Oct. 3, 1933. F. J. BURNS 1,928,811

MANIPULATING MECHANISM

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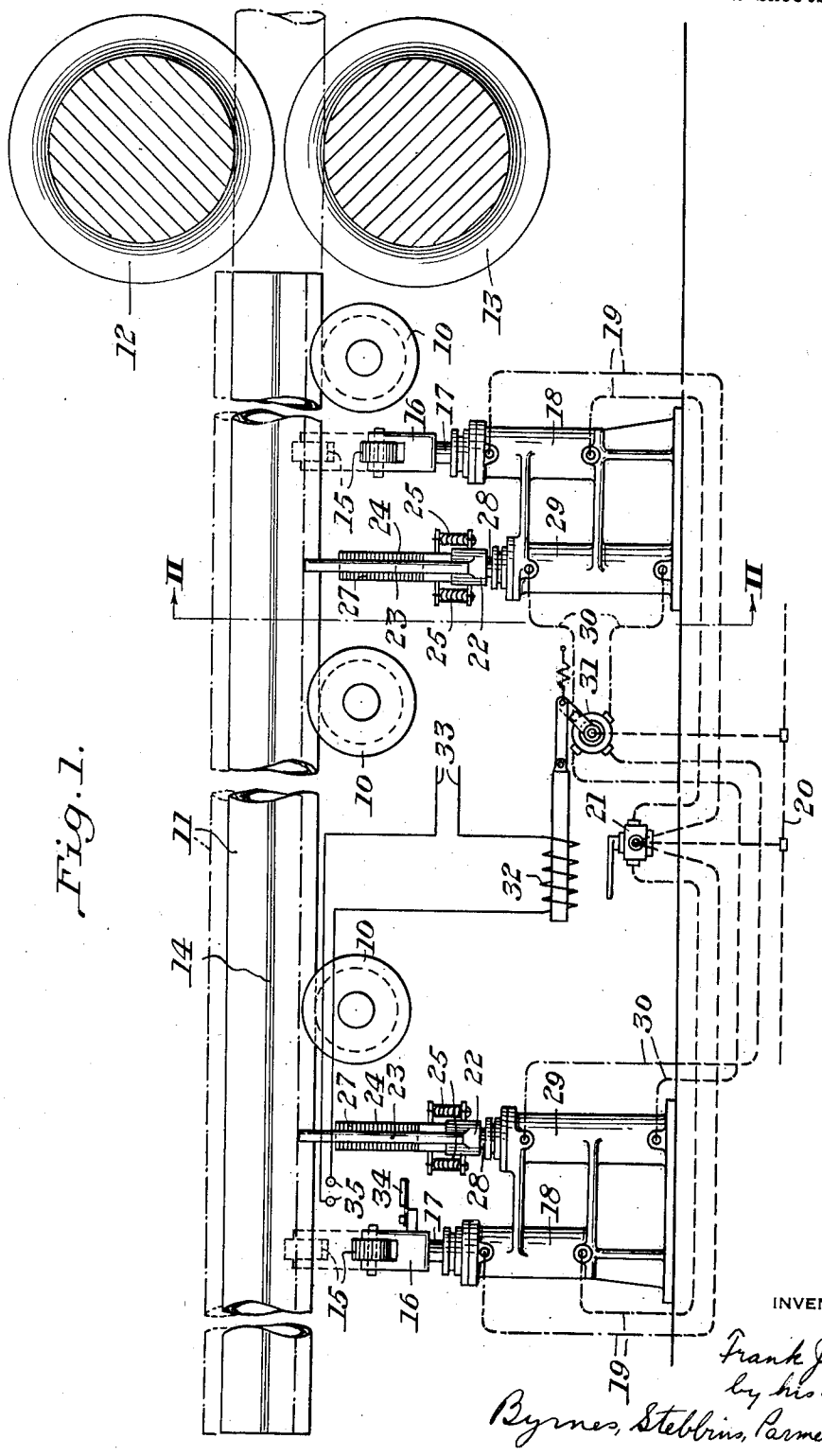

Fig. 1.

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Fig. 4.

