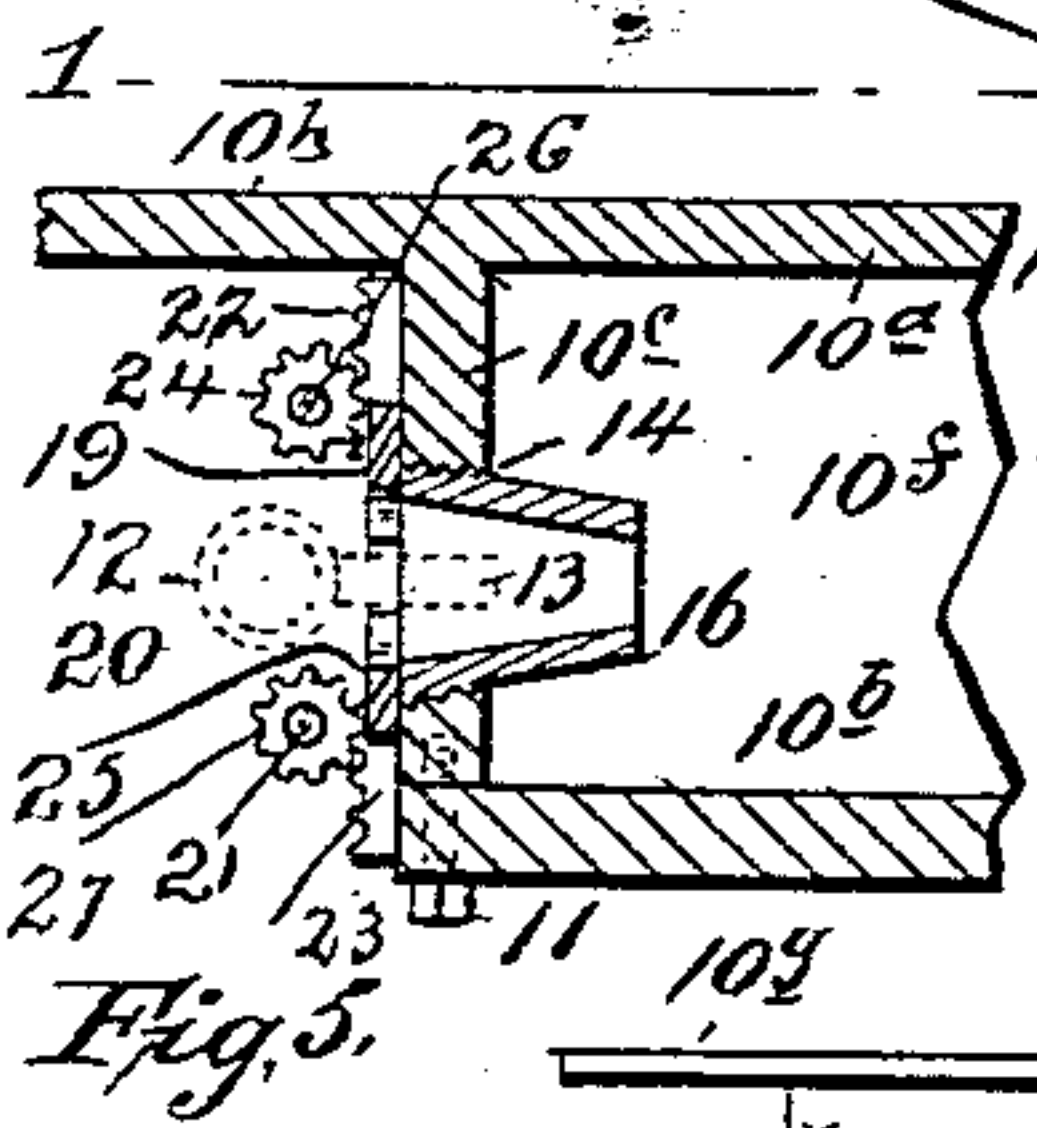
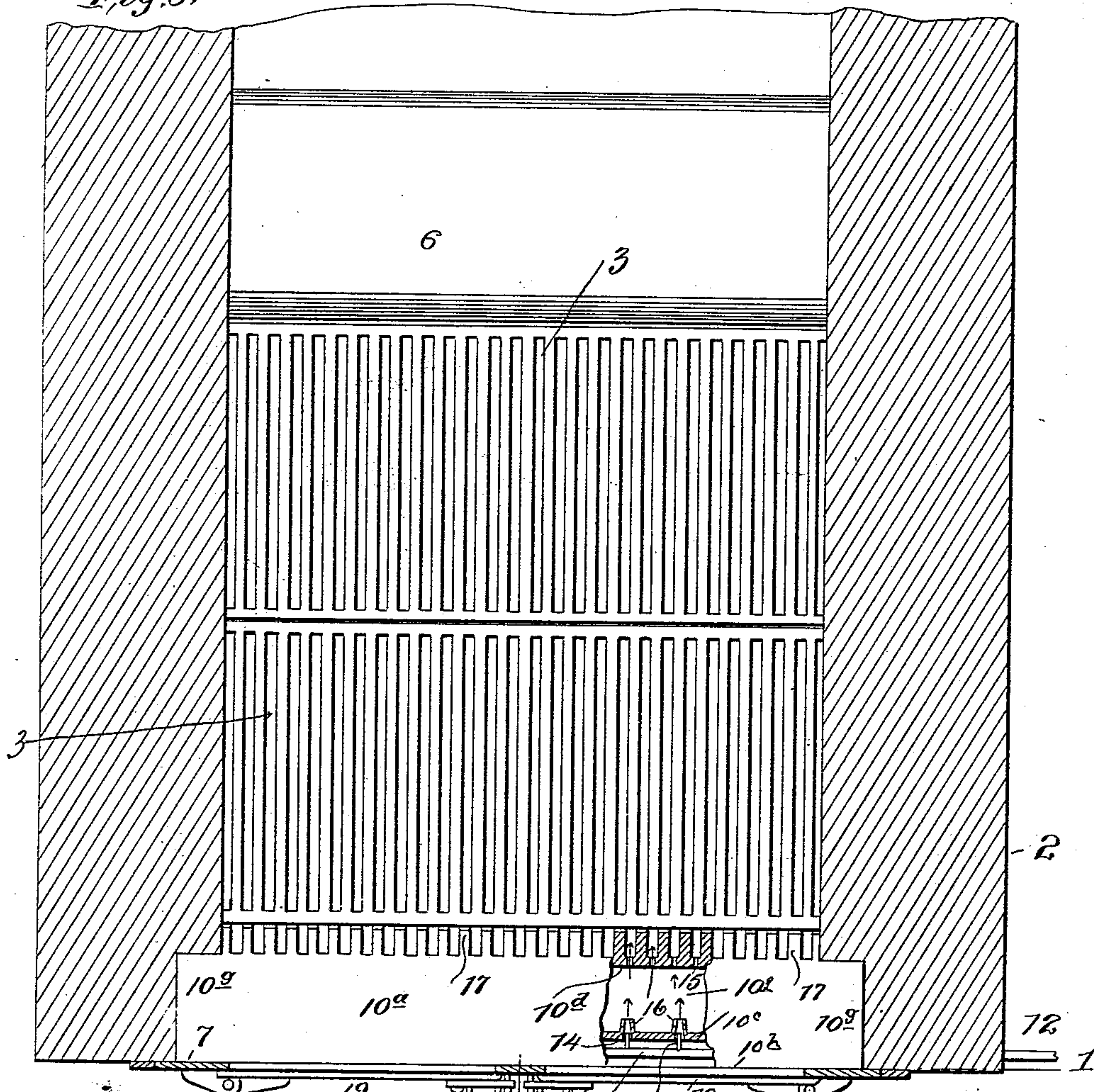
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Fig. 3.

