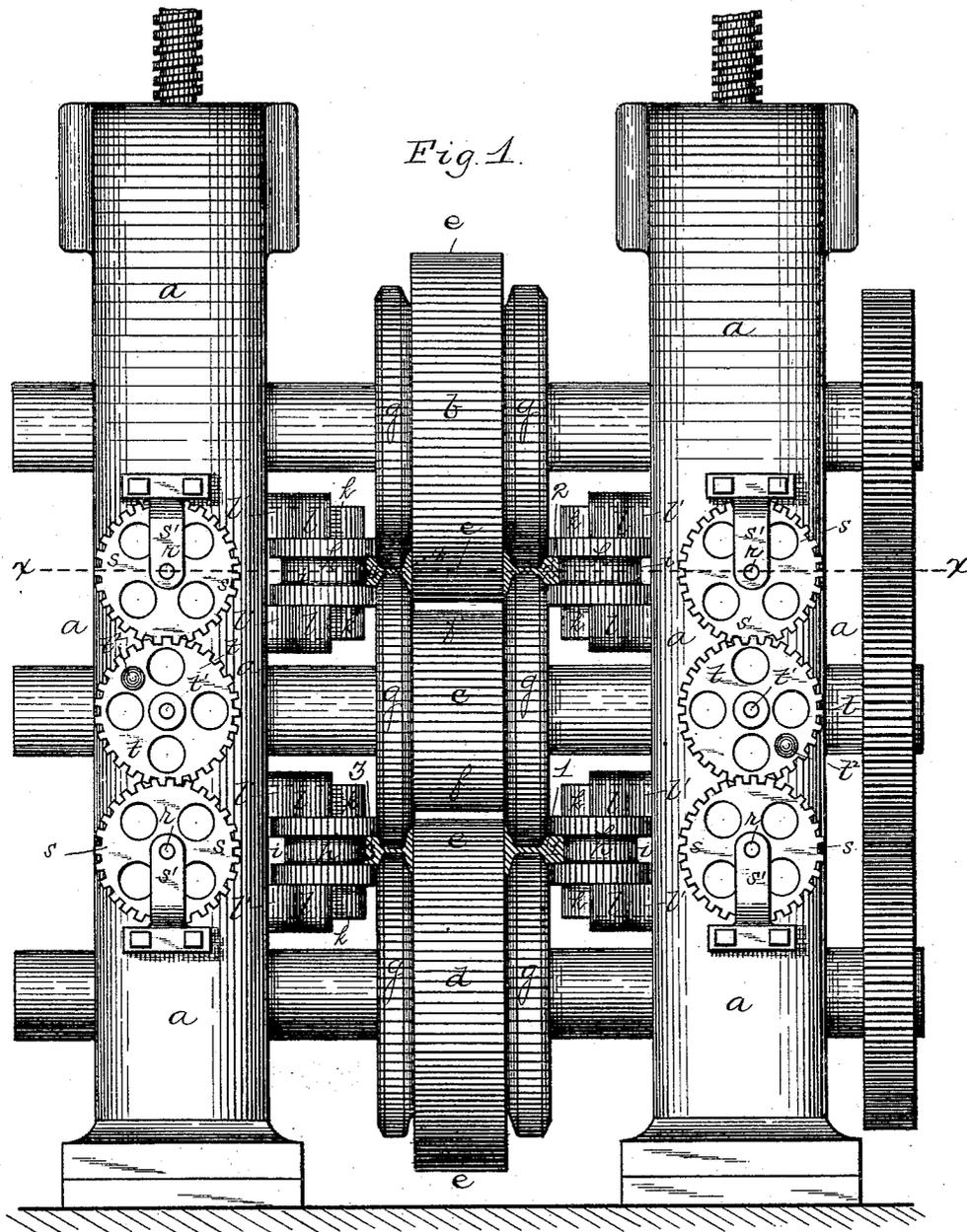


A. REESE.

APPARATUS FOR REROLLING OLD RAILS.

No. 395,350.

Patented Jan. 1, 1889.



