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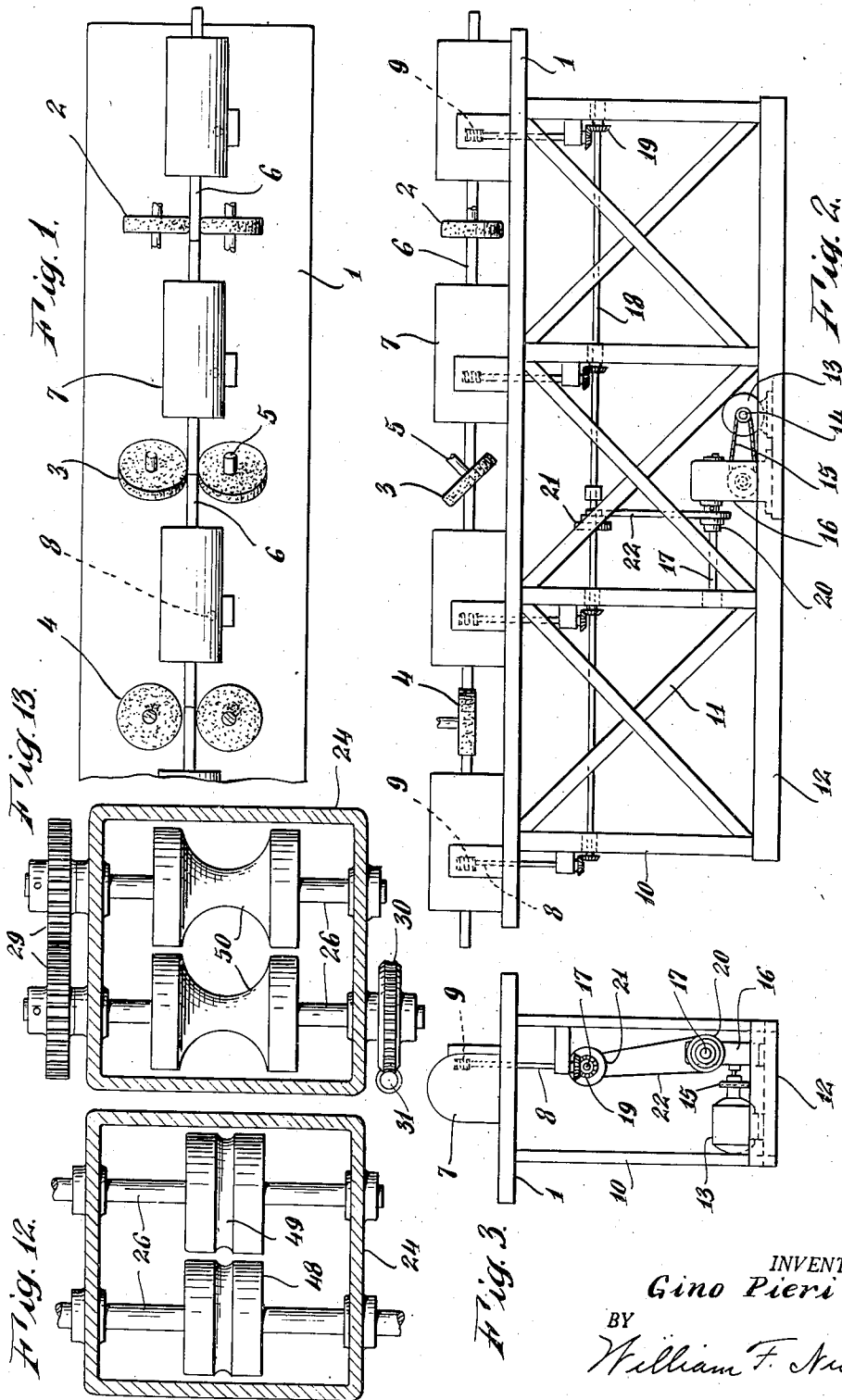
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2,476,683

