(No Model.)

F. NEVEGOLD.

METAL ROLLING MILL.

No. 480,609. Patented Aug. 9, 1892.

Fig. 1.

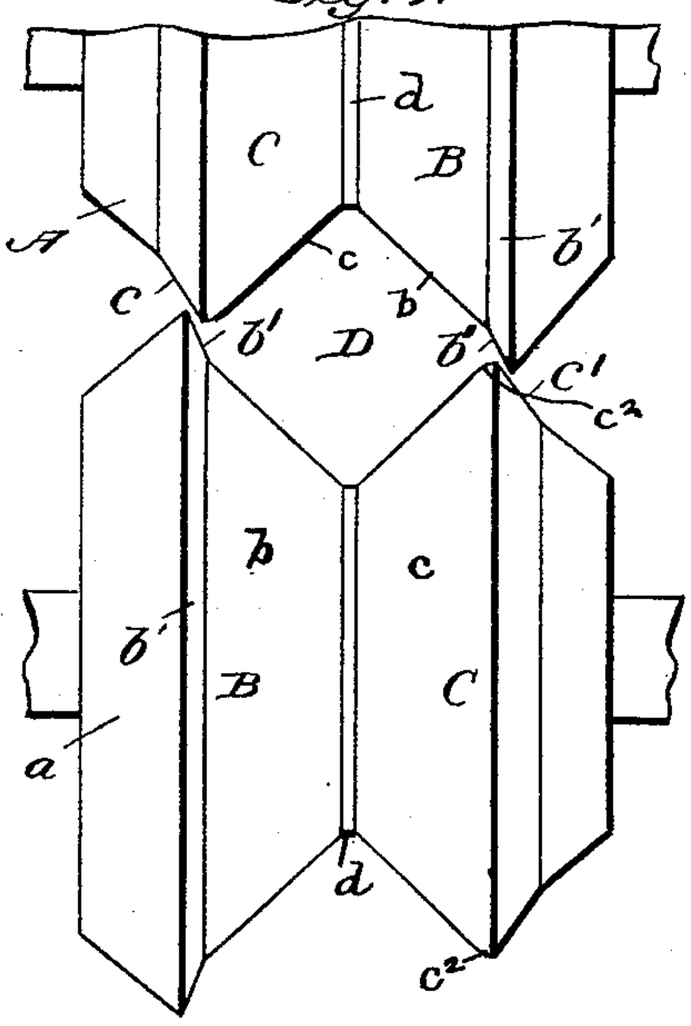


Fig. 2.

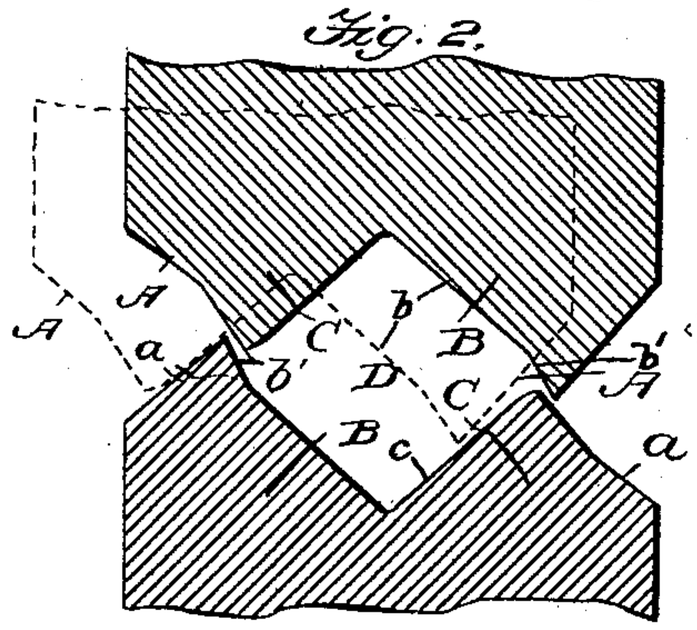


Fig. 5.

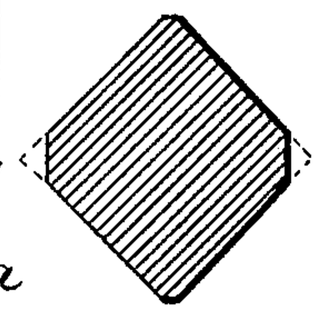


Fig. 3.

