Oct. 5, 1926. 1,601,959

J. R. GEORGE ET AL

SAMPLE CUTTING MECHANISM FOR ROLLING MILLS

Filed Jan. 9, 1924 2 Sheets-Sheet 1

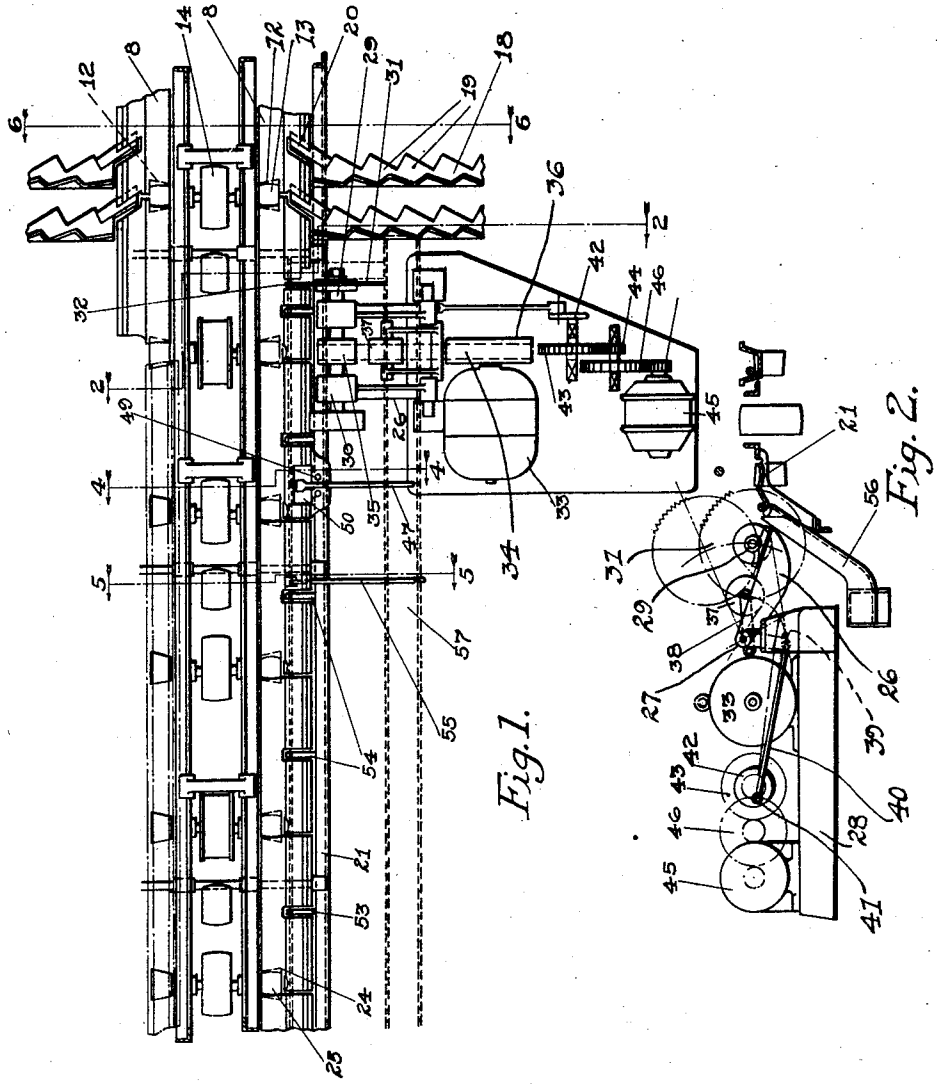


Fig. 1.

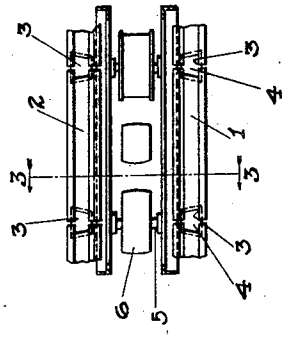


Fig. 2.

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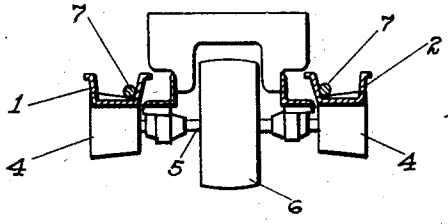


Fig. 3.

