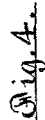
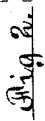
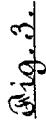
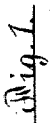


2 Sheets—Sheet 1.

No. 566,871.

Patented Sept. 1, 1896.



Inventor.
John M. Roe,
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his Atty.

(No Model.)

2 Sheets—Sheet 2.

J. M. ROE.
MECHANICAL STOKER.

No. 566,871.

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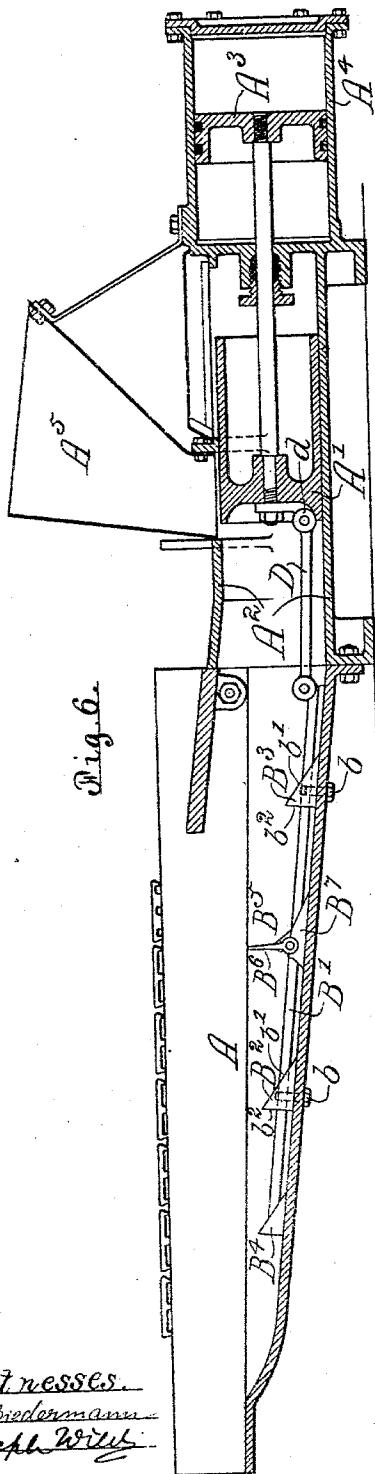


Fig. 6.

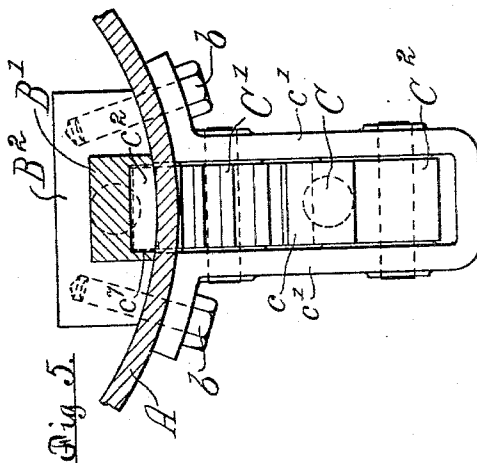


Fig. 5.

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UNITED STATES PATENT OFFICE.

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MECHANICAL STOKER.

SPECIFICATION forming part of Letters Patent No. 566,871, dated September 1, 1896.

Application filed August 25, 1894. Serial No. 521,288. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. ROE, of Austin, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Mechanical Stokers; and I do declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in mechanical stokers, and relates primarily to improvements in under-feed stokers of the type heretofore patented to Evan W. Jones by Letters Patent of the United States, No. 409,792, dated August 27, 1889, and No. 470,052, dated March 1, 1892. In furnaces of this type it is essential, in order to obtain the maximum efficiency therefrom, that fresh fuel shall be discharged into the fire-box along the entire length of the "retort," as the receptacle into which the fuel is delivered from the hopper by the feed ram or plunger may be conveniently designated, and that fresh fuel shall constantly replace that so discharged into the fire-box. Owing to the considerable length of said fire-box and to the fact that the fuel is delivered thereto by being forced through an admission-opening located at the extreme front end of the fire-box, it is found in practice that the resistance offered to the passage of the fuel along said retort, due principally to the friction between the fuel and the retort and to the weight of the fuel, is so great that almost the entire bulk of said fuel is discharged into the fire-box at the extreme front end thereof, very greatly decreasing the fire area and leaving a large portion of the grate-surface exposed, and also causing clinkers to form at the back end of said retort, which, increasing gradually in size, finally necessitate that the fires be drawn in order to clean out said retort. These undesirable features are further increased by the fact that, as commonly constructed, the bottom of the retort inclines upwardly from the admission-opening. They are reduced to a minimum when wood or lump coal is used

for fuel and are worse when fine or slack coal is used.

