

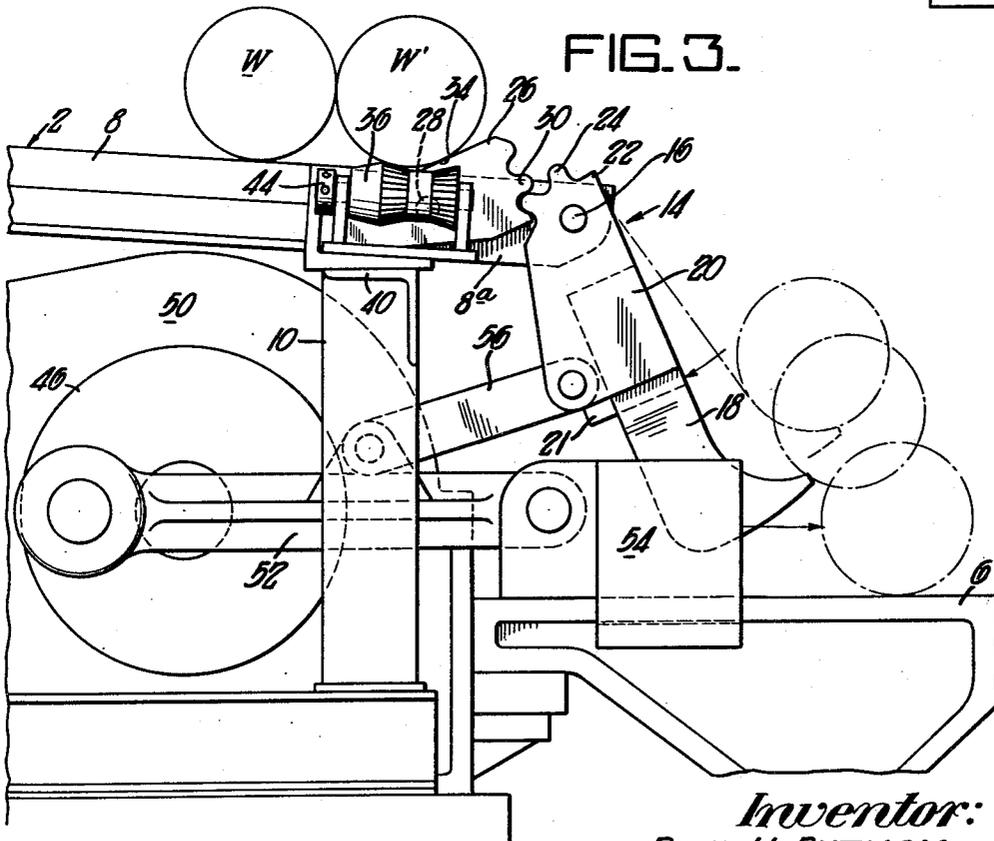
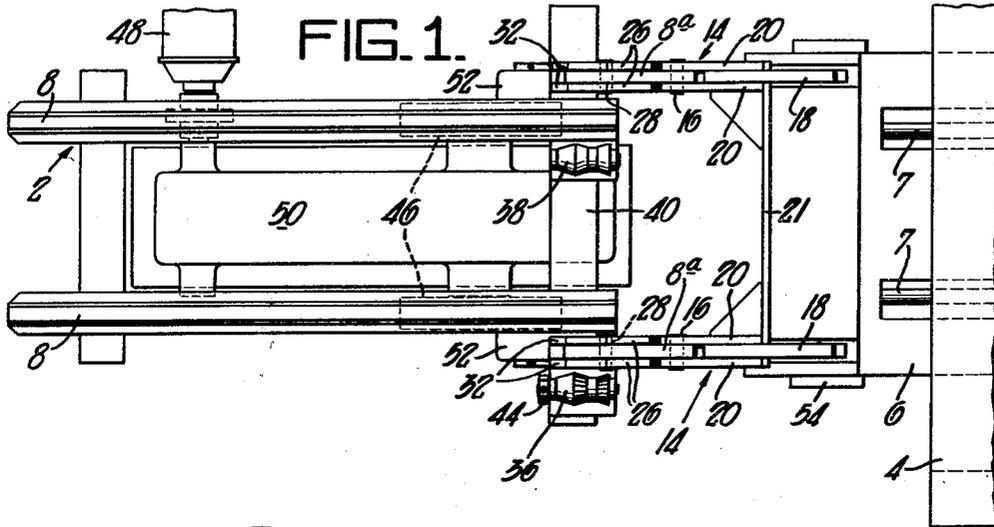
June 7, 1955