POLISHING APPARATUS

Filed April 17, 1948

3 Sheets-Sheet 1



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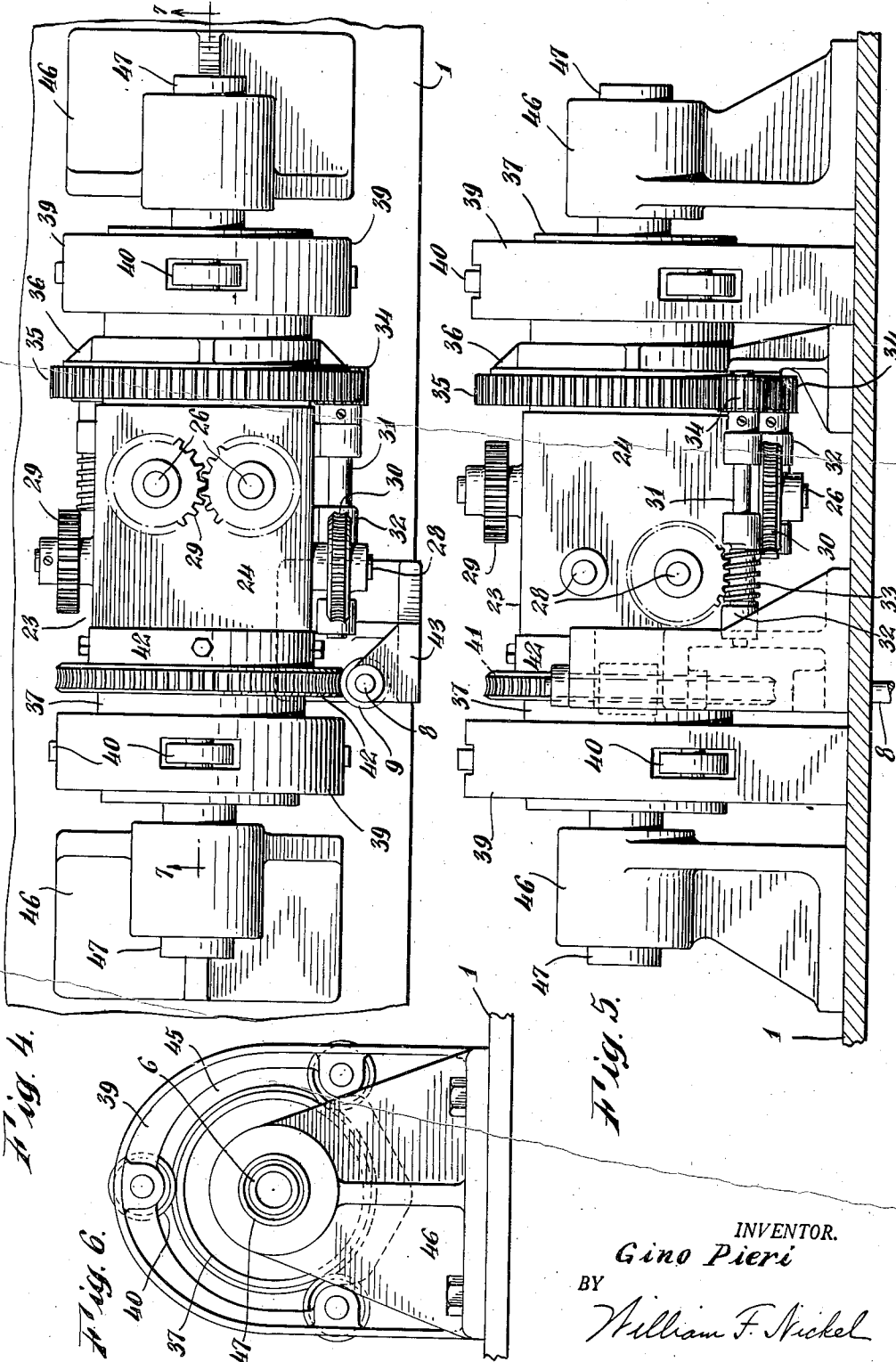