Witnesses:
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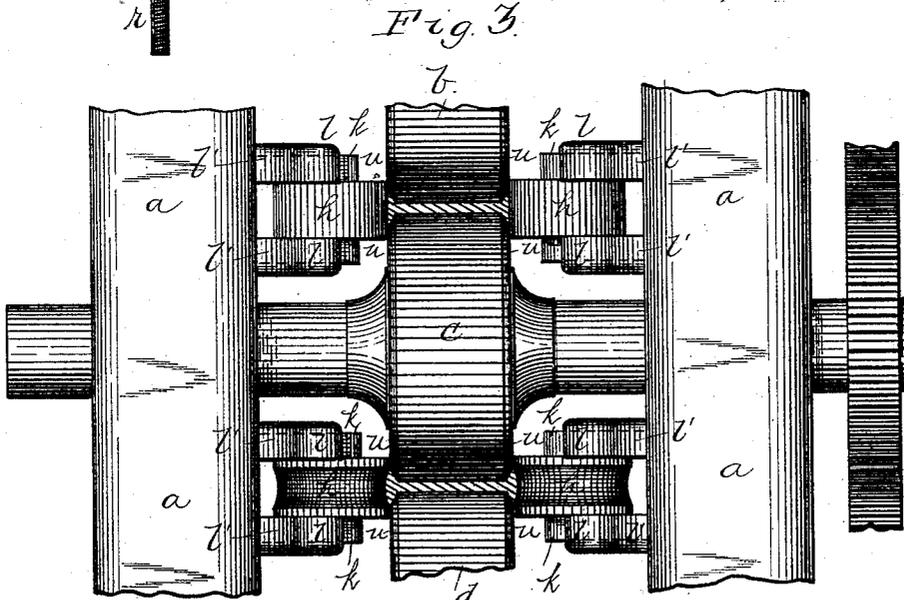
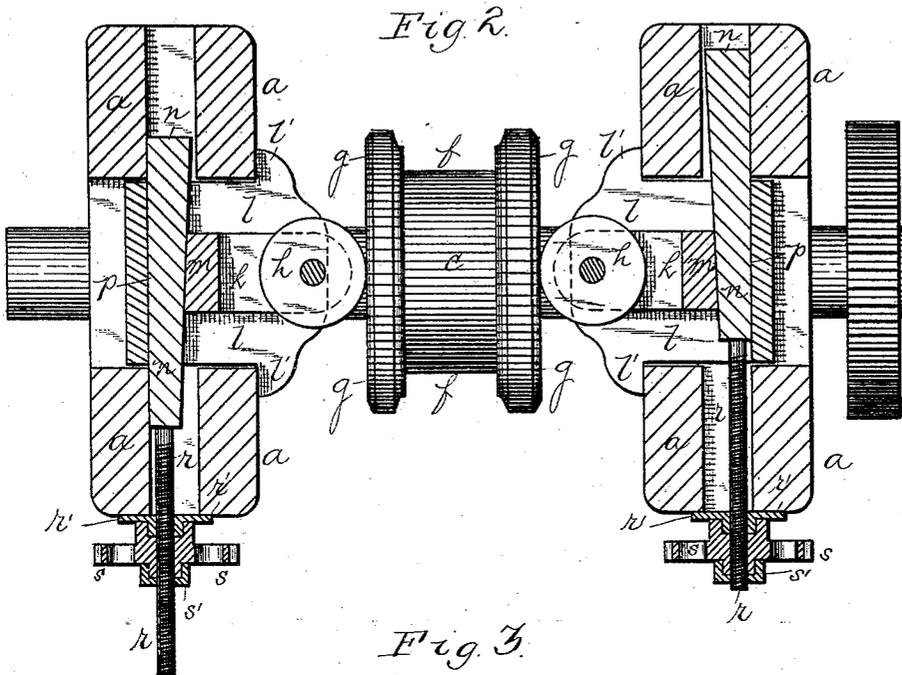
Inventor:
 Abram Reese
 By *James D. Day*
 Attorney

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UNITED STATES PATENT OFFICE.

ABRAM REESE, OF PITTSBURG, PENNSYLVANIA.

APPARATUS FOR REROLLING OLD RAILS.

SPECIFICATION forming part of Letters Patent No. 395,350, dated January 1, 1889.

Application filed April 20, 1888. Serial No. 271,357. (No model.)

To all whom it may concern:

Be it known that I, ABRAM REESE, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Rerolling Old Rails; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for rolling rails or beams, and more especially to apparatus for rerolling old rails to reduce them to rails of smaller section, the apparatus being employed in practicing the method of rerolling these old rails, as described in a separate application filed by me of even date herewith, Serial No. 271,356.

