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MEANS FOR SECURING ROLLS TO SHAFTS

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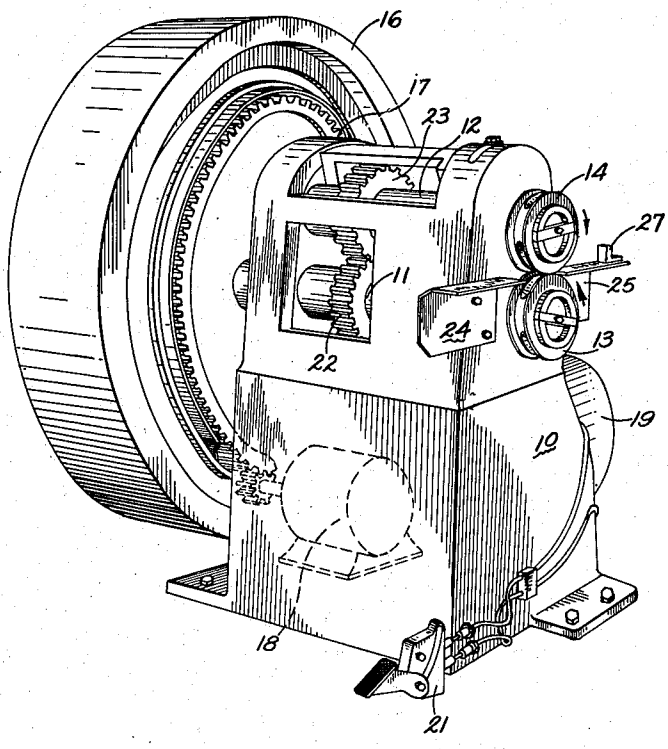


Fig. 1

Fig. 2

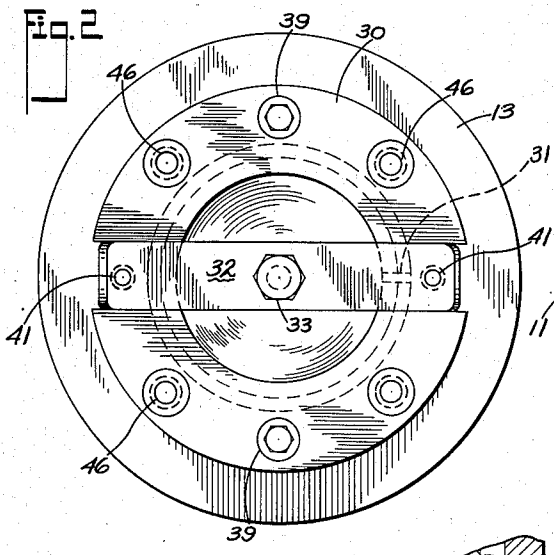


Fig. 3

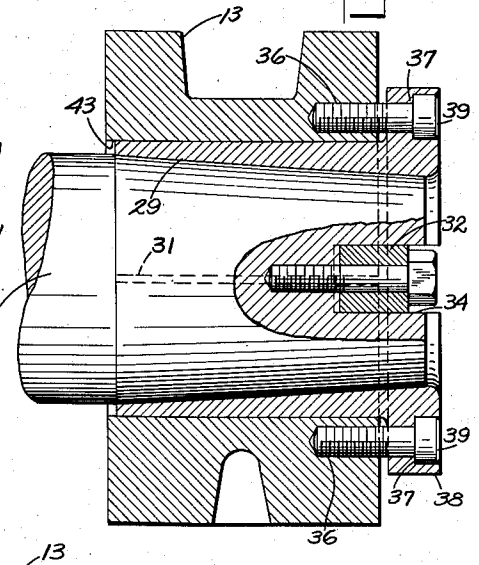
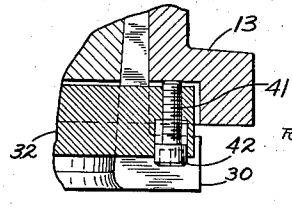


Fig. 4



INVENTOR.
JOHN H. FRIEDMAN

BY
RICHEY, WATTS, EDGERTON & McSENNY
Donald W. Harrington
ATTORNEYS

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MEANS FOR SECURING ROLLS TO SHAFTS

John H. Friedman, Tiffin, Ohio, assignor to The National Machinery Company, Tiffin, Ohio, a corporation of Ohio

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2 Claims. (Cl. 287—53)

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This invention relates to apparatus for metal rolling and particularly to the means for securing the roll to the roll shaft.