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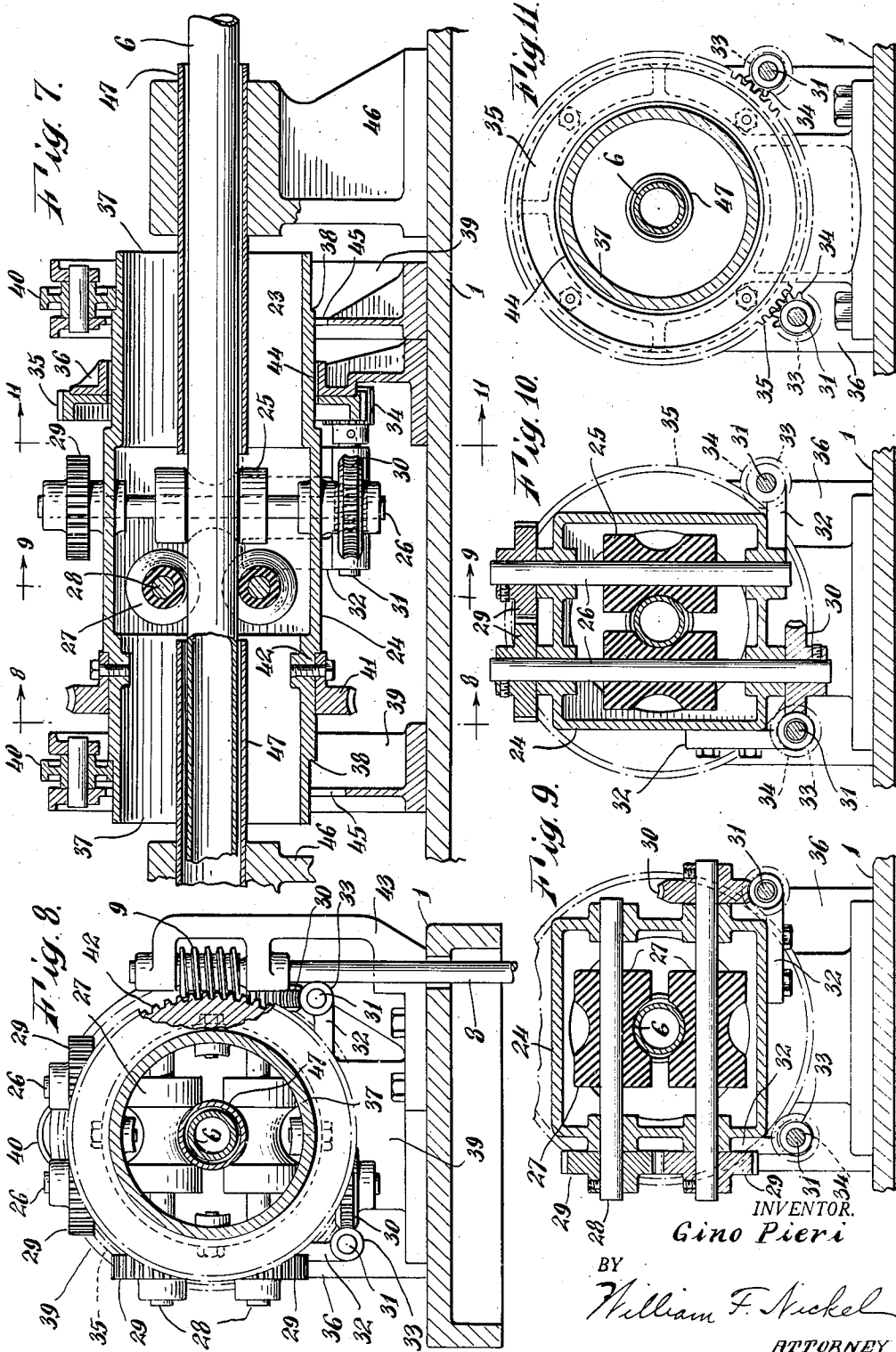
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POLISHING APPARATUS

