

No. 689,560.

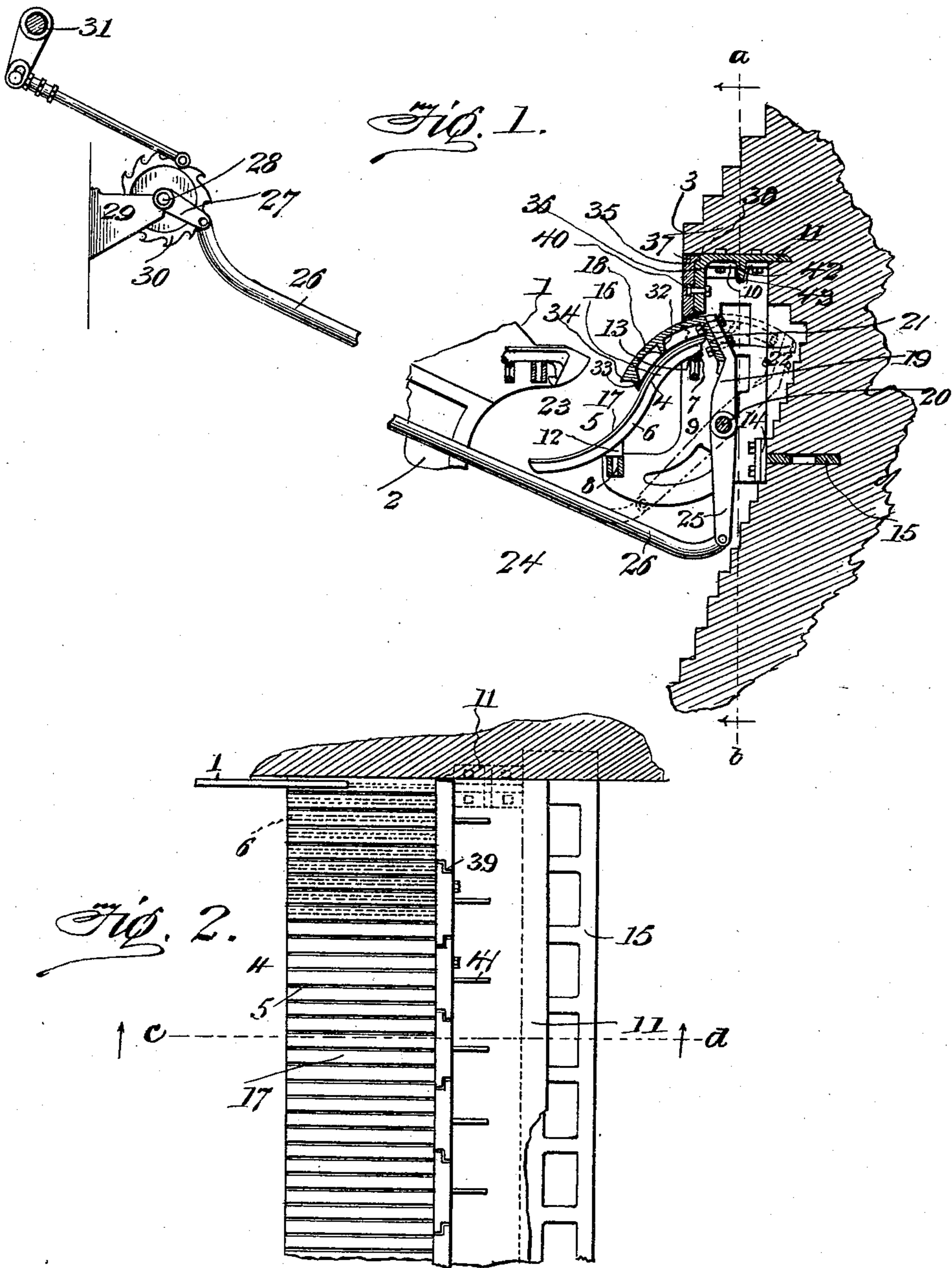
Patented Dec. 24, 1901.

