June 24, 1930. C. C. GROTNES 1,767,755

METAL WORKING MACHINE

Filed Aug. 4, 1928

Fig. 1.

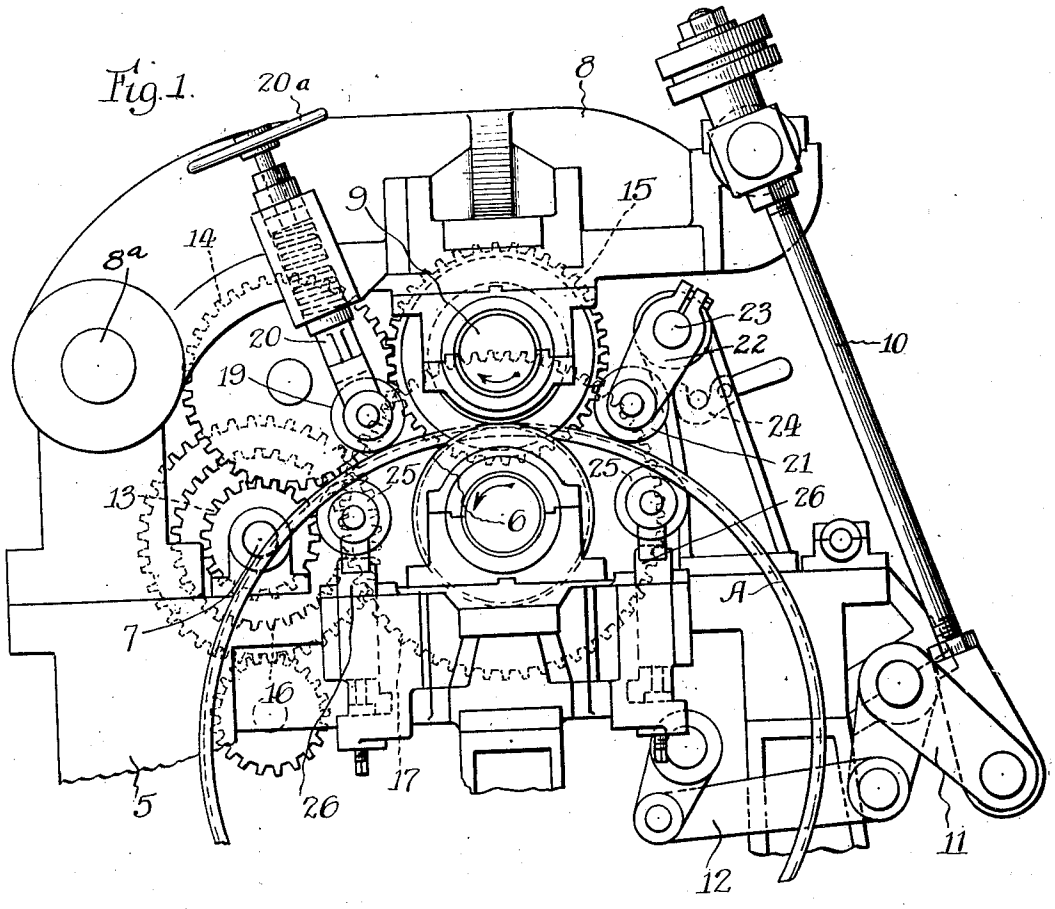


Fig. 2.

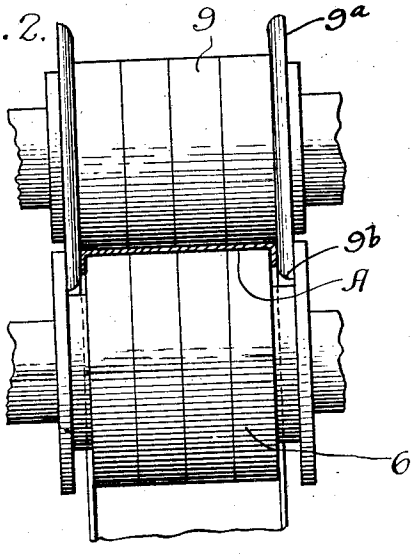
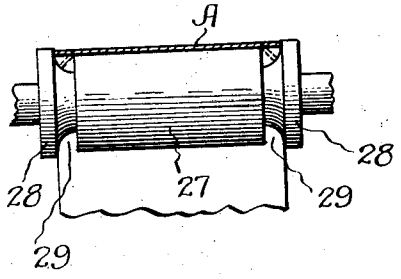


Fig. 3.