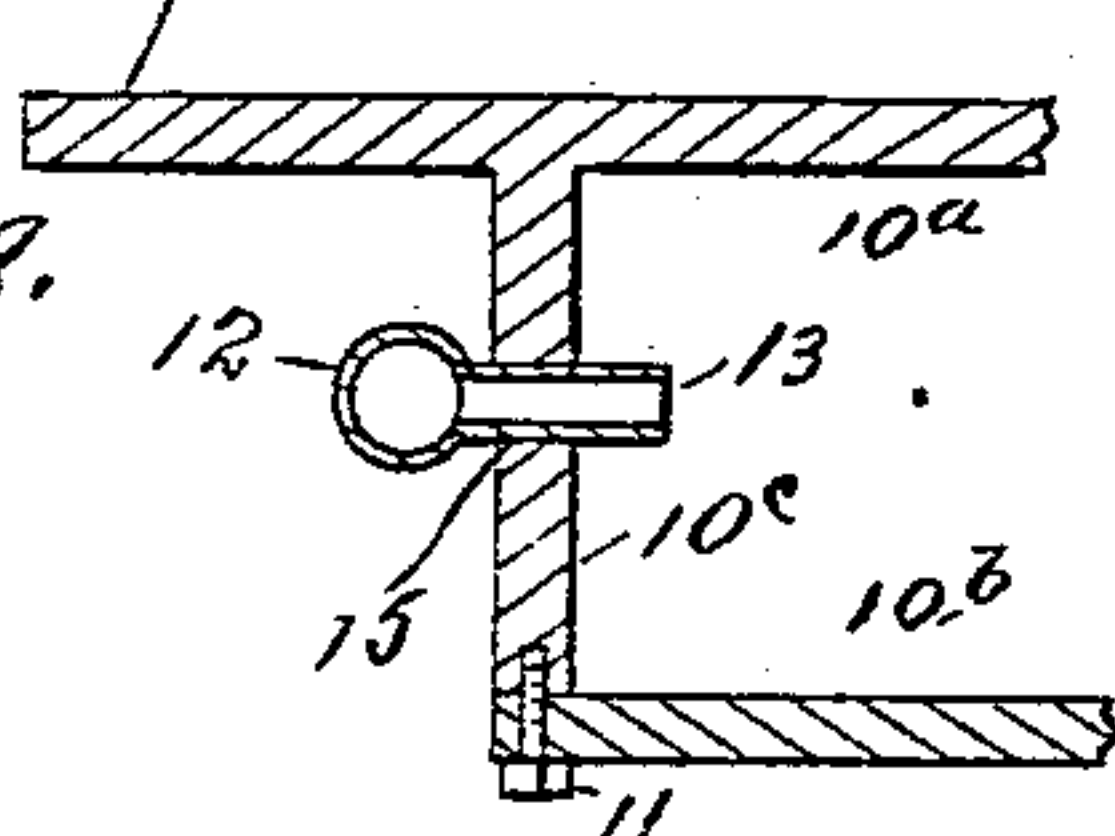


WITNESSES:

C. W. Benjamin

J. Q. Curtis

Fig. 8.



BY

Chas. H. Evans,  
his Attorney



# UNITED STATES PATENT OFFICE.

CHARLES H. EVANS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO  
PHILIP EBLING, OF SAME PLACE.

## DEAD-PLATE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 560,026, dated May 12, 1896.

Application filed January 13, 1896. Serial No. 575,245. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES H. EVANS, a citizen of the United States, residing in New York city, New York, have invented certain new and useful Improvements in Dead-Plates for Furnaces, of which the following is a specification.

In the class of "dead-plate" for furnaces known to me the live coals rest upon them and thus cause such plates to quickly burn out.

It is the object, therefore, of my invention to provide a dead-plate which will not burn out so readily as those above mentioned and which, from its construction and manner of use, will serve as part of the means to cause the consumption of smoke.

