June 10, 1930. R. C. STIEFEL 1,762,427

TUBE ROTATING APPARATUS

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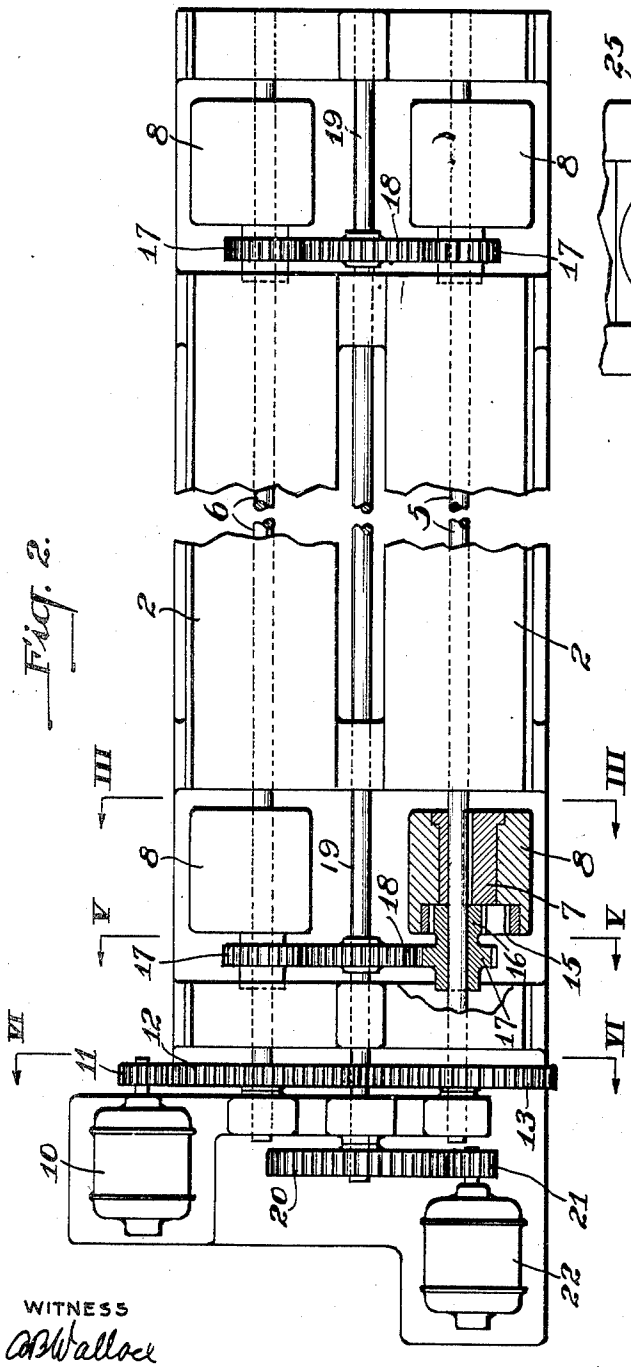


Fig. 2.

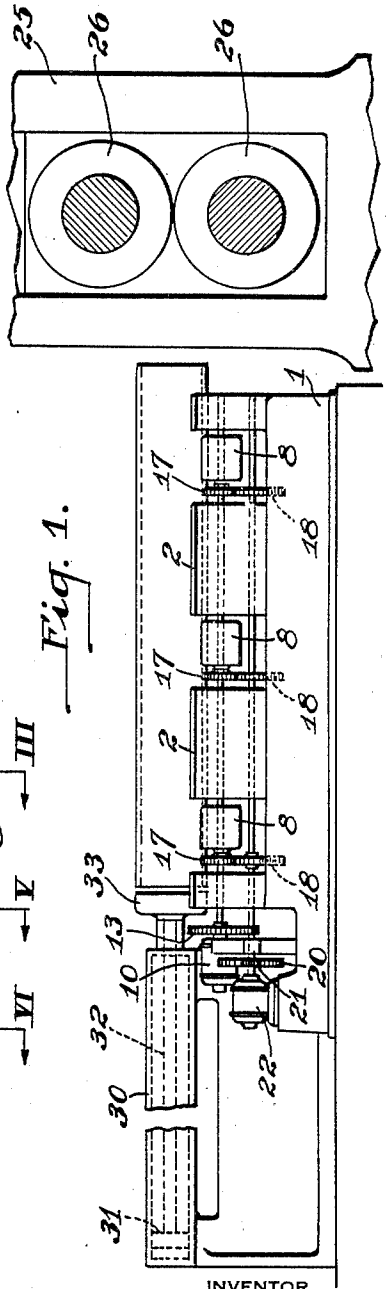


Fig. 1.

WITNESS

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Fig. 3.

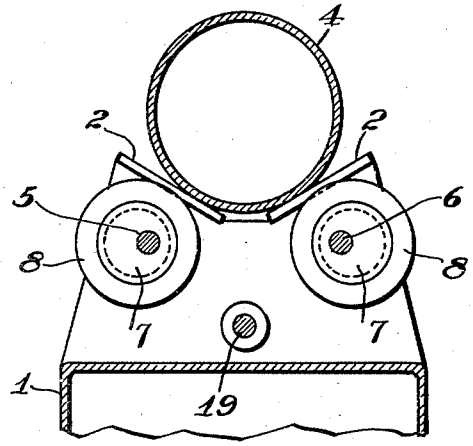


Fig. 4.