It is well known that on account of the heavy strains to which railroad-rails are subjected the rails are liable either to break, or, in the case of iron rails, to split at different places, on account of the lamination or fiber thereof, thus rendering them unfit for use. It has been attempted heretofore to reduce these rails to the desired section by a simple rerolling process in the ordinary grooved rolls for rolling rails; but the principal difficulty experienced has been that the web portion in the rail of larger section was of too great width to be properly rolled out to rails of smaller section where the width of the web was necessarily reduced and the head and flanges drawn closer to each other. To overcome these difficulties attempts have been made to reduce the width of the web and increase its thickness by reducing the height of the rail by pressure applied directly upon the head of the rail, which rested in a groove within the rolls, the rail being confined between the top of the head and the base of the flanges. This has been found impracticable, however, in most cases, because the web being thinner than the other portions of the rail would bend or buckle under the pressure brought upon it instead of thickening up, and consequently when the rail was passed through the reducing-groove it was found that the web would be simply opened out again and that the difficulty in reducing the width of the web was not overcome. It is of course well known that a large amount of these old rails are worn out each year, and consequently that the means of utilizing them at small cost

for other purposes is extremely desirable; but the difficulty in connection with such utilization for purposes other than rails has been that in the iron rail the pile or fagot from which it is formed is generally built up from different metals, according to the particular properties desired in the head, web, and flanges, respectively, and consequently the iron rail has not been found to form a fine quality of merchantable iron of different kinds, as when it is cut into lengths and formed into a pile the different qualities of metal in the different parts of the rail are distributed throughout the article formed therefrom and so deteriorates from the strength of the article formed on account of the heterogeneous mass contained within it.

In the case of steel rails it has also been found that as steel is extremely difficult to weld even when brought to a high heat, it was practically impossible to employ the steel rails in piles or fagots, and the only practicable method of utilizing them was by remelting. As, however, the metal in the rail is properly distributed for rail purposes, a means of reducing these old rails to rails of smaller section is extremely desirable, and by my apparatus, and the method described in the application above referred to, I am enabled to reroll them in such a way as to maintain the metal in the desired parts of the rail-body, and at the same time to form a rail of any desired section. It is also found desirable in many cases to reroll iron I or T beams to form light and narrower beams for structural purposes either in utilizing imperfect beams formed or short or crop ends of such beams, and as these beams have also thin webs the same difficulty has arisen in utilizing them; and it has also been found desirable in forming beams of small sections to roll them from railroad-rails, as the railroad-rails correspond substantially in section to the beam, and yet in drawing out such rail it is desirable in some cases to spread the head thereof and in some cases to reduce the width of the web, and this cannot well be done in the ordinary form of rolls employed in rolling these beams.

The object of my invention is to provide rolling apparatus suitable for the rolling of these articles and overcome the difficulties above referred to; and to these ends my inven-

tion consists in the improvements hereinafter set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a face view of a rolling-mill embodying my invention. Fig. 2 is a horizontal section on the line $x x$, Fig. 1; and Fig. 3 is a face view of a portion of a mill suitable for rolling beams.

Like letters of reference indicate like parts in each.

My improved apparatus is shown in connection with a three-high mill, as that is found to be the more desirable form of apparatus, since by it the necessary apparatus for reducing the rail or beam and preparing it for the subsequent rolling in the ordinary mill employed for such purposes can be accomplished at a single heat. The housings a are the ordinary housings employed in a three-high rolling-mill, except as hereinafter referred to, the horizontal rolls $b c d$ employed being mounted in the housings in any desired manner, according to the desired adjustment of the rolls toward and from each other, or according to the regulation of the passes of the mill. These rolls are driven by any suitable power-connections, and are generally formed in the following manner, where, as shown in Figs. 1 and 2, they are employed in the rerolling of old rails: The top and bottom rolls, $b d$, are provided with the large tongues or disks e , having flat side faces, which enter the groove f of the central roll, c , the sides of the tongues e forming the bases of the passes through the rolls and the bases of the flanges of the rails being pressed against the sides of these tongues.

Formed on the rolls $b c d$ are the annular collars g , these collars corresponding in shape to the faces of the flanges and web of the rail, and if desired to part of the head of the rail, so as to support the rail and to reduce to some extent the flanges thereof, the collars of the rolls $b d$ extending out from the sides of the tongues or disks e , which form the bases of the passes, as above set forth, while the collars g on the roll c extend up above the groove f thereof and lap over the tongues e of the rolls $b d$, said collars in this case forming the sides of the groove f in the roll c . These rolls thus form the passes of the mill, except that for the head of the rail or part of the head thereof, and the passes for the head of the rail, as shown, are formed by the vertical rolls h , having the grooves i therein corresponding to the upper portion of the rail-head, these rolls being adjusted and held up to the horizontal rolls in forming the desired passes, as hereinafter described. These rolls h are generally allowed to run freely, being operated by the friction of the article passing through the mill or the friction of the faces of the rolls on the sides of the horizontal rolls.

