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PUSH-OUT APPARATUS FOR BILLETS

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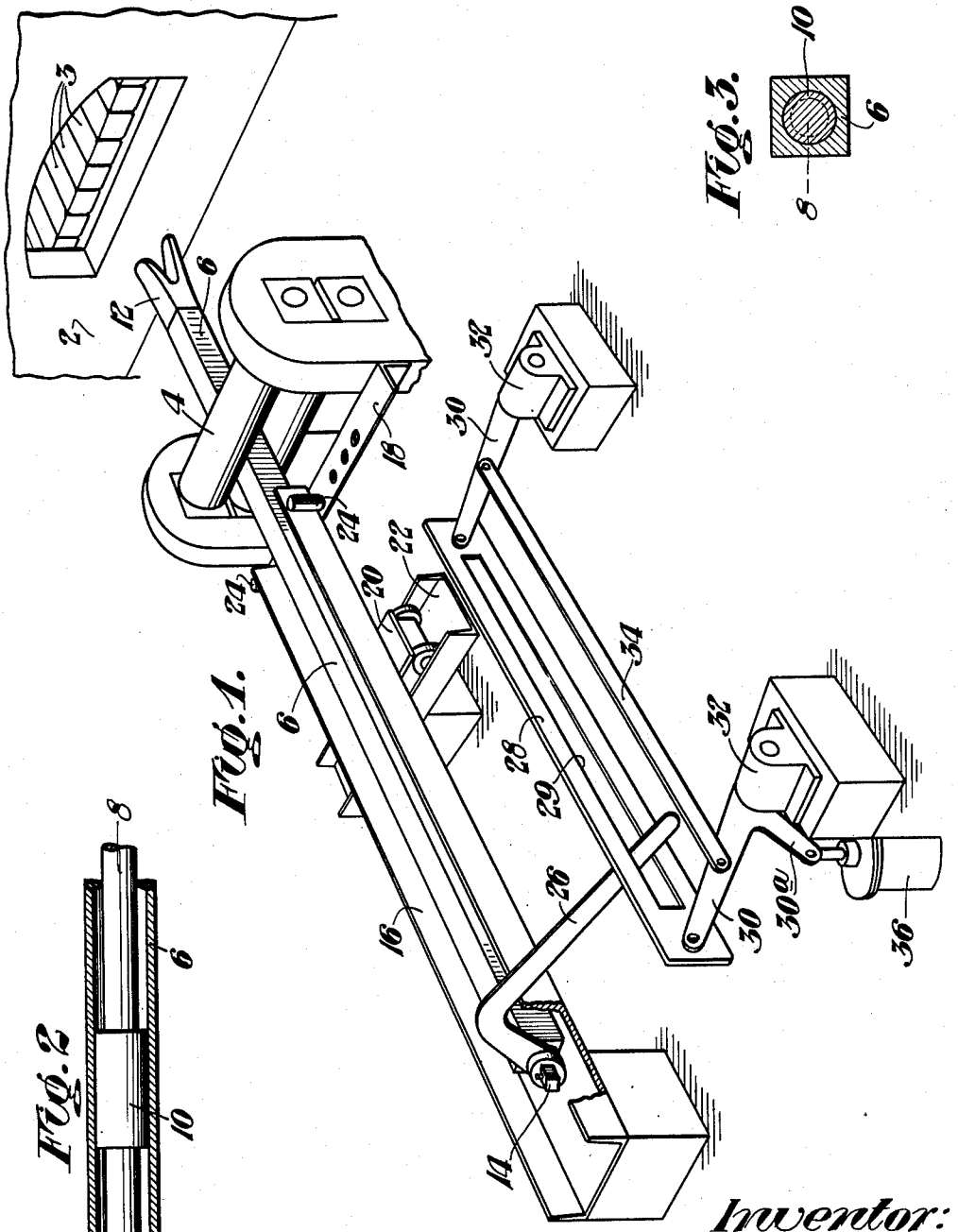


Fig. 1.

Fig. 2.

Fig. 3.

Inventor:
JOSEPH H. SWIFT,
by: Ursina & Kauber
his Attorneys.

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PUSH-OUT APPARATUS FOR BILLETS

Joseph H. Swift, Worcester, Mass., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey

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10 Claims. (Cl. 214—23)

This invention relates to push-out apparatus for billets and has particular reference to push out apparatus that is adapted to turn billets as it pushes them from a reheating furnace.

Billets are ordinarily placed immediately adjacent each other in a reheating furnace and, therefore, their tops and bottoms are the only portions directly exposed to heat. Due to this reheating arrangement appreciable amounts of scale form only on the top and bottom surfaces of the reheated billets.

One object of this invention is to provide means which will rapidly and easily push varying length billets from the reheating furnace and position the withdrawn billets for entry into the first rolling-mill so that the heavier scale formed on the billets during the reheating process will not be rolled into the metal composing the billet.