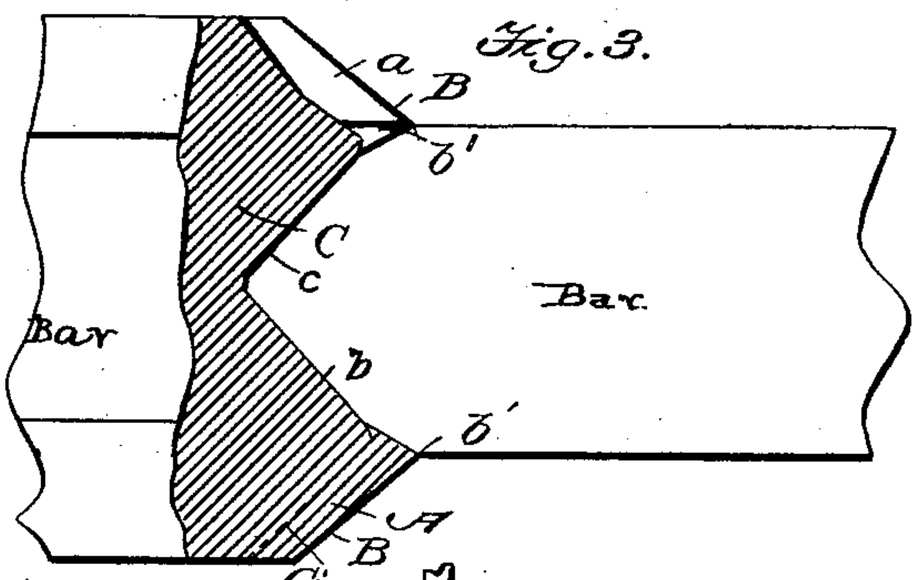
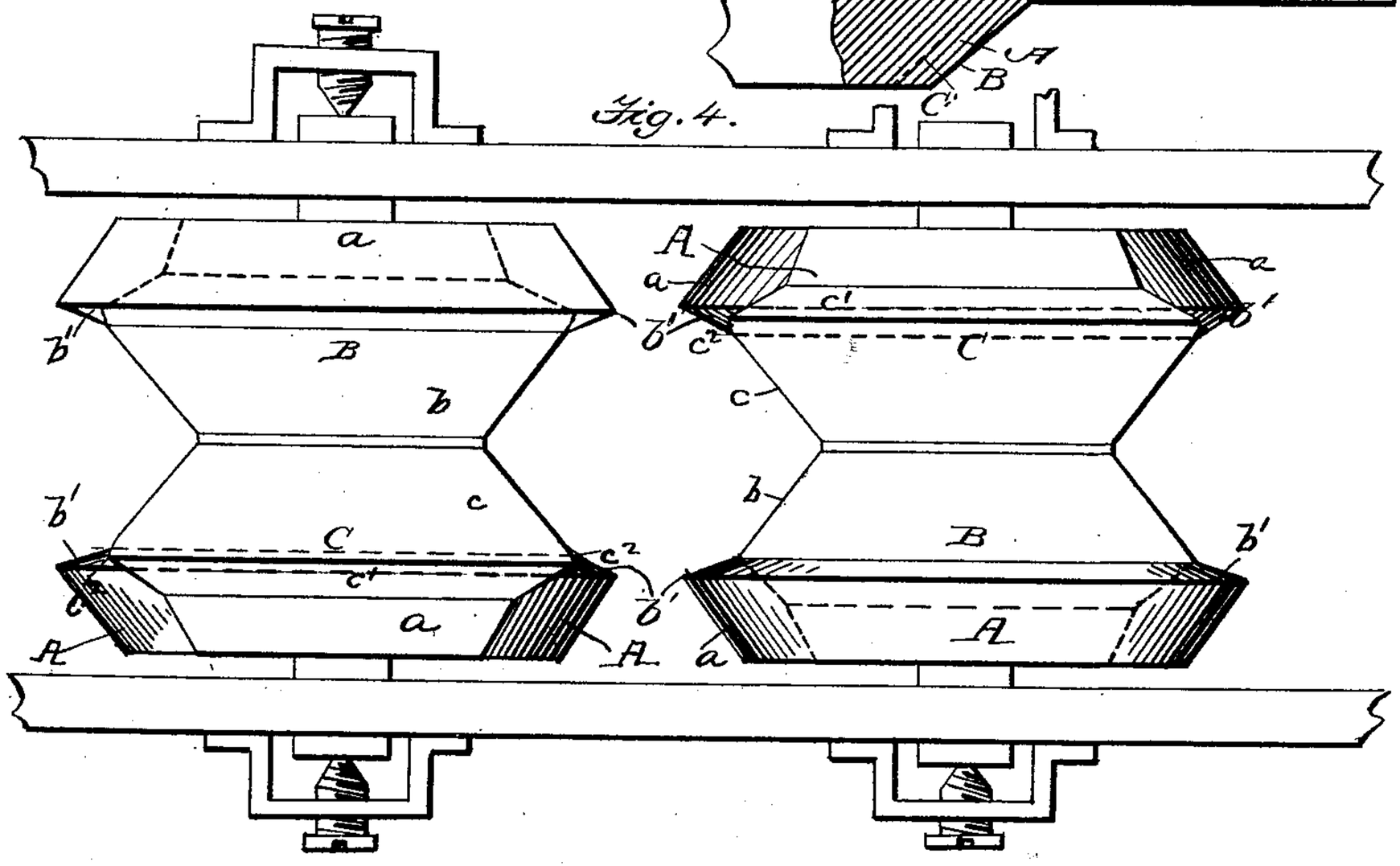


