G. G. McMURTRY.

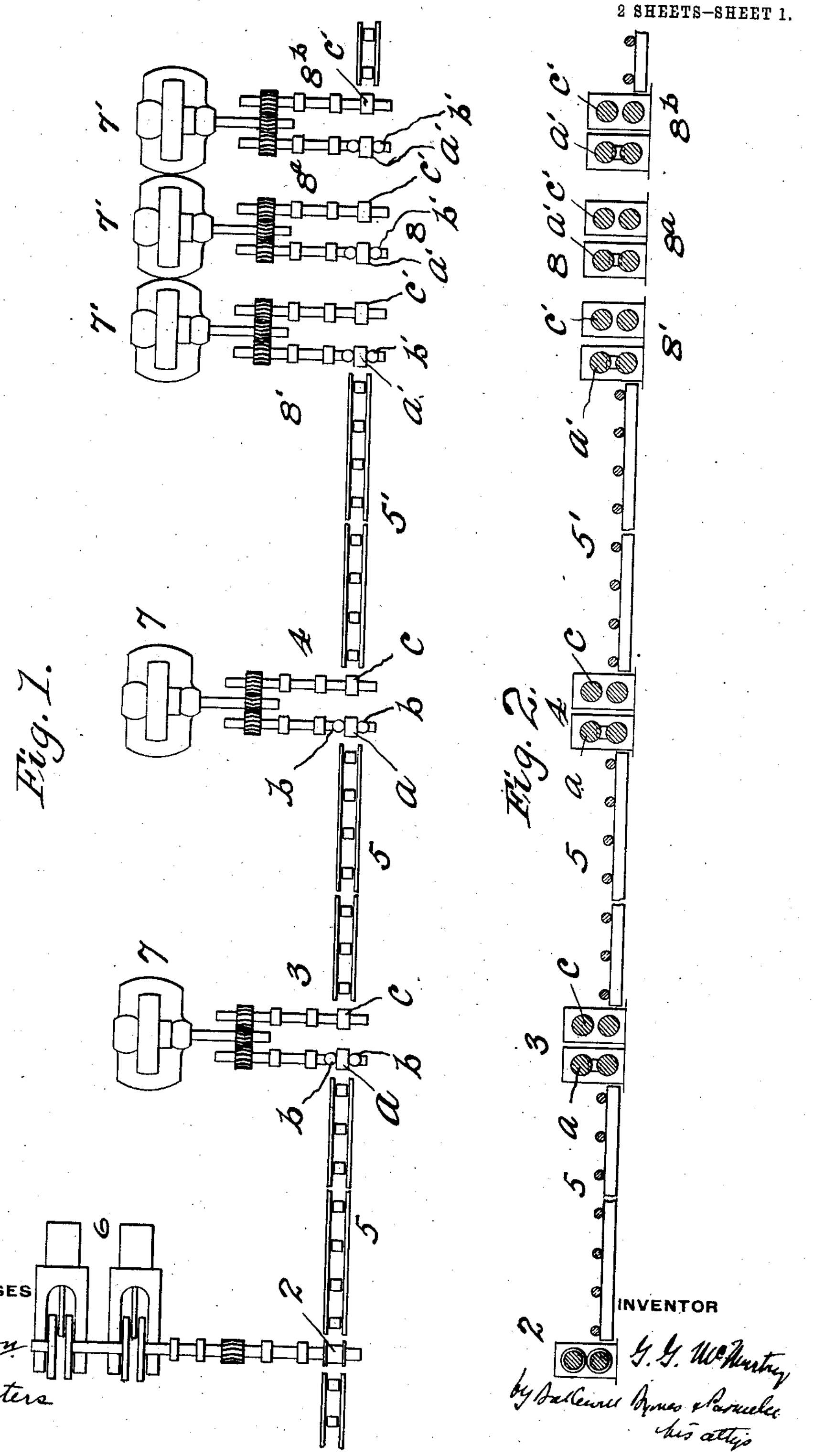
APPARATUS FOR ROLLING SHAPES.

APPLICATION FILED DEC. 1, 1908.

1,021,468.

Patented Mar. 26, 1912.

