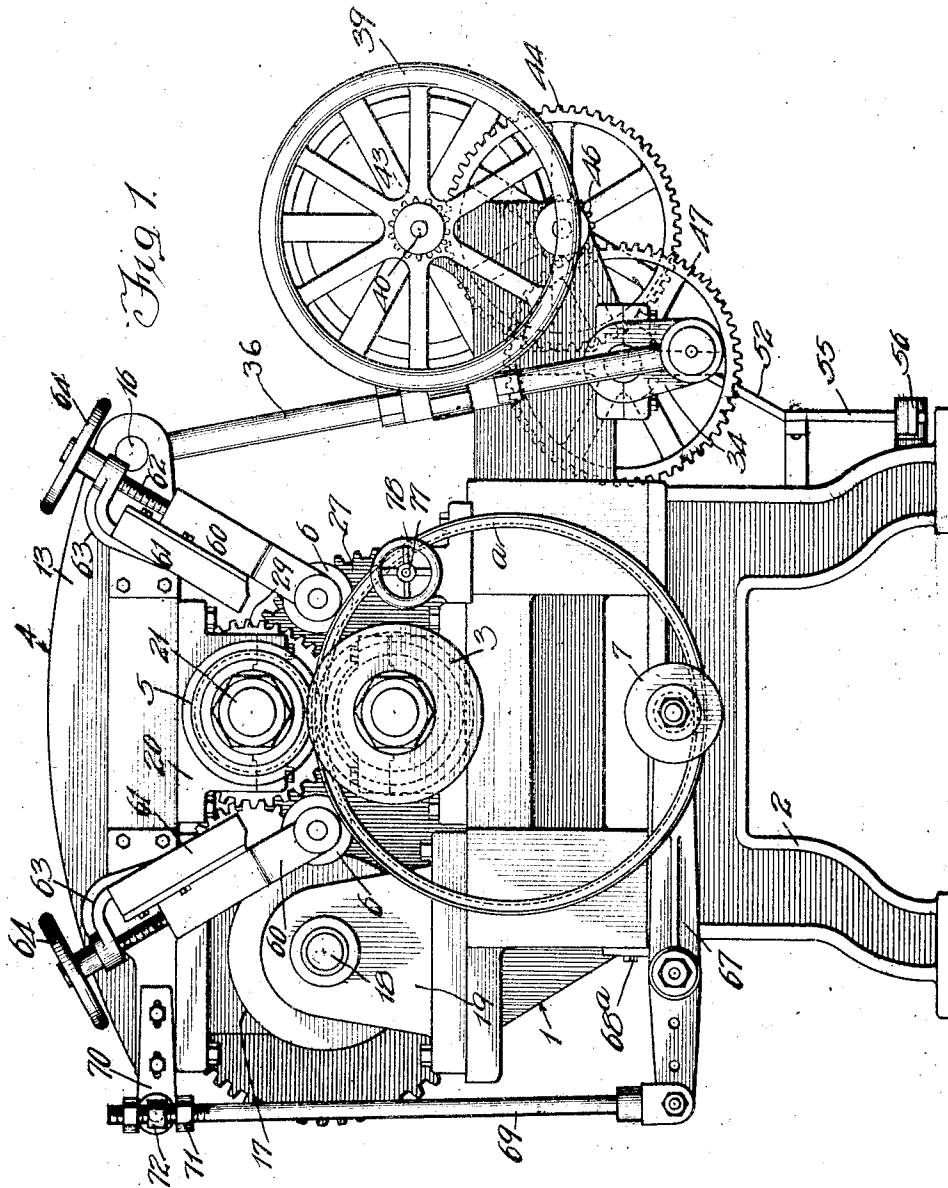


C. G. GROTNES.
ROLLING MACHINE.
APPLICATION FILED SEPT. 13, 1917.

1,284,093.

Patented Nov. 5, 1918.
4 SHEETS—SHEET 1.