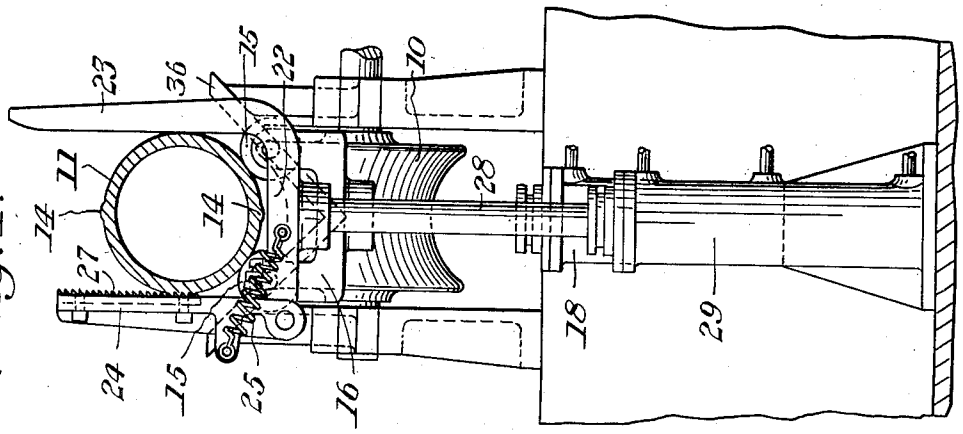


Fig. 3.

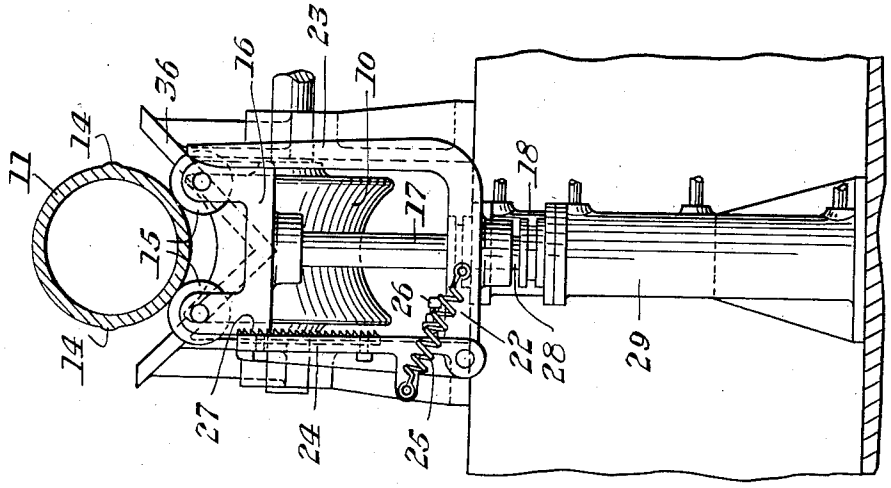
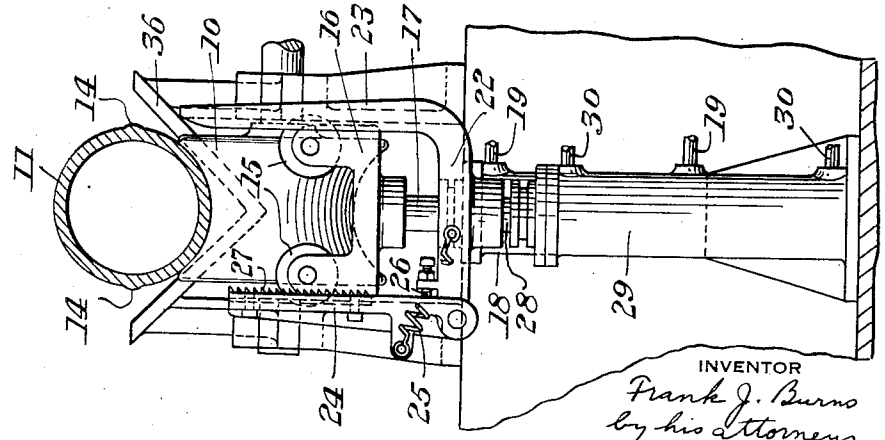


Fig. 2.



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UNITED STATES PATENT OFFICE

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MANIPULATING MECHANISM

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Application October 22, 1931. Serial No. 570,335

14 Claims. (Cl. 80—11)

My invention relates to the manufacture of seamless tubes and, in particular, to a mechanism for handling the tubes between rolling passes.

It is well known that, in the manufacture of seamless tubes, a bead or rib is formed on the exterior of a tube at diametrically opposite points because of the spacing between the edges of the reducing rolls. It is common practice in the manufacture of seamless tubes, therefore, to effect a partial rotation of a tube between rolling passes so that the bead or rib will be rolled down and will not appear in the finished product. This operation has been performed by hand heretofore, and the object of the present invention is to provide power-operated means, automatic in part, for performing the function described.

