

April 6, 1926.

L. R. HEIM

1,579,932

ROLL GRINDING APPARATUS

Original Filed Dec. 21, 1920 2 Sheets-Sheet 1

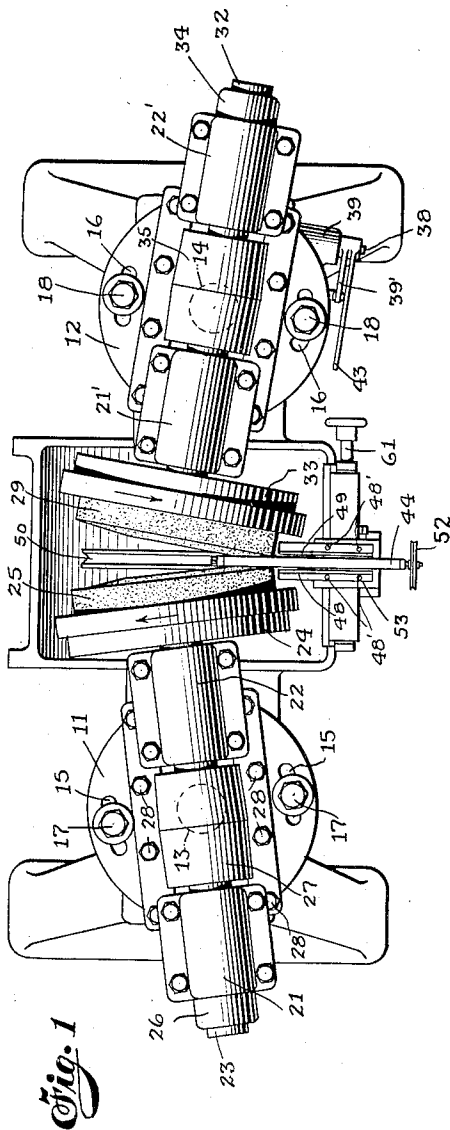


Fig. 1

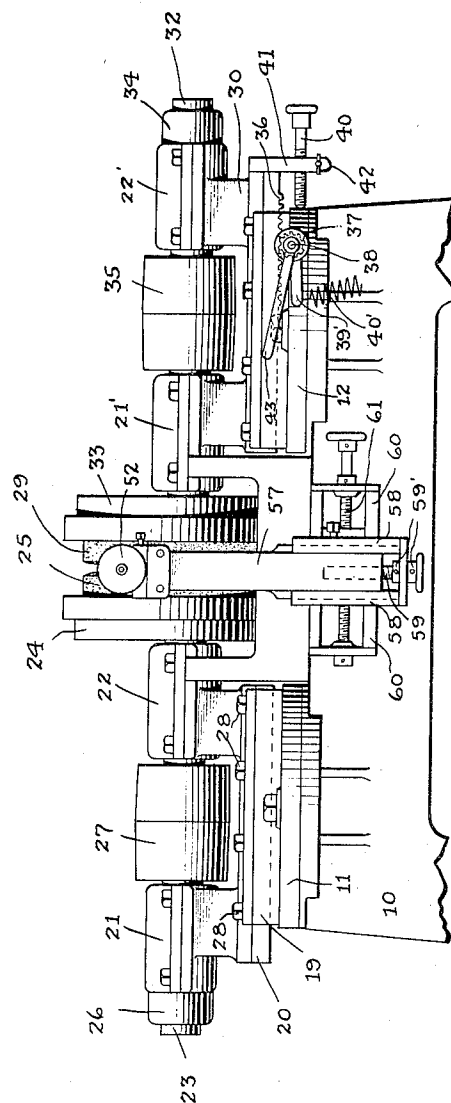


Fig. 2

Lewis R. Heim Inventor

By his Attorneys  
Emery, Varney, Blair & Hoguet

**April 6, 1926.**

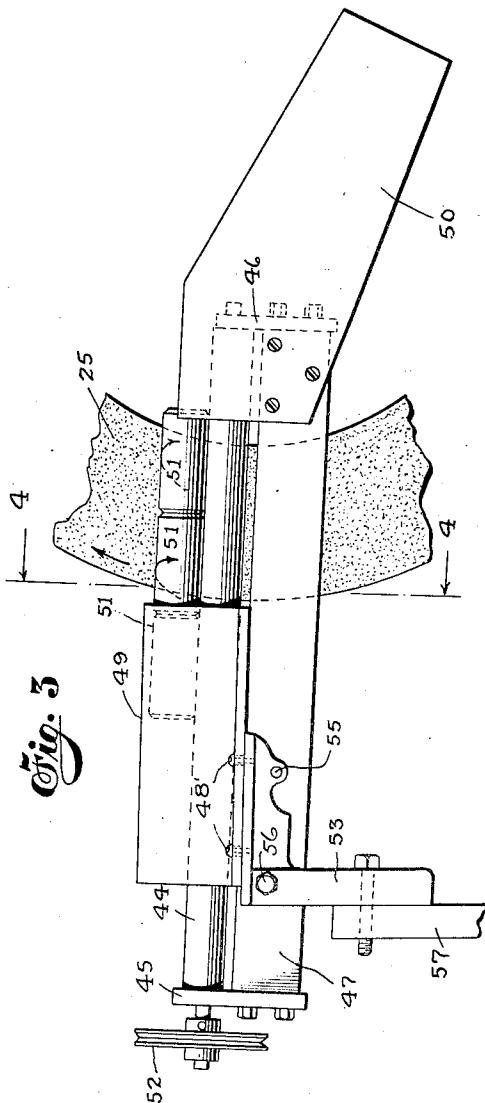
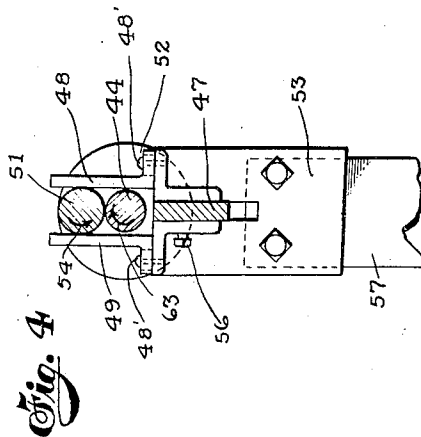
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L. R. HEIM

## ROLL GRINDING APPARATUS

Original Filed Dec. 21, 1920

2 Sheets-Sheet 2



# UNITED STATES PATENT OFFICE.

LEWIS R. HEIM, OF DANBURY, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE HEIM GRINDER COMPANY, OF DANBURY, CONNECTICUT, A CORPORATION OF CONNECTICUT.

## ROLL-GRINDING APPARATUS.

Application filed December 21, 1920, Serial No. 432,175. Renewed May 6, 1925.

*To all whom it may concern:*

Be it known that I, LEWIS R. HEIM, a citizen of the United States, and a resident of Danbury, in the county of Fairfield and State of Connecticut, have invented an Improvement in Roll-Grinding Apparatus, of which the following is a specification.

This invention relates to grinding machines and more particularly to apparatus for grinding rolls.

An object of this invention is to provide roll grinding apparatus of efficient action and of durable construction.

This invention aims also to provide an improved roll grinding apparatus comprising a durable work rest or carrier for rolls having great flexibility of adjustment with respect to the operating surfaces of the abrasive wheels and capable of convenient adjustment thereof to compensate for wear imposed thereon by the work or rolls.

Another object is to provide a roll grinding apparatus of the above type in which the harmful effect of wear and friction of the rolls on the carrier may be reduced or eliminated.

Other objects will be in part obvious or in part pointed out hereinafter.

The invention accordingly consists in the features of construction, arrangement of parts and combinations of elements as will be exemplified in the structure hereinafter described and shown in the accompanying drawings and the scope of the application of which will be indicated in the appended claims.

One of various possible embodiments of this invention is illustratively shown in the drawings, wherein

Figure 1 is a plan view, and

Figure 2 is a front elevation of the roll grinding apparatus, the rearwardly extending portions of the several parts not being shown in Figure 2.