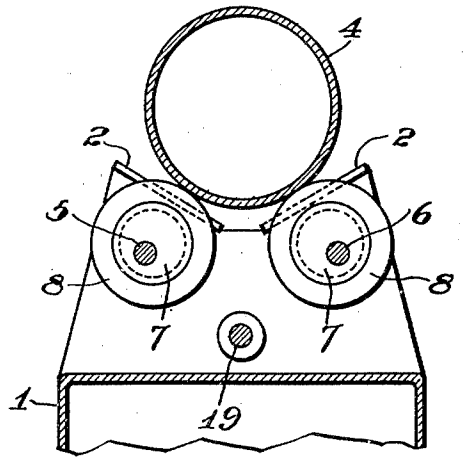


Fig. 5.

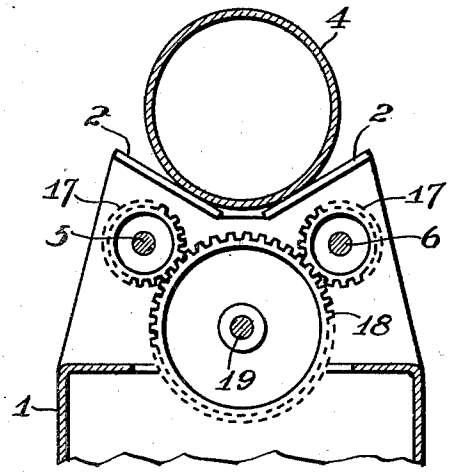
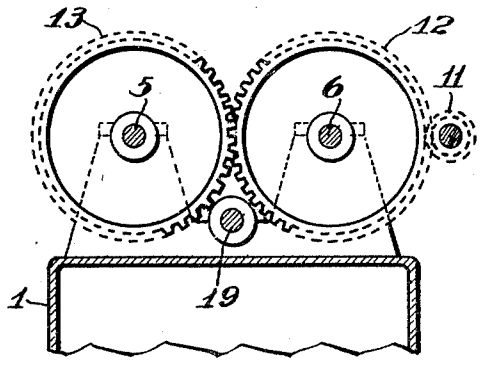


Fig. 6.



WITNESS

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UNITED STATES PATENT OFFICE

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TUBE-ROTATING APPARATUS

Application filed July 12, 1928. Serial No. 292,251.

The invention relates to apparatus for rotating tubing on its longitudinal axis; and while unlimited to any particular use or uses, it is especially applicable to the turning of seamless tubing between its successive passes through a tube-forming mill, and is herein so illustrated and described.

In the manufacture of seamless tubing by the plug rolling process, a pierced billet or other tubular blank is given several passes between grooved rolls and over a mandrel or plug, and between each successive pass it is necessary to rotate the blank on its longitudinal axis through an angle of 90°, or thereabouts, to effect uniform reduction of its wall thickness and to avoid the formation of fins or projections on its side at the meeting plane of the rolls. The prevailing practice has been to turn the tubing by hand, which can be done when relatively small diameter tubing is being formed. However, the weight and heat of blanks used in the manufacture of large diameter tubing are such that great difficulties and much discomfort are encountered in turning them by hand.

The object of the invention is to provide apparatus whereby tubing, or tubular or other cylindrical blanks, of different diameters may be quickly turned without any manual handling of it.

The invention is illustrated in the accompanying drawings, of which Fig. 1 is a side elevation of the apparatus constructed and arranged for turning tubes for a plug rolling mill; Fig. 2 a plan view to enlarged scale of the tube turning portion of the apparatus shown in Fig. 1, portions of the apparatus being shown in section to more clearly illustrate it; Figs. 3 and 4 transverse sectional views taken on the line III—III, Fig. 2, showing alternate positions of an element of the apparatus; and Figs. 5 and 6 transverse sectional views taken on the planes indicated by the lines V—V and VI—VI, respectively.

The tube turning apparatus provided according to this invention comprises a table the top of which is constructed to receive and position a tube for engagement by turning mechanism. While the table may be variously constructed, its top is preferably trough-shaped, and constructed in longitudinally spaced sections forming in a sense a skeleton tube-supporting frame. At the intervals between the sections of the table, or otherwise positioned when other than a sectional table is used, there are a plurality of rollers mounted for vertical movements so that they may be raised from positions below the tube-supporting face of the table to positions above it to elevate and support a tube previously resting on the table. Means are provided for rotating these rollers in the same direction so that a tube which rests upon them will be rotated on its longitudinal axis.

Having reference to the illustrative embodiment of the invention, the table there shown comprises a frame 1 having a top formed of inclined plates 2 made in sections to afford a plurality of extended points of support for a tube 4. Below the table top, and on each side of the center of the trough which it forms, there are a pair of rotatable shafts 5 and 6, to each of which there is keyed or otherwise attached at each interval between the table sections a bearing cylinder 7, the surface of which is eccentric to the shaft. On each cylinder there is rotatably mounted a roller 8 adapted to be driven in a manner presently to be explained, the rollers being arranged in pairs as shown.