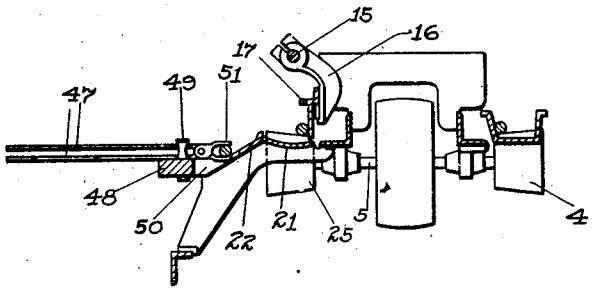


Fig. 4.

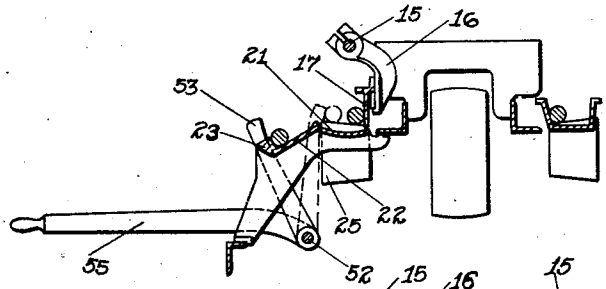


Fig. 5.

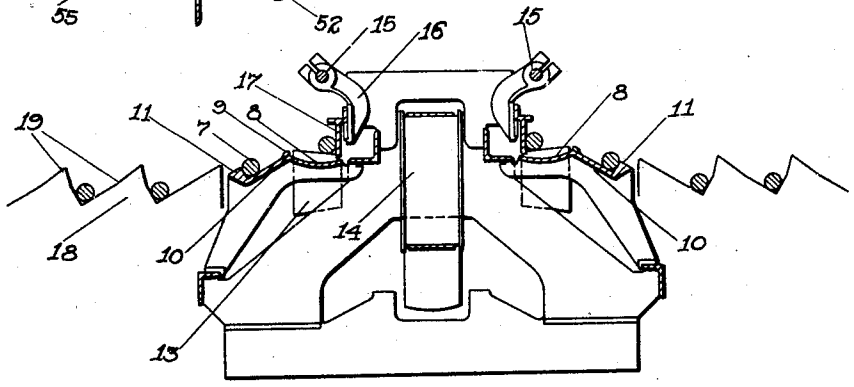


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SAMPLE-CUTTING MECHANISM FOR ROLLING MILLS.

Application filed January 9, 1924. Serial No. 685,178.

Our invention relates to a mechanism for obtaining samples of the product of a rolling mill, such as rounds, squares, angles, channels, or any other product of the finishing rolls, while the heated rolled material is in transit from the finishing rolls to a suitable receiving means such as a cooling bed.

In ordinary practice, full length bars, or other sections, are gauged by hand after passing onto the cooling bed or other receiving means, from the finishing rolls, the gauging being done by a special operator stationed at one end of the bed, or located on a bridge extending over the same. When relatively small sections are being rolled, it is possible for the gauger to cut off small lengths of the rolled product with an axe, which samples can be carried back to the operator of the finishing mill, who quenches them before inspection.

When however, the mill is rolling larger sections which cannot be readily cut by hand, the gauging must be done while the rolled material is on the cooling bed or other receiving means, in a heated condition, and it is then necessary for the gauger at the bed to make a rough allowance for shrinkage and to signal the operator of the finishing mill the information necessary to make proper adjustments of the rolls. It is obvious that the gauger must operate close to the heated rolled product which is at substantially the temperature of rolling, and for this reason the work of the gauger is attended with considerable personal danger, particularly when gauging bars which are being moved on the cooling bed, or other receiving means. Furthermore, the gauger is always hampered in his work by the uncertain temperature of the material being gauged, and it frequently happens that the calipers employed by the gauger become distorted by the heat of the material. When the stock is in a heated condition, it cannot be handled freely and it is impossible for the gauger to properly determine whether or not it is pitted by scale being rolled into it, for the reason that proper examination for scale pitting or other surface defects should be made when the material is cold.