Figure 3 is a side view on an enlarged scale of the roll carrier or work rest, and

Figure 4 is a sectional view taken on the line 4-4 of Figure 3.

Referring more particularly to Figures 1 and 2, it will be noted that there has been provided a main base or standard 10 upon the respective ends of which are pivotally mounted the tables 11 and 12 pivoted thereon as by means of the pins 13 and 14, re-

spectively, indicated in dotted lines in Figure 1. The tables 11 and 12 are each provided with a pair of slots 15 and 16, respectively, through which extend the clamping screws 17 and 18, respectively, for clamping the tables 11 and 12 to the main frame or standard 10 at any desired position to which they may be swung about their pivot pins.

The table 11 is provided with ways 19, in which is slidably mounted the bearing frame 20 which supports the bearings 21 and 22. Housed in the bearings 21 and 22 is a shaft 23 upon one end of which is mounted a suitable chuck 24, in which is adapted to be secured in any convenient manner an abrasive wheel 25, the shaft 23 having mounted upon its other end a collar 26 to prevent axial movement thereof. A pulley 27 secured to the shaft 23 intermediate the bearings 21 and 22 serves to transmit rotation to the abrasive wheel 25 from any suitable source of power as by means of a belt. The bearing frame 20 may be moved longitudinally of the ways 19 and may be clamped in any desired adjusted position by means of the clamping bolts 28.

Upon the pivotally mounted table 12 at the other end of the standard 10 a substantially similar construction is employed for mounting the abrasive wheel 29 in operative relation to the abrasive wheel 25. This construction embodies substantially similar parts and comprises the bearing frame 30 slidably mounted in the ways 31 on the pivotally adjustable table 12, the bearing frame 30 supporting the shaft 32 in suitable bearings 21' and 22' thereon and at one end of which is mounted the chuck 33 for supporting the abrasive wheel 29. A suitable collar 34 is provided upon the end of the shaft 32 to prevent axial movement thereof and a pulley 35 is mounted upon the shaft to transmit rotation to the abrasive wheel 29. The bearing frame 30, however, is provided with a rack 36 facing downwardly and adapted to engage the pinion 37 mounted upon a shaft supported in a suitable bearing 39 preferably integral with the table 12. A lever 39' rigidly secured to the shaft 38 has its end connected to a tension spring 40', one end of which is secured to the standard 10 so as to urge the pinion 37 in such a rotative direction as to tend to move the

rack 36 and its associated abrasive wheel 29 in a direction toward the abrasive wheels 25. Movement of the bearing frame or carriage 30, and hence of the abrasive wheel 29, in the direction toward the wheel 25 is limited by means of a screw 40 extending through a downwardly extending split arm 41 at the end of the carriage 30 and adapted to abut against the end of the table 12. The screw 40 may be manually operated to adjust the wheel 29 toward or away from the wheel 25 as desired, and to preserve the adjustment given the screw 40 there is provided a clamping screw 42 at the lower end of the arm 41 to clamp the screw in its adjusted position. A hand lever 43 rigidly secured to the shaft 38 on which the pinion 37 is mounted permits of a manual withdrawal against the action of the spring 40' of the carriage 30 and its associated wheel 29.

To carry the rolls or parts operated upon into operative relation with the wheels 25 and 29 there is provided a carrier 44, referring particularly to Figs. 3 and 4, of circular cross-section rotatably mounted in bearings 45 and 46 upon a main frame member 47 extending between the wheels 25 and 29 and mounted as hereinafter described. To guide the rolls along the carrier 44 there is provided a pair of guides 48 and 49 preferably of sheet metal bent into an angular form so as to provide base members by means of which the guides 48 and 49 may be secured, as by means of the screws 48', to the bracket 53. The base members of the guides 48 and 49 are provided with transversely extending slots through which the screws 48' extend so that the guides 48 and 49 may be adjustably positioned with respect to the carrier 44 to accommodate therebetween rolls of various diameters. The rolls or parts operated upon, indicated at 51, are thus guided and carried into operative relation between the operative surfaces of the wheels 25 and 29. At one extremity of the frame member 47 there is secured an inclined trough 50 adapted to receive the rolls 51 after operation upon them by the wheels 25 and 29 in a manner to be hereinafter described and to pass the rolls into a suitable receptacle.

