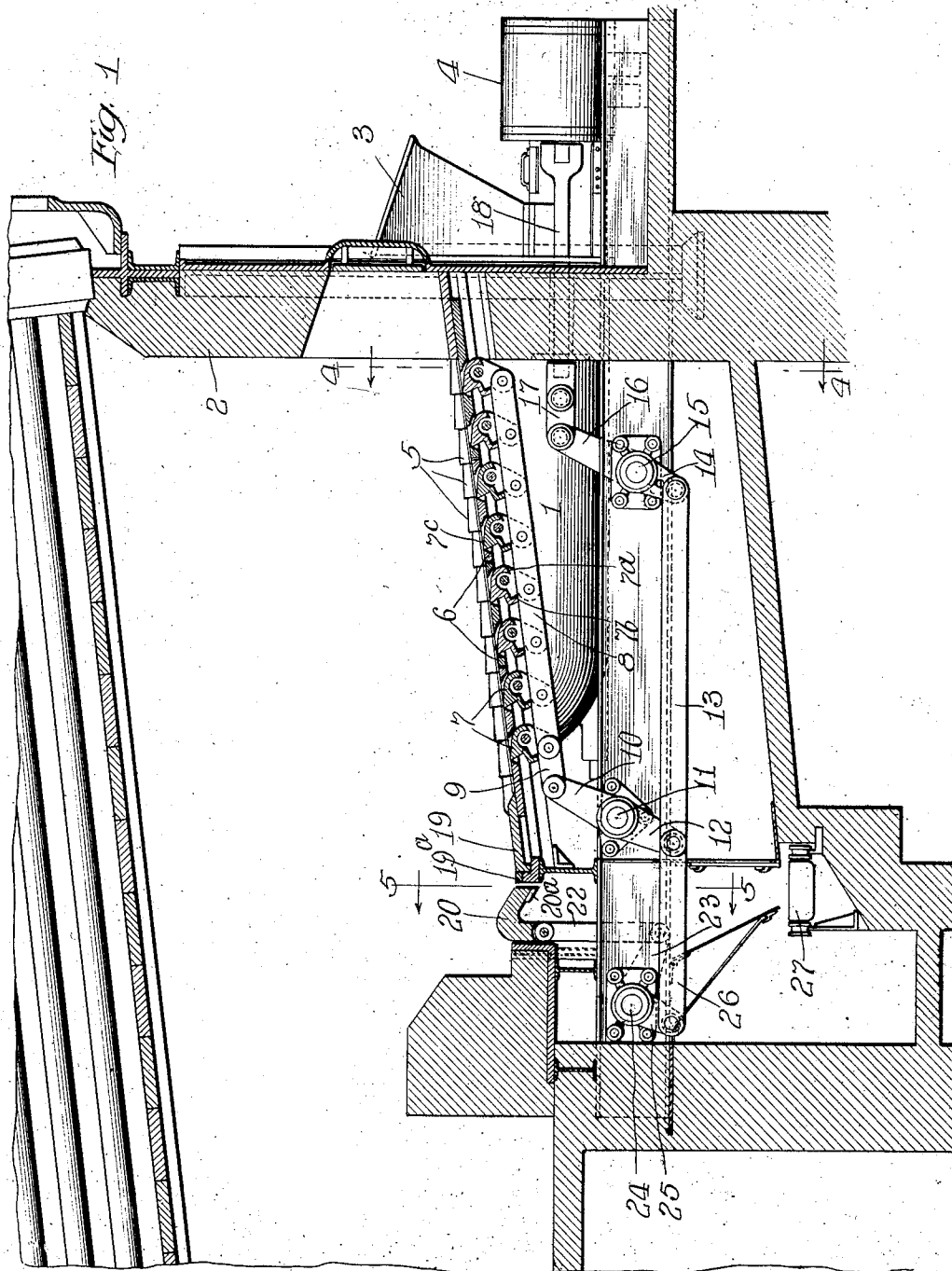


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S. S. HOWELL.
AUTOMATIC STOKER.
APPLICATION FILED NOV. 14, 1908.