W. McCLAVE.
CUT-OUT FOR GRATES.

(Application filed Feb. 13, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
Anton Stoltz
E. Seavey

Inventor
William McClave
By *Mason Fenwick Lawrence*, Attorneys

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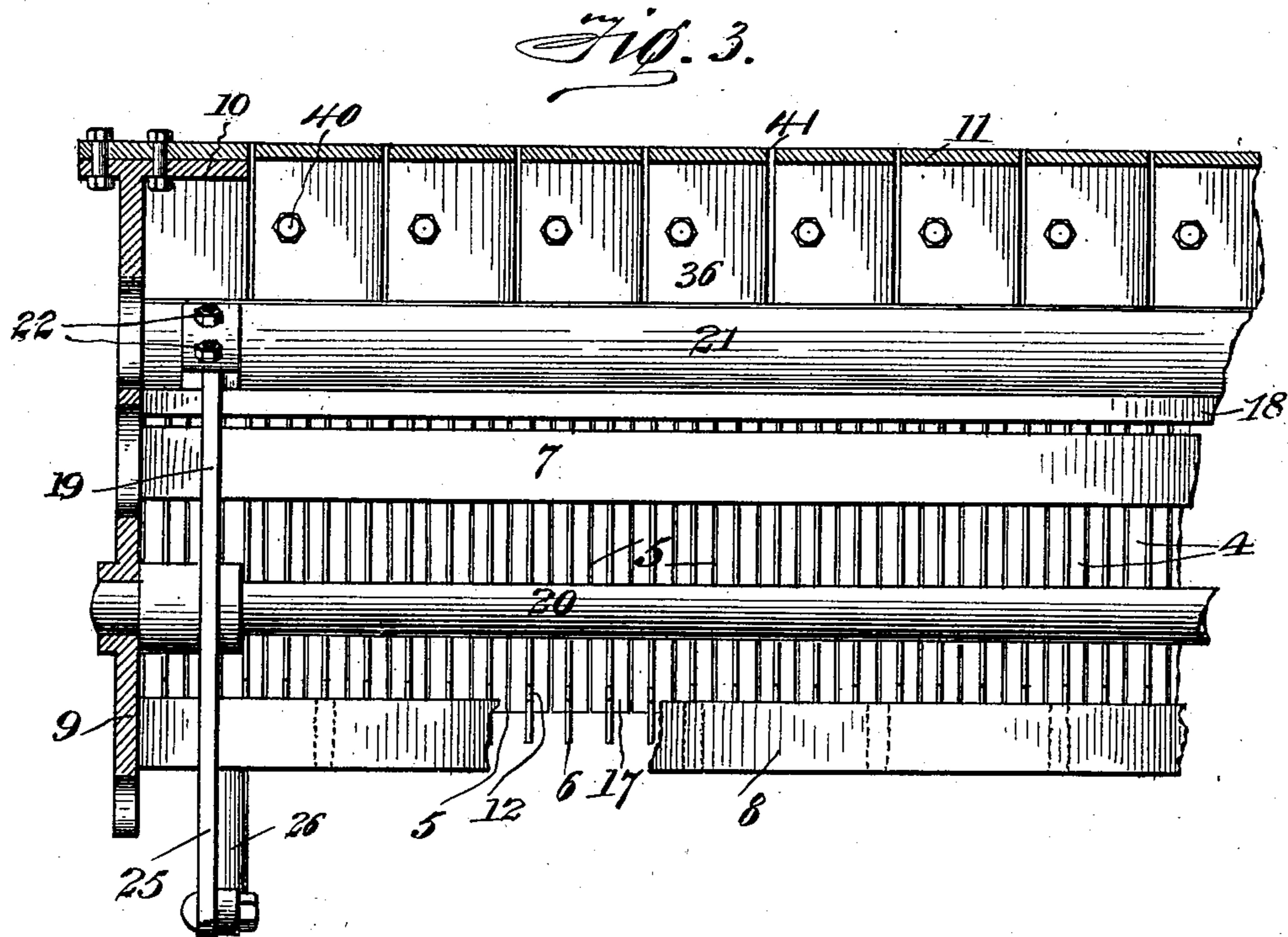
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Inventor

William M^cClave

By

Mason Fenwick Lawrence

Attorneys.