The abrasive wheels 25 and 29 are preferably of annular form and are beveled as indicated in Figure 1, so that upon the proper angular relation between the axes of the wheels 25 and 29 having been established by means of the pivotal adjustment of the tables 11 and 12 as hereinbefore described, the adjacent operating faces of the beveled abrasive wheels 25 and 29 will be substantially parallel and will present substantially parallel operative portions for action upon the rolls to be ground. The carrier 44 extends between the wheels 25 and 29 and is

adapted to present rolls carried thereby to the substantially parallel portions of the operative surfaces of the wheels 25 and 29, the angular setting of the wheels providing a sufficient space between their rear portions to accommodate the downwardly inclined discharge trough 50.

The abrasive wheel 29 is adapted to be rotated at a relatively high speed in the direction of the arrow as indicated in Figure 1 and serves to perform the grinding action upon the rolls 51 on the carrier 44. The wheel 25, however, is rotated in a reverse direction at a relatively low speed and serves to control or regulate the rate of rotation of the rolls upon carrier 44 during the action of the grinding wheel 29 thereon.

It will be understood that this action of the abrasive wheels upon the rolls is attained by reason of the operating surfaces of the wheels travelling in opposite directions and that in the embodiment herein described, such travel of the operating surfaces in opposite directions is conveniently accomplished by the opposite rotations given the wheels. I may, however, also employ peripheral abrasive wheels rotating in the same direction for accomplishing the desired travel in opposite directions of the operating surfaces of the wheels such as are shown, for example, in my United States Patent #1,264,930 of May 7, 1918.

The carrier 44, presenting a cylindrical surface to the cylindrical rolls 51, presents a path of contact for the rolls which is substantially a line and which forms substantially an element of the cylindrical surface. The travel of the rolls 51 along the carrier 44 and past the grinding wheel 29 and the regulating wheel 25 is restricted by three paths of contact formed by the element of the cylindrical carrier 44 and by the two operating surfaces of the wheels 29 and 25. During continuous operation and due to the substantially continuous travel of the rolls along the carrier, as will be more clearly hereinafter described, that portion of the carrier forming the path of contact with the rolls is subjected to wear so that the accuracy of operation, and hence of the grinding, is impaired. The carrier 44, however, in being rotatably mounted on the main frame 47, may be manually rotated throughout a sufficient extent to present a new element of its cylindrical surface for contact with the rolls to compensate for or avoid the bad effects of the wear made in the previously used path of contact. Preferably the carrier 44 is made of hardened steel so as to reduce the wear thereon to a minimum.

It will be noted that the wear resulting upon the paths of contact presented by the carrier 44 to the rolls 51 is due not only to the movement of the rolls in the direction of its axis but also to the relative movement

of the surface of the rolls upon the carrier 44 by reason of the regulating wheel 25 determining the rate of rotation of the rolls. In order to further minimize the wear on the carrier 44 and also to eliminate the friction between the rolls and the carrier 44, a pulley 52 is provided upon the shaft of the cylindrical carrier 44 to permit the latter to be rotated at substantially the same surface speed as the surface speed of the rolls, and hence to eliminate relative rotation between the two. The regulating wheel 25 will give the roll 51, indicated in Figure 4, a rotation in the direction indicated by the arrow 54, and the carrier 44 is rotated in the direction indicated by the arrow 63 at a rate to substantially eliminate relative rotation between itself and the rolls, the pulley 52 being connected to any suitable source of power. Thus the harmful effects of the friction between the rolls 51 and the carrier 44 are reduced or substantially eliminated, thus eliminating also a great part of the wear on the carrier 44 and permitting a more uniform and precise regulating action of the regulating wheel 25 as well as greater accuracy of grinding by wheel 29. Furthermore, the rotation of the carrier 44 gives the rolls 51 a rotative movement preliminarily to their being gripped between the wheels 25 and 29 so that the marking or injuring of the face of the rolls is successfully eliminated. Where the rolls are not given such a preliminary rotative movement, they are apt to be marred or injured by reason of the sudden gripping thereof by the coacting operative surfaces of the two wheels.