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UNITED STATES PATENT OFFICE

CARL C. GROTNES, OF CHICAGO, ILLINOIS

METAL-WORKING MACHINE

Application filed August 4, 1928. Serial No. 297,471.

The invention pertains to a metal working machine of the type shown in my prior Patent No. 1,428,778, dated September 12, 1922, and especially adapted for rolling flanged rims for vehicle wheels, or similar annular articles. In the operation of a machine of this character the overall width of the rim decreases as the flanges are being formed, and it therefore has a tendency to creep longitudinally of the axis of the rolls during the forming operation, with the result that a distorted and otherwise unusable article is produced which must be scrapped at a substantial loss.

The object of this invention is to provide novel and simple means in a metal working machine of this character, which positively prevents creeping movement of the work piece longitudinally of the axis of the forming rolls during the forming process.

Other objects and advantages will become apparent from the following description and in the accompanying drawings in which:

Figure 1 is an end elevation of a rim rolling machine in which the principles of my invention have been embodied.

Fig. 2 is a detailed view on an enlarged scale showing a rim in cross section between the forming rolls.

Fig. 3 is an enlarged detailed elevation of the guiding mechanism.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and have herein described in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

For the purpose of illustration the invention has been shown as being embodied in a machine substantially similar to that shown in my aforesaid prior patent. This machine generally comprises a suitable frame 5 which rotatably supports a lower forming roll 6 and a combined pivot and drive shaft 7. A head 8 is pivotally mounted at 8a on the frame and carries an upper forming roll 9 for swinging movement toward and from the lower forming roll. Suitable means including a pitman 10, a crank 11 and connecting linkage 12 is arranged automatically to produce the movement of the head 8 to swing the upper roll into and out of operative position relative to the lower roll. The drive shaft may, for the purpose of the present invention, be considered a common source of power for rotating both the upper and lower forming rolls and suitable gears 13, 14 and 15 drivingly connect the upper roll with the drive shaft while a second gear train 16, 17 connects the lower roll with the shaft.

Means are provided at points approximately equally spaced at opposite sides of the main rolls to engage a work piece A as it proceeds to and from the forming rolls to assist and maintain the peripheral curvature of the rim in a true circle. To this end an adjustable roll 19 carried at the end of a support 20 is slidably mounted in the head 8 at one side of the upper forming roll 9 and is capable of vertical adjustment by means of the hand wheel 20a. A second roll 21 arranged to engage the work on the opposite side of the forming rolls at a point substantially equidistantly therefrom, is carried by an arm 22 swingably mounted on a suitable shaft 23 and is arranged to be maintained in work engaging position by suitable latching means 24.

The operation of the machine, as set forth in detail in my previous patent, comprises the steps of positioning the work piece between the forming rolls 6, 9 while the head is in its raised position, and then swinging the head downwardly to bring the upper roll into forming engagement with the work. Preferably the work is passed between the rolls several times before the formation of the rim is complete, so that the side flanges on the rim are bent from a plane position as shown in Fig. 3 to a perpendicular position as shown in Fig. 2 by successive stages. In this operation the edges of the rim have a strong tendency to resist bending and it is therefore necessary that the

forming rolls be shaped to form the flange gradually. To this end those portions which engage the outer side of the flange being formed have their peripheral surfaces curved gradually in a direction away from the rim. Thus referring to Fig. 2, the upper forming roll has its annular flange forming ribs 9^a shaped at their peripheral edges to form rounded surfaces 9^b curved outwardly toward the adjacent end of the roll and the result is that the extreme edges of the flat band constituting the work are engaged first, the curved surfaces 9^b thereafter coming into operation to force the edge portions of the metal gradually into the desired perpendicular relation to the body of the rim.

As a result of the character of the flange forming operation thus set forth, a severe endwise pressure is exerted upon the work end, owing to different characteristics of the metal in various parts of the rim the endwise pressures on opposite edges thereof are not equalized. Accordingly as the width of the rim is reduced coincident with the formation of the flanges, it is essential that means be provided for preventing endwise creeping movement of the rim in either direction during the forming operation. To this end the present invention contemplates the provison of guide means which engage the side edges of the rim at all times during the flanging operation to prevent lateral displacement of the rim and a consequent distortion thereof.