Witnesses

Frederick Stelt,
A. G. Sims.

UNITED STATES PATENT OFFICE.

WILLIAM MCCLAVE, OF SCRANTON, PENNSYLVANIA.

CUT-OUT FOR GRATES.

SPECIFICATION forming part of Letters Patent No. 689,560, dated December 24, 1901.

Application filed February 13, 1901. Serial No. 47,165. (No model.)

To all whom it may concern.

Be it known that I, WILLIAM MCCLAVE, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Cut-Outs for Grates; and I do hereby 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.

This invention relates to improvements in cut-outs for furnaces, and is particularly applicable to furnaces employing inclined grates adapted to have fuel fed down their surfaces toward the said cut-out mechanism.

It consists, in combination with a furnace having a duct at the lower end of its grate, of a cut-out pusher adapted to travel forwardly and downwardly across the line of the ashes or clinkers on the grate for forcing the same through the said duct into the ash-pit of the furnace and means for moving the said cut-out back and forth to accomplish this operation.

It also consists in certain other novel features, combinations, and arrangement of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a central vertical longitudinal section, taken on the line *c d* of Fig. 2, through a portion of the combustion-chamber of the furnace and the ash-pit thereof, showing an inclined grate mounted therein and my improved cut-out mechanism arranged at the lower end thereof. Fig. 2 is a top plan view of a portion of the cut-out mechanism, showing the plates of which the duct-walls are constructed, the pusher being retracted beneath the plate 11. Fig. 3 is a vertical sectional view taken on the line *a b* of Fig. 1.

My improved cut-out mechanism is adapted for operation in connection with grates upon which the fuel is fed from one end to the other, the partially-consumed fuel and ashes passing off the end of the grate. While, of course, I may employ this mechanism in connection with grates of various kinds, I preferably use the same in connection with an inclined grate similar to that described and claimed in my application for patent, of even date herewith,

Serial No. 47,163. In grates of this kind it is usual to permit the ashes and clinkers to drop into the ash-pit, at the lower end thereof. There has been difficulty in such grates in sealing the ash-pit at this point when it is desired to employ a forced draft for the fire on the grate. By my present construction I so form the lower end of the grate and the floor or surface over which the cut-out operates that a duct of sufficient length will be formed at the lower end of the grate, through which the ashes and clinkers will have to pass before being deposited in the ash-pit. In connection with such a duct I employ a suitable pusher which is adapted to cut downwardly, preferably across the line of clinkers and ashes, and force a portion of the same through the said duct, there being always a sufficient quantity of ashes in the duct to completely close the same and thoroughly seal the ash-pit at this point. In arranging these features in a practical manner I support the lower end of the grate 1 in the furnace so that it will project a considerable distance beyond its bearers or standards 2. This makes it possible to extend from the bridge-wall 3 of the furnace a floor or surface 4 beneath the end of the grate and some distance past the same to form a passage-way or duct between the said floor and the lower end of the grate. I preferably form this surface or floor 4 out of a series of curved bars 5 5, which are formed with broad upper bearing-surfaces and strengthening-webs 6 on the under sides thereof. These bars 5 rest upon transverse bearing-bars 7 and 8, which are mounted beneath them. The ends of these supporting-bars are secured to downwardly-extending brackets or hangers 9 9, secured to the bridge-wall and arranged for the most part to the rear of the said floor 4. The supporting-brackets 9 are preferably provided with flanges 10 at their upper ends, which are bolted or otherwise secured to horizontal supporting-plates 11, which are partially embedded in the brickwork of the bridge-wall 3, the ends of said plates projecting partially into the said brickwork and their rear edges being also inclosed within the same. The brackets 9 are preferably provided with suitable apertures to lighten their structure, as illustrated in Fig. 1 of the drawings, and their