The above and further objects will be apparent from the following description and the accompanying drawing, in which:

Figure 1 is a perspective view of one embodiment of my invention.

Figure 2 is an elevation of one method for rotatably mounting a shaft in the push-bar that is shown in Figure 1; and

Figure 3 is a transverse cross-sectional elevation through the shaft and push-bar shown in Figure 2.

Referring to the accompanying drawing, the numeral 2 indicates a reheating furnace, the end of which is shown in Figure 1 of the drawing. The reheating furnace 2 contains billets 3. Located adjacent the end of the furnace 2 is a standard pinch-mill 4 which is provided with any standard motivating means so that it can be moved in forward and reverse directions. The mill 4 receives and is adapted to move a hollow push-bar 6 which preferably has opposed external flat portions adapted to fit between the rolls of the mill 4. The push-bar 6 is of such length that it can be engaged with and moved by the mill 4 and yet extend into the furnace 2 and push out the billets 3 therefrom. The position of the push-bar 6 is positively controlled by the mill 4. Rotatably mounted in the push-bar 6 and extending therefrom at both ends is a shaft 8. Bearings 10, which can be any suitable size or length, and preferably are integral with the shaft 8, mount the shaft 8 in the push-bar 6. The shaft 8 is preferably provided with an integral head 12 which is adapted to engage with the ends of the billets heated in the reheating furnace 2. The head 12 is, of course, located on the end of the shaft 8 adjacent the furnace 2 and the opposite end of the shaft 8 extends from the other end of the push-bar 6 and preferably is provided with a square portion 14.

The push-bar 6 is supported and positioned at right angles to the mill 4 by any suitable means such as a channel 16. The channel 16 is preferably mounted for movement along the axis of the mill 4 so that the position of the push-bar 6 can be varied in relation thereto. The channel 16 is supported by an angle 18 which is immediately adjacent the mill 4 and a truck 20 which is secured to the channel 16 near its other end. The truck 20 is provided with wheels so that the truck 20 can move along a channel 22 and move that end of the channel 16 in relation to the axis of the mill 4. The end of the channel 16, supported by the angle 18, is held in place by removable pins 24 and by gravity so that by removing the pins 24, that end of the channel 16 can also be moved along the axis of the mill 4.

In order to rotate the shaft 8 in the push-bar 6, a lever or actuating arm 26 is secured to the square portion 14 of the shaft 8. The actuating arm 26 preferably extends perpendicular to the axis of the shaft 8, in a substantially horizontal direction therefrom. The actuating arm 26 is of any suitable length and the end thereof is engaged with a guide 28 having a longitudinal slot 29 therein. The guide 28 is parallel to the channel 16 and thereby the push-bar 6. The slot 29 in the guide 28 is as long as the distance traversed by the push-bar 6 when it pushes a billet from the furnace 2 and the guide 28 is in such a position that it does not interfere with the movement of the push-bar 6. Crank-arms 30 are secured to each end of the guide 28 and journalled in housings 32 for movement in a plane which preferably is perpendicular to the axis of the mill 4. A bar 34 is preferably secured between the crank arms 30 to strengthen and further unify them. One of the crank arms 30 is provided with an arm 30a that connects to means, such as a piston and cylinder 36, that is adapted to give the crank-arms 30, as a unit, a predetermined, reversible, arcuate movement. The housings 32 are so positioned that movement of the crank-arms 30 through their predetermined arcs does not disengage the actuating arm 26 from the slot 29, nor does the slot 29 interfere with the movement of the push-bar 6.

The motion of the crank-arms 30 is adapted to give the guide 28 movement in a vertical arc. This movement of the guide 28 accordingly moves the end of the lever arm 26 engaged with the guide 28 through a vertical arc whereby the shaft

8 is rotated through an arc due to the movement of the crank-arms 30. The movement given to the crank-arms 30 is of such predetermined amount that the rotation produced in the shaft 8 by the fixed movement of the crank arms 30 is a 90 degree arc. By rotating the shaft 8 through the 90 degree arc, any one of the billets 3 engaged with the head 12 is also rotated through a 90 degree arc.

The movement of the crank-arms 30 is controlled by the operator of the push-out apparatus so that it can be made to occur whenever the head 12 is engaged with one of the billets 3. By rotating the billets 3 through a 90 degree arc when they are being removed from the reheating furnace 2, the top and bottom surfaces of the billets 3 are made the vertical sides of the billets 3 as they enter the first rolling-mill. When the billets 3 are passed through the first rolling-mill, the scale formed during the reheating process will drop off rather than be rolled into the surface of the billets 3 due to such scale being formed principally on the top and bottom surfaces of the billets 3 when in the reheating furnace 2 and such surfaces are changed to the side surfaces before the billets 3 enter the first rolling-mill.

The push-out apparatus is designed to turn any billet which is engaged with the head 12 at any time in the course of pushing out one of the billets 3 from the furnace 2 and it also is adapted to turn billets of varying lengths without adjusting the apparatus in any manner.