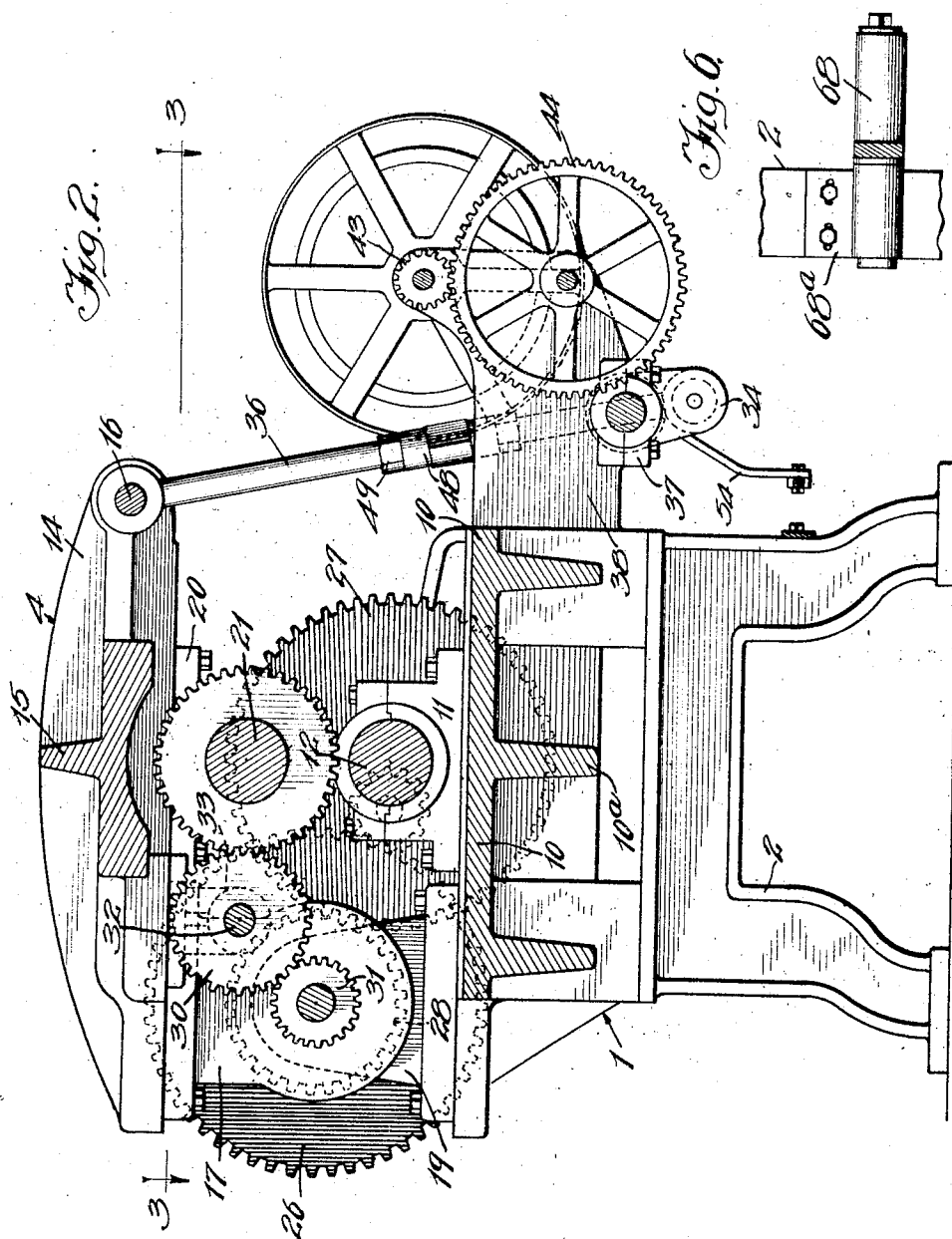
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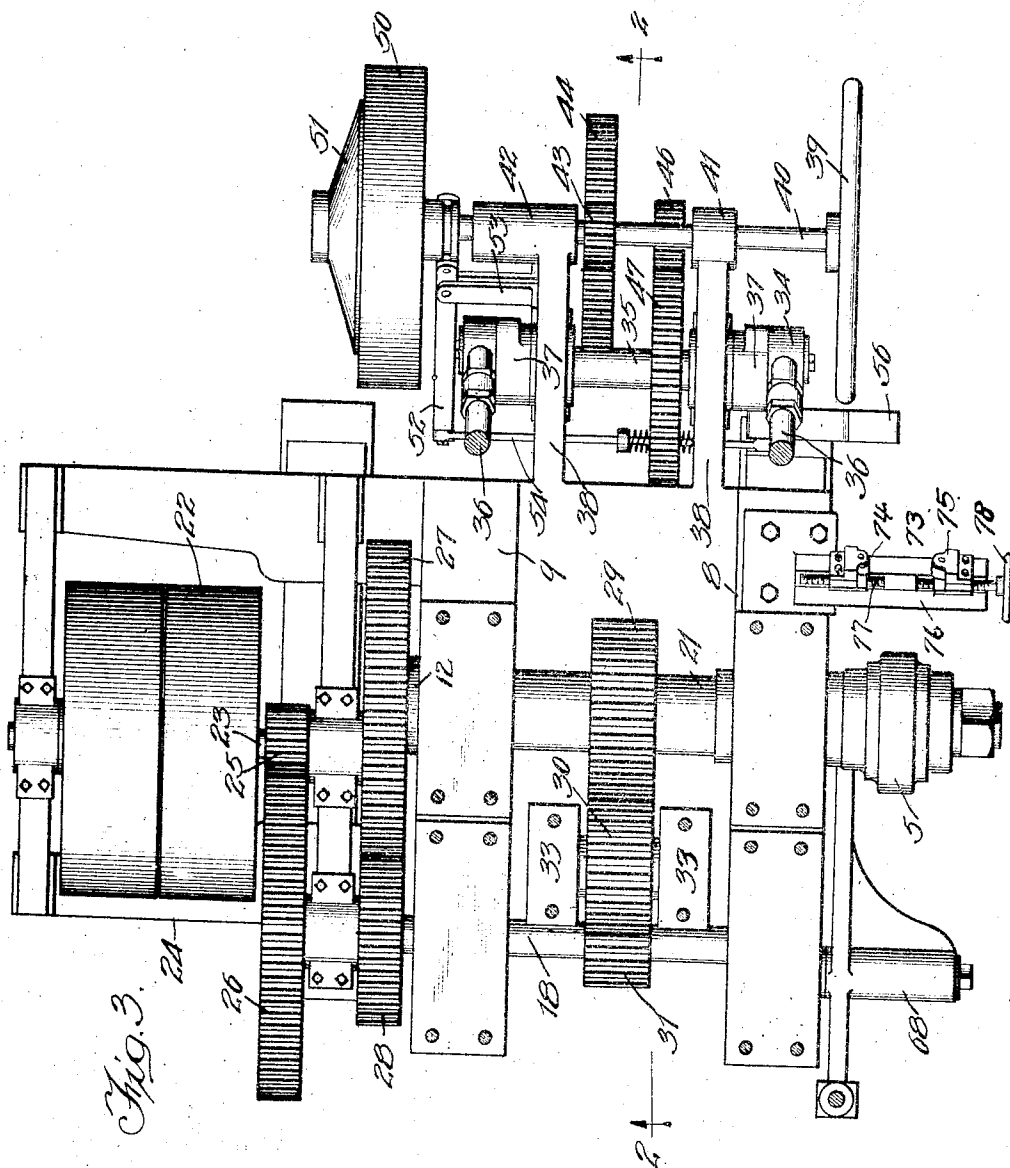