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4 Claims. (Cl. 51--87)

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This invention relates to improvements in apparatus for grinding and polishing bars and tubes, particularly bars and tubes which are circular in cross section and are to be finished to present a bright glistening outside surface.

Important objects of this invention are to provide: (A) A rapidly operating apparatus capable of performing in one simple process, the various steps required in the polishing and grinding of tubing. (B) The execution of each successive step by means of wheels set at different angles; thus making certain that the abrasive marks imposed by previous wheels are cleanly, visibly and fully rubbed out by the finer abrasive action of the succeeding wheels. (C) Grinding or polishing wheels set in pairs for each operation, each pair working at the same time and on the same spot, thus developing a high and efficient cutting action.

To this end my device departs entirely from the centerless principle now utilized in well-known prior machines, and incorporates instead, as a basic feature, a centered mechanism that includes a succession of abrading wheels.

To this end the mechanism in its practical form comprises a succession of wheels of emery, "carborundum" or other material of sufficient hardness to engage the tubes or rods, and means for imparting to the stock a longitudinal shifting motion, so that bit by bit the stock is worked over its entire length. Preferably the wheels are disposed in pairs, with the pairs a predetermined distance from one another; the elements of each pair being separated to permit the stock to move between them and engage opposite sides thereof; and each pair being mounted so that the plane of the two wheels thereof make the same angle to the stock, and its direction of movement, while the several pairs each make different angles thereto. In conjunction with the wheels, which are rotated from any suitable source of power, the apparatus includes a number of units adapted to feed the bars or tubes at the necessary rate past the wheels, and likewise to rotate the stock while the feeding or transmission is in progress. Each portion along the length of the stock thus receives the impact of the grinding and polishing elements at an angle that is changed for successive stages; the wheels take effect on the outsides of the tubes or rods at no particular plane with reference to the long axis thereof, and the result is a smooth, perfect metallic lustre when the end of the operation is reached.

Another object of the invention is to provide

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a feeding unit that is simple in construction but capable of supporting the stock in exact position during the whole operation, carrying it steadily forward and holding it firmly while the grinding wheels do their work upon it as required. These units are arranged in line with one another, as many being utilized as are needed, and the grinding wheels are disposed in pairs between the adjacent or successive units. Each of the units comprises a rotatable casing, and in the casing are mounted feed rolls with yieldable frictional surfaces to press upon but not to abrade the bars or tubes; the rolls being turned as the casings revolve and caused to urge the stock forward longitudinally to be engaged by the grinding wheels, which are disposed at the outlet ends of the separate units. As fast as one pair of grinding wheels takes hold of a bar or tube as it comes from one unit it is passed on to the next unit, being revolved uninterruptedly and transmitted to the next pair of wheels, which continue the process and operate at an angle to the first. When delivered from the apparatus the stock has a beautiful lustre or sheen with no indication of a score line or scratch or striation.

Other objects and advantages of the improvement will be made clear in the following description, and the novel features are pointed out in the claims. But this disclosure is explanatory only and changes in details may be made without departing from the general design which characterizes the invention, or omitting any of the essential parts.

Figure 1 is a top plan of an apparatus according to my invention.

Figure 2 is a side view thereof.

Figure 3 is an end view.

Figure 4 is a top plan of one of the units for rotating the bars or tubes to be polished.

Figure 5 is a top view thereof.

Figure 6 is an end view of the same.

Figure 7 is a longitudinal section along line 1-7 of Figure 4.

Figures 8, 9, 10 and 11 are respectively cross sections taken through one such unit on the planes indicated by the lines 8, 9, 10 and 11 in Figure 7, looking in the direction of the arrows; and

Figures 12 and 13 are cross sectional views somewhat similar to Figure 9 showing modifications in detail.