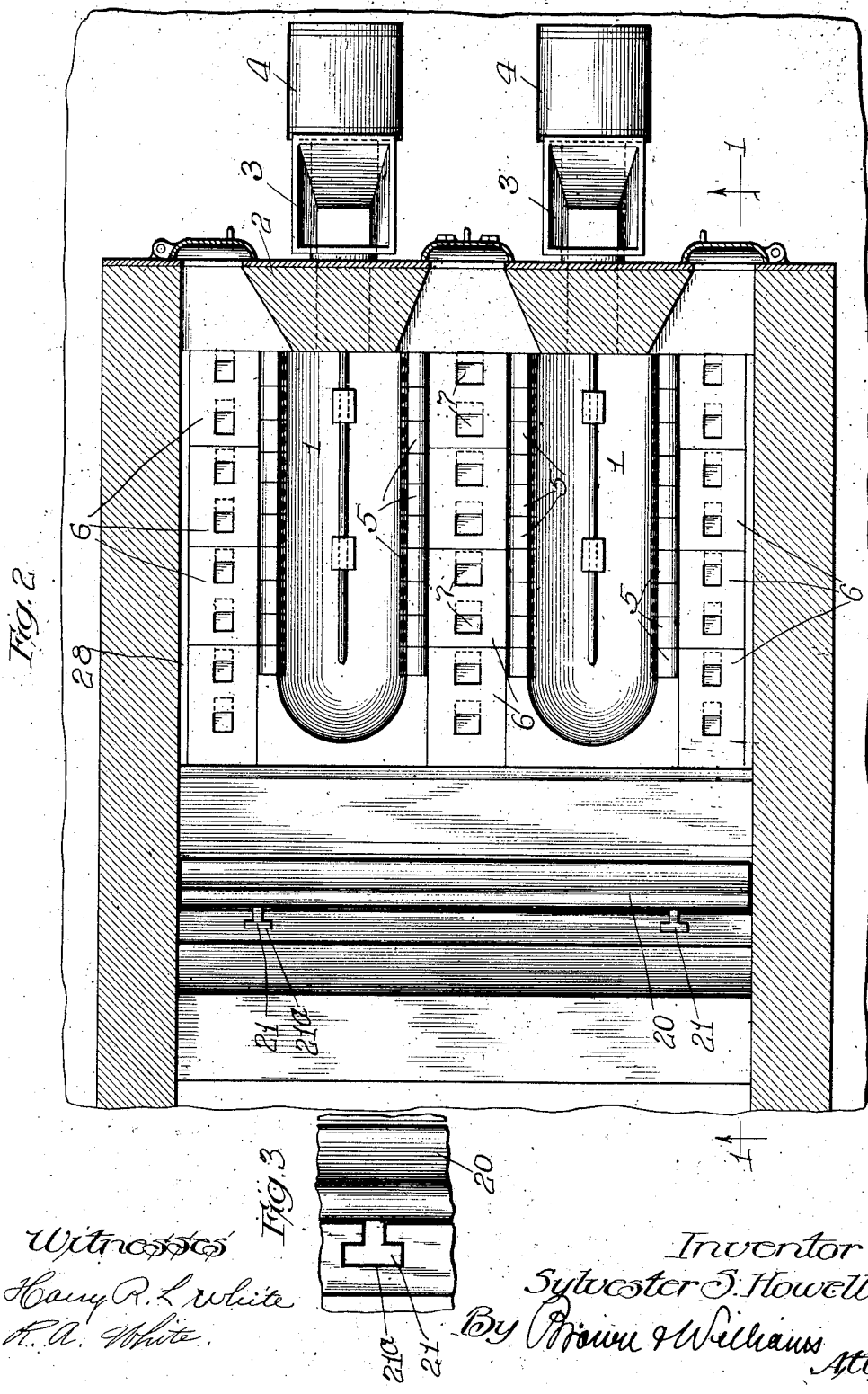
Patented Sept. 10, 1912.

