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APPARATUS FOR GRINDING ROLLS

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FIG. 1.

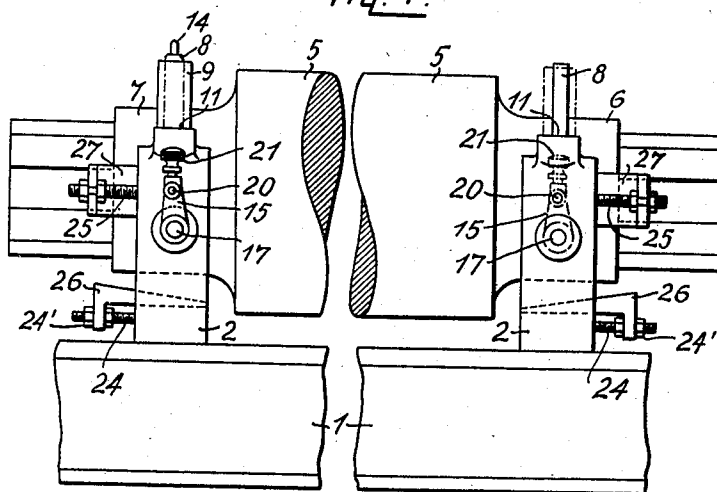
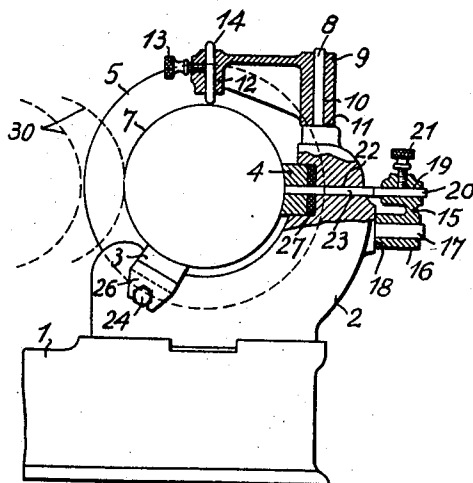


FIG. 2.



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## UNITED STATES PATENT OFFICE

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## APPARATUS FOR GRINDING ROLLS

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My invention relates to improvements in apparatus for grinding rolls, and more particularly in apparatus for setting the roll being ground in its bearings.

5 In grinding heavy rolls used in roll trains for working iron, steel and other metal care must be taken that the working face of the roll is made exactly cylindrical and of even diameter throughout the length of the roll, and that it is exactly coaxial of the trunnions. 10 The surface layer of a roll suitable for rolling sheet metal is a comparatively thin layer. Therefore, in grinding care must be taken that a minimum of metal is taken from the 15 roll for imparting thereto the cylindrical shape. As now practiced, the grinding apparatus comprises a pair of adjustable bearings on which the roll is placed, and before grinding the bearings must be adjusted so 20 that the axis of the roll has not the slightest inclination relatively to the horizontal plane passing through the direction of movement of the grinding carriage and, further, that the axis is exactly parallel to the vertical 25 plane passing through the said direction. Now, the working surface as well as the trunnions of a roll which has been used for a certain length of time are not exactly round and they have uneven radii in different parts 30 of their lengths. Therefore the adjusting of the axis of the roll in the bearings of the grinding machine is exceedingly difficult.

As now practiced, the working surface of the roll is first ground, whereupon the diameter is measured particularly at the ends of 35 the rolls in order to ascertain whether or not the diameters at the said ends are alike. If the diameters are found to be different, the bearings are re-adjusted accordingly, whereupon the working surface is again ground, 40 and the said diameters are again measured. This operation is continued until the diameters are exactly alike. This operation requires much care and ability, because otherwise even diameters are never attained, and 45 a larger surface layer is ground from the roll than is actually necessary. Finally, the method is expensive.

The object of the improvements is to provide a method which requires less skill in

grinding the roll, and by means of which a minimum of metal is taken from the roll, and with this object in view my invention consists in providing apparatus by means of 55 which at first the trunnions are ground so that they are exactly cylindrical and alike in diameter, and so that they are centered in a common axis, whereupon the working surface of the roll is ground, such apparatus consisting of instruments provided on the bear- 60 ings for indicating the position of the axis of the roll relatively to the direction of the movement of the grinding disk, and showing the amount of adjustment of the bearings necessary for setting the axis of the roll in 65 the proper position.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing, 70 in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawings,

Fig. 1, is an elevation showing the bearing of the grinding machine, a roll mounted 75 therein, and the gauging instruments, and

Fig. 2, is an elevation partly in section and looking from the right in Fig. 1.