lower ends extend forwardly a sufficient distance to support the bars 5 near their outer free ends. The transverse bars 8 for securing the said bars 5 at this point are dovetailed or otherwise secured to the forwardly-projecting portions of the brackets 9, and the bars 5 are provided with shouldered projections 12 for resting upon the top of this bar 8. The upper ends of the bars 5 are provided with rearwardly-projecting portions 13, adapted to engage recesses formed in the upper bearer or carrier bar 7, the structure being, preferably, like that shown in my application for patent on furnace-grates above referred to. This bar connection will prevent any accidental displacement of the said bars 5 and will serve to hold them properly in position. The brackets 9 are also adapted to be held firmly in position at their lower ends by being bolted to the flange 14 of an anchor-plate 15, which is embedded in the masonry of the bridge-wall.

While the surface of the floor 4 may be of any suitable contour, I preferably curve the same upward in a convex manner at the upper end, as at 16, while the upper surface of the said floor is concaved at its lower end, as at 17, making a compound reversed curve of the whole upper surface. By this structure the upper surface is adapted to the movement of the cut-out or pusher, as will be hereinafter described, while the lower end of the floor will extend beneath and forward of the lower end or edge of the grate, forming there-with a curved channel or duct adapted to support the ashes and material received from the grate-surface. The said floor is formed of a series of bars, as above described, in order to present short lines of metal to the action of the furnace heat and prevent the distortion of the bars. The bars 5, composing the said floor, are arranged with slight spaces between them to allow for the contraction and expansion of the metal under the varying temperatures to which they are subjected.

Operating in conjunction with the floor 4 is the cut-out, pusher, or slide 18, which is preferably segment-shaped in cross-section, being formed upon an arc which coincides with the arc of the upper surface of the floor 4, at the upper end thereof. This cut-out bar is secured by means of arms 19 to the rock-shaft 20, which extends across the ash-pit and finds suitable bearings in the brackets 9. The upper ends of the arms 19 are preferably somewhat flattened and adapted to receive against their forward surfaces downwardly-extending flanges 21, formed at the rear edge of the cut-out bar 18. These are bolted together by suitable bolts or rivets 22. The cut-out bar 18 is thus adapted to travel in an arc having the axis of the shaft 20 as a center. The said cut-out bar will thus travel along the upper surface of the floor 4 in close proximity thereto, but without actually touching the same, since a metal-to-metal contact is not needed and is of course not desirable.

When the cut-out is in its normal or rearmost position, as shown in dotted lines in Fig. 1, the clinkers and ashes from the grate-surface can drop down in front of the edge of the cut-out and rest against the surface of the floor 4. Upon actuating the pusher or cut-out, as will be hereinafter described, so that the same is moved along the upper surface of the floor 4 the front edge of the said cut-out will be forced across the line of the clinkers and ashes coming down the grate and will cut off a portion of the same and force it forward down the surface of the floor 4 into the duct 23, formed between the lower portion of the said floor and the lower end of the grate. The cut-out bar 18 is not designed to extend through the duct, since it is not desirable to push the material entirely through the said duct at one operation, as it is necessary to keep a sufficient quantity of ashes and clinkers in the said duct to close and seal the same. Of course as each quantity of ashes and clinkers is cut off and forced down the duct some of the material already in the duct will be thereby forced off the lower end of the floor 4 and will drop into the ash-pit 24 beneath the same.

