C. H. NORTON.

METHOD OF GRINDING ROLLS.

APPLICATION FILED SEPT. 19, 1913.

1,096,189.

Patented May 12, 1914.

2 SHEETS—SHEET 1.

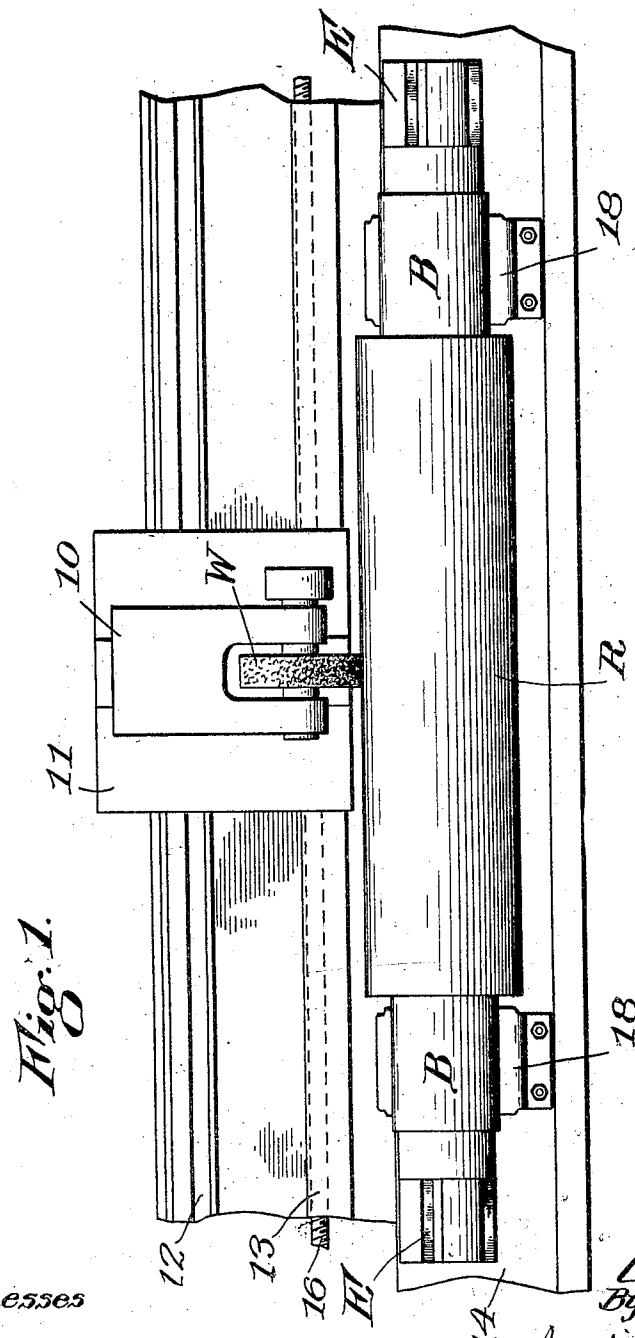


Fig. 1.

Witnesses

C. F. Reason.

C. L. Hartnett

Inventor

Charles H. Norton.

By Attorneys.

Southgate & Southgate

C. H. NORTON.

METHOD OF GRINDING ROLLS.

APPLICATION FILED SEPT. 19, 1913.

1,096,189.

Patented May 12, 1914.

2 SHEETS—SHEET 2

Fig. 2.