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APPARATUS FOR CHARGING BILLET HEATING
FURNACES AND THE LIKE

2,710,104

Filed Dec. 11, 1953

2 Sheets-Sheet 1



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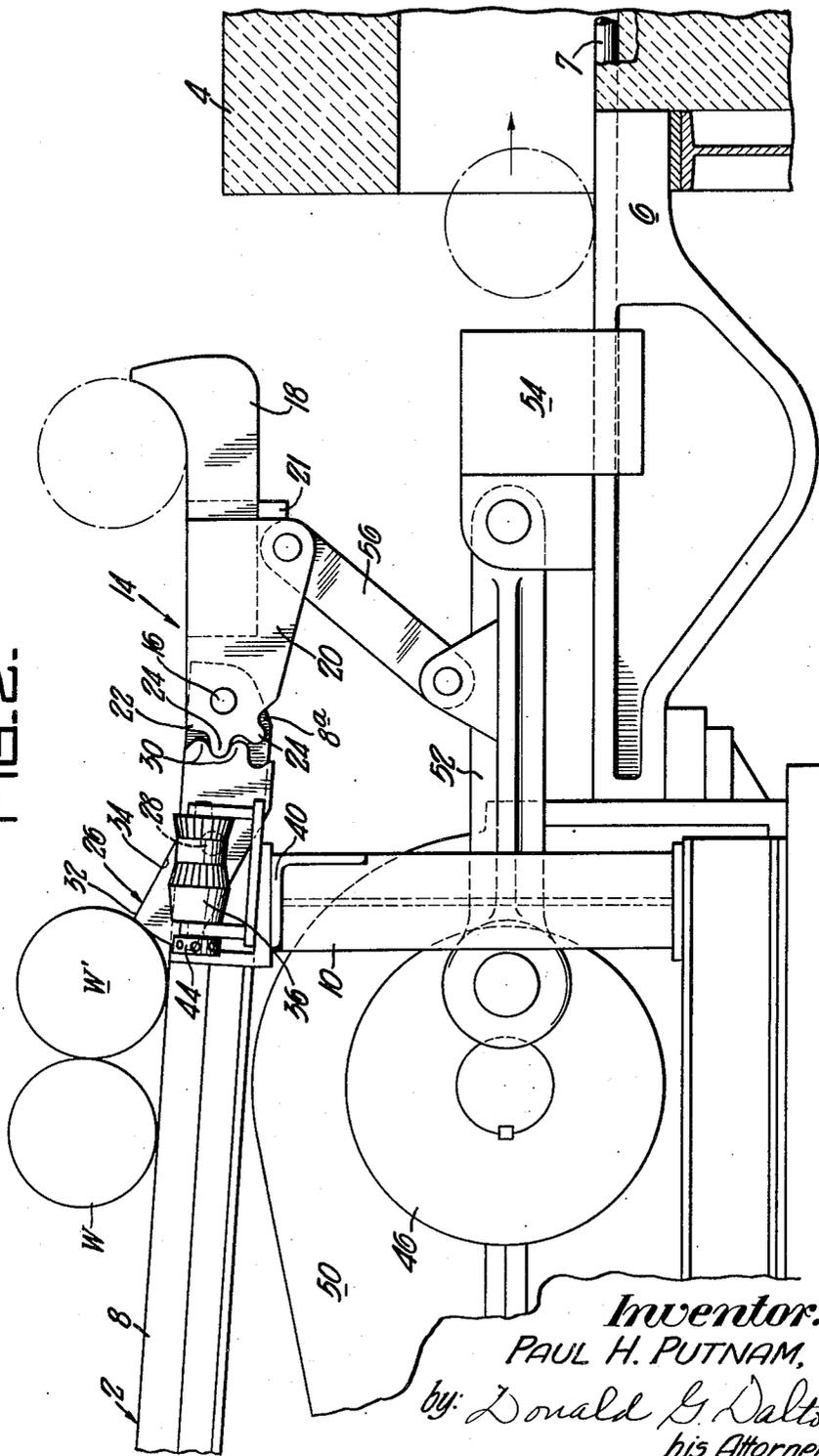
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FIG. 2.



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APPARATUS FOR CHARGING BILLET HEATING FURNACES AND THE LIKE

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5 Claims. (Cl. 214—23)

The present invention relates generally to material handling and more particularly to apparatus for charging billets or ingots into rolling mill heating furnaces.

The heating furnaces of modern rolling mills are generally provided with loading tables adjacent their charging end upon which billets or ingots are disposed preparatory to charging into the furnace. The hearth or bottom of the heating furnace usually projects outwardly of the charging end of the furnace itself a short distance to provide a charging ledge upon which the billets or ingots could be deposited and then pushed into the furnace by suitable ram mechanism provided for the purpose. Water-cooled skid pipes traverse the hearth of the furnace and extend outwardly on the charging ledge. The loading table surfaces are inclined downwardly to a level approximately three feet above the loading ledge of the furnace.