According to the present invention we provide a mechanism for cutting samples of any desired length from any portion of a bar, or other rolled section, while the heated rolled material is in transit from the finishing mill to the cooling bed, or other receiving means. With our mechanism, the sections cut out may be held stationary and allowed to cool before being gauged and inspected, or if desired, short lengths can be cut from any particular portion of a sample and conveyed to the operator of the finishing mill, who is thus afforded an opportunity to quench the smaller samples and examine them carefully, when cold, for scale pitting and other surface defects. Our invention further contemplates means whereby long pieces cut off for inspection may be delivered to the cooling bed, or other receiving means, after being inspected, without in any way interfering with the normal operation of the cooling bed, if such constitutes the receiving means, and the nearly continuous delivery of the rolled product from the finishing mill to said cooling bed. The above and other advantageous features of our invention will hereinafter more fully appear, reference being had to the accompanying drawings in which

Fig. 1 is a plan view showing portions of a conveyor and cooling bed with our sample cutting mechanism applied thereto.

Fig. 2 is a transverse sectional view along the line 2, 2 of Fig. 1, looking in the direction of the arrows.

Fig. 3 is a transverse sectional view along the line 3, 3 of Fig. 1, looking in the direction of the arrows.

Fig. 4 is a transverse sectional view along the line 4, 4 of Fig. 1, looking in the direction of the arrows.

Fig. 5 is a transverse sectional view along the line 5, 5 of Fig. 1, looking in the direction of the arrows.

Fig. 6 is a transverse sectional view along the line 6, 6 of Fig. 1, looking in the direction of the arrows.

Like reference characters refer to like parts in the different figures.

Referring first to Fig. 1, there is shown at the left, a portion of a hot runout, or conveyor, for receiving the product of the finishing mill, not shown. The conveyor consists of spaced parallel trough members

1 and 2, which are provided with openings 3 at suitable intervals, within which are located rolls 4. As best shown in Fig. 3, the rolls 4 are cone-shaped and the periphery of each roll extends slightly above the bottom of the corresponding trough. The rolls 4 are mounted in pairs on shafts 5 extending across the conveyor, each shaft 5 having a pulley 6 mounted thereon, whereby the rolls are adapted to be driven in unison from a suitable source of power, such as a belt, not shown. The rolls 4 are adapted, by their rotation, to advance lengths of rolled material, indicated at 7, along the troughs 1 and 2, as the material is delivered to the troughs from the finishing mill.

The hot runout, or conveyor, just described may be of any desired length to accommodate the product of the finishing mill, and by its operation is adapted to longitudinally move the finished rods, or other sections, from the finishing mill to any suitable receiving means, such as a cooling bed, a portion of which is shown at the right hand side of Fig. 1. Any desired type of cooling bed may be employed to receive the material delivered by the runout, and for purposes of illustration we have shown a type of cooling bed which is adapted to impart a step-by-step lateral movement to the lengths of material delivered thereto. Inasmuch as this particular type of cooling bed forms no part of the present invention, but is shown and described in United States Patent No. 793,926, issued July 4, 1905 to Victor E. Edwards, only so much of the bed will be described, as is necessary for a complete understanding of the present invention.

Referring to Figs. 1 and 6, it will be seen that a cooling bed is provided for each of the conveying mechanisms, and as these beds are substantially identical in construction, only one need be described. Each cooling bed consists of a trough 8 having its bottom portion bounded by a shoulder 9 and a downwardly inclined portion 10 provided along its lower edge with a lip, or flange 11. The trough 8 is provided with a number of openings 12 in which are located conical conveyor rolls 13, with the upper portion of their peripheries projecting through the openings 12. The rolls 13 are adapted to be driven by pulleys 14, and by their rotation, advance the material which is received from the conveyor along the trough 8. A shaft 15 extends parallel to and above the trough 8, and is provided with a number of arms 16 carrying a kick-off member 17 extending the length of the trough 8. Turning movement of the shaft 15 in a clockwise direction is adapted to move a length of material in the trough 8 laterally across the rolls 13 until it passes over the shoulder 9, whereupon the length of material will roll or slide down the inclined portion 10 until it comes to rest against the flange 11. The length of material is then adapted to be removed from the trough 8 to the cooling bed proper, as will now be described.