To remedy said defects is a primary object of my invention; and to this end it consists in providing a feed mechanism auxiliary to the feed-ram adapted to maintain said retort full of fresh fuel and to deliver it into the fire-box along the entire length thereof. In the preferable form now known to me a feed mechanism embodying my invention comprises a conveyer located adjacent to the bottom of the retort and consisting of a rod adapted to reciprocate in suitable bearings in which it is supported, on which are projections adapted to engage the coal or other fuel and means to impart a reciprocal movement to said conveyer. The preferable means shown for so actuating said conveyer comprise a rod attached to the feed-ram and a spur-gear supported in stationary brackets, the teeth of which engage racks formed on both the conveyer-rod and the rod attached to the feed-ram. By this construction the feed-ram and the auxiliary feed mechanism or conveyer are simultaneously actuated, but in opposite directions, one advancing as the other is retracted, and vice versa, which is desirable.

The invention also consists in the various other features, combinations of features, and details of construction hereinafter described, and then specifically pointed out in the claims.

In the accompanying drawings an auxiliary feed mechanism embodying my invention is fully illustrated.

Figure 1 is a longitudinal vertical sectional view of a stoker provided with my improved feed mechanism. Fig. 2 is an enlarged view of the conveyer. Figs. 3, 4, and 5 are enlarged sectional views taken on the lines 3-3 and 4-4 of Fig. 2 and 5-5 of Fig. 1, respectively; and Fig. 6 illustrates a modification of the means for actuating said auxiliary feed mechanism.

Referring now to the drawings, A is the retort of the stoker; A', the feed-ram; A², the casing in which said feed-ram A' works and through which the fuel is delivered to the re-

tort A; A³, the piston by which the feed-ram A' is actuated; A⁴, the steam-cylinder in which said piston A³ works, and A⁵ is the hopper which contains the fuel to feed the furnace, which communicates with the casing A² through an opening in the top thereof, which is alternately opened and closed as the feed-ram A' reciprocates. All of these parts are old and well known in the art, and may be of any desired or approved construction, and need not be described in detail.

The auxiliary feed mechanism, which will now be described in detail, comprises a conveyer designated as a whole by B and means hereinafter fully described for imparting thereto a reciprocating movement. The conveyer B consists of a rod or slide B', fitted to and adapted to reciprocate in suitable ways or bearings formed in supporting-blocks B² B³, a head B⁴ at the extreme inner end of the rod B', and what may, for purposes of convenient reference, be termed a "wing" B⁵, attached at about the middle of said rod or slide. The blocks B² B³ are rigidly secured to the bottom of the retort A in any suitable manner, as by bolts b, which pass through said retort and are threaded into said supporting-blocks. In order that they may offer the least possible resistance to the passage of the fuel rearwardly along the retort A, the front sides b' thereof are rearwardly inclined. The rear sides b² thereof, on the other hand, are substantially perpendicular to the bottom of the retort, so that they will obstruct to the greatest degree possible movement of the fuel toward the front end of said retort as the conveyer B is retracted. A desirable size for said supporting-blocks B² B³ is about six (6) inches transversely of the retort A by three (3) inches in height. The head B⁴ is rigidly secured to the rear or inner end of the rod or slide B', and is preferably of substantially the same form and size as the supporting-blocks B² B³. The wing B⁵ may be of the same general construction and form as the head B⁴, but is preferably somewhat larger, a desirable size for ordinary use being about seven (7) inches transversely of the retort by eight (8) inches in height. Preferably, however, and as illustrated in the drawings, said wing B⁵ consists of a rake or gate B⁶, pivotally supported in a frame-piece B⁷, rigidly secured at about the middle of the rod or slide B'. As shown, lugs b⁸, formed on said rake or gate B⁶, engage corresponding recesses at opposite side of the frame-piece B⁷, and are pivotally connected to said frame-piece by means of a rod b⁴, which passes through holes in said lugs and engages a corresponding hole in the said frame-piece. Ledges b⁵ b⁶ and b⁷ b⁸, formed, respectively, on the rake or gate B⁶ and on the frame-piece B⁷, form stops which operate to limit the pivotal movement of said rake or gate. With the construction shown, said limits of movement are from a substantially upright position to a rearwardly-inclined po-

