

Jan. 19, 1926.

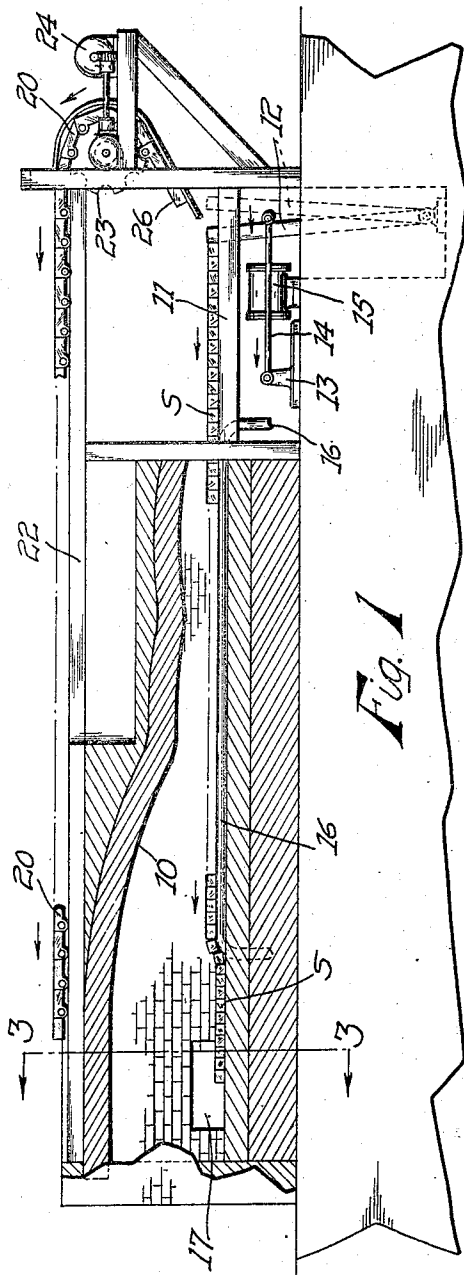
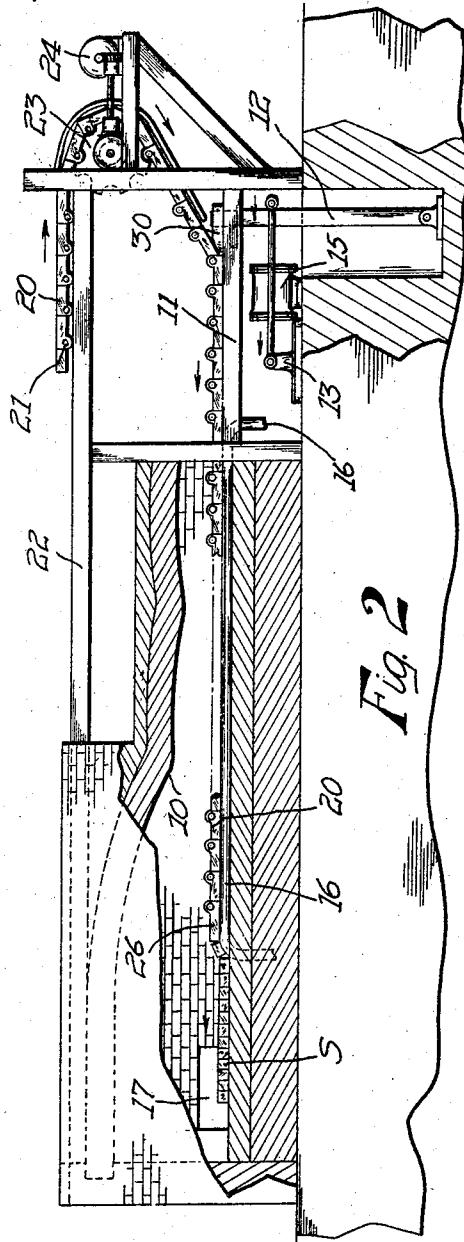
1,570,463