2 SHEETS—SHEET 1.



WITNESSES

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Fig. 4.

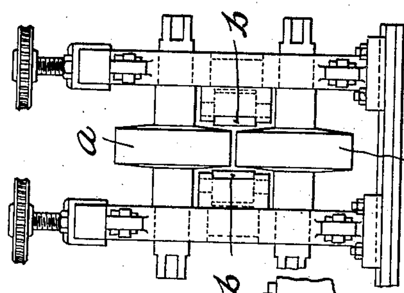


Fig. 3.

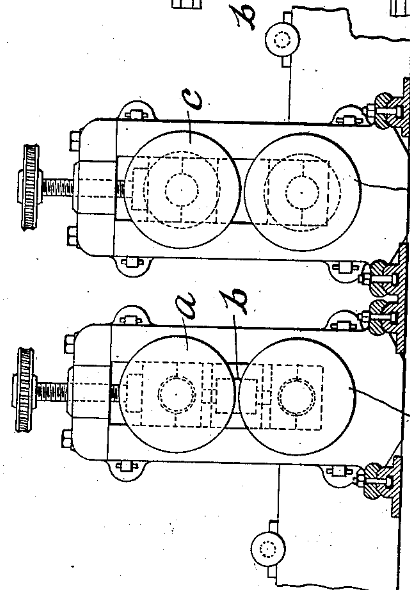
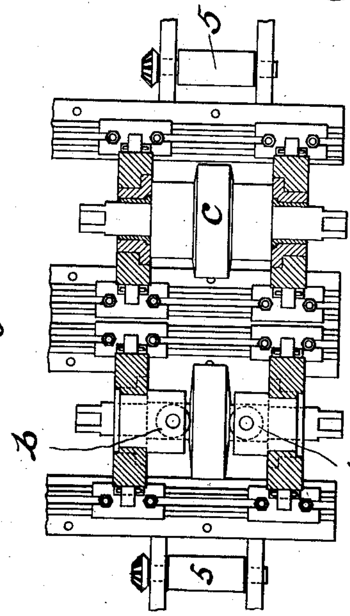


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE G. McMURTRY, OF NEW YORK, N. Y.

APPARATUS FOR ROLLING SHAPES.

1,021,468. Specification of Letters Patent. **Patented Mar. 26, 1912.**

Application filed December 1, 1908. Serial No. 465,524.

To all whom it may concern:

Be it known that I, GEORGE G. McMURTRY, of the borough of Manhattan, city of New York, State of New York, have invented a new and useful Apparatus for Rolling Shapes, of which the following is a specification, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a plan view showing the mill in diagram; Fig. 2 is a longitudinal section thereof; Fig. 3 is a longitudinal section on a large scale showing two of the stands of finishing rolls; Fig. 4 is an end elevation of one of the stands of rolls shown in Fig. 3 and Fig. 5 is a horizontal section or plan view of Fig. 3.

My invention relates to an improvement in universal mills for rolling flanged beams. The practice of reducing the metal by passing it back and forth through the rolls a sufficient number of times to bring it to the desired final shape has resulted in a serious difficulty due to the fact that a large proportion of defective beams was produced, stresses being set up especially at the angles between the flanges and webs of the beams which developed cracks or imperfections. It has also been found that the ends of the pieces of metal rolled on such mills become colder than the middle portions and afford greater resistance to reduction by the rolls. There is sufficient elasticity in the rolls and housings to cause them to yield when the colder end portions of the metal are in the grip of the rolls and the consequence is that the finished beam is apt to be irregular being of greater cross-sectional area at the ends than at the middle. My invention overcomes these difficulties. It produces a less percentage of defective beams, a more regular product and an increased output.

Referring to the drawings, 2 (Fig. 1) indicates a blooming mill in which the initial passes are given to the ingot, the ingot being passed back and forth through this mill the desired number of times.

3 and 4 are universal mills of the kind heretofore employed, having horizontal rolls *a*, vertical rolls *b* which are set in the same vertical plane, and horizontal edging rolls *c* which are set in a different vertical plane back of the rolls *a* and *b*.

5, 5 are reversing feed tables, 6 is an engine by which the blooming mill 2 is driven and 7, 7 are motors for driving the universal mills 3 and 4.