sition, both as clearly indicated in Fig. 1 of the drawings. With this construction it is obvious that when the retort A is full of coal movement of the conveyer B rearwardly along said retort will operate to automatically raise the rake or gate B⁶, so that it will engage and carry with it the greatest amount of fuel possible, and that as said conveyer is retracted said rake or gate will be returned to its reclined position, also automatically, in which position its tendency to drag fuel with it will be reduced to a minimum. In any given case the size of the head B⁴ and of the wing B⁵ may be made to conform to any requirements. As commonly constructed the rod or slide B', the head B⁴, and the frame-piece B⁵ are made of cast-iron, and are all made integral, but this is not essential and may be modified by making one or more of said parts in separate pieces if for any reason it is considered desirable.

The preferable means for actuating the conveyer B are illustrated in Fig. 1 of the drawings and are as follows: Directly beneath the stoker, and extending within the ash-pit of the furnace, is a rod C, at the end of which, within the ash-pit, is formed a rack c, which engages the teeth of a spur gear-wheel C', mounted so as to rotate freely in brackets c', secured to and depending from the under side of the retort A. Said gear-wheel C' also engages a rack c², formed on the conveyer rod or slide B', a slot or opening c³ being made in the bottom of the retort to receive said gear-wheel and to allow the same to engage the rack c², formed on the conveyer B. The rod or slide B' being fitted to bearings in the rigid supporting-blocks B² B³, the rack thereon will be maintained in engagement with the teeth of the gear-wheel C' by said blocks B² B³, and an antifriction-roller C², revolvably mounted in the brackets c', supports the rod C in such position that the teeth of the rack c on said rod will likewise be maintained in engagement with said gear-wheel C'. The end of the rod C projects outside of the ash-pit of the furnace and is rigidly attached to the feed-ram A', so that movement of said feed-ram will impart a corresponding movement to said rod. As shown, the end of the rod C passes through the eyebolt c⁴, and nuts c⁵ are threaded thereto on each side of said eyebolt. The shank of the eyebolt extends through a slot c⁶ in the ram-casing A², of sufficient length to permit the full stroke of said ram, and is rigidly secured to said ram in any suitable manner. From the construction described it is obvious that through the medium of the rod C and the gear C' movement of the feed-ram A' will impart a corresponding movement to the conveyer B, but in an opposite direction.

In order to prevent, as much as possible, the contents of the retort A from getting into the teeth of the rack c² and of the gear-wheel

C', the section of said conveyer B on which the rack c^2 is formed is made to come as close as practicable to the bottom of the retort A, and the lateral openings of the teeth thereof are closed either by webs formed integral therewith and extending flush therewith or by a separate piece attached to the sides of said rod or slide, all as clearly shown in Fig. 5. In order also to relieve the rod or slide B' from unnecessary strain, the supporting-block B² is placed directly over the gear-wheel C'. A slot c^1 , extending upwardly from the bottom of said supporting-block, is adapted to receive the portion of the rod or slide containing the rack c^2 , and forms the bearing therefor. Said slot also allows the gear-wheel C' to engage the teeth of said rack c^2 . With this construction it is obvious that the said supporting-block will take any thrust which said gear-wheel C' may produce in driving the conveyer B.