This portion of my invention consists in a dead-plate having a steam or air chamber into which steam or air, or both, is or are admitted or forced, so as to retard the burning out of the plate; or, in other words, my improved dead-plate is made hollow with provision for the admission of steam or air, or both. Furthermore, I utilize this chambered or hollow dead-plate as a means for directing steam or steam and air into and through the live coals that may be upon or adjacent to the plate, so as to cause the smoke from the fire to be consumed to a valuable degree, if not entirely so. For this purpose the side wall of the chamber of the dead-plate is provided with openings which are located beneath the bed of coals, and from which openings the steam or steam and air issue, passing through the adjacent fire, suitable provision being made, such as inlet tubes or openings, for admitting the steam or air into said chamber. The steam may be admitted under suitable pressure, as desired.

A further object of the invention is to provide a "bearing-bar" for the ends of the grate-bars adjacent to the dead-plate that will reduce the danger of the bearing-bar burning out, and for this purpose I construct the bearing-bar in the form of fingers, upon which the ends of the grate-bars rest. These fingers project from the walls of the chamber of the dead-plate. Above these fingers and projecting from the same wall of said chamber are other fingers, which break joints with the first-mentioned fingers and are located on opposite

sides of the before-mentioned openings in the side wall of the chamber. By these means the steam or air and steam are caused to circulate against said fingers to reduce the danger of their burning out. Furthermore, by this means the corresponding ends of the grate-bars are brought in contact with the steam to keep them from readily burning out.

The invention also consists in the novel details of improvement and the combinations of parts that will be more fully hereinafter set forth, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a partly sectional front elevation of a furnace or boiler setting provided with my improvements, the section being taken on the plane of the line 1 1, Fig. 3. Fig. 2 is a vertical longitudinal section on the plane of the line 2 2 in Fig. 1. Fig. 3 is a horizontal section on the plane of the line 3 3 in Fig. 2, part being broken away. Fig. 4 is a detail plan view, enlarged, of a portion of the improved dead-plate. Fig. 5 is a detail section thereof, showing a modification. Fig. 6 is an edge view of the dead-plate, showing means for regulating the admission of air to the chamber. Fig. 7 is an edge view of the entire dead-plate, showing the devices for regulating the admission of air to the chamber. Fig. 8 is a detail section of the dead-plate, showing means for admitting steam therein.

In the accompanying drawings, in which similar numerals of reference indicate corresponding parts in the several views, the numeral 1 indicates a boiler, 2 is a setting or brickwork therefor, 3 are grate-bars, 4 5 are bearing bars or supports therefor, 6 is a bridge-wall, 7 is the front of the setting, and 8 and 9 are the doors, all of which may be of suitable or well-known construction.

10 is my improved dead-plate, which is composed, primarily, of a top plate 10<sup>a</sup>, bottom plate 10<sup>b</sup>, and sides 10<sup>c</sup> 10<sup>d</sup>, which together form a chamber 10<sup>f</sup>, or, in other words, my improved dead-plate is hollow. By preference said top, sides, and ends are cast in an integral structure, and the bottom 10<sup>b</sup> is detachably connected therewith to permit access to the chamber 10<sup>f</sup>. For convenience the bot-



tom plate 10<sup>b</sup> may be connected with the side 10<sup>a</sup> by a dovetail connection, as in Fig. 2, the opposite side of plate 10<sup>b</sup> being screwed or bolted to the side 10<sup>c</sup> by screws or bolts 11, (see Fig. 5;) but, of course, either of the sides or walls of the structure could be removable, if preferred. By preference the ends 10<sup>e</sup> of the top or plate 10<sup>a</sup> extend beyond the ends 10<sup>c</sup> and may be secured in the setting or brickwork 2, whereby the dead-plate can be supported; but, of course, the dead-plate can be otherwise supported, if desired. The side 10<sup>h</sup> of the top plate 10<sup>a</sup> also by preference extends beyond the wall or side 10<sup>c</sup> to rest against the front 7 to provide a space for the steam-pipe 12 and at the same time prevent a circulation of air between the front 7 and the dead-plate. (See Fig. 2.)