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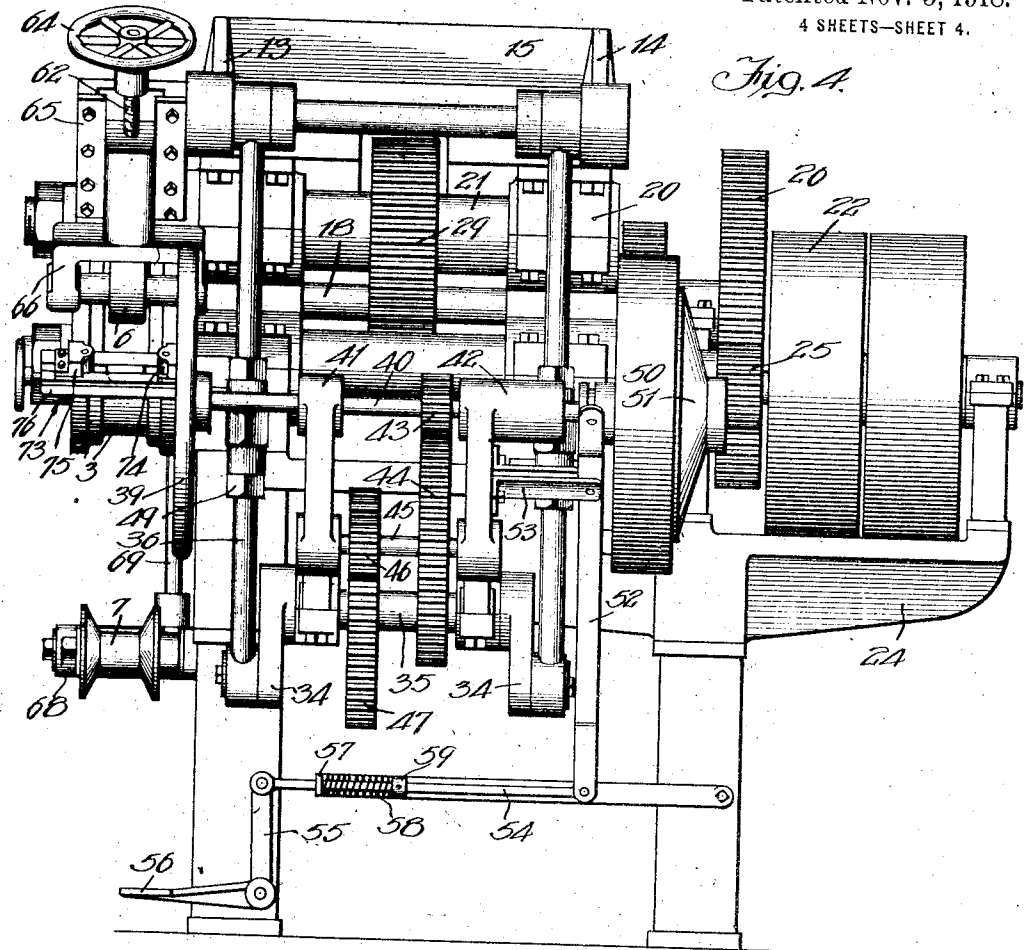
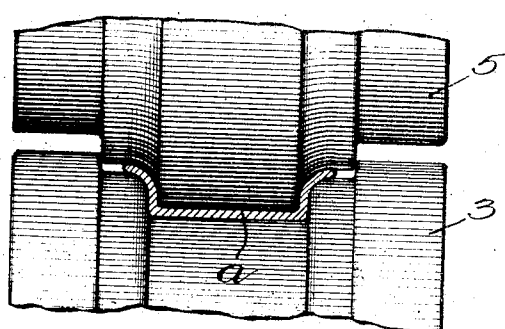


Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES G. GROTNES, OF CHICAGO, ILLINOIS.

ROLLING-MACHINE.

1,284,093.

Specification of Letters Patent.

Patented Nov. 5, 1918.

Application filed September 13, 1917. Serial No. 191,101.

To all whom it may concern:

Be it known that I, CHARLES G. GROTNES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rolling-Machines, of which the following is a specification.

This invention relates to a machine for forming tire rims or similar annular devices, and the general object of the invention is to provide an improved machine which will facilitate the manufacture of such devices.

A further object of the invention is to provide a machine which is comparatively simple in construction and operation and at the same time is efficient and practical.

I have illustrated a preferred embodiment of my invention in the accompanying drawings forming a part hereof, in which Figure 1 is a side elevation of the machine with a completed rim in position therein. Fig. 2 is a vertical sectional view through the machine taken in the plane of line 2—2 of Fig. 3. Fig. 3 is a horizontal sectional view taken in the plane of line 3—3 Fig. 2. Fig. 4 is a front elevation. Fig. 5 is a fragmental detail view on a large scale showing a section of the completed rim between the shaping rolls. Fig. 6 is a fragmental view showing a detail of construction.

Similar numerals refer to similar parts throughout the drawings.

The machine comprises a frame 1 mounted upon a suitable base 2 and carrying a shaping roll 3; a head 4 hinged to the frame and carrying a shaping roll 5; adjustable guide rolls 6 carried by said head; and a tensioning roll 7 movable by the head 4 to engage with the work at a point substantially diametrically opposite that engaged by the shaping rolls.