In Fig. 6 of the drawings I have shown modified means for driving the conveyer B. In said modification the conveyer is in all respects identical in construction with that shown in Figs. 1 to 5 of the drawings and heretofore described, comprising a rod or slide B', supporting-blocks B² B³, a head B⁴, and a wing B⁵. As shown in said Fig. 6, the end of the conveyer rod or slide B' adjacent to the feed-ram A' is connected to said feed-ram by means of a link D, pivoted at its opposite ends to the end of said conveyer rod or slide B' and to a lug d , formed on the head of said feed-ram adjacent to the lower side thereof. It is obvious that with this construction movement of the feed-ram will impart a corresponding movement to said conveyer B and in the same direction. While the form of the device shown in Fig. 6 is found to work successfully and to produce beneficial results, it is found that its efficiency is somewhat impaired, due to the fact that the conveyer when retracted through the unsupported fuel drags or carries a certain amount of the fuel with it, which is undesirable. By the use of the preferable means for actuating said conveyer, however, (that illustrated in Fig. 1 of the drawings,) this undesirable feature is overcome, for as the conveyer is retracted as the feed-ram advances said feed-ram will support the bulk of fuel, so that it will not be carried back by the retraction of said conveyer, all in an obvious manner. In either construction the perpendicular sides b^2 of the supporting-blocks B² B³ form stops which tend to prevent the contents of the retort from being drawn back with the conveyer as it is retracted.

I claim—

1. In a mechanical stoker, the combination with a retort and a primary feed mechanism, of an auxiliary feed mechanism, located in said retort, and driving connection between said primary and auxiliary feed mechanisms, substantially as described.

2. In a mechanical stoker, the combination with a retort and a primary feed mechanism, of an auxiliary feed mechanism, comprising a feed-rod located in said retort, and movable longitudinally thereof, and means to impart a reciprocating movement thereto, substantially as described.

3. In a mechanical stoker, the combination with a retort and a primary feed mechanism, of an auxiliary feed mechanism, comprising a feed-rod located in said retort and movable longitudinally thereof, and means to impart a reciprocating movement to said rod or slide, whereby it will be actuated in retraction, during the operation of the primary feed mechanism, substantially as described.

4. In a mechanical stoker, the combination with a retort and a feed-ram, of an auxiliary feed mechanism, comprising a rod or slide mounted, so as to be longitudinally movable, in supporting-blocks secured to the bottom of said retort, and lateral projections from said rod or slide, and means to impart a reciprocating movement thereto, substantially as described.

5. In a mechanical stoker, the combination with a retort and a feed-ram, of an auxiliary feed mechanism, comprising a rod or slide mounted, so as to be longitudinally movable, in supporting-blocks secured to the bottom of said retort, a head formed on the rear or inner end of said rod or slide, a pivoted rake or gate secured to said rod or slide, stops to limit the pivotal movement of said rake or gate, and means to impart a reciprocating movement to said rod or slide, whereby it will be actuated simultaneously with the feed-ram and in an opposite direction, substantially as described.

6. In a mechanical stoker, the combination with a retort and a feed-ram, of an auxiliary feed mechanism, comprising a rod or slide mounted, so as to be longitudinally movable, in supporting-blocks secured to the bottom of said retort, lateral projections on said rod or slide, and a driving connection between said feed-ram and said rod or slide, whereby movement of said feed-ram will impart a corresponding movement to said rod or slide, substantially as described.

7. In a mechanical stoker, the combination with a retort and a feed-ram, of an auxiliary feed mechanism comprising a rod or slide mounted, so as to be longitudinally movable, in supporting-blocks secured to the bottom of said retort, lateral projections thereon and a driving connection between said feed-ram and said rod or slide, whereby said rod or slide will be actuated simultaneously with said feed-ram and in an opposite direction, substantially as described.

8. In a mechanical stoker, the combination with a retort and a feed-ram, of an auxiliary feed mechanism, comprising a rod or slide mounted so as to be longitudinally movable, in supporting-blocks secured to the bottom

of the retort, lateral projections thereon and
driving connection between said rod or slide
and the feed-ram, said connection comprising
a rod rigidly attached to said feed-ram and a
5 gear-wheel which engages racks formed on
said rod and on the rod or slide of the auxiliary
feed mechanism, substantially as described.

In testimony that I claim the foregoing as
my invention I hereunto set my hand this 17th
day of August, 1894.

JNO. M. ROE.

Witnesses:

FRED A. DALEY,
DOUGLAS C. GREGG.