The pipe 12 serves to supply steam to the chamber of the dead-plate, and in order to distribute the steam throughout the length of the chamber said pipe is provided with a series of tubes 13, which enter corresponding holes 14 in the wall or side 10<sup>c</sup> of the dead-plate. The pipe 12 may receive steam from the boiler under suitable pressure. The opposite wall 10<sup>d</sup> is provided with a series of apertures 15, preferably upwardly and outwardly inclined, for the passage of steam from the chamber 10<sup>f</sup>, so as to direct steam against the adjacent bed of coals. The tubes 13 may fit snugly in the openings 14 in the wall 10<sup>c</sup>, if desired, as shown in Fig. 8. By preference, however, I desire that air shall be drawn into and discharged from the chamber of the dead-plate by and with the steam before mentioned. For this purpose the apertures 14 are made larger than the tubes 13, so that air can pass into the chamber around said tubes, the steam acting to draw the air through said apertures. To afford the best results, I provide tubes or hollow teats 16 on the inner side of wall 10<sup>c</sup> around the apertures 14, into or in line with which the tubes 13 project, the bore of the tubes or teats 16 being tapered inwardly or cone-like to afford the best suction for the air. The tubes or teats 16 are preferably cast integral with the wall of the chamber 10<sup>f</sup>, as in Figs. 2 and 3; but these tubes or teats 16 may be made separately and suitably connected with the wall 10<sup>c</sup>. In Fig. 5 I have shown individual cone-like tubes fitted in the openings 14 and connected to the wall 10<sup>c</sup> by screw-threads, as shown. As the bore of the tube or teat 16 is larger than the tube 13, it is evident that when steam rushes through the former air will be drawn into the chamber 10<sup>f</sup> and mix with the steam therein, so that this mixture will issue from the apertures 15 into the bed of coals.

On the outer side of the wall 10<sup>d</sup> are a series of outwardly-projecting fingers 17, which are located on opposite sides of the openings 15. (See Figs. 3 and 4.) The fingers 17 are preferably cast integral with the wall 10<sup>d</sup>, as shown, and between them are spaces into

which the steam or steam and air issuing from the apertures 15 pass, and by coming in contact with these fingers serve to cool them, although the coals rest upon them. Beneath the fingers 17 and projecting from the wall 10<sup>d</sup> are another series of fingers 18, which are longer than the fingers 17 and break joints or alternate therewith, as shown. (See Figs. 2 and 4.) These fingers 18 form a support for the forward or front ends of the grate-bars 3, or, in other words, the fingers 18 constitute a bearing-bar for the ends of the grate-bars. The spaces between the fingers 18 permit a circulation of air and steam, and as the steam issuing from the apertures 15 encounters the surfaces of the fingers 18 it serves to cool them, so as to prolong their life.

As shown in Fig. 3, the front or forward ends of the grate-bars 3 rest upon the fingers 18, and the ends of the grate-bars preferably abut against the ends of the fingers 17, whereby a pocket is formed between the top of a finger 18, the sides of two fingers 17, and the ends of the grate-bars and wall 10<sup>d</sup>, into which pocket the steam or steam and air issuing from the chamber 10<sup>f</sup> pass. It thus encounters the metal of the fingers 17 18 and the ends of the grate-bar, and so on throughout the series, so as to keep them from burning out quickly. As the coals of the fire cover the fingers 17 and a portion, at least, of the dead-plate, or the plate 10<sup>a</sup>, the steam or steam and air issuing from the apertures 15 will be forced through the coals at that part, and thus pass along over the fire, causing the smoke to consume, and at the same time increasing the heat developed, thereby reducing the consumption of coal. On account of the presence of steam in the chamber of the dead-plate the metal of the latter is kept comparatively cool and prevented from burning out as quickly as would occur if the steam were not present.

For some reasons it may be desirable to regulate the admission of air to the chamber of the dead-plate or to entirely stop its admission. For this purpose suitable means may be employed. I have shown horizontal bars 19 20 extending along the outer side of the wall 10<sup>c</sup> and provided with recesses 21, which are adapted to close over the tubes 13, so as to enable the bars 19 20 to close the openings 14. (See Figs. 5, 6, and 7.) Suitable means may be employed for the raising and lowering the bars 19 20. I have shown said bars as provided with racks 22 23, which mesh with pinions 24 25, carried by shafts 26 27, which may be suitably journaled on the dead-plate or otherwise carried. The shafts 26 27 may have cranks or other operating means by which they may be rotated. It will be understood that the plates 19 20 serve as valves for the openings 14 in the wall of the dead-plate and that more or less air can be admitted to the chamber 10<sup>f</sup>, according to the positions of the bars, so that the quantity of



the air to be mixed with the steam can be readily regulated.