In practice the ingot to be rolled is first reduced in the blooming mill and then is passed repeatedly through the rolls 3 until it is brought to the desired cross-sectional area. It is then passed repeatedly through the second universal mill 4 until it is further reduced to the desired cross-sectional area, but instead of finishing the beam in the mill 4 as has heretofore been the practice, I then conduct the metal by a feed table 5′ to the continuous mill 8. This continuous mill is composed of two or more universal mills, 8′, 8^a and 8^b set in tandem. Each of these mills has horizontal rolls *a′* and vertical rolls *b′* set in the same vertical plane, and horizontal edging rolls *c′*. The rolls are driven by electric motors 7′, which operate at successively higher speeds, each motor driving its rolls more rapidly than the preceding mill, to accommodate the elongation of the metal. The speed of the motor is regulated by controlling the current by which the motors are driven. When the metal piece has received its last pass at the universal mill 4 it is conveyed by the feed table 5′ to the continuous train of universal mills 8 and is passed therethrough in continuous fashion without stoppage. As shown in the drawings the mills of the continuous train are in close proximity so that the metal piece or blank can be in two or more mills at the same time. In this way the finishing of the metal piece is accomplished very rapidly, and, the metal being finished when it is hot and by the flow of the metal in the same direction, the irregular contraction of the thin flanges is prevented and the finished beam is produced without the stresses mentioned above. The effect also is to finish the beam at substantially the same temperature at different portions of its length; and, the ends of the beam being substantially as hot as the middle portion of the beam, it is of approximately the same cross-section throughout its length. A very large output can be produced with this mill.

The number of universal mills which constitute the continuous train 8 may be varied. I have shown three such mills, but if desired four or two may be employed.

In the reversing mills 3 and 4 the blank is fed through and clear beyond the rolls in each operation, on to the tables where it has only its residual heat to retard its cooling.

In the continuous mill however the blank is continuously engaged with the rolls, the friction of which tends to keep it hot and the direction of rotation of which causes the metal to flow continuously in the same direction and so avoids strains which would be due to reversals of the flow. Furthermore, the difficulties above referred to, due to the greater coolness of the ends of the blank are serious only when the flanges and other parts of the shape have been rolled down quite thin, especially in the rolling of small sizes, and when the blank has been exposed for a considerable time to the atmosphere. The first passes are therefore executed while the metal is still comparatively fresh from the heating furnace and while it has a comparatively large cross-section, so that advantage may be taken of the rapidly running reversing rolls and the cost of the plant and the space occupied can be minimized; only the nicer, finishing, operation being performed in the continuous mill which brings the blank quickly to final shape before its ends have much time to cool, by reason of the simultaneous engagement of the successive rolls with the blank at different points in its length.

I claim as my invention—

1. A mill for rolling flanged beams including in combination a reversing universal mill and means for passing the blank back and forth through the same to partially reduce the blank, a continuous mill comprising a plurality of universal mills in tandem and means for passing the blank from said reversing universal mill to said continuous mill, the universal mills constituting said continuous mill operating in one and the same direction, and means for driving said universal mills constituting the continuous mill at successively increasing rates of speed corresponding to the elongation successively effected, the mills being adapted to operate on different portions of such blank simultaneously to reduce it to its finished dimensions rapidly in a single pass.

2. A mill for rolling flanged beams including in combination a blooming mill and means for passing a blank back and forth through the same, a reversing universal mill and means for passing the blank from the blooming mill to said reversing universal mill and back and forth through the same to partially reduce the blank, a continuous mill comprising a plurality of universal mills in tandem and means for passing the blank from said reversing universal mill to said continuous mill, the universal mills constituting said continuous mill operating in one and the same direction, and means for driving said universal mills constituting the continuous mill at successively increasing rates of speed corresponding to the elongation successively effected, the mills being adapted to operate on different portions of such blank simultaneously to reduce it to its finished dimensions rapidly in a single pass.

In testimony whereof, I have hereunto set my hand.

GEORGE G. McMURTRY.

Witnesses:

J. H. GRAY,

ANNA E. WALLACE.