According to my invention, I provide supporting rolls for a seamless tube, positioned intermediate of the conveyor rolls or guides usually employed for advancing a tube to the rolls and retracting it therefrom. The supporting rolls are journaled axially of the path of pipe travel and are carried in movable bearings. Ordinarily, the supporting rolls are positioned below the conveyor rolls. Means are provided for raising the supporting rolls when a tube has been withdrawn from the reducing rolls. Turning means operated by the movement of the supporting rolls engage the pipe and effect a partial rotation thereof. The supporting rolls and turning means are then withdrawn so that in the next rolling pass the ribs or beads formed on the tube by the previous pass will be rolled down.

For a complete understanding of the invention, reference is made to the accompanying drawings illustrating a present preferred embodiment of the invention. In the drawings,

Figure 1 is a largely diagrammatic view of the apparatus embodying the invention in side elevation;

Figure 2 is a sectional view taken substantially along the line II—II of Figure 1;

Figure 3 is a view similar to Figure 2, showing the parts in altered relation; and

Figure 4 is another view similar to Figure 2, showing the parts in a further altered relation.

Referring in detail to the drawings, conveyor rolls 10 are suitably journaled and driven for conveying a tube 11 to and from reducing rolls 12 and 13. The reducing rolls have their edges spaced slightly apart, and this spacing has the effect of producing ribs or beads 14 at diametrically opposite points in the exterior surface of the tube after it has passed through the reducing rolls.

It is usual in seamless tube mills to turn the tube through an angle of 90° so that, on a subsequent pass through the reducing mills, the beads will be rolled down. This step has been performed manually heretofore, requiring considerable time and effort between passes of the tube through the mill. In order to avoid this loss of time and expenditure of effort, I provide supporting rolls 15 journaled axially of the path of pipe travel in bearing brackets 16. The brackets 16 are carried on piston rods 17 reciprocating in cylinders 18. The cylinders 18 have connections 19 to a source of fluid pressure 20 through a manual control valve 21.

The mechanism for turning the pipe when supported on the rolls 15 comprises yokes 22, each having a fixed arm 23 and a movable arm 24 pivoted to the yoke. Springs 25 urge the movable arm toward the fixed arm and an adjustable stop 26 on the yoke 22 determines the position of the arm 24. The latter is provided with a toothed surface 27 for gripping frictional engagement with the periphery of a pipe.

The yokes 22 are mounted on piston rods 28 reciprocating in cylinders 29. The cylinders 29 are connected to the source of fluid pressure 20 through connections indicated at 30. A magnetically operated valve 31 controls the application of fluid pressure from the source 20 to the cylinders 29, and a solenoid 32 controls the operation of the valve 31. The circuit for the solenoid 32 has connections 33 to any convenient source of electric current and is controlled by a contact 34 carried on one of the brackets 16 and adapted to cooperate with fixed contacts 35.

The operation of the mechanism is as follows: When the pipe is withdrawn from the reducing rolls 12 and 13 after a pass therethrough, it is supported on the rolls 10 in the position shown in Figure 2. Trough guides 36 assist the rolls 10 in positioning the pipe properly. An operator thereupon shifts the valve 21 to apply pressure to the lower ends of the cylinders 18. The piston rods 17 are thereby raised and the rolls 15 on the brackets 16 engage the pipe and raise it to the position shown in Figure 3, clear of the rolls 10. On the completion of the upward movement of the rolls 15 the contact 34 engages the contacts 35 so that the solenoid 32 is energized to operate the valve 31. The operation of the valve 31 applies fluid pressure to the lower ends of the cylinders 29 and thereby raises the piston rods 28 and the yokes 22 carried thereon.

The fixed arms 23 of the yokes first engage the pipe. On further upward movement, the movable arms 24 with their toothed surfaces 27 engage the other side of the pipe. The frictional engagement between the toothed surfaces 27 and the pipe being much greater than the frictional engagement between the pipe and the smooth surfaced arms 23, the pipe is turned on the rolls 15 until the ribs 14 have been moved through substantially 90° to the position shown in Figure 4.

When the desired rotation of the pipe has been effected, the valve 21 may be operated to lower the rolls 15. The weight of the pipe and raising mechanism may be relied on for lowering. The circuit of the solenoid 32 for operating the valve 31 is broken on the downward movement of the brackets 16 and a spring may be employed to restore the valve to the position illustrated. The toothed arms 24 are designed so that the yokes will exert but little friction on the pipe 11 when they move downward with respect thereto.

It will be apparent that the construction described greatly simplifies the work of turning pipe between passes and permits the entire operation to be controlled by a single operator who may be stationed so as to observe it closely.