5 SHEETS—SHEET 1.



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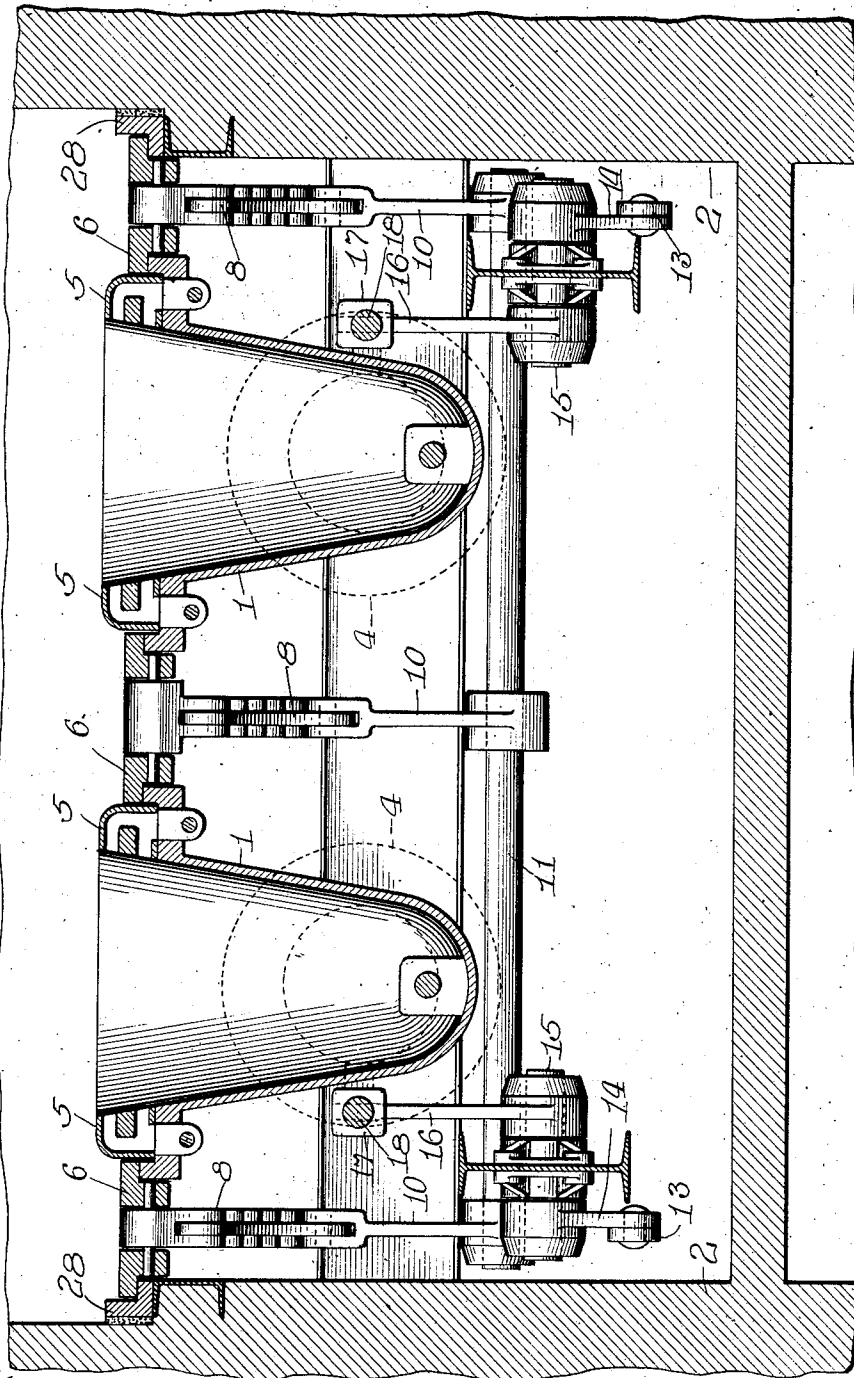
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Fig. 4