The frame 1 may be made in the form of a single casting having forward and rear sides 8 and 9 connected together by a top piece 10 having transverse ribs 10^a on its underside. On each side, substantially centrally of the frame, is mounted a suitable journal bearing 11 in which is mounted a shaft 12 having fixed on its forward end the shaping roll 3.

The head 4 also is in the form of a rectangular frame having side bars 13 and 14 connected together by a central cross-piece 15 and a forward cross-rod 16. At their rear ends, said side-bars are each provided with a depending arm 17 carrying between them at their lower ends a shaft 18 having its op-

posite ends mounted in bearing brackets 19 secured on the sides 8 and 9 at the rear end of the frame.

On the underside of the side-bars 13 and 14 of the head 4 is secured a pair of journal bearings 20 in which is mounted a shaft 21 having fixed on its forward end the shaping roll 5. Said shaft 21 is mounted on the head substantially centrally thereof so that the roll 5 is adapted to be swung with the head into and out of operative engagement with the roll 3 mounted centrally of the frame.

The shaping rolls 3 and 5 may be rotated by any suitable means. Herein I have shown a power pulley 22 mounted on a supporting shaft 23 in a bracket 24 on the rear side of the frame. The shaft 23 has fixed thereto a pinion 25 meshing with a spur gear 26 fixed on the rear end of the shaft 18 upon which the head 4 is mounted and which also constitutes a drive-shaft. The lower or stationary shaping roll 3 is driven from said drive-shaft 18 by means of a spur gear 27 on the rear end of the roll shaft 12, meshing with a pinion 28 fixed near the rear end of the drive-shaft; and the upper or movable shaping roll 5 is driven by means of a gear wheel 29 fixed on the roll shaft 21 and meshing with an idler pinion 30 which in turn meshes with a pinion 31 fixed on the drive-shaft. The idler pinion 30 is carried by a short shaft 32 supported in journal bearings 33 mounted on the under side of the head 4; and it will be evident that by rolling upon the pinion 31 on the drive-shaft the idler permits the head to be swung upon the drive-shaft without interfering with the operation of the shaping rolls.

The means for raising and lowering the head 4 to swing the shaping roll 5 into and out of operative engagement with the shaping roll 3, preferably comprises a pair of crank arms 34, each having one end thereof fixed on one end of a shaft 35 and having its other end connected to the front end of the head 4 by means of a connecting rod 36. Said crank shaft is supported in suitable journal bearings 37 mounted on the underside of a pair of outwardly extending arms 38 at the front end of the frame; and the upper ends of the rods 36 are connected to the cross-rod 16 of the head.

The shaft 35 is adapted to be rotated to operate the crank arms 34 either manually or by application of motive power. For manually rotating said shaft, I employ a

hand wheel 39 fixed on the forward end of a shaft 40 which is mounted in bearings 41 and 42 at the forward ends of the arms 38 on the frame. Said shaft has fixed thereto a pinion 43 (Figs. 2, 3 and 4) which meshes with a spur gear 44 mounted on a shaft 45 journaled in the arms 38 below the shaft 40, and the shaft 45 has fixed thereto a pinion 46 which meshes with a spur gear 47 fixed on the crank shaft 35. By these means, it will be apparent that the rotation of the hand wheel will operate the crank arms 34 to raise or lower the head 4, the parts being so proportioned and arranged that, when the head is in its lowermost position with its shaping roll 3 in operative engagement with the shaping roll 5, the crank arms will be in their lowermost position. Preferably the connecting rods 36 are made longitudinally adjustable as by forming them in sections secured together by a sleeve 48 having its periphery shaped for engagement by a wrench and screw-threaded to the rod sections, said sleeve being held against movement by means of lock nuts 49.

For operating the crank shafts 35 by motive power, a pulley 50 may be provided on the rear end of the shaft 40 which carries the hand wheel. Said pulley normally is free to rotate upon the shaft 40 but is adapted to be slid into engagement with a conical clutch member 51 (Figs. 3 and 4) fixed on the shaft, by means of a lever 52. Said lever is pivoted to a bracket 53 mounted on the rear arm 38 at the forward end of the frame and at its yoked upper end is suitably connected to the grooved hub of the pulley. The lower end of said lever is connected by means of a link 54 to an arm 55 formed integral with a treadle 56 pivoted to the base 2; and the link may be mounted in the flanged end of an arm 57 pivoted to the rear of the base. The lever and treadle are normally held in inoperative position by means of a compression spring 58 provided on the link and bearing between the flanged end of the arm 55 and a collar 59 secured to the link. It will be seen that a depression of the treadle 56 will throw the driven pulley 50 into operative engagement with the clutch member 51 on the shaft 40, which shaft, through the gear train above set forth, will operate the crank arms to raise or lower the head.