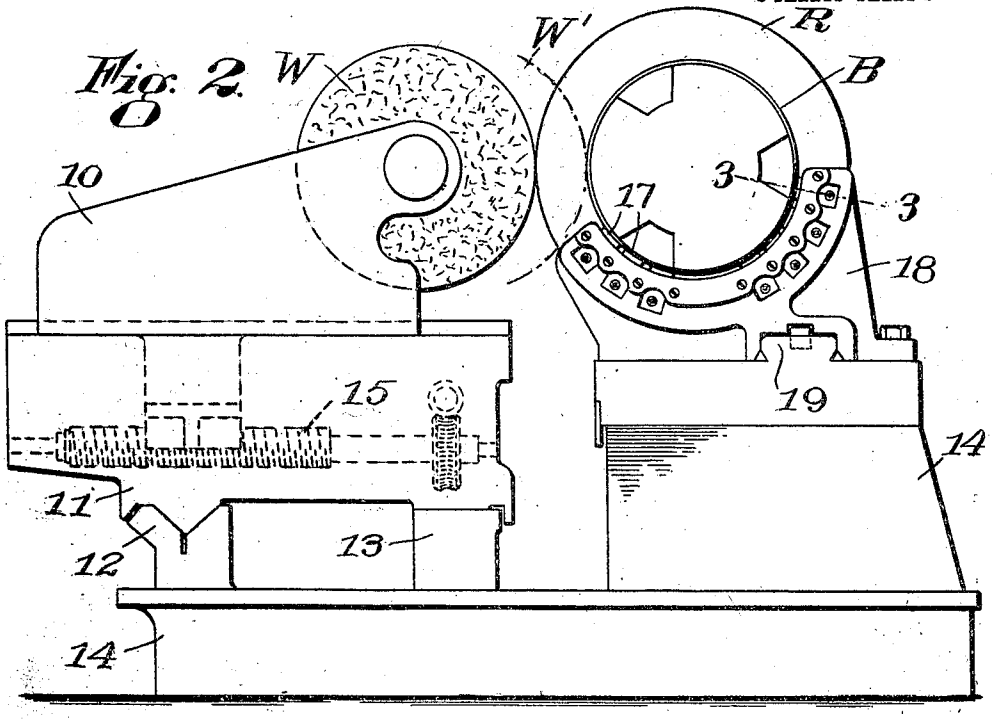
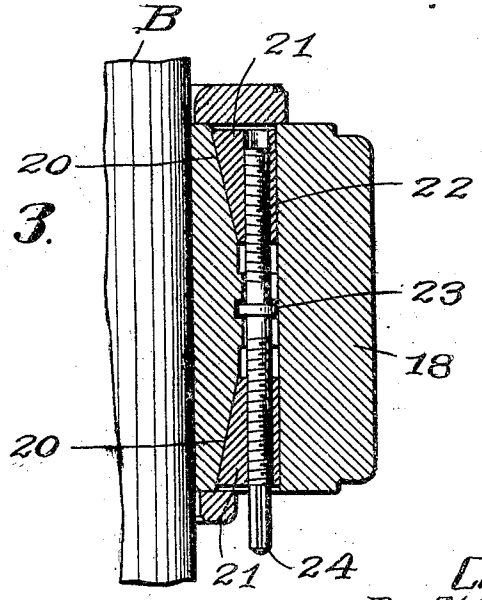


Fig. 3.



Witnesses

C. F. Wesson

C. S. Hartnett

Inventor

Charles H. Norton.

By Attorneys.

Southgate & Southgate

UNITED STATES PATENT OFFICE.

CHARLES H. NORTON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO NORTON GRINDING COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

METHOD OF GRINDING ROLLS.

1,096,189. Specification of Letters Patent. Patented May 12, 1914.

Original application filed June 14, 1911, Serial No. 633,021. Divided and this application filed September 19, 1913. Serial No. 790,804.

To all whom it may concern:

Be it known that I, CHARLES H. NORTON, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Method of Grinding Rolls, of which the following is a specification.

This invention relates to a method of grinding rolls and constitutes a division of my prior application, Serial No. 633,021, filed June 14, 1911.

The object of my invention is to provide an improved method of grinding rolls by which rolls of the character hereinafter described can be quickly, accurately and economically reground.

The rolls to which my improved method is particularly applicable are of relatively large size and weight and are widely used in rolling metal, in milling, crushing and grinding machinery, in printing and paper making machines, and in many other lines of industry. A roll of this character usually comprises a central cylindrical portion and cylindrical bearings of reduced size at the ends of the central portion. The roll may also be provided with extensions beyond the bearings to which driving connections may be fitted. Such rolls are usually originally turned and ground upon centers but as they are subject to great pressure and strain when in use, the working peripheries rapidly lose their exact shape and require regrinding. In some lines of work this has to be done very often as the nature of the work requires that the rolls be kept to exact cylindrical shape, even to the thousandth of an inch or less. The regrinding of these rolls involves considerable difficulty as the original centers are sometimes cut off after the roll is made and if this is not done, the centers are often bruised or their accuracy is otherwise destroyed. The regrinding of the roll upon its original centers is usually impracticable and the present practice is to support and rotate the roll on its bearings and, while thus rotating it, to regrind its working periphery. As the bearing surfaces often wear irregularly and may develop flat spots under the heavy duty to which they are subjected, it has been found that the regrinding of the working periphery in this manner does not always result in a perfectly cylindrical surface. It should also be noted that the working periphery is usually of considerably larger diameter than the bearing surface and that any irregularity in the bearings may be magnified at the working periphery, thus producing greater inaccuracies in the working surfaces than are present in the bearing surfaces. I have discovered that this regrinding operation may be very successfully performed by supporting a roll on the periphery of its bearings, rotating the same while thus supported, grinding the periphery of the bearings while it is thus supported and rotated, and thereafter regrinding the working surfaces of the roll while it is supported and rotated upon its reground and accurate bearings. It is found in actual practice that when this method of procedure is used both the bearing and the working surfaces can be brought to exact cylindrical shape.