Prior to my invention, the billets or ingots to be heated were first loaded on the table and then dropped individually from the inclined end of the table onto the charging ledge. The pusher ram, which was positioned adjacent the hearth ledge was then actuated to push the individual billet or ingot into the furnace along the water-cooled pipe skids. This method not only resulted in damage to the water-cooled pipe skids due to the impact of the dropping billets or ingots but also caused frequent damage to the pusher ram and the hearth ledge itself. The absence of means for adjusting the billets and ingots transversely of the charging end of the furnace constituted another disadvantage inherent in the prior art charging devices.

It is, accordingly, an object of my invention to provide apparatus for charging rolling mill heating furnaces with billets or the like from an elevated loading table which includes means for selectively transferring the billets individually from the table to the furnace charging ledge.

It is a further object of my invention to provide an improved furnace charging apparatus as set forth in the above object including means for adjusting the position of the billets transversely of the furnace charging mouth preparatory to charging.

These and other objects will become more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is a plan view;

Figure 2 is a side elevation showing the apparatus of the invention in precharging position; and

Figure 3 is a view similar to Figure 2 showing the apparatus of the invention in charging position.

Referring more particularly to the drawings, reference numeral 2 indicates generally a storage table positioned adjacent the charging end of a rolling mill heating furnace 4 which is equipped with a conventional charging ledge 6. Water-cooled pipe skids 7 extend from the charging ledge 6 into the interior of the furnace. The table 2 is made up of a pair of spaced rail skids 8 and skid extensions 8a supported by spaced vertical support posts 10. The rail skids 8 and extensions 8a are in-

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clined downwardly toward charging ledge 6. The forward end 12 of each of the rail skid extensions 8a is provided with a pair of lowering carriages 14 pivoted thereto by means of a pin 16. Each of the lowering carriages 14 is made up of a supporting arm 18 which is carried by a pair of spaced bracket plates 20 which in turn are pivoted to the forward end of the rail skid extension 8a by means of the pin 16. The lowering carriages 14 are connected together by means of a transverse plate 21. The rearward end 22 of each of the bracket plates 20 is provided with integral gear teeth 24. A pair of tilting stop members 26 is pivoted to each skid extension 8a rearwardly of each of the lowering carriages 14 by means of a pin 28. The forward end of each stop member 26 is provided with integral gear teeth 30 which match and mesh with the gear teeth 24 in the bracket plates 20. The intermeshing arrangement of the gear teeth 24 and 30 brings about up-tilting of the rearward end 32 of the stop members 26 when the carriage 14 is lowered and down-tilting thereof when the carriage is raised. Each of the stop members 26 is provided with a generally V-shape upper surface so as to form a cradle 34 for receiving a billet W.

Positioning rolls 36 and 38 are mounted on a vertically supported platform 40 laterally adjacent the pairs of stop members 26. Positioning roll 36 is provided with a spanner disc 44 attached thereto whereby the roll may be turned manually by means of a spanner wrench.

A crank disc 46 is rotatively mounted subjacent each of the rail skids 8. The crank discs 46 are driven by a motor 48 through a suitable reduction gear 50. A crank pitman arm 52 connects each of the crank discs with a pusher head 54 which is mounted for sliding movement on the charging ledge 6 of the heating furnace beneath the inclined end of the table 2. The arms 18 of the lowering carriage 14 extend above the ledge 6 ahead of the pusher head 54 when it is in retracted position. A link 56 connects each pair of bracket plates 20 with a crank arm 52 so that as the pusher head 54 is withdrawn to retracted position by rotation of the crank disc 46, the arms 18 are lowered toward the charging ledge 6.

In operation, billets W are loaded side by side on the table 2 with the foremost billet W' pressing against the rearward ends 32 of the tilting members 26. At this time, the lowering carriage 14 is in raised position and the pusher head 54 is extended to its forward position. The charging operation is continued by actuating the motor 48 to cause the crank disc 46 to rotate and move the pusher head 54 back from its extreme forward position. As the pusher head moves back from its forward position, the link 56 lowers the carriage 14 causing the gear teeth 24 to mesh with the gear teeth 30 and tilt the forward ends of the stop members 26 upwardly and the rearward ends 32 downwardly so that the billet W' advances onto the cradle 34 formed in the upper surface of the tilting stop members. In this position, the projecting ends of the billet W' are supported by the rolls 36 and 38. The roll 36 may now be rotated to adjust the longitudinal position of billet W'. The crank discs 46 are again rotated to move the pusher head 54 forward which causes the lowering carriage 14 to rise and the forward ends of the tilting members 26 to tilt downwardly so that the billet W' moves forward to be supported by the arms 18 of the lowering carriage. Advance of the next succeeding billet on the table is retarded by the up-tilted rearward ends of the stop members 26. Billet W' is then lowered to the charging ledge 6 by again rotating the crank disc 46 to withdraw the pusher head 54 from its forward position which movement causes the link 56 to lower the carriage 14. The direction of rotation of the crank disc 46 is then reversed

to move the pusher head 54 forward to push the billet W' into the furnace. As the pusher head 54 moves forward, another billet is positioned on the tilting members and positioning rolls and the charging operation proceeds as above.

