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[54] **WORK ROLLS DRIVE IN A COLD-ROLLING TUBE MILL**

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[51] **Int. Cl.** **B21b 35/06**

[58] **Field of Search** 72/214, 249, 208, 189

[56] **References Cited**

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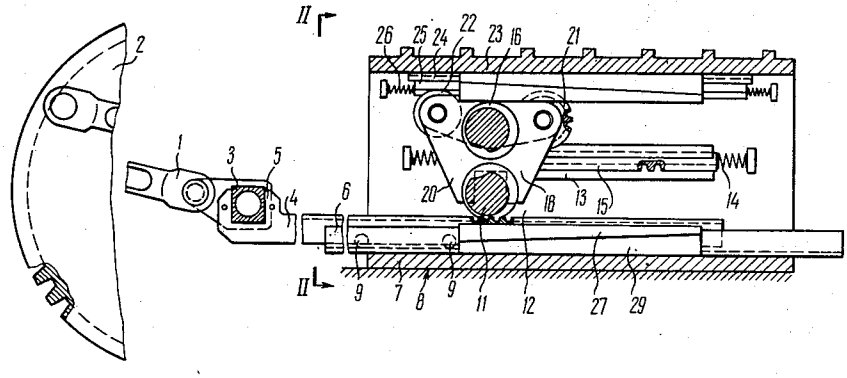
[57] **ABSTRACT**

A drive is disclosed, said drive comprising movable racks which are linked with connecting rods driven from the main drive and engaged with the gears of the driven roll, imparting thereto rotational and reciprocatory motions in the course of rolling. The improvement of the drive is aimed at reducing the weight of its movable components, so as to enable its number of double strokes to be increased.