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRED NEVEGOLD, OF COLUMBIA, PENNSYLVANIA.

METAL-ROLLING MILL.

SPECIFICATION forming part of Letters Patent No. 480,609, dated August 9, 1892.

Application filed September 15, 1891. Serial No. 405,786. (No model.)

To all whom it may concern:

Be it known that I, FRED NEVEGOLD, of Columbia, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Metal-Rolling Mills; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification, in which—

Figure 1 is a side elevation of a pair of my improved reducing-rolls for metal-rolling mills. Fig. 2 is a detail vertical longitudinal section showing the "pass" between the rolls. Fig. 3 is a diagrammatical horizontal sectional and plan view showing the relation of the "fillet-ribs" of the rolls. Fig. 4 is a detail view illustrating a roll-train. Fig. 5 is a detail view illustrating a section of a bar before and after passing through the rolls by the aid of dotted lines.

This invention is an improvement in metal-rolling mills; and its objects are to prevent "finning" of the bars while being rolled, and to enable the bar to be passed directly through a series of reducing-rolls in immediate succession without turning or twisting the bar; and these objects I accomplish by the novel construction of the reducing-rolls in which lies my invention, and which will be clearly understood from the following description and claims.

Referring to the drawings by letter, A *a* represent the upper and lower opposed rolls of a reducing pair which are constructed alike, but face endwise in different directions, and are suitably mounted in bearings and housings (not shown) of any suitable construction—such, for instance, as are shown in my Letters Patent No. 460,882. Each roll may be described as consisting of two large collars B C, fixed on the roll-shaft and set close together, they, in fact, being preferably formed integral, and each being double-beveled at its edge or A-shaped in cross-section at its periphery, so that a triangular or V-shaped groove is formed between the collars. Collar B is larger and of greater diameter than collar C. The inner face *b* of collar B lies about perpendicular to the opposed inner face *c* of collar C, as shown, and from the apex of the collar C its outer face *c'* slopes downward or inward toward the shaft, so as not to interfere with the adjustment of the rolls in relation to each other. When rolls A *a* are in proper relative position, collars B C of the respective rolls adjoin each other, and faces *b b* and *c c* of the respective rolls are diagonally opposed and parallel, and the grooves in the two rolls constitute a rectangular pass or opening D between the rolls, through which the bars of metal are passed while being operated upon and reduced. Faces *c c* are the guide-faces and *b b* the working faces of the rolls, although the former also have a share in the reduction of a bar when the rolls are adjusted to operate on large-sized bars. The bottoms of the grooves are not sharp, but have proper fillets *d* left in them, as is usual in this class of machines.

At the apex of collar B of each roll, on the face *b*, is formed what I call a "fillet-rib" or "corner-working rib" *b'*, which is an annular rim formed integral with the collar and face *b* and having its outer face beveled off flush with the outer face of collar B, but its inner face is beveled at a greater angle to the roll-axis than face *b*, so that it forms a slight angular offset at the outer periphery of face *b* or top edge of the groove. The fillet-rib *b'* lies opposite the apex of the collar C, which is slightly tapered or rounded, as at c^2, so that a line drawn in the pass in the plane of the inner face *c* of collar C when the rolls are adjusted to work on the largest-sized bars would strike the inner face of the fillet-rib.