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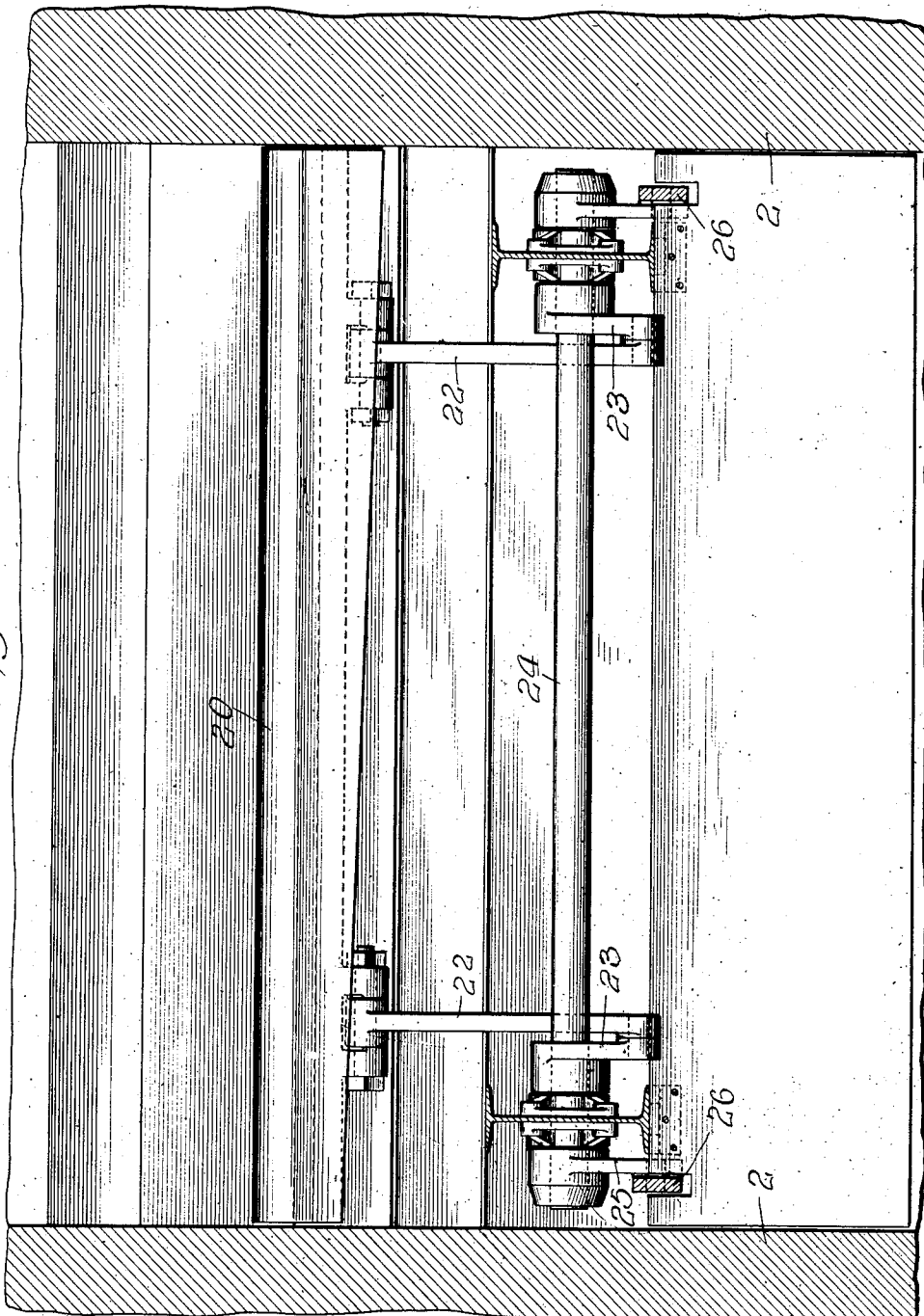
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Fig. 5