A number of rack bars 18 extend laterally from the trough 8, and as best shown in Fig. 1, each is provided with a number of series of teeth 19, the teeth of one series being in staggered relation with respect to the teeth of the other series. A wing 20 is carried by each rack bar 18, which is adapted to lift a length of material over the flange 11 of the trough 8 and deposit it in the notch provided by the first set of teeth 19 when the bars 18 are oscillated by mechanism, not shown. Further oscillation of the bars 18 is adapted to cause the stock to be moved laterally across the bed with a step-by-step movement all as fully described in the above mentioned Patent No. 793,926, to Edwards.

Referring again to Fig. 1, a trough 21 is interposed between the runout trough 1 and the cooling bed trough 8, the trough 21 being of substantially the same cross section as the trough 8, with an inclined surface 22 and a lip or flange 23, as best shown in Figs. 4 and 5. The trough 21 is provided with openings 24, within which are placed conveyor rolls 25, rotation of which is adapted to move the stock longitudinally from the runout trough 1 to the trough 8 of the cooling bed. The kick-off shaft 15, together with its kick-off member 17 extends the length of the trough 21, so that turning of the shaft 15 in a clockwise direction is adapted to also move a length of stock from the rolls 25 to a position at the lower end of the inclined surface 22. Consequently, if the movement of the shaft 15 occurs when a length of stock is partly in the trough 21 and partly in the trough 8, the whole piece will be moved laterally down the inclined portions of the troughs 21 and 8, so that it may be severed at any particular point by a cutting mechanism, which will now be described.

As best shown in Figs. 1 and 2, a pair of brackets 26 are pivotally mounted on lugs 27 extending upwardly from a base 28, and a shaft 29 is rotatably mounted in bearings 30 carried by the free ends of the brackets 26. A circular saw 31 is carried by the end of the shaft 29 and in its lower position is adapted to extend into a slot 32 provided between the trough 21 and the trough 8. The shaft 29 is adapted to be driven from any suitable source of power, such as an electric motor 33 mounted on the base 28, by a belt 34 extending around pulleys 35 and 36. An idler pulley 37 is pivotally mounted between arms 38 and is adapted to hold the belt 34 tight, as the saw 31 is swung into and out of engagement with the work to be cut.

One of the saw brackets 26 is provided

with a downwardly extending arm 39 which is connected by a link 40 to a pin 41 provided on a crank disk 42. The crank disk 42 is mounted on a shaft which carries a gear 43 in mesh with a pinion 44 mounted on a shaft which is driven by an electric motor 45 through reduction gearing 46. Operation of the motor 45 is adapted to impart an oscillatory movement to the brackets 26 by means of the crank connection, one complete revolution of the motor shaft causing the saw 31 to be swung from the upper position of Fig. 2 to the lower position and back again. Suitable switches, not shown, are provided for controlling the operation of the motors 33 and 45.

Referring now to Fig. 4, there is shown a pair of tongs 47, supported on a frame member 48 between pins 49, and extending in the direction of the trough 21. The trough 21 is provided with a slot 50 into which the curved ends 51 of the tongs 47 may be inserted when it is desired to grasp a piece of material resting on the inclined surface 22 of the trough 21, for a purpose to be hereinafter described.

Referring now to Fig. 5, a shaft 52 extends beneath the trough 21 for substantially the entire length thereof, and a plurality of arms 53 are mounted thereon and extend upwardly in the direction of the trough 21. The upper ends of the several arms 53 extend into slots 54 provided in the inclined portion 22 of the trough 21, and in their normal position the arms 53 terminate just above the flange 23. A lever 55 is mounted on the shaft 52, whereby the arms 53 may be moved in unison through the slots 54 to push a length of material resting against the flange 23 up the inclined surface 22 onto the rolls 25, as indicated in dotted lines.