M. H. DAMERELL

UNLOADING DEVICE FOR FURNACES

Filed June 16, 1924

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

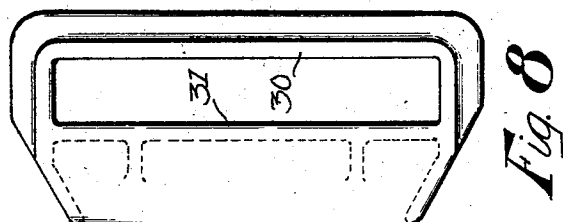


Fig. 8

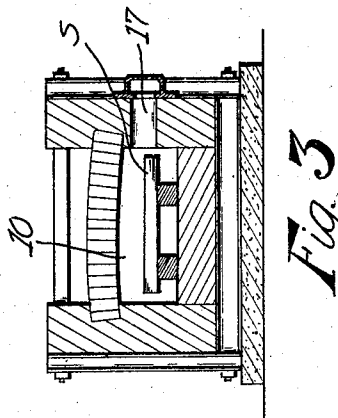


Fig. 3

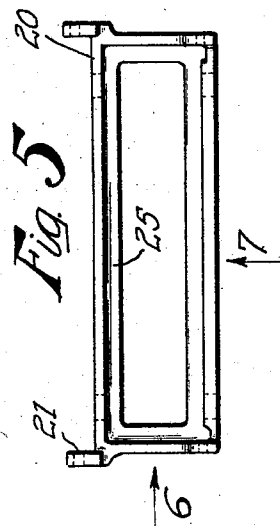


Fig. 5

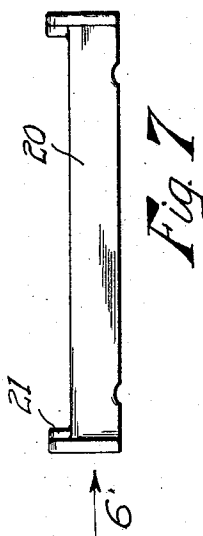


Fig. 7

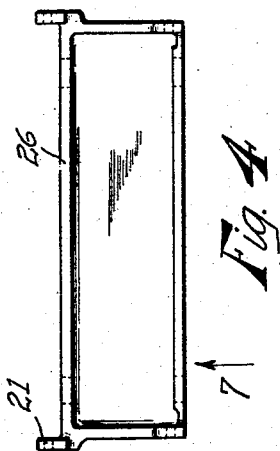


Fig. 4

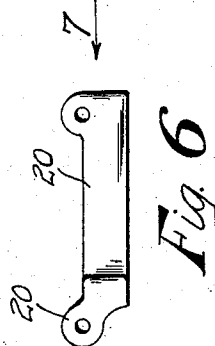


Fig. 6

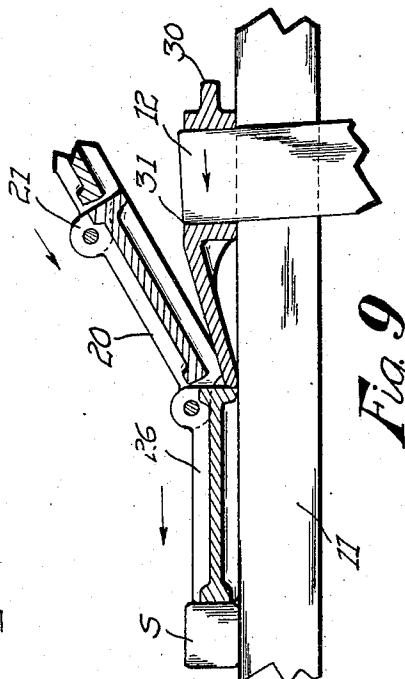


Fig. 9

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UNITED STATES PATENT OFFICE.

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UNLOADING DEVICE FOR FURNACES.

Application filed June 16, 1924. Serial No. 720,154.

To all whom it may concern:

Be it known that I, MARK H. DAMERELL, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Unloading Device for Furnaces, of which the following is a specification.

This invention relates particularly to furnaces in which billets or bars of steel are subjected to prolonged heat treatment. It is customary to feed the billets successively into the furnace at one end thereof by some suitable mechanism such as a mechanical pusher. As each additional billet is pushed into the furnace, it advances the billets already in the furnace, causing them to make a slow intermittent progress through the furnace to the farther end thereof, where they may be laterally removed through a side opening in the furnace wall.

These furnaces are often as much as thirty feet long and may contain as much as three thousand pounds of steel at any given time, while they are in operation. At the end of the day's run, it is necessary that all of the steel in the furnace be removed, as otherwise the prolonged exposure to the heat remaining in the furnace walls will cause the steel to scale and to suffer other injuries, even after the supply of additional heat is shut off.

For clearing the furnace, it has been customary to feed in a sufficient number of defective or scrap billets to force forward all of the good billets to the point where the heat treatment is completed and where the good billets may be removed laterally from the furnace. All of these defective billets must be thereafter removed from the furnace upon the starting of the next day's run. This method of clearing the furnace thus requires that some three thousand pounds of scrap steel shall be handled twice between each two successive runs of the furnace.

It is the object of my invention to provide a simple and convenient unloading device for such furnaces, by means of which the furnace may be conveniently and easily cleared of billets at the end of each run.

In the preferred form this device is actuated by the usual pusher mechanism and provision is also made for mechanically withdrawing the device and moving the

same to an inoperative position after the furnace has been emptied.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings in which

Fig. 1 is a sectional side elevation of a heat treating furnace, with my improved unloading device applied thereto;

Fig. 2 is a similar view, but showing the unloading device in inoperative position;

Fig. 3 is a transverse sectional elevation, taken along the line 3—3 in Fig. 1;

Fig. 4 is a plan view of one of the pusher plates;

Fig. 5 is a plan view of a second form of pusher plate;

Fig. 6 is an end view of either of the plates shown in Figs. 5 and 6;

Fig. 7 is a side elevation thereof;

Fig. 8 is a plan view of a plate feeding or pusher head, and

Fig. 9 is a sectional side elevation, showing the manner in which the unloading device is actuated by the pusher bar.