The guide rolls 6 are mounted for movement with the head 4 upon the lower ends of a pair of slide blocks 60 adjustably mounted in supporting blocks 61. Said supporting blocks are secured to the forward side bar 13 of the head 4 and the slide blocks are adjustable therein by means of screw spindles 62 whose lower ends are threaded into the slide blocks and whose upper ends operate in brackets 63 mounted on the supporting blocks, and are provided with hand

wheels 64. Said slide blocks may be movably mounted in the supporting blocks by means of plates 65 (Fig. 4) secured on the lower side of the supporting blocks to form T-shaped slots therein adapted to receive flanges formed on each edge of the block, and the lower ends of said slide blocks may be provided with yoked ends 66 for supporting the guide rolls 6, the supporting blocks being preferably secured in such position that the slide blocks may be adjusted in a plane substantially radially of the rim being rolled.

The tensioning roll 7 is provided with end flanges to receive and guide the rim blank being rolled and is mounted on the free end of a lever 67 pivotally mounted in a bearing 68 (Figs. 1 and 3) mounted upon a bracket 68^a adjustably secured to the rear end of the frame 1 (Fig. 6). A link 69 having its upper end slidably connected to the rear end of a bracket 70 which is fixed to the head 4, and its lower end to the rear end of the lever 67, serves to move the tensioning roll as the head is raised and lowered to insert a blank or remove a completed rim. The upper end of the link 69 is adapted to slide between a pair of nuts 71 in a pivot bearing 72 secured to the rear end of the bracket 70, the nuts 71 being adjusted to permit the free movement of the roll 7 when the head is in operative position so that the roll is merely held in operative engagement with the work by the action of gravity. The lower end of the link also is adapted to be adjustably connected to the rear end of the lever in order that the proper amount of movement will be imparted to the roll by the movement of the head; and by reason of the fact that the bracket 68^a is adjustably secured to the frame, the bearing 68 is adapted to be adjusted horizontally to position the roll 7 with its center in the same vertical plane as the central plane of the work between the rolls 3 and 5. The machine thus is arranged to be adjusted for rolling work of varying diameter and width.

Referring to Figs. 3 and 4, 73 illustrates a laterally adjustable guide for the rim blank. Said guide consists of a pair of guide rolls 74 mounted uprightly in a pair of bearing blocks 75 slidably mounted on a bracket 76 secured to the forward side of the frame. Said bearing blocks are arranged to be adjusted toward and away from each other simultaneously by means of a screw spindle 77 having a hand wheel 78 on its forward end, said screw being provided near its opposite ends with right and left-hand threads engaging with the respective bearing blocks. It will be apparent that by this construction the upright rollers are adapted to accurately position and guide rims of varying widths with reference to the shaping rolls.

In the operation of forming a tire rim or

the like, the head 4 is elevated by an operation of the crank arms 34 either manually or by motive power applied to the pulley 50. The blank from which the rim or other article is to be made, and which has been previously formed, is then placed in position upon the rapidly revolving shaping roll 3 and the head lowered by an operation of the crank arms. As the head is lowered, the guide rolls 6 and the tensioning roll 7 having been properly adjusted in accordance with the diameter of the rim to be rolled, the shaping roll 5 and the guide rolls 6 engage with the outer periphery of the blank and the tensioning roll 7 engages with the inner periphery thereof at a point substantially diametrically opposite from that engaged by the shaping rolls; and a further downward movement of the head gradually forces the roll 5 toward the roll 3 and at the same time the guide rolls 6 and the tensioning roll 7 operate to hold the blank in its proper form and position. By the time the downward movement of the head has been completed, the blank has been forced to assume the shape determined by the rolls, as shown in Fig. 5, to form the completed rim *a*.