The rolls h are mounted in journal-boxes k ,

fitting and sliding in frames or housings l , secured in the housings a , and said journal-boxes k have inclined or wedge-shaped faces m at the base thereof, which press against the adjusting wedge-bars n , passing through seats or grooves p in the frames l , and longitudinally adjustable therein. The frames l are secured in any desired manner in the housings, the manner preferred by me being such as shown in the drawings, in which the frames fit between the journal-boxes of the horizontal rolls, the frames l having shoulders l' , which press against the inner sides of the housings a and so sustain the pressure of the horizontal rolls during the rolling operation.

If desired, regular seats for the reception of the frames l may be formed in the housings, but where the vertical adjustment of the horizontal rolls is but slight or said rolls are set so that no vertical adjustment thereof is required, this is not necessary, the journal-boxes of the horizontal rolls holding the frames l in proper position. The wedge-bars n , above referred to, are preferably adjusted in the following manner: Secured to each wedge-bar is a threaded or screw bar, r , which passes through one standard of the housing a and out through a bearing-plate, r' , secured to the housing a , on which screw-bar the gear wheel or pinion s is screwed, the central opening of said pinion being threaded, corresponding to the thread on the bar r , and the pinion being supported between the plate r' and the bracket s' , secured to the housing. These pinions s gear into a pinion, t , which is mounted on a suitable shaft, t' , between the screw-bars r , and provided with a handle, t'' , by means of which the pinion t can be rotated, thus causing the gear-wheels s to be screwed onto or off the screw-bars r of the wedge-bars n , so causing the longitudinal movement of these wedge-bars in the frame or housings l , drawing said bars forward or receding them, so as to force out the sliding journal-boxes k and force the vertical rolls supported therein toward the horizontal rolls or permit said vertical rolls to be forced back within the supporting-frame l , and so adjusting the height of the pass through the mill, according as it is desired to increase or diminish the height of the pass or passes for the rail. The apparatus is thus arranged so that by the means above set forth the vertical rolls of the upper and lower passes can be properly adjusted at the same time.

The flanges g on one side of the horizontal rolls are made of greater width than those on the other side thereof, so as to accommodate the rolls to the desired reduction in the width of the web of the rail and cause them to support the same, and to provide means on one side to permit the head and flanges of the standard size of rail to be forced toward each other, so reducing the width of the web from the standard gage of the rail, and on the other side provide means for permitting the head and flanges to be forced closer to each

other after passing through the passes on the first side of the mill.

The construction of the rolls for rolling beams is substantially the same, except, as illustrated in Fig. 3, that the three horizontal rolls are made substantially the same diameter, the tongues or disks on the upper and lower rolls and the groove in the middle rolls being dispensed with, and that shape of the horizontal rolls is changed according to the shape of the article to be rolled, the web portion of the body of the rail rolled being held and supported between the faces of the horizontal rolls, while the pass for the inner portion of the flanges is formed by the side portions or faces, *u*, of the horizontal rolls and the passes for the outer faces of the flanges by the vertical rolls *h*.

In employing my improved apparatus in the rerolling of old rails the operation is substantially as follows: I first adjust the rolls so that the first passes thereof—such, for instance, as the pass 1 and pass 2—shall each act to reduce the head slightly, the one slightly more than the other, while supporting the web of the rail, but permitting the head thereof to be forced down toward the web, so forcing the head toward the flanges and reducing the width of the web, while the faces of the flanges *g* on the other side are slightly narrower and the height of the passes 3 4 less than the passes 1 2, so that after the rail has been rolled through the passes 1 2 it is in condition to be still further reduced in height and the head drawn nearer to the flanges in the passes 3 4. The rolls having been so adjusted the short section of the rail to be rolled is raised to the proper heat and fed to the mill, and, as the width of the flange-rolling portion of the pass is less than the width of the flanges of the rail, as it passes through the first pass the flanges thereof are slightly reduced in width, while by the pressure of the vertical roll *h* the head of the rail is pressed toward the flanges, and, as the web of the rail is supported so that it cannot be bent, buckled, or thickened up under the pressure in rolling, the metal is necessarily forced either into the head and flange portions, or else, being forced into the web, it causes the elongation of the web during the rolling operation, the rail being thus reduced in height and the head and flange thereof elongated, while the web is supported, and any tendency of the web to buckle or bend out of form is overcome, the entire body or substantially the entire body of the rail being supported during its passage through the rolls. The action upon the rail in the other passes of the rolls is substantially the same; and during said passes the rail is reduced in height and the web thereof reduced in width, while the head is to some extent thickened at the base thereof, thus enabling me to draw out the rail and maintain substantially the same section and reduce the width of the web without either thickening it up or bending or