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Fig. 6

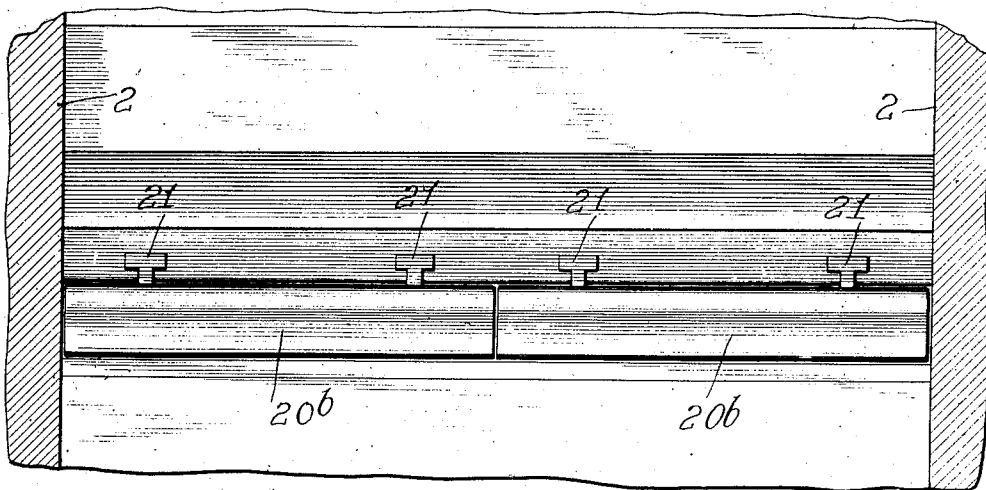
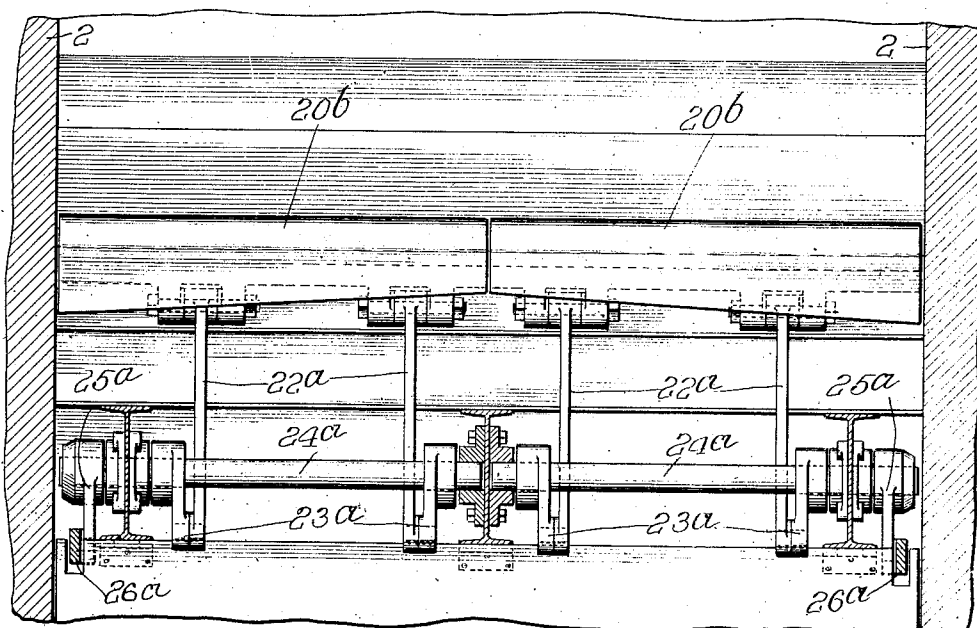


Fig. 7



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UNITED STATES PATENT OFFICE.

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AUTOMATIC STOKER.

1,037,913.

Specification of Letters Patent.

Patented Sept. 10, 1912.

Application filed November 14, 1908. Serial No. 462,570.

