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BAR HEATING FURNACE

Filed Dec. 31, 1927

2 Sheets-Sheet 1

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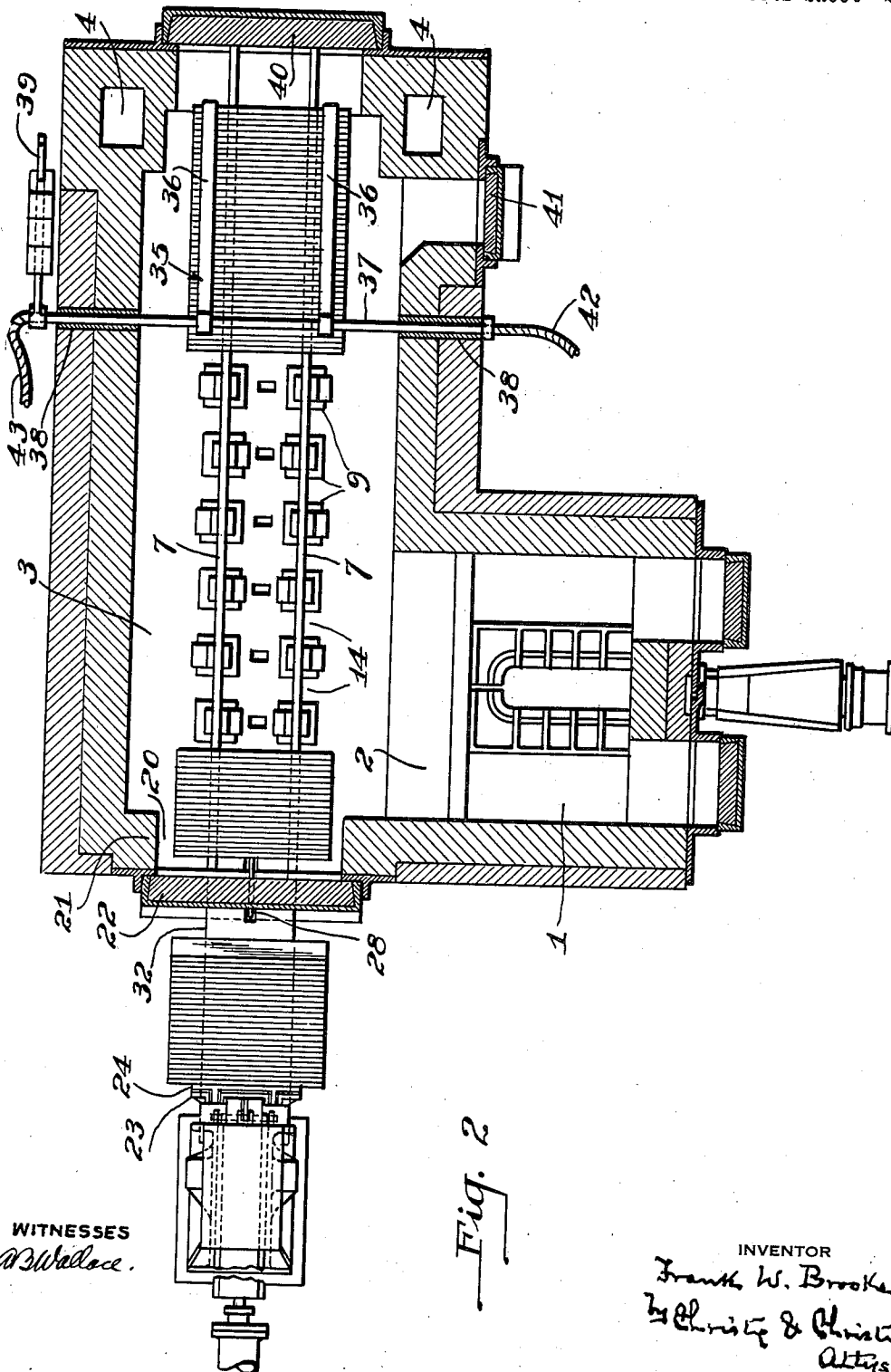
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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BAR-HEATING FURNACE

Application filed December 31, 1927. Serial No. 243,851.