The complete apparatus comprises a platform or flat support 1 above which are three pairs of grinding and polishing wheels, indicated at 2, 3 and 4, the pairs being disposed at different loca-

tions on the top 1, with a space of predetermined width between the wheels of each pair. This space of course varies according to the thickness or diameter of the stock, and the wheels of each pair can be mounted in any suitable way for the necessary adjustment. The wheels are mounted on shafts 5 which are operated by connection with a suitable source of power, and the rods or tubes 6 to be polished are moved from one end of the top 1 to the other between the wheels or elements of each pair in succession. The different pairs of wheels are set so that the parallel planes of their opposite flat faces make a different angle for each pair with the axis of the stock 6. Both wheels of the pair 2 turn at right angles to the stock 6. The wheels of the pair 3 rotate in planes which are inclined to the line of the axis of the stock and to the top 1, and the wheels 4 are mounted so that they rotate parallel to the top 1. As the rods or tubes 6 are fed lengthwise to pass between the wheels of the successive pairs, they are simultaneously rotated about their central long axes by units 7 mounted in line with each other on the support 1, as indicated in Figures 1 and 2. Hence the stock 6 in the first unit 7 at the right is revolved therein, comes into contact with wheels 2 as it passes between them; enters the next unit 7, where it is similarly revolved and fed forward to be engaged by the wheels 3; and then transferred to the third unit 7, where its rotation is continued as it is fed between the wheels 4. The process can be continued beyond the third unit 7 if desired, with additional grinding wheels mounted to rotate in still different planes. Hence, when the treatment is completed the outside of the stock 6 presents a smooth, burnished surface without visible grain, scratches, or striations, because of the different angles at which the separate pairs of wheels are disposed on the platform 1. Each of the units 7 is actuated by a vertical shaft 8 and gearing including a worm 9.

The platform or top 1 is supported upon legs 10, strengthened by diagonal braces 11 and resting upon a base 12. The base carries a motor 13 with shaft 14 connected by a chain or belt to a suitable speed reducing assembly 16. This member transmits motion to a shaft 17 mounted in suitable bearings on the legs 10 and connected to drive a shaft 18, similarly mounted on the legs 10 under the top 1, which transmits motion through bevel gears 19 to each of the vertical shafts 8. The shaft 17 carries a number of pulleys 20 of different diameters united to a similar set of pulleys 21 on the shaft 18 by a belt 22. Hence the speed of the shaft 18 can be adjusted as desired.

Each of the units 7 comprises a tubular casing 23 open at both ends, this casing having a central section 24 which is approximately square in cross section. In the section 24 are mounted two feed rolls 25 of some yielding substance, such as rubber or leather or the like, and of such shape that they can make contact over a large part of the exterior surface of each tube or rod 6. Each of these feed rolls 25 is mounted on a shaft 26 supported in bearings in the section 24 of the casing. This section 24 also carries two additional feed rolls 27 similar in shape to the rolls 25, and mounted upon separate shafts 28; the shafts 28 being at right angles to the shafts 26. Each of the casings of the units 7 has connections so that the casing is revolved, carrying the shafts 26 and 28 around with it and at the same time the shafts are rotated to cause the rollers 25 and 27 to feed the stock forward.

The shafts 26 project at one end to the outside of the casing and are joined together by gears 29 affixed to said ends. The opposite end of one of these shafts projects from the other side of the casing and carries a worm wheel 30. Adjacent this wheel 30 is a shaft 31 mounted in bearings 32 affixed to the side of the casing and carrying a worm 33 which meshes with the worm wheel 30. This shaft 31 is extended at one end and carries a pinion 34 which meshes with teeth on the outside of a ring gear 35 carried by a post 36 on the top 1. Hence, as the casing 23 revolves the fixed gear 35 causes the pinion 34 and shaft 31 to turn and motion is thus transmitted to the two shafts 26 to revolve them and the rollers 25. One of the shafts 28 similarly projects from one side of the casing and is likewise there connected by gears 29, and one of these shafts 28 projects at opposite side of the casing and bears a similar worm wheel 30 to be turned by another worm 32 on a shaft 31, which carries a gear 34 also in mesh with the ring gear 35. The bearings 32 for the shafts 31 and connections with the gear 35 to operate the shafts 26 and 28 to rotate the rollers 25 and 27 are at adjacent corners of the square section 24 of the casing 23, as indicated at Figures 8, 9, 10 and 11.