The mechanism described may be incorporated in the usual roll table adjacent the pipe reducing rolls, the lifting and turning mechanism for the pipe being mounted in a pit below the roll table which may be supported from the floor level, as indicated in the drawings. The operation of making seamless tube is considerably facilitated and expedited by the invention and, since it is simple in construction and operation, it can be installed and maintained at comparatively small expense. While the structure already described is particularly suited for large size pipe, the invention is also applicable to smaller pipe sizes. For this purpose, the conveying rolls 10 and the supporting rolls 15 will not be needed. The pipe may be supported solely by the guides and the turning mechanisms may operate through slots therein. The cylinders 29 for actuating the yokes may be manually controlled since the automatic control is useful only when the auxiliary supporting rolls 15 are employed.

Although I have illustrated and described herein but a single present preferred embodiment of the invention, it will be apparent to those skilled in the art that changes in the design shown may be desirable. Such changes, of course, are contemplated within the scope of the invention as set forth in the appended claims.

I claim:

1. In a seamless tube mill, the combination with means for supporting a tube for movement axially of itself to the mill, of rolls disposed axially of the tube, means for raising the rolls to lift a tube from the supporting means, and means actuated by movement of said rolls for rotating the tube while supported on said rolls.

2. In a seamless tube mill, means for supporting a tube for axial movement, rolls for supporting the tube for rotation about its own axis, means for moving the last mentioned rolls to tube supporting position and means actuated by movement of the rolls for effecting rotation of the tube while so supported.

3. The combination with a support for pipe, of reciprocating means for embracing a pipe and turning it about its own axis while on the support, said means including means for rotating the pipe through a predetermined angle on movement of the last-mentioned means in only one direction, and means on said reciprocating means for preventing lateral displacement of the pipe while being turned.

4. In a seamless tube mill, means for supporting a tube adjacent the mill in axial alignment therewith, and retractible means engaging the tube circumferentially to turn the tube through a predetermined angle about its own axis while on the supporting means, including means movable with said pipe-engaging means for preventing lateral displacement of the tube on the supporting means while being turned.

5. In a seamless tube mill, the combination with means for supporting a tube blank adjacent the mill in axial alignment therewith, of means for gripping the circumferential wall of the blank and turning it through a predetermined angle while resting on said supporting means, and means movable with said gripping means for preventing lateral movement of the blank while being turned.

6. The combination with guides for directing tube blanks to a rolling mill, of power-operated means engageable with a tube within said guides to turn the tube about its own axis, means for controlling said tube turning means, and means carried by the tube-turning means for preventing lateral movement of the tube while being turned.

7. Pipe turning mechanism for a seamless tube mill comprising a retractible yoke for embracing a pipe supported in position for turning, one arm of the yoke having means for frictionally engaging the pipe tangentially, and the other having a substantially frictionless surface for restraining lateral movement of the pipe during turning.

8. Pipe turning mechanism for seamless tube mills comprising a yoke movable to embrace a pipe supported for rotation about its own axis, said yoke including one arm for rotatably retaining the pipe against lateral movement, and a retractible arm on the yoke having means to engage the pipe and exert a torque thereon.

9. In a seamless tube mill, the combination with a tube support, of reciprocable means for embracing a tube and turning it on its own axis while resting on said support, said means including a retractible member for frictionally engaging the pipe tangentially, said reciprocable means also including means for preventing lateral displacement of the tube while being turned.

10. Pipe turning mechanism comprising a retractible abutment for rotatably supporting a pipe against sidewise bodily movement, means for engaging the pipe to exert a torque thereon sufficient to cause rotation thereof about its own axis while restrained against sidewise bodily movement by said abutment, and common operating means for the abutment and rotating means.

11. In combination with pipe guiding means, a plurality of rolls with their axes extending longitudinally of said means, said rolls being movable to support a pipe above the guiding means, means for raising said rolls, and means actuated by movement thereof for turning a pipe supported thereon through a predetermined angle.

12. Tube turning mechanism for a seamless mill comprising rolls with their axes extending longitudinally of the mechanism, means for lifting said rolls to engage and support a tube, and means actuated by operation of the lifting means for turning a tube supported on said rolls.

13. In a seamless tube mill having means for supporting and forwarding tubes to the mill, rolls with their axes extending longitudinally of said

means, said rolls being movable for raising tubes from said means, means for turning a tube supported on the rolls and means responsive to predetermined movement of said rolls for actuating the tube-turning means.

14. In a seamless tube mill, means for supporting tubes to be forwarded to the mill, rolls having their axes extending longitudinally of said means, said rolls being movable vertically for raising tubes from said means, and means actuated on predetermined movement of said rolls for turning a tube supported thereon.

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