In connection with the pressing or forging of numerous articles, it has been recognized that it would be desirable to employ a blank wherein the rod or strap stock was worked prior to forging and pressing so as to redistribute the volume of metal in the rod or strap stock to provide a blank having the general configuration of the article to be forged or pressed. For instance in connection with the forging of a double ended flat wrench, it is recognized that it would be desirable to provide a preformed blank wherein the stock width available in the two end portions of the blank exceeds that intermediate the ends so as to reduce the volume of the flow required in the forging operation.

According to the present invention a rolling mill is provided with a pair of co-operating, small diameter rolls mounted on shafts carried in frame bearings so as to transmit the shaft loads to the frame in a manner that minimizes the deflection in the roll shafts and wherein a massive, continuously rotating flywheel is operably clutched so as to drive the rolls intermittently one revolution at a time. Large reductions may be effected in each roll pass and the blank being rolled is characterized by a longitudinal movement of the metal at the central axis of the blank exceeding the longitudinal movement of the metal at the surface of the blank.

Reference is made to my co-pending application Serial No. 42,791, filed August 6, 1948, which discloses small diameter rolls controlled so as to be operated in a cyclic one revolution manner and of which the instant application is continuation in part. Reference is also made to my co-pending application Serial No. 294,176, filed June 18, 1952, for a "Rolling Mill" which is a division of the instant application and to my application Serial No. 294,178, filed June 18, 1952, for "Roll Adjustment Apparatus" which is a division of the instant application and to my co-pending application Serial No. 294,177, filed June 18, 1952, for "Die Rolling Method" which is a division of the instant application. The disclosure and drawings of said last-named divisional applications correspond to the disclosure and drawings of the instant application as filed, whereas the instant application has been revised to limit the disclosure to the roll mounting apparatus herein claimed.

The present invention is directed to that part of a rolling mill wherein the roll is secured to the shaft by a tapered split sleeve arrangement

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which permits the adjustment of the roll axially with respect to the roll shaft.

It is a primary object of this invention to provide a mounting means for attaching a roll to a shaft capable of withstanding extreme shock and driving loads.

It is another object of this invention to provide a roll mounting means which permits axial adjustment of the roll with respect to the roll shaft.

The foregoing and other objects and advantages will become apparent in view of the following description taken in conjunction with the drawings, wherein:

Fig. 1 is a perspective view of a rolling mill showing the environment of the roll mounting according to this invention;

Fig. 2 is an end elevation of the roll shaft showing the means provided for ataching the roll to the roll shaft;

Fig. 3 is a sectional view showing the details of the roll attachment; and

Fig. 4 is a sectional view with parts broken away disclosing the means used to axially adjust the roll relative to the shaft.

Referring to the drawings, the press embodying the invention is shown wherein the frame 10 supports a pair of roll shafts 11 and 12 the ends of which project from the frame to support the overhanging rolls 13 and 14 at a height convenient for the operator. The lower or driven roll shaft 11 extends out beyond the other side of the frame 10 and supports rotatably thereon a masive flywheel 16. A ring gear 17 fixed to the flywheel is attached to be continuously rotated by the motor 18 indicated in phantom outline within the frame 10. The flywheel 16 and the shaft 11 are provided with co-operating clutch members so that the rotation of the flywheel may be imparted to the drive shaft 11. The driven shaft 11 is also provided with a brake so arranged with respect to the clutch that the brake is released when the clutch is engaged and the brake is applied when the clutch is disengaged. The clutch and brake and control therefor employed in carrying out the rolling operation is disclosed in said co-pending divisional applications.

A compressed air supply tank 19 is mounted on the frame 10 and is utilized for power to actuate the brake and clutch apparatus. The foot treadle 21 is provided to permit the operator to control the operation of the clutch and brake. The lower driven roll 11 is supported in the frame 10 and has fixed thereto a gear 22 in mesh with a similar gear 23 fixed on the upper roll shaft 12. The upper roll shaft 12 is also supported by the frame 10. The guides 24 and 25

provide a working table on which the blank slides and a stop 27 limits the insertion of the blank through the rolls.

Since the loads and strains produced in the rolls during the metal forming are extremely great, a rigid, rugged mounting means is necessary to secure the rolls on the shafts 11 and 12.