In the example shown in the drawings the grinding machine comprises a base plate 1 80 having bearings 2 mounted thereon, the said bearings being provided for supporting the trunnions 6 and 7 of the roll 5 and being adapted to be shifted on the base plate 1 longitudinally of the roll for accommodating 85 rolls of different lengths. The bearings are provided with bearing blocks 3 and 4 adapted to be set in radial direction by means of wedges 26 and 27 adapted to be shifted by means of screws 24 and 25.

At the side of the bearings 2 a carriage 90 carrying the grinding disk 30 is shiftable parallel to the axis of the bearings, and the said grinding disk is adapted to grind the working surface of the roll 5 and the trunnions thereof, as has been indicated in dotted 95 lines in Fig. 2. The construction of the grinding apparatus and its driving mechanism does not form a part of my invention, and therefore I deem it not necessary to show the same in the drawings.

The bearings 2 are provided with upwardly directed bolts 8 providing bearings for arms 9 formed with bores 10 exactly corresponding to the bolts 8, the said arms being supported with their bottom faces on the top faces 11 of the bearings 2. As shown, the faces 11 are plane and perpendicular to the axis of the bolt 8, and the arms 9 are adapted to be rocked on the bolts 8 relatively to the bearings 2. Suitable means are provided for indicating the angular position of the arms 9, and more particularly for indicating the position of the said arms perpendicular to the direction of the movement of the carriage carrying the grinding disk. At its free end the arm 9 is provided with a bore 12 which as shown is exactly parallel to the bore 10 of the bolt 8, and within the said bore 12 a bolt 14 is shiftable which can be set in any position by means of a screw 13. It will be understood that the dimensions of the bolt 8, the arm 9 and the bolt 14 are exactly alike on both sides of the machine, or that the same instrument 9, 14 is used on both sides.

By successively placing the said instrument on both bearings 2 any irregularities in the vertical position of the trunnions 6 and 7 and the roll 5 are indicated by the different positions of the bolt 14 within the arm 9. Preferably the bolt 14 is provided with marks. In one construction the said scale marks are provided on the screw 13, and the said screw is constructed so as to shift the bolt 14 upwardly or downwardly when turning the same. Thus the amount of the vertical adjustment of the ends of the rolls relatively to each other required for setting the axis of the roll parallel to the horizontal plane passing through the direction of the movement of the carriage carrying the grinding disk can be ascertained.

It will be understood that such measuring is not always necessary. By setting the bolt 14 so that it just makes contact with the surface of the higher trunnion, and thereafter placing the arm 9 on the bearing of the lower trunnion, it is only necessary slightly to lift the bearing block 3 of the said bearing so far that the surface of the trunnion makes contact with the bottom end of the bolt 14, whereupon the axis of the roll is parallel to the said horizontal plane.

For adjusting the roll to position in which with its axis extends parallel to the vertical plane passing through the said direction of movement similar gauging means are provided.

As shown, the said gauging means are constructed as follows: The bearings 2 are provided each with a bolt 17 on which an arm 15 formed with a bore 16 is mounted, the said arm being in contact with a shoulder 18. In the example shown in the figures the bolt 17 and the bore 16 are likewise cylindrical, so that the arm 15 is adapted to be rocked in

lateral direction. In a bore 19 of the arm 15 a pin 20 is longitudinally shiftable, which pin is adapted to be fixed in position by means of a screw 21. In some cases the screw 21 is constructed for shifting the pin 20 in axial direction in the same way as has been described with reference to the screw 13. In a bore 22 a bolt 23 is shiftable, the outer end of which projects from the bore and into position for making contact with the pin 20, when the inner end is in engagement with the surface of the trunnion 6 or 7.