The end sections 37 of the casings 23 are circular with external shoulders 38 at the extremities. The casing is supported at the end sections in posts 39 which carry anti-friction rollers 40, engaging the ends 37 adjacent the shoulders 38. Rotation is imparted to the casings by a gear 41 encircling one of the end sections and having a collar or flange 42 to enable it to be secured fast on the casing which carries it. The adjacent worm 9 meshes with the gear 41 and this worm gear and the shaft 8 carrying it is disposed at its upper end in bearings on the bracket 43 on the top of the table which has an opening so that the shaft can pass down and be connected with the shaft 18.

The support 36 for the ring gear 35 of each unit 7 is open at the center as indicated at 44, to receive the ends 37 of the casing, and the supports 39 have similar central openings 45. At both ends of each casing are bearings 46 having openings at the top which are coaxial with the casing and support tubular guides 47 affixed therein. These guides are of larger diameter than the stock 6, and when the stock 6 is inserted at one end of the guide and pushed into the casing it is engaged at once by the rollers 25, fed forward to the rollers 27 and rotated with the casing, urged forward between the first pair of wheels 2 which operate on the entire outside surface of the same over the whole length; and then passed to the next casings to be projected into position to be operated upon successively by the next wheels 3 and 4.

The apparatus is designed to work upon rods or tubes of different diameters. The circumferential grooves in the rollers 25 and 27 can therefore be of greater or smaller width and depth, according to the thickness of the stock to be worked. Figure 12 shows two rollers 48 having relatively narrow and shallow circumferential grooves 49 for smaller tubes, and Figure 13 shows rollers for either set of shafts 26 or 28 with wider and deeper grooves 50.

The wheels 2, 3 and 4 are made of successively finer abrasive to give a gradually smoother polishing action.

Having described my invention, what I believe to be new is:

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1. Apparatus for polishing stock comprising grinding wheels, a casing in line therewith, feed rolls in said casing for moving said stock into engagement with said wheels, shafts in said casing carrying said rolls, connections between said shafts, a fixed gear surrounding said casing, connections between said gear and one of said shafts, a gear carried by said casing, a drive shaft adjacent said casing, and a gear on the drive shaft engaging the last-named gear.

2. Apparatus for polishing stock comprising grinding wheels, a casing in line therewith feed rolls in said casing for moving said stock into engagement with said wheels, shafts carrying said rolls, another pair of rolls, shafts carrying the latter and disposed at right angles to the aforesaid shafts, the casing having a square section wherein said rolls and shafts are mounted, the shafts of each pair being connected together, a fixed ring gear surrounding the casing, shafts mounted on said casing connected to said ring gear and to each pair of shafts carrying said rolls to rotate the latter, the ends of the casing being cylindrical, bearings containing anti-friction elements receiving said ends, a gear affixed to the casing, a drive shaft connected to the gear, supports adjacent the ends of the casing, and tubular guides secured on the supports and projecting into the casing.

3. Apparatus for polishing stock comprising wheels for engaging the stock, a casing having a central section, feed rolls in said section to impart movement lengthwise to the stock, means comprising a gear on the casing for revolving the casing, means comprising a gear surrounding said casing, and connections between said last-named gear and said rolls for revolving said rolls, said

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casing also having sections at its ends, and bearings receiving the last-named sections, said bearings containing anti-friction elements to make contact with said sections.

4. Apparatus for polishing stock comprising grinding wheels, a casing in line therewith, feed rolls in said casing for moving said stock into engagement with said wheels, shafts carrying said rolls, another pair of rolls, shafts carrying the latter and disposed at right angles to the aforesaid shafts, the casing having a central section wherein said rolls and shafts are mounted, the shafts of each pair being connected together, a fixed ring gear surrounding the casing, shafts mounted on said casing connected to said ring gear and to each pair of shafts carrying said rolls to rotate the latter, the casing also having end sections, bearings containing antifricition elements receiving said end sections, a gear affixed to the casing, a drive shaft connected to the last-named gear, supports adjacent the ends of the casing, and tubular guides secured on the supports and projecting into the casing.

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