In the heating of comparatively thin bars of iron and steel, such as sheet bars, in furnaces of the continuous type, it has been the practice to feed the bars through the heating-chamber on edge and in backwardly inclined position in order to prevent their falling forwardly, a support being provided at the rear of the row in order to prevent their falling backwardly. In such arrangement of the bars portions of their flat surfaces are directly exposed to the flame in the heating chamber, and while these directly exposed flat portions are comparatively small, they are nevertheless to that extent the more exposed to scaling, and this often results in an un-uniform surface on the final sheet. It is the object of the invention to provide means whereby the bars in their progress through the heating-chamber of the furnace will be maintained on their edges in upright position, and consequently the unevenness of heating referred to will be avoided.

In the accompanying drawings Figure 1 is a central sectional elevation of a continuous heating furnace embodying the invention in its preferred form, and Figure 2 is a sectional plan view, it being understood that in normal operation the body of the heating-chamber will be filled with bars being heated. Figure 3 is a detail view of the pusher at the front of the furnace.

The furnace may be any well known or suitable type of continuous heating furnace, such for instance as that shown in Letters Patent No. 632,020, in which the pieces being heated are pushed in contiguous succession upon a track extending through the heating-chamber. I have shown in the drawings, however, a furnace intended for the pair-heating of sheet-bars, which rest on edge on the track in their passage through the heating-chamber. This furnace, as shown in the drawings, is provided with a combustion chamber 1 for heating by means of coal, using a standard form of stoker, the flame and products of combustion flowing over the bridge-wall 2 into the heating-chamber 3, and thence through the heating-chamber and out through the flues, 4, 4, at the opposite or rear end of the heating-chamber, and into the stack-flue

5. But the character of fuel employed and the manner of its introduction into the heating-chamber are not material to the invention.

The bars or billets being heated are caused to pass through the heating-chamber 3 on ways which are elevated above the floor 6 of the chamber, with the space beneath the ways in open communication with the body of the chamber. These ways preferably consist of hollow water-cooled skid-pipes 7 of well known form which are laid in the top surfaces of pedestals 9 arranged at intervals in rows longitudinally of the chamber. Thus a pair of the longitudinal skid-pipes 7 constitutes a track through the chamber for the bars or billets.

In the heating-chamber the space 13 underneath the bars on the track is in open communication with the body of the heating-chamber through the openings 14 between the pedestals 9. In order to draw active currents of the heated products of combustion around and underneath the bars, flue-ports 15 are formed in the floor 6 of the chamber beneath the track and are connected to a flue 16 underneath the floor, the latter opening into the stack-flue 5.

The charging-opening 20 of the furnace is formed in the front end-wall 21 and is provided with a vertically sliding door 22. The reciprocable pusher-head 23 may be operated by any suitable means, various types of which are well known. The pusher-head herein shown and described constitutes a part of the present invention. It includes a face-plate 24 which is pivoted at its top to the body of the head 23, as is shown in Figures 1, and 3, and its lower end is held yieldingly outwardly by springs 25, the inner ends of which are seated in the body of the head in any suitable manner, so that normally the face-plate 24 is tilted backwardly. Furnaces of this class are usually operated in what is known as the semi-batch method, that is to say, a number of sheet bars, on their edges, covering a length of two or three feet, are pushed into the furnace at one time. At the discharge end the bars are withdrawn until a number of bars equal to the charge have been sent to the rolls, and then a fresh batch is pushed into the

furnace. The strength of the springs 25 is such that the usual charge of bars, outside the heating chamber, will not be sufficient to force the face-plate 24 backwardly, but when in the operation of charging the furnace the bars being charged come into contact with the bars already in the furnace, the springs 25 will yield so that the face-plate 24 and the bars will assume an upright position and the bars will be charged into the furnace standing vertically upon their edges.