Although I have shown cylindrical billets in the drawings which roll by gravity along the inclined table 2, it will be understood that the apparatus of my invention may also be used for loading billets or ingots having a rectangular contour in which case, the billets are moved along the length of the storage table 2 manually.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. Apparatus for lowering billets individually from a storage table to a delivery surface therebelow comprising a pair of tilting arms pivoted on said table and projecting therefrom over said surface, said arms being adapted to receive a billet from said table and cradle it preparatory to discharge, means effective to tilt said arms downwardly toward said surface whereupon a billet cradled on said arms is discharged on said surface, said means including a crank disc rotatably supported adjacent said table, a drive arm pivoted to said disc, a link pivotally connecting said drive arm with said tilting arms, and means for rotating said disc, a tilting stop member pivoted on said table rearwardly of each of said arms, means whereby down-tilting of said arms effects up-tilting of said stop members to a position in which they arrest a succeeding billet, said last named means being comprised of matching gear teeth in the rear end of each of said tilting arms and in the forward end of each of said tilting stop members, the gear teeth in each of said tilting arms being in mesh with the gear teeth in one of said tilting stop members, said tilting stop members each being provided with a V-shape upper surface forming a cradle for supporting a billet, and a roller rotatably mounted on said table adjacent each of said stop members whereby a billet resting on said stop members can be adjusted transversely of said table.

2. Apparatus for lowering billets individually from a storage table to a delivery surface therebelow comprising a pair of tilting arms pivoted on said table and projecting therefrom over said surface, said arms being adapted to receive a billet from said table and cradle it preparatory to discharge, means effective to tilt said arms downwardly toward said surface whereupon a billet cradled on said arms is discharged on said surface, a tilting stop member pivoted on said table rearwardly of each of said arms, means whereby down-tilting of said arms effects up-tilting of said stop members to a position in which they arrest a succeeding billet, and a roller rotatably mounted on said table adjacent each of said stop members whereby a billet resting on said stop members can be adjusted transversely of said table.

3. Apparatus for lowering billets individually from a storage table to a delivery surface therebelow comprising a pair of tilting arms pivoted on said table and projecting therefrom over said surface, said arms being adapted

to receive a billet from said table and cradle it preparatory to discharge, means effective to tilt said arms downwardly toward said surface whereupon a billet cradled on said arms is discharged on said surface, a tilting stop member pivoted on said table rearwardly of each of said arms, and means whereby down-tilting of said arms effects up-tilting of said stop members to a position in which they arrest a succeeding billet, said last named means including matching gear teeth in the rear end of each of said tilting arms and in the forward end of each of said tilting stop members, the gear teeth in each of said tilting arms being in mesh with the gear teeth in one of said tilting stop members.

4. Apparatus for charging billets individually into a heating furnace having a delivery ledge adjacent its entry end which comprises a billet storage table, a pair of tilting arms pivoted on said table and projecting therefrom over said ledge, said arms being adapted to receive a billet from said table and cradle it preparatory to discharge, a pusher mounted on said ledge for movement toward and away from said entry end, means connecting said pusher and said arms effective to lower said arms as said pusher moves away from said entry end, whereupon a billet cradled on said arms is discharged on said ledge, and to raise said arms as said pusher is moved toward said entry end to thereby push a discharged billet from said ledge into said furnace, means for moving said pusher, a tilting stop member pivoted on said table rearwardly of each of said arms, and means whereby down-tilting of said arms effects up-tilting of said stop members to a position in which they arrest a succeeding billet.

5. Apparatus for charging billets individually into a heating furnace having a delivery ledge adjacent its entry end which comprises a billet storage table, a pair of tilting arms pivoted on said table and projecting therefrom over said ledge, said arms being adapted to receive a billet from said table and cradle it preparatory to discharge, a pusher mounted on said ledge for movement toward and away from said entry end, means connecting said pusher and said arms effective to lower said arms as said pusher moves from said entry end, whereupon a billet cradled on said arms is discharged on said ledge, and to raise said arms as said pusher is moved toward said entry end to push a discharged billet from said ledge into said furnace, means for moving said pusher, a tilting stop member pivoted on said table rearwardly of each of said arms, and means whereby down-tilting of said arms effects up-tilting of said stop members to a position in which they arrest a succeeding billet, said last named means including matching gear teeth in the rear end of each of said tilting arms and in the forward end of each of said tilting stop members, the gear teeth in each of said tilting arms being in mesh with the gear teeth in one of said tilting stop members.

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