To this end guide rollers 25 rotatably carried by standards 26 are supported from the frame of the machine on either side of the lower forming roll 6 in radial alinement therewith. The guide rolls are spaced laterally from the lower forming roll preferably sufficient distance to permit the upper guide rolls 19, 21 to engage the work at a point intermediate the guide rollers 25 and the forming rolls 6, 9 to insure that the work will be maintained in running engagement with the guide rollers. Only one of the guide rollers will be described in detail since they are similar in construction.

As shown in Fig. 3, the rollers comprise a cylindrical body portion 27 having an annular flange 28 at either end separated from the body portion by means of annular grooves 29. The annular flanges 28 are spaced apart a distance equal to the width of the original flat rim, and are of slightly greater diameter than the diameter of the body to receive the work piece guidingly therebetween. The width and depth of the annular grooves is the same as the width of the flanges to be formed on either side of the rim, and the outer side wall of the groove is curved inwardly toward the median plane of the rim upon a radius corresponding to the width of the flange. Thus, when the forming rolls are moved slowly together increasingly to bend the edges of the original flat piece to form the finished product, the bent edges of the piece will be received within the arcuate grooves on the guide rolls with the edges of the piece in positive contact with the arcuate side of the groove at all times during the bending process.

It will be apparent therefore that the engagement between the guiding rolls and the work piece during all the stages of the diminishing width of the work piece provides an arcuate guide positively preventing longitudinal displacement of the work piece relative to the axis of the forming roll. It will therefore be obvious that spoilage of stock due to creeping of the work during the forming process is eliminated in a simple and efficient manner.

I claim as my invention:

1. In a metal working machine, a pair of rolls shaped to bend a rim or the like, to form flanges at opposite edges thereof, and in bending to narrow it, and a guiding roll for holding the rim against longitudinal displacement axially of the bending rolls as the width of the rim decreases, said guiding roll being held against axial movement and having surfaces thereon formed arcuately substantially on a radius equal to the width of the bent portions of the rim, said surfaces being positioned to engage the edges of the rim during the bending thereof.

2. In a machine for flanging metallic rims or other annular articles, the combination of a pair of forming rolls adapted to engage with the opposite edge portions of an annular band to form flanges thereon, and guiding means for preventing longitudinal displacement of the rim axially of the forming rolls including a roller having a body portion of substantially the width of the flat body portion of the finished rim, and an arcuate surface extending from either end of the body portion adapted to be engaged by the ends of the rim during the entire bending operation.

3. A metal working machine, having, in combination with a pair of forming rolls arranged to form flanges on both sides of a rim or the like, guiding means for preventing longitudinal movement of the work piece axially of the forming rolls comprising a roller positioned on either side of said forming rolls in radial alinement therewith said rollers each having grooves therein positioned to receive the flanges on the rim during the formation thereof, said grooves being substantially of a width and depth equal to the width of the flanges.

4. In a machine for operating upon metallic wheel rims and similar annular articles, the combination of a pair of forming rolls coacting to form flanges at opposite edges of

an annular band, one of said rolls having annular flange-forming ribs with peripheral edges curved outwardly and toward the ends of the rolls, and means for holding the band against lateral displacement during flange forming operation, said means including a guide roller held against axial movement and having guiding surfaces with which the edges of said flanges constantly engage during the flange-forming operation.

5. In a machine for operating upon metallic wheel rims and similar annular articles, the combination of a pair of forming rolls coacting to form flanges at opposite edges of an annular band, one of said rolls having annular flange-forming surfaces curved outwardly and toward the ends of the rolls, and means for holding the band against lateral displacement during flange forming operation, said means including a guide roller held against axial movement and having curved surfaces at opposite ends thereof struck on a radius of a length approximately equal to the length of the flange being formed so as to provide continuous engagement between such surfaces and said edges during the flanging operation.

6. A machine for operating upon wheel rims and similar annular articles having, in combination, a pair of forming rolls with coacting flange-forming surfaces adapted to engage first with the extreme edges of the rim and gradually force them into perpendicular relation to the body of the rim, and means for holding the rim against lateral displacement during the flanging operation, said means including a guide roller held against axial movement and having opposed surfaces adapted to engage constantly with opposite surfaces on the rim during the flanging operation.

In testimony whereof, I have hereunto affixed my signature.

CARL C. GROTNES.