To all whom it may concern:

Be it known that I, SYLVESTER S. HOWELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Stokers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

It is an object of my invention to provide an improved means for cleaning automatic stokers generally, my invention being particularly adapted for use in connection with automatic stokers of the type adapted to have the clinkers and ashes resulting from the combustion moved to one end of the stoker and removed from the stoker by suitable means.

My invention relates particularly to an improved mechanism for removing the clinkers and ashes from the rear end of the stoker, and is particularly adapted to stokers of the underfeed type in which retorts are employed to receive the fuel to be consumed, and plates or bars are employed outside of and parallel with the retorts to receive the clinkers and ashes resulting from the combustion.

The several drawings illustrating my invention are as follows:

Figure 1 shows a vertical longitudinal section through a furnace in which an automatic stoker is located, such stoker being equipped with mechanism for removing the clinkers and ashes, as will be described. This section is taken along the line 1—1 in Fig. 2. Fig. 2 is a plan view of the stoker mechanism shown in Fig. 1. Fig. 3 is an enlarged detail view of the parts shown in Fig. 2, as will be explained. Fig. 4 is a transverse vertical section of the parts shown in Fig. 1, taken along the line 4—4 in Fig. 1. Fig. 5 is a transverse vertical section taken along the line 5—5 in Fig. 1. Figs. 6 and 7 show, in views similar to Figs. 2 and 5, a modified form of mechanism by which the clinkers and ashes may be removed from the rear end of the stoker.

Similar numerals refer to similar parts throughout the several views.

Referring to Figs. 1 to 4, inclusive, two retorts 1—1 are located in the furnace 2 in such a position as to receive fuel delivered into the hoppers 3—3 as a result of the oper-

ation of the cylinders 4—4. The cylinders 4—4 are adapted to be so operated in any suitable manner, by steam pressure preferably, to reciprocate rams below the hoppers 3—3 so as to force the fuel supplied to the hoppers into the retorts 1—1. The retorts 1—1 have supported thereon along their sides twyer blocks 5—5, through which air under pressure is communicated to the fire to support the combustion. Outside of the twyer blocks 5—5, dead plates 6—6 are located in such a position as to receive the clinkers and ashes resulting from the combustion of the fuel. These plates 6—6, as indicated in Fig. 1, are adapted to be reciprocated longitudinally of the retorts 1—1 in a manner and for a purpose to be explained. The plates 6 located between the retorts 1—1 are supported between the corresponding twyer blocks 5—5 by the upper edges of the retorts, as indicated in Fig. 4, while the plates 6 located outside of the retorts 1—1 are supported by the upper edges of the retorts 1—1 and the fixed plates 28—28. These fixed plates 28 extend slightly above the upper surfaces of the plates 6, and are adapted to receive in part the clinkers and ashes resulting from the combustion. Each plate 6 has pivoted thereto two dogs 7—7 adapted to rock relatively to the plate by a bar 8 connected thereto. The dogs 7 are so formed that their angular motion is limited by shoulders 7^a and 7^b, as a result of which when either one set of shoulders 7^a or the other set of shoulders 7^b engages the bar 8, a further motion in the same direction will cause the plates 6 to be moved. The bar 3 is connected at its left-hand end by a link 9 to the upper end of a lever 10 secured to a shaft 11 supported from the framework of the stoker. The shaft 11 has also secured thereto a crank 12 connected by a link 13 with a crank 14 rigidly secured to a shaft 15. The shaft 15 is supported in a suitable bearing from the framework of the stoker, and is comparatively short, serving only to communicate motion to the crank 14 from a second crank 16 secured to such shaft 15. The crank 16 is connected by a link 17 and a connecting rod 18 with a ram operated by one of the cylinders 4.

