

(No Model.)

3 Sheets—Sheet 1.

L. D. HILL.
MILL FOR ROLLING AXLE BLANKS.

No. 470,243.

Patented Mar. 8, 1892.

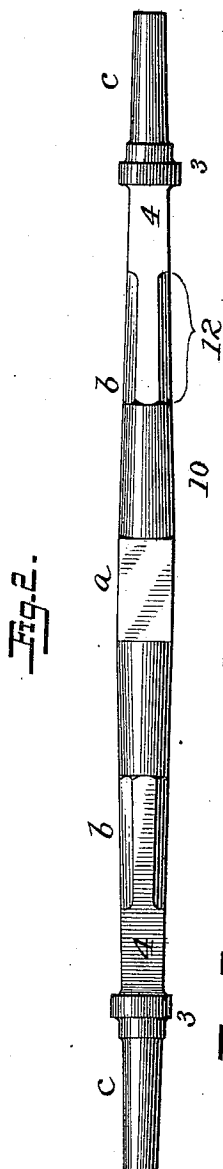


Fig. 3.

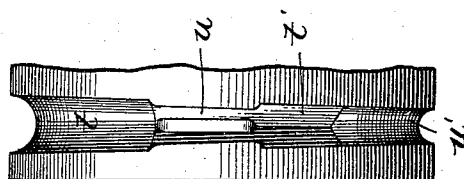
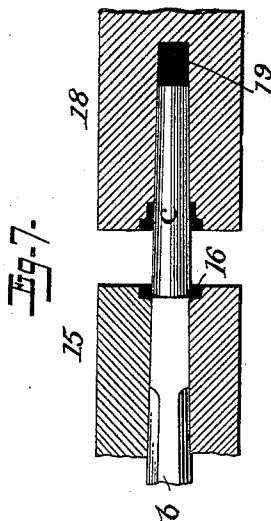
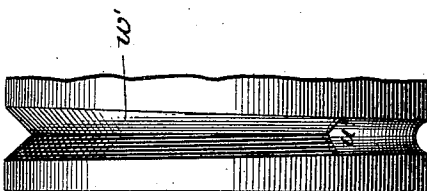


Fig. 4.