The rocking of the cut-out bar for each grate-section may be accomplished in any suitable manner and is preferably effected through the agency of the lever-arm 25, secured to the rock-shaft 20 and extending a sufficient distance below the floor 4 and the supports 9 to be engaged by the operating rod or link 26, to which it is pivotally secured. Of course it will be apparent that more than one arm 25 and link 26 can be used for rocking the cut-out bar of each grate-section, if desired. The rod 26 extends forwardly toward the ash-pit 24 and is attached to an actuating-crank 27, arranged upon the shaft 28, which is journaled upon brackets 29, secured to the inner faces of the furnace-front plate. The shaft 28 may be rotated in a number of ways without altering the spirit of the invention; but I preferably turn the same by means of the ratchet mechanism 30, which is designed to be engaged and operated with the rock power-shaft 31 outside the furnace-front in the same manner described by me in my previous patent, No. 646,913, issued April 13, 1900. Since this mechanism is fully described and set forth in the said patent, it will be unnecessary to give a detailed description of the same at this point. The object of the mechanism is to furnish means for rocking the cut-out pusher back and forth at stated intervals either automatically or by having the operator of the furnace throw the same into operation whenever desired.

The cut-out bar 18 is preferably formed with an upper curved bearing-surface, the metal thereof being made of a suitable thickness and being strengthened on its under side by means of webs 32 and 33. The web 33 also forms the forward edge of the cut-out and is preferably somewhat sharpened, as at 34, to

form a good cutting edge, by which it is capable of being easily forced through the solid mass of clinkers and ashes at the foot of the grate. The ashes are prevented from traveling rearwardly on the upper surface of the cut-out bar in its movement rearwardly by means of a series of plates 35 35, which are mounted above the said cut-out and are secured to the depending flange 36, secured to the forward edge of the supporting-plate 11. This structure extends within a very close distance of the upper surface of the cut-out bar; but a sufficient space is left for the contraction and expansion of the metal under the action of the heat of the furnace. The upper ends of the plates 35 are preferably formed with rearwardly-extending flanges or shoulders 37, adapted to engage recesses or notches 38, formed in the upper forward corner of the said plate 11. These flanges or shoulders 37 prevent the plates 35 from slipping downward. The plates 35 are made comparatively short and are preferably rabbeted where their edges meet, as at 39, so as to seal the joint between them and yet permit of contraction and expansion of the metal without throwing them out of alignment. Each of the said plates 35 is bolted or otherwise secured to a flange 36 of the plate 11, as at 40. In order to prevent the supporting-plate 11 from warping or being drawn out of shape by the action of the furnace heat, it is preferably kerfed at suitable intervals, as at 41, so that the flange 36 and much of the forward edge of the said plate 11 will be free to expand and contract without causing trouble. The said supporting-plate 11 is preferably strengthened by a depending web or flange 42, extending from end to end of the said plate. The brackets 9 are notched, as at 43, to fit around the said web 42, the said standards extending upwardly upon each side of the same, as clearly illustrated in Fig. 1. In the use of this cut-out mechanism the said cut-out bar normally stands, as shown in dotted lines in Fig. 1 and in full lines in my application above referred to, in its retracted position, the ashes and fuel upon the grate being allowed to drop down against the floor 4. When it becomes necessary to remove some of the ashes or clinkers from the lower end of the grate, the actuating mechanism for moving the cut-out bar is put into operation, as described by me in my previous patent above referred to, and the shaft 20 is rocked so that the cut-out 18 will be forced forwardly, traveling along the upper surface of the floor 4, and its nose will cut through the mass of clinkers and ashes at the lower end of the grate and will force some of the said ashes through the duct 23 and permit the same to drop into the ash-pit. If a sufficient amount of ashes has not been removed from the bottom of the grate by one operation of the cut-out, it may be retracted again and the operation repeated until the desired amount of material has been forced through the duct

at the lower end of the grate. The construction and mounting of the floor 4 and the wall formed of the plate 35 are such that the draft, whether forced or natural, will have access to the rear surfaces of these parts and prevent them from being burned out by the heat of the furnace. The cut-out bar also, occupying normally its retracted position, will be protected in the same way, together with the actuating levers and links connected with the same. The action of the device is absolutely positive and will be capable of performing its function under all circumstances without the necessity of inspection or of any one entering the ash-pit of the furnace.