Operating mechanism as described is provided between the shaft 11 and each of the cylinders 4, the shaft 11 extending transversely of the furnace and serving to operate

by means of a crank 10, link 9 and bar 8, as described, each series of dead plates 6. The amount of reciprocal motion imparted to the bars 8 by the rams is more than sufficient to rotate the dogs 7 from one position to the other, as a result of which the plates 6 are reciprocated relatively to the retorts 1. A plate 19 is located across the rear ends of the retorts 1 to receive the clinkers and ashes resulting from the combustion of the fuel, which are moved to the rear of the stoker and onto such transverse plate by the reciprocation of the plates 6 in the manner described. It is to be noted that the conformation of the dogs 7 is such that when the plates 6 are moved forwardly or toward the front end of the furnace, the teeth 7^c formed on such dogs are depressed below the upper surface of the plates 6, while motion of the bar 8 toward the rear end of the stoker serves to raise the teeth 7^c above the upper surface of the plates 6 at the same time that the plates 6 are moved toward the rear end of the stoker. The result of this operation of the dogs 7 is to raise and loosen the clinkers and ashes from the plates 6 and twyer blocks 5, and thus make it possible to carry such clinkers and ashes toward the rear of the furnace. As shown in Fig. 1, the tops of the twyer blocks 5 are displaced relatively to each other to constitute in effect a broken line, such conformation serving to prevent the clinkers and ashes being moved to the forward end of the stoker by the return motion of the plates 6 and dogs 7 carried thereby.

As the clinkers and ashes are moved over the rear edge of the plate 19, they are engaged during the return or forward motion of the plates 6 by a cutter bar 20 extending transversely of the furnace and adapted to cooperate with the rear edge of the plate 19 to separate and remove from the stoker the clinkers and ashes extending beyond the rear end of the plate 19. The cutter bar 20 is hook-shaped, as indicated in Fig. 1, and has formed thereon T-shaped guides 21, as shown in Fig. 2, which guides cooperate with correspondingly shaped guides in the form of slots, and as a result the cutter bar 20 is positively guided so that it is movable only in a vertical direction. The detail arrangement of the guides 21 and the cooperating slots 21^a is better shown in enlarged detail view in Fig. 3. The cutter bar 20 is connected by links 22 with cranks 23 secured to a shaft 24 supported by the framework of the stoker. The ends of the shaft 24 have secured thereto cranks 25—25 connected by links 26—26 with the lower ends of the cranks 12.

As a result of the construction just described, reciprocation of the bars 8 by the links 13 serves also to cause reciprocation of the cutter bar 20 vertically in its sup-

porting guides, the arrangement of parts being such that as the bars 8 are moved toward the front of the furnace the cutter bar 20 is moved downward, while such cutter bar is moved upward as the bars 8 are moved toward the rear end of the stoker.

As indicated in the drawings, the plate 19 is provided at its rear edge with a removable cutting edge 19^a, and the cutter bar 20 is similarly provided with a removable cutting edge 20^a adapted to cooperate with the cutting edge 19^a. As a result of this construction, when the cutting edges become worn, they may be readily replaced.

As shown in Fig. 5, the cutting edge of the cutter bar 20 is obliquely inclined to the cutting edge 19^a, which is horizontally disposed, the purpose of this arrangement being to produce an easier cutting operation than if it were necessary to sever the entire width of clinkers and ashes at the same instant from the mass of clinkers and ashes still supported by the plate 19.

In the modification shown in Figs. 6 and 7, the cutter bar is formed in two sections 20^b—20^b, each supported in a manner similar to that used for the cutter bar 20, as already described. As shown in Fig. 7, the cutter bars 20^b—20^b are adapted to be independently operated by shafts 24^a—24^a, each of such shafts being connected by a link 26^a with one of the cylinders 4 independently of the operating connections of the other of such shafts. Each shaft 24^a has secured thereto two cranks 23^a connected by links 22^a with the corresponding cutter bar 20^b. The cutting edges of the cutter bars 20^b—20^b are obliquely inclined relatively to the cutting edge 19^a, as already described for the cutter bar 20, but in this modification the cutting edges of the bars 20^b—20^b are oppositely inclined, thus serving to balance the lateral thrust exerted upon the clinkers and ashes, and thus upon the cutting edge 19^a.