Another advantage in my improved dead-plate is that as the steam or steam and air are contained in the chamber 10<sup>f</sup>, and as the live coals rest upon the plate 10<sup>a</sup>, the steam or steam and air become superheated, and when forced through the coals are in an advantageous condition for assisting in combustion of the fuel, and thus also serve to more effectively cause consumption of the smoke. This last feature is very important and gives increased value to the dead-plate. The spaces between the fingers 18 enable air to circulate around the ends of the grate-bars in addition to the passage of the steam, thus prolonging their life.

It will be evident that the fingers 17 can be omitted, if desired, and only the lower grate-supporting fingers 18 used, in which case the grate-bars could project against the dead-plate, or nearly so, the steam issuing against the ends of the grate-bars.

I do not limit my invention to the details of construction shown and described, as they may be varied without departing from the spirit of my invention.

Having now described my invention, what I claim is—

30 1. A dead-plate having a chamber, the latter having outlet-openings, combined with a steam-pipe having a plurality of tubes leading into said chamber through the side directly opposite the outlets, substantially as described.

35 2. A dead-plate having a chamber provided with inlet, and outlet openings, that are inclined upwardly and outwardly combined with a steam-pipe having a plurality of tubes leading therefrom into said inlet-openings through the outer wall of the chamber, the inlet-openings being larger than said tubes, to admit air with the steam substantially as described.

45 3. A dead-plate having a chamber provided with inlet and outlet openings, combined with a steam-pipe having a plurality of tubes leading into said inlet-openings, a plurality of tubes projecting inwardly from said openings, and carried by said chamber the bores of said tubes being larger than said steam-tubes, substantially as described.

50 4. A dead-plate having a chamber provided with inlet and outlet openings, combined with a steam-pipe having tubes leading into said inlet-openings, the latter being larger than said tubes, with means for regulating the admission of air into said inlet-openings, while

still permitting the entrance of steam substantially as described.

5. A dead-plate having a chamber provided with inlet and outlet openings, combined with a steam-pipe having tubes leading into said inlet-openings, the latter being larger than said tubes, and with bars or plates 19, 20, having recesses to receive said tubes, and means for operating said bars to regulate the admission of air to said chamber, while still permitting the passage of steam into said chamber substantially as described.

6. A hollow or chambered dead-plate having a steam-inlet, and steam-outlets in one of its walls and fingers projecting from said wall and located on opposite sides of said outlets, to receive steam between them, substantially as described.

7. A hollow or chambered dead-plate having a steam inlet and outlets, and fingers on one side of said chamber having spaces between them and serving as a bearing bar or support for grate-bars, substantially as described.

8. A hollow or chambered dead-plate having a steam inlet and outlets, fingers projecting from the side of said device and located on opposite sides of said outlets, and other fingers also projecting from said device to serve as a bearing bar or support for the ends of grate-bars, substantially as described.

9. A hollow or chambered dead-plate having a steam inlet and outlets, fingers projecting from one side of said device and located on opposite sides of said outlets, and other fingers projecting from the same side of said device as the first-mentioned fingers and projecting farther outwardly than the latter fingers, the second-mentioned fingers being located on a lower plane than the first-mentioned fingers whereby pockets are formed to receive and distribute the steam from the outlets, substantially as described.

10. The combination with a furnace or boiler setting, a front therefor, and grate-bars, with a hollow or chambered dead-plate having inlet and outlet openings, said dead-plate being supported inside of said front and having a ledge projecting toward said front over the inlet-openings, and a steam-pipe leading to said inlet and located beneath said ledge in the space between the dead-plate and said front, substantially as described.

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Witnesses:

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J. K. MCKEAN.