By rotating shafts 5 and 6, their eccentric bearing cylinders 7 may be brought from the positions shown in Fig. 3 in which the faces of rollers 8 are positioned below the tube-supporting face of the table, to the positions shown in Fig. 4 in which the rollers lie above the face of the table and support the tube previously resting upon it. For so rotating shafts 5 anl 6, there is provided a motor 10, to the rotor of which there is attached a pinion 11 which meshes with a gear 12 attached to shaft 6, this gear also meshing with a similar gear 13 attached to shafts 5. Thus, by setting motor 10 in operation, both shafts 5 and 6 may be simultaneously rotated equal amounts to uniformly raise and lower rollers 8.

For rotating rollers 8, their ends are provided with internal gears 15 which mesh at one point with external gears 16 rotatably

mounted upon shafts 5 and 6. Attached to or formed as a part of each gear 16, there is another gear 17 meshing with a gear 18 attached to a shaft 19 extending longitudinally of the table at its center. As indicated in the drawings, one gear 18 meshes with the two gears 17 of each pair of cooperating rollers 8, there being as many gears 18 as there are pairs of rollers. Shaft 19 is provided with a gear 20 which meshes with a pinion 21 attached to the rotor of a motor 22, the arrangement being such that when this motor is operated the several tube-supporting rollers will be continuously rotated regardless of their vertical positions which they occupy and which are determined by the angular positions of eccentric bearings 7 upon which they are rotatably mounted.

In Fig. 1 the tube rotating apparatus is illustrated as being in front of a plug rolling mill comprising a housing 25 and grooved rolls 26, the mandrel or plug for the mill being omitted from the drawing. When a tube is passed backwardly through the mill, it is received by table top 2 which properly guides and supports it. Before the next pass through the mill, motor 10 is operated to raise rollers 8 from their position indicated in Fig. 3 below the face of table 2, to their position indicated in Fig. 4 above the face of the table. The driving connections for thus elevating the rollers are motor pinion 11, gears 12 and 13, shafts 5 and 6, and eccentric bearing cylinders 7 secured to the shafts. Either while the rollers are being thus elevated, or after being elevated, motor 22 is operated to cause rollers 8 to rotate in the same direction to revolve the roller-supported tube on its longitudinal axis, the driving connections for this purpose being motor pinion 21, gear 20, shaft 19, gears 18, and gears 17, 16 and 15, the latter being internal gears formed at the ends of rollers 8. By observing the rotation of a tube, the operator may shut off the motor when the tube has been rotated the desired amount, which for the requirements of the plug mill is about 90°.

At the left end of the tube rolling apparatus, there may be provided a pushing apparatus for moving tubes into the mill pass. As shown in Fig. 1, this apparatus may consist of a fluid pressure cylinder 30 provided with a piston 31 attached to the inner end of a piston rod 32, to the outer end of which there is attached a tube-engaging pusher block 33, the block being beyond gears 12 and 13. By opening the opposite ends of cylinder 30 to pressure-fluid supply and exhaust, pusher block 33 may be reciprocated, it being moved forwardly to push a tube 4 between rolls 26, and rearwardly to permit a tube to be received by the table.

According to the provisions of the patent statutes, I have explained the principle and operation of my invention and have illustrated and described its preferred embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as illustrated and described.

I claim as my invention:

1. A tube rotating apparatus, comprising a table for receiving and supporting a tube at longitudinal intervals thereof, a pair of shafts extending longitudinally of the table below its top, cylindrical bearing sleeves eccentrically attached to and for rotation with said shafts between the tube-supporting points of the table, tube-supporting rollers mounted upon said sleeves, means for rotating said shafts to elevate said sleeves and rollers to raise a tube above the table, and means for rotating said rollers to revolve a tube supported by them.

2. A tube rotating apparatus, comprising a table for receiving and supporting a tube at longitudinal intervals thereof, a pair of shafts extending longitudinally of the table below its top, cylindrical bearing sleeves eccentrically attached to and for rotation with said shafts between the tube-supporting points of the table, tube-supporting rollers mounted upon said sleeves, a motor, driving connections from said motor to each of said shafts for rotating them in one direction to first raise a tube above and then lower it upon said table, and means for rotating said rollers upon said eccentric sleeves to revolve a tube supported by the rollers.

3. A tube rotating apparatus, comprising a table for receiving and supporting a tube at longitudinal intervals thereof, a pair of shafts extending longitudinally of the table below its top, cylindrical bearing sleeves eccentrically attached to and for rotation with said shafts between the tube-supporting points of the table, the ends of said sleeves being provided with internal gears, tube-supporting rollers mounted on said sleeves, means for rotating said shafts to elevate said sleeves and rollers to raise a tube above and lower it upon said table, pinions rotatably mounted on said shafts and meshing with said internal gears, a motor, and driving connections from said motor to said pinions for rotating said rollers to revolve a tube supported by them.

In testimony whereof, I sign my name.

RALPH C. STIEFEL.