By reference to Fig. 2 it will be seen that while the pass is properly rectangular or square in cross-section, having four main sides or faces, it is really sexagonal, because the fillet-ribs *b'* form two very short sides at two diametrically-opposed corners of the pass. The object of the fillet-ribs therefore is to keep down and prevent finning of the metal, because while being compressed by the rolls in passing therebetween through pass D' the metal crowded toward the meeting edges of the rolls at the sides of the pass is worked back into the body of the bar by the angular fillet-ribs *b'* and kept from finning. In other words, when the rolls are running and work-

ing on a metal bar of full size the faces *b c* work the four main sides of the bar and compress it sufficiently to cause it to go through the pass, while the fillet-ribs *b'*, being of greater diameter than the faces *b* and *c*, work down the lateral corners of the bar before it is worked down by the faces *b c*, (see Fig. 6,) and if any metal is crowded up or down faces *c* of the pass it impinges against the fillet-ribs *b'* and is deflected back and worked into the body of the reduced bar without finning, and any tendency of the metal to crowd along faces *b* of the pass is checked and prevented by the fillet-ribs *b'*, which form a barrier to prevent any metal sliding or working bodily over the faces *b*.

The increasing diameter of the rolls from the fillets *d* to the apex of the collars B C causes an intense amount of friction on the bar being worked, as necessarily the apexes of the collars, by reason of greater diameter, travel faster than their bases, and the fillet-ribs *b'*, being of still greater diameter than any portion of faces *b c*, will cause the greatest amount of friction on the bar at two of its corners where there is least metal to heat. This friction is productive of heat so great that the corners maintain the same heat as the body of the bar. Thus the fillet-ribs *b'* are enabled the more readily to work down its corners and prevent finning thereof. By properly speeding the rolls so much frictional heat can be generated as to keep the bar at working heat while passing through a number of pairs of rolls in a train without impairing the effectiveness of the mill. This friction is occasioned by the slipping of parts of the roll-faces over the bar, owing to the unequal linear peripheral speed of the faces. If the rolls be sufficiently speeded, the bar will be finally delivered as highly heated as it was when first introduced into the rolls. In fact, I have found the heat of the bar to be increased by such friction.

In practice I propose to employ a number of pairs of my rolls, as indicated in Fig. 4, so that the bar being worked passes directly from one pair to the next without handling. In order to properly work the bar, however, the alternate pairs of rolls are set in an endwise reversed position, so that the fillet-ribs in alternate pairs will alternately work top and bottom of the edges. The faces *b b* of the rolls have to bear the principal strain in reducing the metal, because fillet-ribs *b'* keep and direct the main body of the metal onto said faces, the faces *c c* being principally effective as guide and molding faces. When it is desired to shift the rolls to work a smaller ingot or bar, they are shifted endwise until the fillet-ribs *b'* are opposed to faces *c*, and then set toward each other until the fillet ribs about touch the faces *c*, thus making the pass instead of square to be a rectangle of unequal diameters, as shown in dotted lines in Fig. 2, and the size of such pass can be varied by shifting the rolls, as described. In such case faces *c c* are simply guide-faces, and do not or only slightly work the metal, which is worked between faces *b b* and fillet-ribs *b' b'*, and in such case ordinary bar-guides might be employed to properly direct the bar through the pass.

I have shown simply a rectangular pass or groove. Its form might be varied particularly where it is only desired to have the rolls work one size of bars, the fillet-ribs being formed to protect the openings in the pass at the meeting faces of the rolls and prevent finning, substantially as herein specified.

From the foregoing a few of the practical advantages of this form of reducing-roll will be understood.

Having described my invention, what I claim as new, and desire to secure by Letters Patent thereon, is—

1. For a metal-rolling mill, a roll having an annular groove, a fillet at the bottom thereof and a fillet-rib at the outer edge of one side of the groove, substantially as described.

2. The combination of a pair of opposed metal-working rolls, each having an annular groove, angular in cross-section and together forming the pass, fillets at the bottoms of said grooves, and fillets at the corners of the pass at the meeting-line of the rolls adapted to prevent crowding of the metal between the rolls and to reduce the corners of the ingot or bar, substantially as specified.

3. The combination of the opposite endwise-adjustable rolls having opposed annular grooves forming the pass, and each having a fillet-rib at one side of its groove, substantially as and for the purpose set forth.

4. A roll for metal-rolling mills, having a pair of collars B C double-beveled on their peripheries, the former having a fillet-rib *b'* at its apex and the latter a beveled or rounded edge c^2 at its apex, substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

FRED NEVEGOLD.

Witnesses:
T. H. ALEXANDER,
W. H. BARNES.