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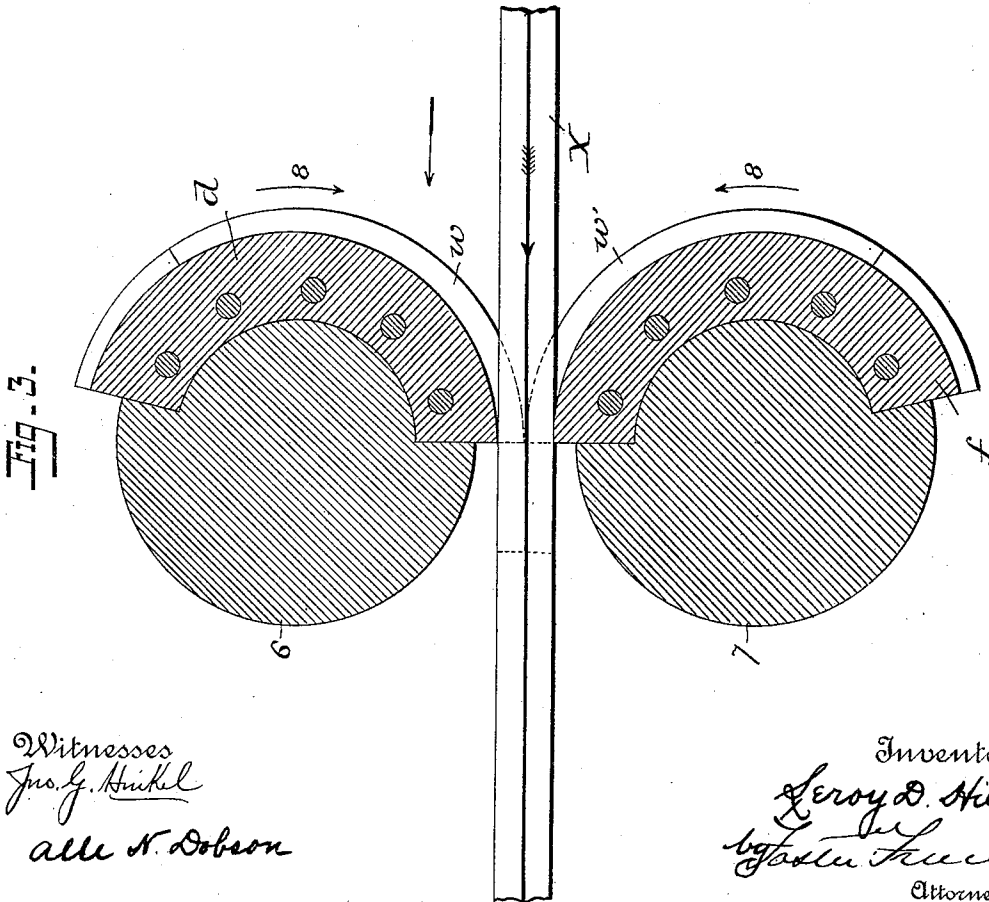
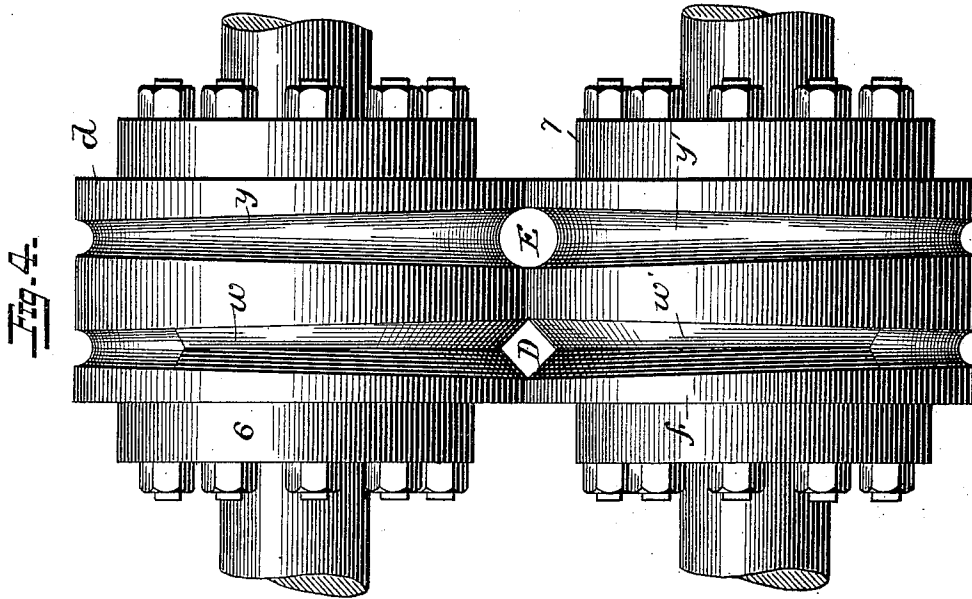
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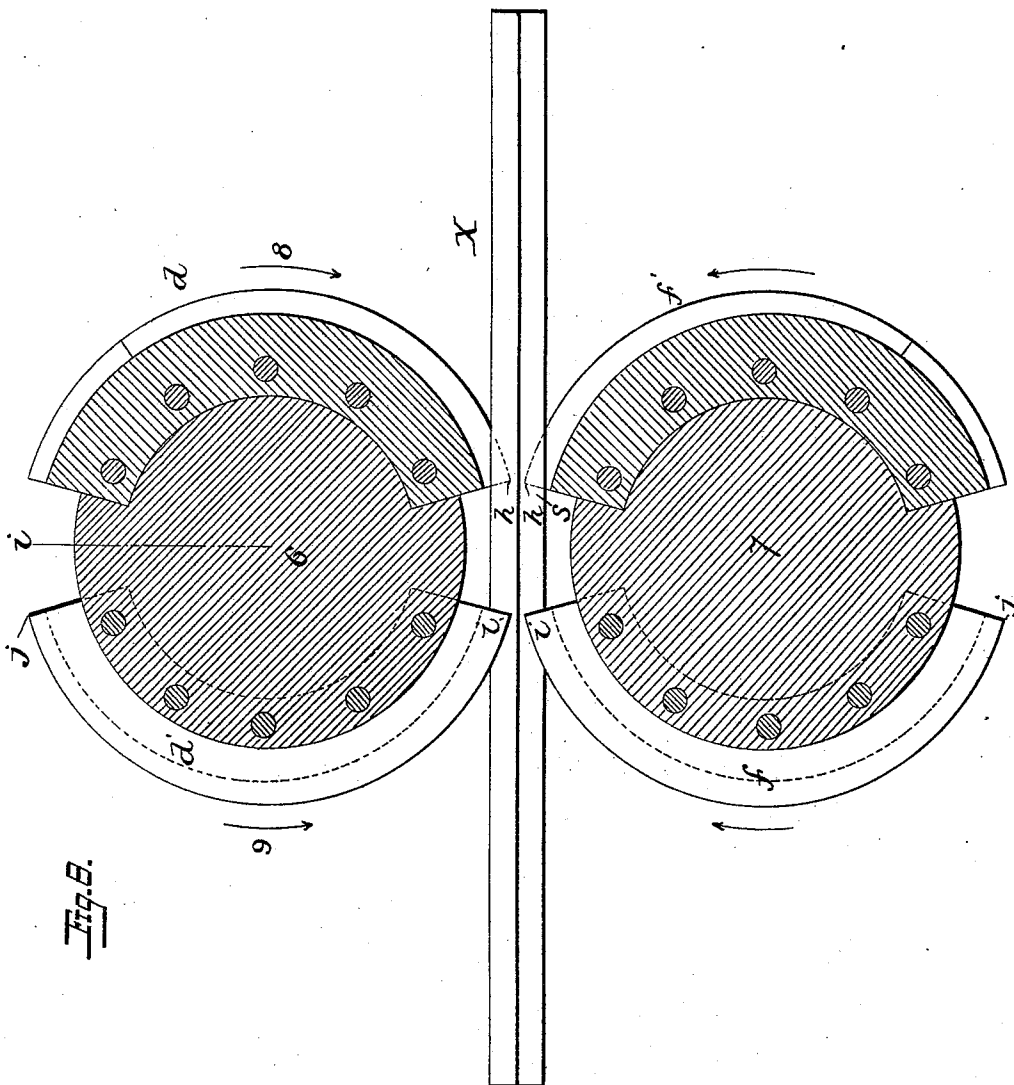
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UNITED STATES PATENT OFFICE.