3 Claims, 2 Drawing Figures



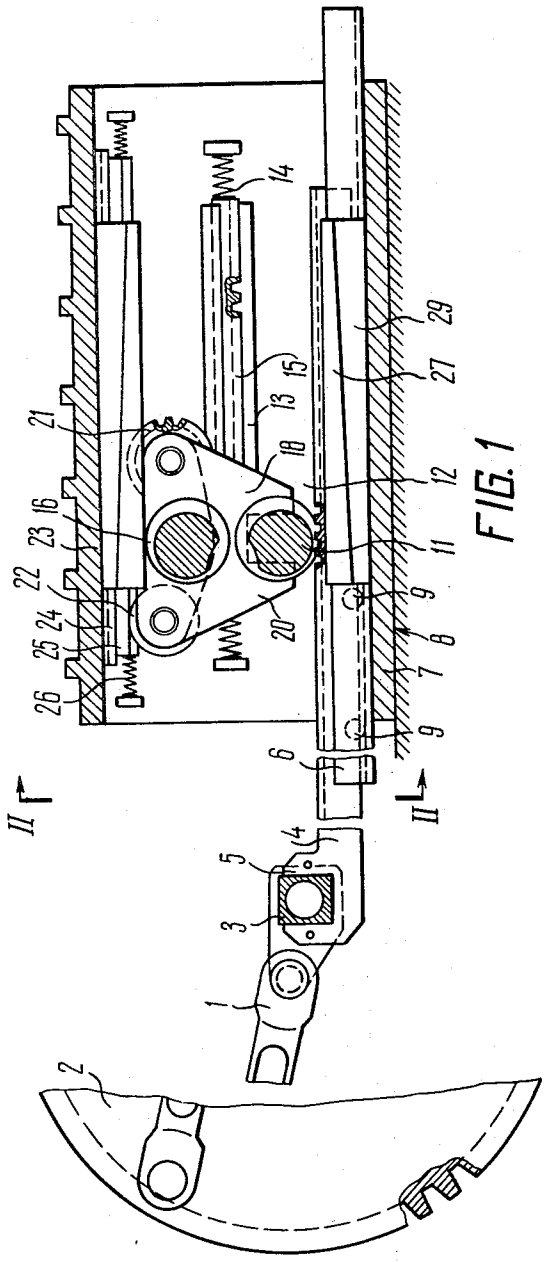


FIG. 1

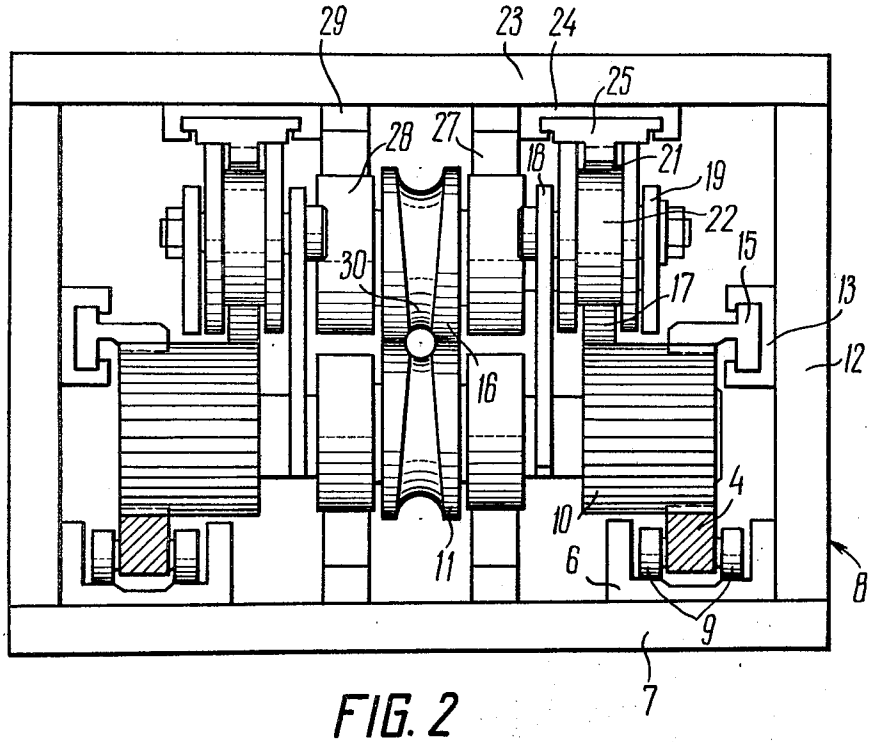


FIG. 2

WORK ROLLS DRIVE IN A COLD-ROLLING TUBE MILL

BACKGROUND OF THE INVENTION

The present invention relates generally to tube rolling, and more specifically, it relates to drives of the work rolls in cold-rolling tube mills.

Known in the art is a drive of work rolls with a reducing pass in a cold-rolling tube mill, comprising a stationary stand with racks secured thereon wherealong rolling are the gears of the driven roll, the latter being connected through a gear to the other roll and being reciprocated from the main drive of the mill through gear cranks and connecting rods.

With such a design of the drive, the two rolls are combined into one unit by means of a casing whereto attached are the connecting rods that impart reciprocatory movement to the rolls. Since movement of the rolls requires significant axial forces, these forces are transmitted from the connecting rods to the rolls through the casing, the latter should be robust and strong enough. However, this involves an increased weight of the movable components of the rolls drive, which substantially limits the possibility of increasing the number of double strokes of the rolls per unit of time. The adverse effect of the additional weight of the movable components sharply rises with the growth of the type-and-size of the tube mill having a tube diameter of 200–250 mm and more.

Besides, in the known drives the work rolls carry driving gears that provide for a medium effective radius of rolling all along the length of the roll pass, the latter having a varying effective radius along its length which causes enhanced slippage of the pass against the tube, thus worsening the surface quality of the rolled tubes, speeding up the wear of the passes, and increasing the number of collisions of the ends of the tube being rolled and the pushing tube. These disadvantages are particularly felt and become quite detrimental when the number of the drive strokes per unit of time is increased.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a roll drive that will feature a smaller weight of its movable parts, thereby allowing an increase in the number of double strokes and reducing the slippage of the pass against the tube in the course of its rolling.