Referring to the drawings, I have indicated a heat treating furnace 10 which is substantially of the usual type, having provision (not shown) for introducing highly heated gases at the left hand or discharge end of the furnace and for removing the somewhat cooler gases at the right hand end of the furnace. The steel billets S are placed successively upon a loading platform or support 11 and are pushed into the furnace by a pusher bar 12 actuated through a cross head 13 and connecting rods 14 from a hydraulic or pneumatic cylinder 15 or in any other convenient manner. As the billets advance through the furnace, they are preferably supported upon water cooled pipes or tubes 16 until they approach the discharge end of the furnace. At this point they preferably descend to a slightly lower support, this action causing relative movement between the billets so that they may be freed from each other at this point.

At the extreme left hand or discharge end of the furnace, the billets are aligned with an opening 17 in the side wall of the furnace through which they may be successively removed, the heat treatment being

completed by the time the billets arrive opposite the opening 17.

The construction thus far described is of the usual type and in itself forms no part of my invention which relates particularly to means for unloading the furnace at the end of a run. For this purpose I provide a series of pusher plates 20 linked together by pivots 21. The chain-like structure thus formed is stored in inoperative position upon suitable supports 22 above the furnace during the normal operation of the furnace. At the feeding end of the furnace, the unloading device is supported upon a pair of sprocket wheels 23 which may be actuated in either direction by a reversible electric motor 24 connected to said sprocket wheels through suitable reduction gearing.

The details of construction of the unloading device are clearly shown in Figs. 4 to 7 inclusive. The pusher plates 20 are commonly of the form shown in Fig. 5, with an opening 25 in the middle portion thereof. One or more of the plates which form the advance end of the chain are preferably of the form shown in Fig. 4, without any opening through the middle portion thereof, and these plates are also preferably made of some special material which will strongly resist high temperatures. The provision of the solid web in these leading plates is specially desirable as they serve to protect the pipes 16 from the high heat retained in the furnace walls after the furnace is unloaded.

A pusher head 30 (Fig. 8) is provided for intermittently advancing the pusher plates into the furnace. This pusher head has an opening 31 adapted to fit loosely over the upper end of the pusher bar 12 (Fig. 9) and is reciprocated thereby. The plates 20 and 26 have their pivots so disposed that the pusher head 30 may freely engage the rear edge of each plate as it rests upon the loading frame 11. After each plate is advanced by the pusher head, the head is withdrawn and the succeeding plate drops into position for engagement by the pusher head. The unloading device is thus intermittently advanced through the furnace and pushes the billets remaining in the furnace forward to the discharge end of the furnace, where they may be laterally removed. After the furnace is thus emptied, the unloading device is left in position, in order to protect the pipes 16 while the furnace is empty.

At the beginning of the next run, the pusher head 30 is removed from the pusher bar 12 and the motor 24 is operated to rotate the wheels 23 in the opposite direction, withdrawing the chain of plates from the furnace and storing it upon the supports 22. When the furnace is to be again unloaded, the motor 24 is used to advance the

chain to a position where the first plate may be engaged by the pusher head. The ends of adjacent plates abut squarely, so that upward movement or buckling of the plates is resisted.

It will thus appear that I have provided an unloading device by which the furnace may be easily emptied of billets at the end of a run, substantially without manual labor and with a minimum loss of time.

Having described my invention and the advantages thereof, I do not wish to be limited to the details of construction herein disclosed otherwise than as set forth in the claims, but what I claim is:—

1. A furnace unloading device comprising a sectional stock engaging member, and means to advance said member lengthwise of the furnace and within the same to clear the furnace of stock, said means comprising a reciprocating element effective to separately engage successive sections of said stock-engaging member and to give each section thus engaged a predetermined advance movement into said furnace.

2. A furnace unloading device comprising a stock engaging member means to intermittently advance said member lengthwise of the furnace and within the same to clear the furnace of stock, and additional separate means to withdraw said member to inoperative position.

3. A furnace unloading device comprising a series of pusher plates pivotally connected together, means to advance said series of plates into the furnace, and guide-ways in said furnace for said plates, said guide-ways being covered and protected by said plates when the latter are positioned within the furnace.

4. A furnace unloading device comprising a series of pusher plates pivotally connected together, means to advance said series of plates to operative position, and additional means to advance said plates into the furnace.

5. In a furnace, a pusher bar, an unloading device comprising a series of pusher plates, and a pusher head fitting said bar and reciprocated thereby to intermittently advance said plates.

6. A furnace unloading device comprising a series of pusher plates pivotally connected together, means to advance said series of plates intermittently into the furnace, and a guide-way to support said plates in inoperative position above said furnace said guide-way being mounted on and firmly secured to said furnace in permanent fixed relation thereto.

In testimony whereof I have hereunto affixed my signature.

MARK H. DAMERELL.