It will be appreciated that the invention is not limited to the specific form illustrated and described, but is actually defined in the appended claims.

I claim:

1. Push-out apparatus for billets including standard pinch-rolls, a hollow pusher-bar adapted to fit between said rolls in a definite position and be moved thereby, means having an end adapted to engage said billets rotatably mounted in said pusher-bar and means for rotating said first named means independently of said pusher bar.

2. Push-out apparatus for billets including standard pinch-rolls, a hollow pusher-bar adapted to fit between said rolls in a definite position and be moved thereby, a shaft having an end adapted to engage said billets rotatably mounted in said pusher-bar and means supporting and positioning said pusher bar and adapted to move said pusher bar parallel to the axis of said rolls.

3. Push-out apparatus for billets including pinch-rolls, a hollow pusher-bar having a limited horizontal movement adapted to fit between said rolls in a definite position and be moved thereby, a shaft having an end adapted to engage said billets rotatably mounted in said pusher-bar and extending therefrom at both ends, an actuating arm secured to said shaft at its end opposite that adapted to engage with said billets, and means engaged with said actuating arm and adapted to rotate said shaft and thereby the billet engaged with the end thereof through an angle of 90 degrees regardless of the position of said pusher bar.

4. Push-out apparatus for billets including standard pinch-rolls, a hollow pusher-bar adapted to fit between said rolls in a definite position and be moved thereby, a shaft having an end adapted to engage said billets rotatably mounted in said pusher bar, means for rotating said shaft independent of said pusher bar, and means supporting and positioning said pusher bar and adapted to move said pusher bar along the axis of said rolls.

5. Push-out apparatus for billets in a reheating furnace including standard pinch-rolls, a hollow pusher-bar adapted to fit between and be moved by said pinch-rolls, a round shaft having an end adapted to engage with said billets mounted in said pusher-bar and extending therefrom at both ends, a channel supporting and guiding said pusher-bar, a lever arm secured to said shaft at the end opposite that adapted to engage with said billets, a slotted guide receiving said lever arm, crank arms secured to the ends of said guide and journaled at one end for movement in a plane, and means connected to said crank-arms and adapted to pivot them whereby said guide is moved and rotates said lever and thereby said shaft and any billet engaged with its end, the motion given said cranks being such that said shaft and any billet engaged therewith are rotated 90 degrees.

6. Push-out apparatus for billets in a reheating furnace including standard pinch-rolls, a hollow pusher-bar adapted to fit between and be moved by said pinch-rolls, a shaft having an end adapted to engage with said billets mounted in said pusher-bar and extending therefrom at both ends, a channel supporting and guiding said pusher-bar, means mounting said channel for movement parallel to the axis of said rolls, a lever arm secured to and extending perpendicularly and in a substantially horizontal direction from the axis of said shaft at the end opposite that adapted to engage with said billets, a slotted guide receiving said lever arm, crank arms whose free ends are secured to the ends of said guide journaled at one end for movement in a vertical plane, and means adapted to pivot said crank-arms whereby said guide is moved vertically and rotates said lever and thereby said shaft and any billet engaged with its end, the motion given said cranks being such that said shaft and any billet engaged therewith are rotated 90 degrees.

7. Push-out apparatus for billets in a reheating furnace including standard pinch-rolls, a hollow pusher-bar having opposed external flat portions adapted to fit between and be moved by said pinch-rolls, a shaft having an end adapted to engage with said billets mounted in said pusher-bar and extending therefrom at both ends, bearings mounting said shaft in said pusher-bar, a channel supporting and guiding said pusher-bar, means mounting said channel for movement parallel to the axis of said rolls, a lever arm secured to and extending perpendicularly in a substantially horizontal direction from the axis of said shaft at the end opposite that adapted to engage with said billets, a slotted guide receiving said lever arm, crank-arms whose free ends are secured to the ends of said guide journaled at one end for movement in a vertical plane, a bar connecting said crank-arms and means connected to said bar and adapted to move it and pivot said crank arms whereby said guide is moved vertically and rotates said lever and thereby said shaft and any billet engaged with its end, the motion given said cranks being such that said shaft and any billet engaged therewith are rotated 90 degrees.

8. Push-out apparatus for billets and the like comprising a billet contacting element, means for reciprocating said billet contacting element, and means adapted to be actuated independent of said last named means for rotating said billet contacting element.

9. Push-out apparatus for billets including a shaft adapted to engage the billets, a pusher-bar receiving and journalling said shaft, means for reciprocating said shaft and said pusher-bar, and means for rotating said shaft independently of said pusher-bar.

10. Push-out apparatus for billets and the like comprising a hollow pusher-bar, a shaft journalled in said hollow pusher-bar, a billet contacting element on one end of said shaft, means for reciprocating said pusher-bar, and separate means for rotating said shaft.

JOSEPH H. SWIFT.