With this and other objects in view, a drive of work rolls with a reducing pass in a cold-rolling tube mill is proposed herein, said drive comprising a stationary stand with racks secured thereon wherealong rolling are the gears of the driven roll, the latter being connected through a gear to the other roll and being reciprocated from the main drive of the mill by means of gear cranks and connecting rods. According to the invention, the drive includes: a second group of racks which are movable and linked to the connecting rods for engaging the gears of the driven roll, imparting thereto rotational and reciprocatory movement; a third group of racks mounted on the stand having intermediate gears engaged therewith, these gears being rotated by the gears of the second roll; and an arrangement to maintain vertical alignment of the rolls and to assure engagement of the intermediate gears with the gears of the second roll and with the racks of the third group.

The arrangement for maintaining vertical alignment of the rolls should advantageously be made in the form of flat cages secured on the second roll and flat straps adjoining them, the cages having lugs embracing the driven roll. Between the cages and straps, there are mounted idler gears on one side and bearing rollers on the other side.

To compensate for the differences in the course of rolling between the values of the effective radius of the pass rolling against the tube and the radius of engagement of the driven roll gears with the movable racks, it is advisable that the racks be secured on the stand and engaging the gears of the driven roll which is longitudinally springed at both ends.

As a result of the present invention, a roll drive has been developed that has a lower weight of its movable components, thereby enabling the number of double strokes per unit of time to be increased, and permitting also a reduction in the slippage of the pass against the tube in the course of its rolling.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is now exemplified with an illustrative embodiment thereof and drawings, wherein:

FIG. **1** is a longitudinal sectional view of the drive of work rolls in a cold-rolling tube mill according to the invention;

FIG. **2** is sectional view along lines II—II in FIG. **1.**

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. **1** and **2,** a drive of a cold-rolling mill for producing thin-walled tubes (wherein the ratio of their diameter to the wall thickness is within 100–50) comprises connecting rods **1** hinged to gear cranks **2** rotated from the main drive (not shown) and a crossbar **3.** Crossbar **3** is mounted in the slots of movable racks **4** (the second group of racks) and is rigidly fixed thereto by dowels **5.** The movable racks **4** are disposed in guides **6** which are fixed on a bottom wall **7** of a stationary stand **8.** Pairs of travelling rollers **9** which during the movement of the racks roll along guides **6** are placed along the movable racks **4.**

The movable racks **4** are meshed with cluster gears **10** seated on a driven roll **11.** Guides **13** are fixed on side walls **12** of the stationary stand **8** said guides accommodating racks **15** (the first group of racks) which are longitudinally springed at both ends by springs **14** and meshed with the cluster gears **10** of the driven roll **11.**

Gears **17** meshing with the cluster gears **10** of the driven roll **11** are mounted on the second roll, and flat cages **18** and flat straps **19** are freely seated. Cages **18** have lugs **20** which embrace the driven roll **11,** thus assuring vertical alignment of the rolls **11** and **16.** Idler gears **21** meshing with gears **17** of the second roll **16** and free-wheeling bearings rollers **22** are located between the cages **18** and the straps **19.**

On the top wall **23** of the stationary stand **8,** there are fixed the guides **24** accomodating the third group of racks **25** which are springed at both ends by springs **26** and are capable of longitudinal displacements, allowing engagement of the idler gears **21** with the racks **25** the third groups of racks.

The bearing rollers **22** have eccentric hubs (not shown), to regulate their position in height and adjust

the mesh of the idler gears **21** with racks **25** (the third group of racks).

Bearing plates are fixed on the bottom wall **7** and the top wall **23** of the stationary stand **8,** wherealong move travelling rollers **28** of the rolls **11** and **16.** The distance between the bottom and top rest bars is regulated by wedges **29.**

The drive of the work rolls operates as follows.