For retaining the row of bars in the heating chamber and preventing them from falling backwardly, a suitable automatic latch or support 27 is provided. One form of such a latch is shown herein. It comprises the head 28 mounted on the outer end of the arm 29 which projects inwardly below the chamber, and the inner end of which is fastened to a shaft 30, which carries at one side of the furnace the weighted arm 31. The latch works through a slot or recess in the sole-plate 32 at the furnace door. The inner face of the head 28 is shaped to support the bars in upright position, and its body portion slopes outwardly and downwardly in an inclined outer face 33. When the bars are pushed into the furnace the head 28 is forced downwardly below the face of the sole-plate 32, and it is held down until the outermost bar has passed the apex of the inclined face 33. Then as the pusher-head is withdrawn the weighted arm 31 causes the upward movement of the head 28 into supporting contact with the rear face of the outermost bar in the furnace, thus holding the bars from falling backwardly. The furnace door 22 can be raised and lowered in any suitable way, and is preferably slotted to fit the head 28.

In order to prevent the row of bars from falling forwardly, a detent 35 is provided at the exit end of the heating chamber, which is shown in the drawings in its preferred form. This detent comprises a pair of lever arms 36 fixed to the transverse shaft 37 and projecting forwardly, so that their outer ends lie in the path of the upper edges of the bars at the exit end of the furnace. This shaft is a rock-shaft supported in bearings 38 in the opposite side walls of the furnace and is provided at one side outside the furnace wall with the weighted arm 39, which normally holds the lever arms 36 in frictional yielding contact with the upper edges of the bars at the exit end of the furnace.

In filling the heating chamber at the start, a suitable dummy, which may be any bar of suitable size and weight to prevent the sheet bars from falling forwardly, will be fed in advance of the sheet bars. Thereafter the feeding will continue until the furnace is filled and the dummy has been discharged at the opposite end, the lever arms 36 serving to hold the sheet bars at the exit end of the heating chamber in the vertical position shown

in Figure 1, and the charging device as already described is utilized intermittently to charge each batch of sheet bars into the heating chamber.

The bars may be withdrawn from the exit end of the heating chamber either through the end door 40, through a side door 41, or, if desired, an automatic inclined discharge may be provided, such as is shown in Letters Patent No. 632,020, above mentioned.

The shaft 37 should be hollow, and have a passage through it for a cooling fluid, inlet and outlet pipes 42 and 43 being provided for that purpose.

I claim as my invention:

1. In a furnace for heating sheet-bars having a heating-chamber and a supporting-track for the bars arranged in said chamber, means arranged at one end of said track for impelling the bars broadside on edge and in contiguous succession upon and over said track, means arranged adjacent to said entrance end of said track for engaging the rear-most bar on the track and preventing the bars from falling backwardly, and yielding means arranged to bear upon the upper edges of the bars adjacent to the opposite end of said track for preventing the bars from falling forwardly.

2. A furnace for heating sheet-bars having a heating-chamber, and a supporting-track for the bars arranged in said chamber, in combination with bar-pushing mechanism arranged at one end of said track for impelling the bars broadside on edge and in contiguous succession upon and over said track, said bar-pushing mechanism having a face-plate pivotally connected thereto and means yieldingly holding said face-plate in position backwardly inclined to the horizontal.

3. In a furnace for heating sheet-bars having a heating-chamber and a supporting-track for the bars arranged in said chamber, means arranged at one end of said track for impelling the bars broadside on edge and in contiguous succession upon and over said track, means arranged adjacent to said entrance end of said track for engaging the rear-most bar on the track and preventing the bars from falling backwardly, a transverse rock-shaft above the bars in the heating-chamber adjacent to the opposite end of said track, means connected to said shaft adapted to bear upon the upper edges of the bars for preventing the bars from falling forwardly, and yielding means for holding said bar-retaining means in operative position.

In testimony whereof I have hereunto set my hand.

FRANK W. BROOKE.