buckling it, while by the reduction of the flanges during the pressure upon the head of the rail I am enabled to draw out the rail evenly and prevent the twisting or bending of the rail, which would occur if the reducing action took place only on one portion thereof, such as the head. As the rolls are so constructed as to bind upon and draw out a portion of the rail, it is evident that the friction on the face of the vertical roll causes the rotation of the same, the necessity of driving said roll by any special gearing being overcome. After the rolling operation, if it is desired to roll the rail through the same passes, the vertical rolls can be forced closer to the horizontal rolls, the adjustment thereof being accomplished by means of the pinion *t*, by the rotation of which the pinions *s s*, gearing therewith, are caused to screw up on the threaded bars *r* and draw the wedge-bars *u* toward the front of the housing, so forcing out the vertical rolls *h*, this adjustment being accomplished in both upper and lower passes at the same time, so that the rolls can be rapidly adjusted and the necessary reduction in height obtained for the passage of the rail through the same passes at the same heat, the horizontal rolls being also drawn together, if desired, by the usual means. The rail thus obtained, after it has been sufficiently reduced in height, can then be rolled to any desired section through the ordinary rail-mill; and in forming rails of very small section—such as those under twenty-five pounds to the linear yard—the rail may, after being rolled in the ordinary mill, be again reduced in height, by the method above described, in a mill having rolls provided with passes of the proper size therefor, and subsequently rolled in the ordinary rail-mill to the section and weight desired.

In forming beams where they are rolled from beams of large section the operation is substantially the same, rolls such as shown in Fig. 3 being employed, and by the pressure of the vertical rolls the flanges of the beam can be forced toward each other, the metal of the web being forced either into the flanges or drawn out in the web during the rolling operation, and, if it is desired, such as in the rolling of rails into beams, the head of the rail being spread to form flanges of the proper width, as necessary, and the blank being subsequently rolled in the ordinary beam-rolls.

I am thus enabled in the rerolling of old rails, by reducing the flanges and supporting the web, and by means of vertical rolls operating in conjunction with the horizontal rolls above set forth, to overcome the greatest objection heretofore found in the rerolling of old rails to rails of smaller section, and by my improved apparatus to utilize old rails of either steel or iron in the production of rails of the same shape, but of any desired section or width therefrom, being thus enabled to produce rails of smaller section at an exceedingly low cost, as the old rails are cheap and

the cost of reducing them in height, as above described, and then rerolling them is small, for the reason that they correspond in shape to the rails of smaller section, and the labor of breaking down and rerolling is done away with. I am also enabled to reduce the beam in like manner and utilize the short lengths or imperfect beams which could not heretofore be employed in the forming of beams of smaller section.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In rolls for rolling rails or beams, the combination of three horizontal rolls forming three sides of two separate passes, with two vertical friction-rolls adjustable horizontally and forming the fourth side of said passes, substantially as and for the purposes set forth.

2. In rolls for rolling rails or beams, the combination of a pair of horizontal rolls, a vertical roll forming one side of the pass and mounted in journal-box in the housing, and a wedge-bar in the housing for adjusting said vertical roll, substantially as and for the purposes set forth.

3. In rolls for rolling rails or beams, the combination of a pair of horizontal rolls, a frame supported in the housing and having guide-ways therein, a vertical roll mounted in

a journal-box sliding in said guideways, and a wedge for adjusting said vertical roll horizontally in the frame, substantially as and for the purposes set forth.

4. In rolls for rolling rails or beams, the combination of a pair of horizontal rolls, a vertical roll forming one side of the pass and mounted in a journal-box, a wedge-bar for adjusting said vertical roll horizontally, provided with a threaded bar, and a revolving nut screwing on said threaded bar for adjusting said wedge-bar longitudinally, substantially as and for the purposes set forth.

5. In rolls for rolling rails or beams, the combination, with three horizontal rolls mounted in suitable housings, of two vertical rolls mounted in suitable journal-boxes, wedge-bars beyond said journal-boxes for adjusting the rolls, threaded bars secured to said wedge-bars, pinions screwing onto the threaded bars, and a pinion gearing with both said pinions, substantially as and for the purposes set forth.

In testimony whereof I, the said ABRAM REESE, have hereunto set my hand.

ABRAM REESE.

Witnesses:

JAMES I. KAY,
J. N. COOKE.