As the mill is started, the gear cranks **2** through connecting rods **1** and crossbar **3** impart reciprocatory motion to the movable racks (the second group of racks) which through the cluster gears **10** rotate the driven roll **11.** the cluster gears **10,** rolling along racks **15** which are secured on the stand, impart progressive motion to the driven roll **11.** Thus, reciprocation of the movable racks **4** provides for rotational and reciprocatory movement of the driven roll **11.**

The driven roll **11** through cluster gears **10** and gears **17** transmits rotation to the upper roll **16.** At the same time gears **17** rotate the idler gears **21** which, while travelling along racks **25** (the third group of racks), impart reciprocatory motion to the second roll **16.** Thus, the second roll **16** rotates and reciprocates in synchronism with the driven roll **11.**

Rotation and reciprocation of the work rolls **11** and **16** by means of movable racks **4** linked through connecting rods **1** with the gear cranks **2** of the main drive make it possible to reduce the weight of the movable components of the drive, and thus to increase the number of its double strokes per unit of time.

The increased speed of the movable components of the rolls drive, as well as of the rolls themselves, makes it very essential to preserve the surface of the tubes and the roll passes from wear, being caused by the pass slipping against the tube.

The slippage of the pass against the tube is due to the discrepancies which are bound to occur in the course of rolling between the effective radius of pass **30** rolling against the tube and the radius of engagement of the cluster gears **10** with the movable racks **4** (the second group of racks) which during the tube deformation produces axial forces of friction involving the pass slippage against the tube, and hence, deterioration of the surface quality of the tube being rolled.

Said discrepancies between the effective radius of the pass rolling against the tube and the radius of engagement of the cluster gears **10** with the movable racks **4** are remedied by securing racks **15** (the first group of racks) on the stand with a possibility of their axial displacements and by springing them at both ends with springs **14.** As in the process of rolling the axial force of friction reaches its critical value, these racks are displaced comprising one of the springs. Subsequently, when said radius of the pass and the radius of engagement of the cluster gears **10** with the movable racks **4** equalize, racks **15** return to their initial position.

We claim:

1. A drive of work rolls with a reducing pass in a cold-rolling tube mill, comprising: a stationary stand; gears which are mounted on the rolls, one of the rolls is a driven roll and a second such roll being connected to the first roll through said gears; idler gears engaged with said gears of the second roll; toothed racks secured on said stationary stand, a part of said toothed racks defining a first group of racks engaging said gears of the driven roll, a further part of said toothed racks defining a third group of racks meshed, with said idler gears; movable toothed racks defining a second group of racks linked to connecting rods driven by gear cranks of the main drive, said movable toothed racks engaging said gears of the driven roll and imparting to these gears and roll rotational and reciprocatory motions, thereby imparting these motions to said gears of the second roll meshed therewith and to said second roll itself, and further imparting said motions to said idler gears engaging the gears of the second roll and running along said third group of toothed racks; and means for maintaining vertical alignment of said rolls and to assure engagement of said idler gears with said gears of the second roll, as well as with said third group of racks.

2. A drive as claimed in claim **1,** wherein means for maintaining vertical alignment of said rolls is made in the form of flat cages secured on said second roll and flat straps adjoining them, said cages having lugs which embrace said driven roll, said idler gears being mounted between said cages and straps on one side and bearing rollers on the other side.

3. A drive as claimed in claim **1,** wherein to compensate for the differences in the course of rolling between the values of the effective radius of said pass rolling against the tube and the radius of engagement of said gears of the driven roll with said movable racks of the second group, said racks of the first group are mounted for axial displacements, said racks being longitudinally springed at both their ends; and being displaced in the directions of reciprocatory movements of said rolls by the axial forces of friction caused by said differences between said radii, said racks being returned by their springs to the initial position after the section of the axial frictional forces stops.

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