As has been hereinbefore noted, the travel of the rolls between the operative surfaces of the wheels 25 and 29 is restricted by three paths of contact. In order that the rolls may be automatically conveyed inwardly between the operating wheels, and in order also to vary the rate of travel for a given rate of drive of the operating wheels, I provide means whereby the relative inclination between the path of contact of the rolls, on the carrier 44 and of the path of the operative surface of the regulating wheel 25 may be adjusted at will. This may be conveniently accomplished by pivotally mounting the frame member 47, as at 55, in a bracket 53, adjustably mounted as hereinafter described, a set screw 56 in the bracket 53 serving to lock the frame member 47 and its associated carrier 44 in any desired adjusted position. The rolls 51 or other parts operated upon are thus positively drawn inwardly between the wheels 25 and 29 by the action of the regulating wheel 25 resulting from the relative inclination given the path of its operative surface with respect to the path of the rolls on the carrier.

The bracket 53 is mounted on a post 57, referring to Figures 1 and 2, slidably

mounted at its lower end in the ways 58 of a secondary frame member and is adjustable in a vertical direction by means of the hand screw 59 rotatably mounted in the lower end of the frame and provided with collars 59' so as to prevent axial movement thereof. The secondary frame is in turn mounted in ways 60 secured to the front part of the standard 10 of the machine and is movable within the ways 60 by means of the hand screw 61, so that the post 57 and hence the carrier 44, may be adjusted toward or away from the operative surface of either of the wheels. A set screw 62 serves to lock the post 57 in its adjusted vertical position. The preferred vertical adjustment of the post 57 and hence of the carrier 44 is such that the wheels 25 and 29 will operate upon the rolls in paths of contact therewith which are substantially in a plane passing through the axes of the wheels. The preferred horizontal adjustment of the post 57 and its carrier 44 is, for a given size of roll, operated upon and hence for a given relative adjustment of the carriage 30 with respect to the wheel 25, such that the carrier 44 occupies a substantially central position between the operative surfaces of the wheels 25 and 29.

It will be noted that there has been provided in this invention a roll grinding apparatus in which the several objects hereinbefore noted, as well as others of this invention, are attained and in which many advantages are achieved.

As many possible embodiments may be made of this invention and as many changes may be made in the embodiment above set forth, it will be understood that all matter hereinbefore described and shown in the accompanying drawings is to be interpreted in an illustrative sense and not in a limited sense.

I claim as my invention:

1. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a carrier of circular cross section for supporting a succession of rolls between the operative surfaces of said wheels and adapted to form a line of contact with said rolls, and means for mounting said carrier between said wheels to permit a manual rotation thereof to present a new line of contact of said rolls.

2. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a high speed and a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a carrier extending between said

wheels for supporting a cylindrical body in operative relation to said wheels, and means adapted to rotate said body preliminarily to its entry into operative relation to said wheels.

3. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a carrier extending between said wheels and having a cylindrical surface for supporting a roll in operative relation to said wheels, said roll being restricted in its travel by the three paths in which said roll contacts with said two wheels and said carrier, and means for adjusting the angular inclination between the path formed by said carrier and the path of travel of the operating surface of said regulating wheel whereby the rate of travel of said roll along said carrier is varied for a given rate of drive of said wheels.

4. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, and a carrier of circular cross section for supporting a succession of rolls in operative relation to said wheels, one of the elements of said carrier forming a path of contact with said rolls.

5. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon and adapted to contact with said rolls in substantially an element thereof, means for rotatably supporting said carrier at its two ends to permit manual rotation thereof to present a new element for contact with said rolls, and means for adjusting said supporting means vertically with respect to one of said wheels.

6. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon and adapted to contact with said rolls in substantially an element thereof, means adapted to permit adjustment of said carrier toward and away from the operating

surface of one of said wheels and means for adjusting one of said wheels toward and away from the operating surface of the other of said wheels.

7. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon and adapted to contact with said rolls in substantially an element thereof, means adapted to permit said carrier to be adjusted vertically with respect to one of said wheels and means adapted to adjust said carrier toward and away from the operative surface of one of said wheels.

8. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon, said rolls contacting with said carrier in substantially an element thereof, means for rotatably mounting said carrier between said wheels to permit manual rotation thereof to present a new element of contact to said rolls, means associated with said carrier adapted to guide rolls on said carrier to the operating surfaces of said wheels, and means adapted to receive said rolls from said carrier after operation thereupon by said wheels.

9. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon, said rolls contacting with said carrier in substantially an element thereof, means adapted to adjust relatively the path of contact of rolls on said carrier with respect to the path of the operative surface of said regulating wheel and thereby adjust the rate of feed of rolls along said carrier with a given rate of drive of said wheels, means adapted to guide the rolls on said carrier to the operating surfaces of said wheels, and means adapted to receive the rolls from said carrier after operation thereupon by said wheels.

10. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regu-

lating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a series of rolls in operative relation to said wheels, and power driven means for effecting a rotary movement of said carrier.

11. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, means for presenting a supporting surface for carrying a series of rolls into operative relation to said wheels, said regulating wheel substantially governing the rate of rotation of said rolls, and means for moving said supporting surface in the same direction as and at substantially the same speed as the surface speed of said rotating rolls.

12. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a carrier extending between said wheels for supporting a series of rolls in operative relation to said wheels, said regulating wheel governing the rate of rotation of said rolls, and means for substantially eliminating friction between said rotating rolls and said carrier.

13. In a roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls in operative relation to said wheels, said rolls contacting with said cylindrical carrier in substantially one element thereof, and continuously operative means for presenting a new element of said cylindrical carrier for contacting with said rolls.

14. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls in operative relation to said wheels, said rolls contacting with said cylindrical carrier in substantially one element thereof, continuously operative means for presenting a new element of said cylindrical carrier for contacting with said rolls,

means associated with said carrier adapted to guide rolls on said carrier to the operating surfaces of said wheels, and means adapted to receive said rolls from said carrier after operation thereupon by said wheels.

15. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a carrier extending between said wheels and having a cylindrical surface for supporting a succession of rolls in operative relation to said wheels, said rolls contacting with said carrier in substantially one element of said cylindrical surface, a frame provided with a pair of bearings for rotatably supporting said carrier between said wheels, and means for continuously rotating said cylindrical carrier.

16. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a carrier extending between said wheels and having a cylindrical surface for supporting a roll in operative relation to said wheels, said roll being restricted in its travel by the three paths in which said roll contacts with said two wheels and said cylindrical surface, means for continuously rotating said carrier to present continuously a new element thereof to form a new path of contact with said roll, and means for adjusting the angular inclination between the path of said cylindrical surface and the path of the operative surface of said regulating wheel.

17. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a carrier of circular cross-section for supporting a succession of rolls in operative relation to said wheels, one of the elements of said carrier forming a path of contact with said rolls, means for continuously rotating said carrier to present constantly a new path of contact, a pivotally mounted frame for rotatably supporting said carrier to permit adjustment of the angular inclination thereof in a vertical plane, whereby the rate of feed of said rolls is varied for a given rate of drive of said wheels, and means for locking said pivotal mounting in adjusted position.

18. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a rela-

tively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for a simultaneous action thereon and adapted to contact with said rolls in substantially an element thereof, means for continuously rotating said carrier to present constantly a new element thereof for contact with said rolls, and means for adjusting and holding said carrier vertically with respect to one of said wheels.

19. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon and adapted to contact with said rolls in substantially an element thereof, means for continuously rotating said carrier to present constantly a new element thereof for contact with said rolls, means adapted to permit adjustment of said carrier toward and away from the operating surface of one of said wheels, and means for adjusting one of said wheels toward and away from the operating surface of the other of said wheels.

20. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon, said rolls contacting with said carrier in substantially an element thereof, means for continuously rotating said carrier to present constantly a new element thereof for contact with said rolls, means adapted to adjust relatively the path of contact of rolls on said carrier with respect to the path of the operative surface of said regulating wheel and thereby adjust the rate of feed of rolls along said carrier with a given rate of drive of said wheels, means adapted to guide the rolls on said carrier to the operating surfaces of said wheels, and means adapted to receive the rolls from said carrier after operation thereupon by said wheels.

21. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier ex-

tending between said wheels for supporting a plurality of rolls for simultaneous action thereon, said rolls contacting with said carrier in substantially an element thereof, means for continuously rotating said carrier to present constantly a new element thereof for contact with said rolls, a movable supporting carriage adapted to be moved toward and away from one of said wheels, means for mounting the other of said wheels with its bearings upon said movable support and adapted to permit the adjustment of the operating surface of said wheel into substantial parallelism with the path of contact of said rolls of said carrier, and means for relatively adjusting the angular inclination of the path of contact of said carrier and the path of the operating surface of the other of said wheels, whereby the rate of feed of said rolls along said carrier is varied for a given rate of drive of said wheels.

22. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon, said rolls contacting with said carrier in substantially an element thereof, means for continuously rotating said carrier to present constantly a new element thereof for contact with said rolls, a movable supporting carriage adapted to be moved toward and away from one of said wheels, means for mounting the other of said wheels with its bearings upon said movable support and adapted to permit the adjustment of the operating surface of said wheel into substantial parallelism with the path of contact of said rolls of said carrier, and means for adjusting said carrier vertically with respect to one of said wheels.

23. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at a relatively high speed, a regulating wheel adapted to be rotated at a relatively low speed, said wheels being adapted to present operative surfaces travelling in opposite directions, a cylindrical carrier extending between said wheels for supporting a plurality of rolls for simultaneous action thereon, said rolls contacting with said carrier in substantially an element thereof, means for continuously rotating said carrier to present constantly a new element thereof for contact with said rolls, a movable supporting carriage adapted to be moved toward and away from one of said wheels, means for mounting the other of said wheels with its bearings upon said movable support and adapted to permit the adjustment of the operating sur-

face of said wheel into substantial parallelism with the path of contact of said rolls of said carrier, means adapted to adjust said carrier vertically with respect to one of said wheels, and means adapted to adjust said carrier toward and away from the operative surface of one of said wheels.

24. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at relatively high speed; and means co-acting therewith for rotating and supporting a succession of rolls in operative relation to said grinding wheel, said means including a member for supporting a succession of rolls and a member for holding the rolls thus supported against the grinding wheel surface, one of said members being rotatable and adapted to be driven at a relatively low speed and in a direction to present an operative surface traveling in a direction opposite from that of the adjacent operative surface of the grinding wheel, and one of said members having a rotary portion extended beyond the operative face of said grinding wheel whereby said rolls are rotated preliminary to their entry into operative relation to said grinding wheel.

25. In roll grinding apparatus, in combination, a grinding wheel adapted to be rotated at relatively high speed; means co-acting therewith for rotating and supporting a succession of rolls for grinding operation thereon by said grinding wheel, said means including a member for supporting a succession of rolls and a member for hold-

ing the rolls thus supported against the grinding wheel surface, one of said members being rotatable and adapted to be driven at a relatively low speed and in a direction to present an operative surface traveling in a direction opposite from that of the adjacent operative surface of said grinding wheel, and said rotatable member being extended beyond the operative face of the grinding wheel, thereby to cause a rotation of said rolls preliminary to their entry into operative relation to said grinding wheel.

26. In a machine for grinding work of round section, a grinding throat, in which work of round section is received for simultaneous grinding and rotation, including, in combination, a grinding wheel rotatable at relatively high speed, a rotatable member adapted to be driven at a surface speed relatively low and substantially equivalent to the surface speed of the work and in a direction to present an operative surface traveling in a direction opposite from that of the adjacent operative surface of said grinding wheel, said member being extended beyond the operative face of said grinding wheel to cause a rotation of the work preliminary to its entry into the grinding throat, and means adapted to prevent lateral displacement of the work while in operative relation to said grinding wheel.

In testimony whereof, I have signed my name to this specification this eleventh day of December, 1920.

LEWIS R. HEIM.