What I claim is—

1. A cut-out mechanism for grates comprising a rocking bar, a floor over which the bar operates, and means for moving the same forwardly and downwardly across the line of clinkers and ashes, for forcing the same over the said floor and into the ash-pit below the grate, substantially as described.

2. In a cut-out mechanism for grates, the combination of a supporting-floor arranged in such relation to the lower end of the furnace-grate as to form therewith a duct at that point and a cut-out bar adapted to travel forwardly above the same for forcing material over its surface, substantially as set forth.

3. A cut-out mechanism for grates, comprising a floor extending downwardly and forwardly beneath the lower end of the grate for forming therewith an ash-duct at this point, a rocking cut-out adapted to move over a portion of the said floor and forwardly and downwardly through the material received from the grate, the structure being such that some of the said material will be forced through the said duct by the operation of the said cut-out, substantially as set forth.

4. In a cut-out mechanism for grates, the combination of an ash-supporting floor arranged to receive the ashes from the lower end of the grate made up of a series of bars presenting short lines of metal to the heat of the furnace and a cut-out bar adapted to move above the said floor for forcing material down the same toward the ash-pit, substantially as set forth.

5. A cut-out mechanism for grates comprising a curved floor at the lower end of the grate, adapted to form in connection therewith a sealing-duct, a cut-out bar adapted to fit the upper surface of a portion of the said floor, means for rocking the said cut-out back and forth above the said surface and across the line of clinkers and ashes on the grate-surface, whereby a portion of the same will be cut off and forced down the said floor toward the ash-pit, substantially as set forth.

6. A cut-out mechanism for grates comprising a floor made up of a series of curved bars, transverse bars beneath the same for supporting them, brackets for supporting the said transverse bars, a rock-shaft also supported by the said brackets, and a cut-out

bar secured to the said rock-shaft and adapted to be forced forward over the surface of the said floor for forcing ashes down the same, substantially as set forth.

5 7. A cut-out mechanism for grates comprising a concavo-convex floor, a segmental cut-out bar adapted to travel over the convex surface of the said floor whereby it will move forward and downward through the material
10 received by the said floor from the grate of the furnace, arms carrying the said cut-out, a rock-shaft carrying the said arms, one or more arms for operating the rock-shaft, means outside the furnace-front for actuating the
15 said arm or arms and rock-shaft and operating the said cut-out, and a depending wall arranged upon the cut-out for preventing the ashes from traveling rearwardly upon the same, and means for supporting the whole
20 structure upon the bridge-wall of the furnace.

8. In a cut-out mechanism for grates the combination with a supporting-floor for forming a duct at the lower end of the grate, a rocking pusher adapted to move above the
25 same, supporting-brackets for holding the floor in position, a transverse plate mounted in the brickwork of the bridge-wall the said brackets being bolted thereto, an anchor-plate also mounted in the bridge-wall for holding
30 the lower ends of the said brackets in position, a series of plates secured to the forward edge of the upper supporting-plate, and ex-

tending to a point within close proximity of the upper surface of the cut-out bar for preventing ashes from being carried rearward
35 upon the same, and means for securing the said plates to the said supporting-bars, substantially as set forth.

9. In a cut-out mechanism for grates, the combination of a cut-out bar, a floor arranged
40 in such relation to the lower end of the grate as to form a duct therewith and supporting-brackets therefor, a supporting bar or plate arranged in the bridge-wall of the furnace for holding the said brackets in position a flange
45 on the forward edge of the said plate, the said flange and forward edge of the said plate being kerfed at intervals to prevent warping, a series of plates secured to the forward edge
50 of the said flanges for forming an ash-removing wall above the cut-out bar, the said plates being rabbeted at their edges and having supporting-flanges at their upper ends for resting upon the shoulder formed on the support-
55 ing-plate, the said rabbeted plates being bolted or otherwise secured to the flange of the supporting-plate.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

WILLIAM MCCLAVE.

Witnesses:

FENTON S. BELT,
RICHARD B. CAVANAGH.