When using the gauging apparatus the bolt 23 is shifted inwardly, and in contact with the surface of the trunnion 6 or 7, and the pin 20 is shifted into engagement with the outer end of the bolt 23, whereupon it is fixed in position by means of the screw 21. Now the arm 15 and the pin 20 carried thereby are removed and placed on the bolt 17 of the other bearing 2. The dimensions of the bearings 2 and the bolts 23 at both sides of the machine being exactly alike, the position of the projecting end of the bolt 23 relatively to the inner end of the bolt 17 indicates whether or not the position of the trunnions is alike at both sides, and the axis of the roll is parallel to the direction of the movement of the carriage. Further, suitable scale marks provided in connection with the pin 20 of the screw 21 indicate the extent of the inaccuracy of the trunnions. If therefore one or both bearing blocks 3 and 4 of one or both bearings 2 are shifted transversely of the direction of the movement of the carriage until both bolts 23 are in corresponding positions, the roll is set with its axis parallel to the said direction of movement. For example, the pin 20 at one side of the roll is set so as to make contact with the projecting end of the bolt 23 which makes contact with the trunnion 6 or 7, and the arm 15 carrying the pin 20 is placed on the bolt 17 of the other bearing, whereupon the bearing blocks 3 and 4 of the last-named bearing are transversely shifted until the end of the pin 20 makes contact with the bolt 23.

The gauging apparatus comprising the pin 20 may likewise be provided with scale marks for measuring the position of the bore 22, which scale marks may be provided either on the bolt 17 or on the bolt 23 or on both bolts, in which case the necessary re-adjustment of the bearing blocks can be determined.

Instead of providing a pin 20 and a bolt 23 made separate therefrom an integral bolt may be provided, in which case the said combined bolt is inserted through the bores 19 and 22 and into contact with the surface of the trunnion, the position of the bolt is ascertained by means of scale marks provided thereon, the arm 15 carrying the bolt is placed on the second bearing 2, and the trunnions are re-adjusted accordingly.

In some cases I provide separate gauging instruments for both bearings 2, in which case, however, scale marks must be provided in order that the positions of the gauging bolts may be compared.

5 A roll is ground as follows: The roll is first placed with its trunnions in the bearings 2 and the diameters of the working surface and the trunnions are exactly measured, so that the position of the axis can be ascer-  
 10 tained. By displacing the bearing blocks 3 and 4 the roll is adjusted so that the said axis is as nearly as possible parallel to the direction of the movement of the carriage. The grinding disk 30 is now operated for  
 15 grinding the trunnions. The diameters and other dimensions of the trunnions will ordinarily not be exactly alike. Therefore, after grinding the trunnions with the roll in the  
 20 adjusted position, the axis is again brought out of its correct position. Therefore the roll is re-adjusted by means of the gauging instruments, whereupon grinding is con-  
 25 tinued, and the operation is repeated, until the diameters of the trunnions are alike. Now the roll is in the position in which when grinding the working surface thereof a  
 30 minimum of material is removed. The grinding disk 30 is now set in position for grinding the working surface.

I wish it to be understood that my improved gauging instrument may be used also for grinding new rolls. Further, the instru-  
 35 ment may be used in many other cases in which it is desired to adjust the axis of a roll by shifting the bearing members thereof.

While in describing the invention reference has been made to a particular example embodying the same I wish it to be under-  
 40 stood that my invention is not limited to the construction shown in the drawings, and that various changes may be made in the general arrangement of the apparatus and the construction of its parts without departing from the invention.

I claim:

1. Apparatus for setting rolls including a bearing, a pair of bearing blocks mounted in said bearing and adjustable in such mount-  
 50 ing along lines of direction angularly disposed one to the other, gauging means including an arm rotatably mounted on said bearing, a gauge bolt extensibly mounted on said arm, and a second gauge bolt mounted  
 55 on said bearing and extensible along a line which is transverse with respect to the line of extension of the bolt first named.

2. Apparatus for setting rolls including a bearing, a pair of bearing blocks mounted on said bearing and adjustable in such mount-  
 60 ing along lines of direction angularly disposed one to the other, gauging means including two arms mounted on said bearing and severally rotatable upon axes trans-  
 65 versely disposed one relatively to the other,

two gauge bolts mounted one on each of said arms and extensible along lines which severally are parallel to the axes of arm rotation.

In testimony whereof I hereunto affix my signature.

OSKAR WALDRICH.

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