Preferably, in the rolling operation, the crank arms 34 are operated by means of the hand wheel 39 to gradually lower the movable shaping roll into engagement with the work, but the elevation of the head, at the completion of the rolling operation, is preferably accomplished rapidly by motive power applied to the pulley 50 which is thrown into operative engagement with the shaft 40 by the depression of the treadle 56.

It will be understood that the shaping rolls may be of any desired form, those herein shown being shaped to form the ordinary tire rim of automobile wheels.

Various features of this invention are applicable to machines for bending a strip of metal into the form of a hoop or ring. I would therefore have it understood that the invention is not limited to the construction and arrangement of parts herein shown.

It will also be understood that while I have herein illustrated and described a crank arm on the shaft 35 for imparting a swinging movement to the head 4, any equivalent means such as a cam or other eccentric element may be employed for this purpose.

I claim as my invention:

1. A machine of the class referred to having, in combination, a pair of shaping rolls, a guide roll, means for rotating said shaping rolls, means for moving one of said shaping rolls and said guide roll into operative engagement with the work, a tensioning roll, and means operatively associated with the means for moving the movable shaping roll and the guide roll for moving the tensioning roll into engagement with the work.

2. A machine of the class referred to, including a pair of shaping rolls, means for rotating said rolls, means for moving one of said rolls into operative engagement with the work, a guide roll adjacent the movable shaping roll and movable therewith, and a movable tensioning roll arranged to move with the movable shaping roll into engagement with the work at a point substantially diametrically opposite that engaged by the shaping roll.

3. A machine of the class referred to including a frame having a drive shaft at one end, a head pivotally mounted on said shaft, a roll mounted on the under side of said head parallel to said shaft, a roll mounted on said frame, means located between said frame and head connecting said rolls to the shaft for rotation thereby, and means connected to the free end of the head for moving it on its pivotal axis.

4. A machine of the class referred to, including a frame, a head pivotally mounted above the frame, a pair of shaping rolls carried by the frame and head, a guide roll adjustably mounted on the head, means for rotating said shaping rolls, and means for raising and lowering the head to swing the rolls carried thereby into and out of operative engagement with the work to be rolled.

5. A machine of the class referred to, including a frame, a head hinged to the frame, a pair of shaping rolls carried by the frame and head, means for rotating the shaping rolls, and a guide roll carried by the head and adjustable thereon in a plane radially of the rim being rolled.

6. A machine of the class referred to, including a frame, a head hinged to the frame, a pair of shaping rolls carried by the frame and head, means for rotating said rolls and a tensioning roll movable by the head into and out of operative position, said tensioning roll being movable independently of the head while in operative position.

7. A machine of the class referred to, including a frame, a head hinged to the frame, a pair of shaping rolls carried by the frame and head, means for rotating said rolls, a tensioning roll, and means operable by the head for moving the tensioning roll in the swinging movements of the head, said means being adjustable to accommodate various sizes of work.

8. A machine of the class referred to having, in combination, a frame, a head movably mounted on said frame, a pair of shaping rolls carried by the frame and head, a shaft journaled in the frame and having an eccentric element fixed thereon and operatively connected with the head, and means for rotating the shaft, said eccentric element being continuously rotatable with the shaft and operable when the shaft is rotated in one direction to cause the head and thereby

its roll to swing first in one direction and then in the other.

9. A machine of the class referred to having, in combination, a frame, a head pivotally mounted above the frame, a pair of shaping rolls carried by the frame and head, a guide roll carried by the head, means for swinging the head, and adjustable means carried by the frame adjacent the shaping roll thereon for positioning the work relative to the shaping rolls and guide roll.

10. A machine of the class referred to including a frame, a head above the frame, a pair of shaping rolls carried by the frame and head, a block slidably mounted on the head, a guide roll mounted on said block, upwardly extending devices for adjusting said block to position the guide roll, means for rotating said shaping rolls, and means

for raising and lowering the head to move the rolls carried thereby into and out of operative engagement with the work to be rolled.

11. A machine of the class referred to having, in combination, a frame having a transverse shaft mounted upon one end, a head having one end pivotally mounted upon said shaft, a pair of shaping rolls carried by the frame and head parallel to the pivotal axis of the head and substantially midway between the ends of the frame and head, said rolls being geared to said shaft, means for driving said shaft, and means connected to the free end of said head for moving the same on said shaft.

In testimony whereof, I have hereunto set my hand.

CHARLES G. GROTNES.