My improved method can perhaps be best understood by reference to the accompanying drawings illustrating one form of machine by the use of which the method can be practised.

In the drawings Figure 1 is a top plan view of a portion of a grinding machine; Fig. 2 is an end elevation of the same; and Fig. 3 is a detail sectional view of one of the bearing supporting members.

Referring to Fig. 1, the letter R indicates the central or working portion of a roll having cylindrical bearing members B and also having extensions E by which the roll may be driven. Any common form of actuating means (not shown) may be utilized to rotate the roll upon its bearings. A grinding wheel is indicated at W, mounted upon a support 10 which is carried by a table 11, which in turn is arranged to slide longitudinally upon ways 12 and 13 secured to the main frame 14 of the grinding machine. Feeding mechanism indicated at 15 is provided by which the wheel W may be caused to advance or recede with respect to the work and a feed screw 16, shown in Fig. 1, provides means for moving the wheel table longitudinally of the work. The bearings B of the roll are supported upon a plurality of radially adjustable bearing members 17 mounted in radial slots in a bearing frame 18 which may be arranged for longitudinal adjustment along a guide 19 formed in-

tegrally with the frame 14. Each bearing member, as shown in Fig. 3, is provided upon its rear side with a pair of inclined surfaces 20 which rest upon a pair of oppositely disposed wedge shaped blocks 21 which are mounted to slide longitudinally of the radial slots. A compound right and left hand screw 22 is threaded into openings in each pair of the blocks 21 and is provided with a collar 23 received within a slot in the frame 18. The collar serves to prevent longitudinal movement of the screw relative to the frame 18 and it will be evident that rotation of the screw when thus confined will result in simultaneous, longitudinal movement of the blocks 21 and in radial adjustment of the member 17. An extension 24 upon the screw provides for the attachment of a wrench for its convenient manipulation. It will be noted by reference to Fig. 2 that the upper bearing members 17 at the front of the bearing are disposed in a plane substantially below the center of the roll R. This arrangement permits the wheel W to be advanced to the position indicated by dotted lines at W′ without interference of the bearing members with the operation of the wheel in grinding the surface B. The bearing members at the rear of the machine are disposed in a somewhat higher plane to counteract the thrust of the grinding wheel against the roll. In the practice of my improved method by the use of this machine, the bearings B are first calipered and the supports 17 are then adjusted by the use of any convenient setting mechanism so that they will be arranged on an arc slightly less in diameter than the diameter of the bearings B in order that when the bearings are reground to perfect cylinders the radius may not be less than that of the supports. When the bearing members 17 have been set to the desired diameter, the roll is placed in position and rotated thereon and the wheel is advanced to the position indicated at W′. The bearings B are then ground to exact cylindrical form so that they coincide with and run truly upon the supports 17. The wheel is then brought back to the position indicated at W and the working periphery of the roll is ground while it continues to rotate upon its resurfaced bearings. The roll is thus restored to its original accuracy of cylindrical form both with respect to its bearings and also with respect to its working periphery and it is also reground so that its bearings and its working periphery are developed upon the same axial line.

I do not wish my improved method of grinding rolls to be limited in any way by the apparatus herein disclosed as it is evident that many other forms of apparatus might be designed by those skilled in the art by the use of which this method might be carried out without departing from the spirit and scope of my invention, but

What I do claim is:—

1. The method of grinding the bearings of a roll which consists in supporting and rotating a roll on the peripheries of its bearings and grinding said bearings while the roll is thus supported and rotated.

2. The method of grinding a roll which consists in supporting and rotating the same on the peripheries of its bearings, grinding said bearings while the roll is thus supported and rotated and then grinding the working periphery of the roll while the same is rotated on its resurfaced bearings.

3. The method of grinding a roll which consists in supporting and rotating the same on its bearings on a plurality of supports adjusted to arcs slightly smaller in diameter than the diameter of said bearings, grinding said bearings until the same are cylindrical and run truly on said supports and then grinding the working periphery of the roll while the same is rotated on its resurfaced bearings.

4. The method of grinding rolls which consists of calipering its bearings, setting a plurality of radially adjustable supports to an arc slightly less in diameter than the diameter of said bearings, rotating said roll on its bearings on said supports, grinding said bearings to cylindrical form of the same diameter as said adjusted supports, and then grinding the working periphery of the roll while it is rotated on its resurfaced bearings in said supports.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

CHARLES H. NORTON.

Witnesses:

ALFRED J. DUPRÉ,

J. HERBERT JOHNSON.