By my invention, as a result of the vertical reciprocation of the cutting bar 20, I secure a positive separation of that part of the clinkers and ashes overhanging the rear end of the plate 19, and further provide an effective means for removing that portion from the end of the stoker. The clinkers and ashes as they are removed from the rear end of the stoker drop into a pit formed for the purpose, from which they are removed by a carrier 27 provided for that purpose.

While I have shown my invention in the particular embodiment herein described, I do not, however, limit myself to this construction, but desire to claim broadly any equivalent that will suggest itself to those skilled in the art.

What I claim is:

1. In combination, a support for fuel to

be consumed, means associated with said support for moving the clinkers and ashes which are formed during combustion of the fuel toward a predetermined point, there being guides located adjacent to said point and extending transversely of the path of movement of the clinkers and ashes, a reciprocable device slidably mounted in said guides for removing said clinkers and ashes when they reach said predetermined point, and means for reciprocating said device, said device having a shearing edge arranged obliquely to the upper surface of said support.

2. In combination, a support for fuel to be consumed, said support having a shearing edge at one end, means associated with said support for moving the clinkers and ashes which are formed during the combustion of fuel toward said edge, there being guides arranged adjacent to said edge and extending transversely thereof, a device slidably mounted in said guides and having a shearing edge adapted to cooperate with the shearing edge on said support for removing the clinkers and ashes, and means for moving said device along said guides.

3. In combination, a support for fuel to be consumed, said support having a shearing edge at one end, means associated with said support for moving the clinkers and ashes which are formed during the combustion of fuel toward said edge, there being guides arranged adjacent to said edge and extending transversely thereof, a device slidably mounted in said guides and having a shearing edge adapted to cooperate with the shearing edge on said support for removing the clinkers and ashes, and means for moving said device along said guides the shearing edges on said support and on said device being arranged obliquely with respect to each other.

4. In combination, a retort for receiving fuel to be consumed, a shearing edge at the rear end of said retort, there being guides arranged adjacent to and extending transversely of said shearing edge, a device slidably mounted in said guides and having a shearing edge adapted to cooperate with the aforesaid shearing edge, and means for moving said device along said guide.

5. In combination, a support for fuel to be consumed, there being guides arranged adjacent to and extending transversely of

one edge of said support, a device slidably mounted in said guides and having a portion arranged at an acute angle to said guides and extending toward said edge, means for moving said device along said guides, and means for moving the clinkers and ashes which are formed during the combustion of the fuel toward said edge.

6. In combination, a support for fuel to be consumed, a shearing member at one end of said support, means for moving the clinkers and ashes which are formed during the combustion of fuel toward said shearing edge, there being vertical guides arranged adjacent to said shearing edge, a complementary shearing member slidably mounted in said guides, and means for moving said member along said guides.

7. In combination with an automatic stoker, a plurality of retorts adapted to receive the fuel to be consumed, twyer blocks supported by each retort, an air box surrounding the retorts and communicating with the twyer blocks supported thereby, fixed plates outside of the retorts extending longitudinally thereof for receiving the clinkers and ashes resulting from the combustion, reciprocable plates movable and extending in the same direction as the fixed plates and cooperating therewith, such reciprocable plates serving to advance the mass of clinkers and ashes toward and beyond one end of the retort, and reciprocable means operating during the backward motion of the reciprocable plates to separate that portion of the mass of clinkers and ashes extending beyond the end of the retorts and to effect the removal of such portion from the proximity of the retorts.

8. In combination, a retort for receiving fuel to be consumed, a shearing edge at the rear end of said retort, guides arranged adjacent to and extending transversely of said shearing edge, members movably mounted in said guides so as to be movable toward and from said shearing edge, said members having shearing edges arranged obliquely to each other and adapted to cooperate with the aforesaid shearing edge.

In witness whereof, I hereunto subscribe my name this 7th day of November, 1908.

SYLVESTER S. HOWELL.

Witnesses:

WILLIAM J. KENNEY,
HENRY P. GROHN.