Having thus described the various parts entering into our invention, the operation thereof is as follows:—When the finishing mill is in operation, the finished bars, or other sections, are usually delivered alternately to the troughs 1 and 2 in which they are moved by the conveyor rolls 4 in the direction of the cooling beds, or other receiving means. When it is desired to take a sample, the length of material to be sampled is permitted to run along the trough 21 until a portion of it enters the cooling bed trough 8. While a portion of this length to be sampled still remains on the trough 21, the shaft 15 is turned, thereby causing the kick-off 17 to push the material off the rolls and allow it to slide down the inclined surfaces 10 and 22, where it comes to rest against the flanges 11 and 23, respectively. Assuming that the saw 31 is in its upper or inoperative position, the switch controlling the motor 45 is then closed, thus causing the saw 31 to descend upon the then stationary bar and sever it at a point between the troughs 21 and 8. Shortly after this occurs the operation of the cooling bed causes the wings 20 to lift that portion of the bar on the trough 8 and deliver it to the first series of notches of the racks 18, along which it progresses with a lateral step-by-step movement.

The severed portion of the bar remains on the depressed portion of the trough 21 where it may be examined and gauged if desired without in any way affecting the progress of succeeding bars through the upper portion of the trough 21 on their way to the cooling bed, or other receiving means. Should it be desired to have pieces of the sample length examined by the operator of the finishing mill, the tongs 47 are inserted into the slot 50 and the bar seized between the end portions 51. The tongs are then pivotally swung between the pins 49, thereby moving the sample bar longitudinally in the direction of the saw 31, which in the meantime has returned to its inoperative position. The motor 45 may then be operated to cause a short length to be cut off the end of the sample bar, after which the bar may be again moved longitudinally by the tongs 47 so that other lengths may be cut off by the oscillating saw 31, as desired. As best shown in Fig. 2, a chute 56 terminates adjacent to the saw 31 so as to receive the short sample lengths as they are cut and deliver them to a suitable conveyor, indicated at 57, which carries the samples to a point convenient for the operator of the finishing mill, or at any other desired point.

When a severed length has been thoroughly examined and short sample lengths cut off, as just described, the remainder may be then returned to the upper portion of the trough 21 by moving the lever 55 in a clockwise direction, as indicated in dotted lines in Fig. 5. The return movement of a sample length to the trough 21 is best accomplished when a length of material is being conveyed through the trough 2, so that the trough 1 and the rolls 25 are free at that time. Upon being again received upon the conveyor rolls 25, the sample length will enter into the trough 8 of the cooling bed, upon which it will be moved laterally with a step-by-step movement in the same manner as preceding bars.

From the foregoing, it is apparent that by our invention we have provided an improved sample cutting mechanism, by means of which samples of any desired length may be cut from heated rolled material as it is conveyed from the finishing mill to the cooling bed, or other receiving means. The particular length of material, from which it is desired to obtain a sample, is handled in substantially the same manner as other lengths of material, with the exception that the length to be sampled is moved from the

conveyor rolls by the push off 17 when only a portion of the length has passed onto the cooling bed. Obviously, samples ranging in length from a few inches up to thirty or forty feet, or more, can be obtained by merely controlling the time at which the push off 17 operates to move the length of material from the conveyor rolls.

When a sample length has ben cut it can be allowed to remain supported along the lower edge of the trough 21 as long as desired for cooling and gauging, or short lengths can be cut therefrom by the saw 31 and quickly conveyed to the operator of the finishing mill, who may then quench the samples and inspect them at leisure. When a sample length has been examined sufficiently, it can be readily returned to the conveyor rolls by means of the arms 53, whereupon the sample length will be conveyed to the trough 8 of the cooling bed, from which it will be lifted and then moved laterally across the cooling bed, in exactly the same manner as other lengths of material.

While we have illustrated our sample cutting mechanism in connection with only one of a pair of runout conveyors and cooling beds, it will be readily understood that our mechanism can be duplicated for the other runout and conveyor, should it be desired to sample more lengths of material coming from the finishing mill. With the arrangement shown, however, it is quite possible to obtain a sample of every other length, owing to the fact that a length can be removed from the rolls and a sample cut therefrom while the next length rolled is passing through the trough 2 to the opposite cooling bed or receiving means.