LEROY D. HILL, OF WILKES-BARRÉ, PENNSYLVANIA.

MILL FOR ROLLING AXLE-BLANKS.

SPECIFICATION forming part of Letters Patent No. 470,243, dated March 8, 1892.

Application filed January 19, 1892. Serial No. 418,612. (No model.)

To all whom it may concern:

Be it known that I, LEROY D. HILL, a citizen of the United States, residing at Wilkes-Barre, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Mills for Rolling Axle-Blanks, of which the following is a specification.

My invention relates to that class of axle bars and blanks that are tapering toward the ends; and it consists of a mill for rolling such bars or blanks constructed as fully set forth hereinafter, and as illustrated in the accompanying drawings, in which—

Figures 1 and 2 are longitudinal side views showing the general characteristics of the axle bars or blanks to be rolled, Fig. 2 illustrating also the collars. Fig. 3 is a transverse sectional elevation of the rolling-mill. Fig. 4 is a side elevation looking in the direction of the arrow, Fig. 3. Figs. 5 to 7 are face views of the dies with grooves of different forms. Fig. 8 illustrates a preferred arrangement of dies on the rolls.

The general characteristics of the bar or blank which it is desired to manufacture are illustrated in Figs. 1 and 2, said bar or blank in any case having a central portion *a* of greater diameter and of greater or less length, as may be desired—that is, preferably square or rectangular in cross-section—terminal journals *c*, generally tapering, and intermediate portions *b*, which taper from the center or near the center toward the ends and are square or round or approximately round—as octagonal—in cross-section or of different cross-sectional forms at different parts, and preferably with rectangular portions 4 4 inside of the journals.

In the manufacture of a bar or blank of the general construction described I make use of any available means, preferably of a rolling-mill substantially as illustrated in the drawings and having two rolls or cylinders 6 7, each provided with any suitable number and conformation of dies forming part of or preferably secured to the cylinders, as shown, the cylinder 6 carrying a die *d*, with two channels or grooves *w y*, and cylinder 7 a die *f*, with two grooves *w' y'*, said grooves *w y w' y'* formed and arranged as may be necessary to constitute passes D E. If desired, there are