To transmit the roll shaft rotation to the rolls the outer end of the roll shaft is tapered as at 29 to receive a split collar 30 which is formed with an internal taper corresponding to the shaft taper. The collar is split axially as indicated at 31 and is notched at opposed points on its diameter to receive the key 32 retained by the cap screw 33 in a transverse notch 34 in the end of the roll shaft. The end portions of the key 32 overhang the notched portions of the collar 30 so that the drawing of the key into position in the shaft with the cap screw 33 causes the split collar to be expanded by the taper 29 on the shaft so as to establish a secure binding fit with the surrounding roll 13. The outer surface of the roll 13 is provided with internally threaded bores 36 in alignment with cap screw openings 37 provided in the flange 38 of the collar 30. As the cap screws 39 are threaded into the bores 36 the collar 30 is drawn axially toward the roll 13.

To provide for accurate axial adjustment of the rolls with respect to the roll shaft thus insuring correct vertical alignment of the rolls the key 32 carried by the end of the roll shaft is provided with threaded openings 41 at the outer end portion of the key where such outer end portions overhang the end of the roll 13 as indicated in Fig. 4. Jack screws such as 42 may be inserted in the threaded openings 41 and by drawing down on these jack screws 42 pressure may be exerted on the roll 13 so as to effect relative axial movement between the roll 13 and the collar 30. It will be understood that in making such adjustments between the collar and the roll the screws 39 should be loosened to permit the required axial motion.

Because the bore 43 in the roll 13 is cylindrical the axial position of the roll 13 relative to the collar 30 does not affect the operation of this mounting means.

The flange portion of the collar 30 also includes spaced threaded apertures 46 so that cap screws may be used therein to serve as jack screws to facilitate the axial motion of the collar with respect to the roll for servicing an adjustment.

By providing an expandable collar working against a taper extreme radial frictional forces can be developed which will carry extremely large rotational forces and shock loads. Of course, the key 32 also carries a portion of the load transmitted from the shaft to the roll and supplements the strength of the connection between the roll and the shaft.

To assemble the roll 13 on the shaft 11, the roll and sleeve may be loosely assembled and the key 32 drawn into position as shown. It will be observed that the outer end portions of the key 32 prevent the roll from moving axially outward on the shaft as limited by the adjusting screws 42. Since the roll is thus limited in its outward movement, drawing up on the adjusting screws 39, will force the sleeve inwardly so as to expand the sleeve along the taper of the shaft so that the roll 13 and its complementary roll 14 may be vertically aligned in proper rolling position.

The structure of the connection between the shaft 12 and the roll 14 is, of course, the same as that described above.

Having completed a detailed description of a preferred embodiment of the present invention so that others skilled in the art may be able to understand and practice the same, I state that what I desire to secure by Letters Patent is not limited by said preferred embodiment but rather is defined in what is claimed.

What is claimed is:

1. Means to secure a wheel to a shaft having a tapered end comprising a cylindrical sleeve, said wheel provided with an opening, said sleeve having an interior taper corresponding to the taper of the shaft and being slotted at one side so that the sleeve may be expanded, the exterior of said sleeve being cylindrical and having an outer diameter corresponding substantially to the inner diameter of said opening in the wheel, a keyway formed transversely at the end of said tapered shaft, diametrically opposed notches in the sleeve and wheel forming a continuation of the keyway, an abutment key arranged in said keyway, said abutment key extending beyond the shaft keyway at opposite sides of the shaft so that the ends of the abutment key are disposed in said notches, and means movable longitudinally of the shaft comprising adjusting screws operatively connecting the key abutment, wheel and sleeve whereby the wheel and sleeve may be adjusted longitudinally with respect to the shaft.

2. Means to secure a wheel to a shaft having a tapered end comprising a cylindrical sleeve, said wheel provided with an opening, said sleeve having an interior taper corresponding to the taper of the shaft and being slotted at one side so that the sleeve may be expanded, the exterior of said sleeve being cylindrical and having an outer diameter corresponding substantially to the inner diameter of said opening in the wheel, a keyway formed transversely at the end of said tapered shaft, diametrically opposed notches in the sleeve and wheel forming a continuation of the keyway, an abutment key arranged in said keyway, said abutment key having portions extending radially beyond the shaft keyway disposed in said notches, and means movable longitudinally of the shaft comprising adjusting screws operatively connecting the said key abutment portions, and wheel, and a flange on said sleeve whereby the sleeve may be adjusted longitudinally of the shaft.

JOHN H. FRIEDMAN.

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