We claim,

1. In apparatus of the class described, the combination with receiving means, an auxiliary receiving device, and means for conveying the product of a finishing or rolling mill to said receiving means, of means for interrupting the passage of and moving a length of said product to said auxiliary receiving device, and means for cutting a sample from said length while supported by said auxiliary receiving device.

2. In apparatus of the class described, the combination with receiving means, an auxiliary receiving device, and means for conveying the product of a finishing or rolling mill longitudinally to said receiving means, of means for causing the broadside transfer of a length of said product to said auxiliary receiving device after a portion of said length has been received by said receiving means, and means for cutting a sample from said length.

3. In apparatus of the class described, the combination with receiving means, and means for conveying the product of a finishing or rolling mill lengthwise to said receiving means, of a cutting device, and means for removing a length of said product from said conveying device for operation thereon by said cutting device after a predetermined portion of said length has been received by said receiving means.

4. In apparatus of the class described, the combination with receiving means, and means for conveying the product of a finishing or rolling mill lengthwise to said reveiving means, of a cutting device, means for removing said product from said conveying means for operation thereon by said cutting device, and means for returning the length of product cut to said conveying means.

5. In apparatus of the class described, the combination with receiving means, and a conveyor for moving the product of a finishing or rolling mill longitudinally in the direction of said receiving means, of means for removing a length of said product from said conveyor after a predetermined portion thereof has been received by said receiving means, and means, for cutting off the remainder of said length.

6. In apparatus of the class described, the combination with receiving means and a conveyor for removing the product of a finishing or rolling mill longitudinally in the direction of said receiving means, of means for removing a length of said product from said conveyor after a predetermined portion thereof has been received by said receiving means, means for cutting off the remainder of said length, and means for returning the cut off portion to said conveyor for passage to said receiving means.

7. In apparatus of the class described, the combination with receiving means, and means for conveying the product of a finishing or rolling mill lengthwise to said receiving means, of means for removing said product from said conveying means to cut off a portion thereof, and means for returning the length of product cut to said conveying means.

8. In apparatus of the class described, the combination with receiving means and a conveyor for removing the product of a finishing or rolling mill longitudinally in the direction of said receiving means, of means for moving a length of said product from said conveyor to cut off a portion thereof, and further means for moving said cut off portion longitudinally to cut off other portions thereof.

9. In apparatus of the class described, the combination with receiving means and a conveyor for moving the product of a finishing or rolling mill longitudinally in the direction of said receiving means, of a cutting device, means for removing a length of said product from said conveyor for operation by said cutting device, and further means

for moving the cut off portion longitudinally for further operation thereon by said cutting device.

10. In apparatus of the class described, the combination with receiving means and a conveyor for moving the product of a finishing or rolling mill longitudinally in the direction of said receiving means, of a cutting device, means for removing a length of said product from said conveyor for operation thereon by said cutting device, and means for conveying the cut off portions of said length away from said receiving means.

11. In apparatus of the class described, the combination with receiving means and a conveyor for moving the product of a finishing or rolling mill longitudinally in the direction of said receiving means, of a cutting device, means for removing a length of said product from said conveyor for operation thereon by said cutting device, means for moving the cut off portion longitudinally for further operation thereon by said cutting device, and means for conveying the latter cut off portions away from said receiving means.

12. In apparatus of the class described, the combination with means for conveying the product of a finishing or rolling mill and receiving means to which said product is conveyed, or means for diverting a portion of said product out of its normal path to said receiving means, and means for cutting a sample from said portion so diverted.

13. In apparatus of the class described, a conveying trough for the product of a finishing or rolling mill, an inclined surface adjacent one edge of said trough having a stop ledge at the lower portion thereof, kick-off mechanism for removing a length of said product to said inclined surface, means for cutting off a sample from said length as it rests on said inclined surface, and manually operated means for replacing the remainder of said length on said trough.

14. In apparatus of the class described, a conveying trough for the product of a finishing or rolling mill, an inclined surface adjacent one edge of said trough having a stop ledge at the lower portion thereof, kick-off mechanism for removing a length of said product to said inclined surface, means for cutting off a sample from said length as it rests on said inclined surface, and lever mechanism for replacing the remainder of said length on said trough.

Dated this second day of January, 1924.

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ELBERT H. CARROLL.