additional grooves and additional passes. The rolls may revolve or oscillate. Assuming that a rectangular bar X, of a shape corresponding in cross-section to the shape of the central section *a* of the axle bar or blank, is to be shaped to the form illustrated in Fig. 1 and that oscillating rolls are used, the said rolls are turned to nearly the position illustrated in Fig. 4, and bar X, turned to an angle quarter round from the flat, is passed between the dies, so that the point where the taper is to start shall be near the forward ends of the dies. If now the rolls oscillate in the direction of the arrows 8, the dies *d f* will be brought together and the bar will be pinched in the largest portion of the pass D, and as this movement of the rolls continues the four sides of the bar in the pass will be simultaneously acted upon to taper the bar, imparting the cross-sectional form and dimensions of the pass, at the same time elongating the bar, this action continuing until the dies have acted upon the bar for their full length. This action is then had at the opposite end of the bar and may be repeated as often as required, the bar being reversed after each action. The tapering form of the ends of the blanks may be secured by rolling the ends in the pass E or by providing the passes *w w'* with terminal semi-conical portions *u'*. When the sections *b b* of the bars are tapered uniformly from the point *v* to the point *v'*, each groove of the pass D is of the form indicated by the groove *w'*, Fig. 5; but when the said section *b* changes its form in cross-section at different points of its length the groove in each pass is correspondingly shaped. Thus the groove in the die for rolling the axle (illustrated in Fig. 2) will have a rounded tapering portion *t* for rolling the rounded tapering portion 10 and will have a half-octagon groove for rolling the octagonal portion 12 and will have a V-shaped tapering portion *t'* for rolling the rectangular portion 4, as in Fig. 6. It will be seen, however, that in each case the groove in the die tapers from one end toward the other, whatever may be the changes in its cross-sectional form, so that the axle bar or blank produced tapers from the central square portion toward the journal.

It will be seen that each end of the bar is quickly shaped by the dies to the extent even

of forming the tapering journal. The bar will lose but a small portion of its heat, and I am therefore enabled without further reheating to place the bar between the clamping-jaws 5 15 16, Fig. 7, and subject it to the action of an end die 18, having a tapering recess 19, to complete, if necessary, the formation of the journal, and then upset the bar to form the collar 3, the faces of the clamping-jaws and 10 dies being appropriately formed to this end.

While for facilitating the description I have described and illustrated in Figs. 3 and 4 the rolls as provided each with a single die, I prefer to provide the upper roll with two 15 dies $d\ d'$ and the lower roll with two dies $f\ f'$, preferably set so that the rolls $d\ f$ shall be upon one plane and the rolls $d'\ f'$ upon a plane farther back. If the bar X is introduced with its central portion s between the passes $h\ h$ 20 and the rolls are rocked in the direction of the arrows 8, the right-hand portion of the bar will be rolled, and the rolls may be then turned back to the position shown in Fig. 8 to get a sort of finishing pass on the same right-hand 25 portion, and the bar may then be shifted longitudinally and laterally to bring the portion s between the points $i\ i$, and the rolls may be rocked in the direction of the arrows 9 to roll the opposite or left-hand end of the bar, or 30 by a different arrangement of the grooves the rolls may rotate in the direction of the arrows 8, the right-hand portion of the bar being tapered by a pass between the dies $d\ f$, and the bar then reversed as the points $j\ j$ of the dies 35 $d'\ f'$ are brought into position of the passes $h\ h$, when the opposite end will be rolled down. This action may be secured in consequence of the separation of the ends of the dies permitting the bar to be set in position 40 after being acted upon by one pair of dies and before the other comes into place. I thus expedite the manufacture, avoid the reheating

and burning of the metal, and secure an article less liable to have defects resulting from reheating. 45

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. A mill for rolling axle bars and blanks, provided with rolls carrying dies, each provided 50 with a tapering groove adapted to roll and shape that portion of the bar at one end beyond a central rectangular section a , substantially as set forth.

2. The combination, in a mill for rolling 55 axle bars and blanks, of two rolls, each carrying a pair of separated dies, each die with a groove tapering from the inner toward the outer end, substantially as described.

3. The combination, in a mill for rolling 60 axle bars and blanks, of two rolls and dies carried by said rolls, each die having a tapering groove, with projections or faces in part of said groove to chamfer or indent the edge of said bar, substantially as set forth. 65

4. The combination, with the rolls, of dies having grooves tapered to form a contracting pass D for part of the bar beyond the collar and a contracting pass E for rolling the journal, substantially as set forth. 70

5. The combination, in a mill for rolling axle bars and blanks, of rolls, each having one or more projecting dies arranged to permit the bar to be brought in position first to be acted upon by one pair of dies on the opposite 75 rolls and then by the other pair, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEROY D. HILL.

Witnesses:

C. S. DEURY,
CHARLES E. FOSTER.