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[54] **TUBE COLD ROLLING METHOD**

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[58] **Field of Search** 72/189, 208, 209, 214

[56] **References Cited**

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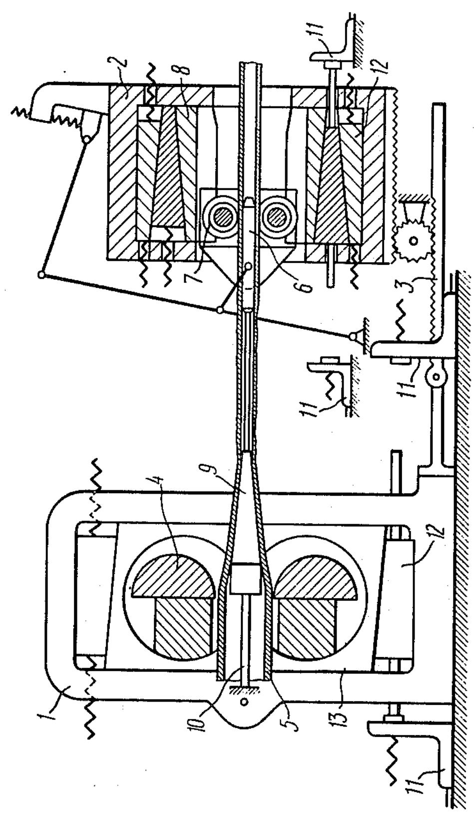
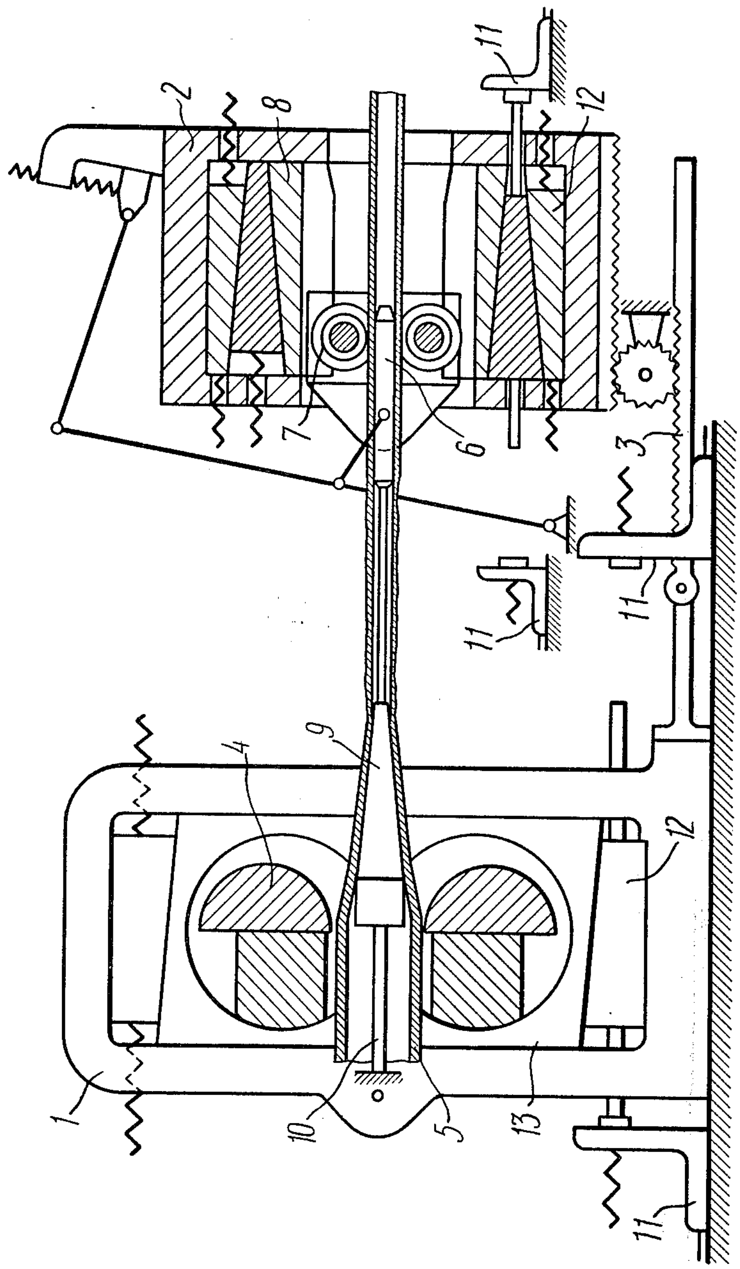
[57] **ABSTRACT**

The method provides for tube reduction in rolls and sizing in rollers during reciprocating motion in opposite directions of roll and roller stands in a straightaway setup. Deformation of the tube metal in the above stands is effected alternately, only in their forward stroke.

1 Claim, 1 Drawing Figure

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TUBE COLD ROLLING METHOD

The present invention relates to metal shaping by pressure and more exactly to tube cold rolling methods.

There are known methods of tube cold rolling on a taper plug by the passes of the working roll stand performing reciprocating motion from the motor through the crank and connecting-rod gear. Major deformation of tube metal in diameter and wall thickness is effected during the forward stroke of the stand, while the backward stroke of the stand is used to roll off backfins and partially finish the outer surface of the tube. The required quality of the tube is achieved through sizing and polishing sections of the passes whose length accounts for 25–35 percent of the entire length of the pass spread. This results in a reduced length of roughing and reducing sections which naturally entails reduced feed rate of the billet with subsequently reduced productivity of the mill.

Tube rolling on taper plug impairs the quality of tube causing the corrugated inner surface and uneven wall thickness.

Another disadvantage of this method resides in axial compressive loads exerted on the tube billet during the backward stroke of the working stand, these loads being transmitted to the feed chuck impair operating conditions increase wear thereof.

Also known is tube cold rolling method wherein no rolling takes place during the backward stroke of the working stand as during this stroke the roll passes are parted without contacting the tube being rolled.

With this method, no axial load is exerted on the tube and the feed chuck during the backward stoke of the working stand, however all other disadvantages inherent in rolling by roll stand passes remain with this method as well.

There is a method of cold rolling of tubes on the cylindrical plug by two or more rollers with constant-section groove in tube cold rolling mills whose working stand reciprocates from the motor through the crank and connecting-rod gear. In this case the function of passes is performed by channel-shaped supporting strips along which the rollers are running with their trunnions.

These mills produce high-quality tubes both in terms of surface finish and wall thickness. However, due to low degree of reduction both in tube diameter and wall thickness these mills are relatively low in productive capacity. They are not devoid of the above disadvantage: during the backward stroke of the working stand the rollers squeeze the tube and generate axial compressive loads.

Methods are known combining tube rolling by rolls and rollers. With such method, roll and roller stands are positioned in a straight-away setup; the stands are reciprocated through the crank and connecting-rod gear and similtaneously perform forward and backward strokes. The tube is rolled simultaneously by two stands (in roll stand — on taper plug, in roller standon cylindrical one) and due to this the roller stand hinders the longitudinal displacement of the tube being rolled in the roll stand, thus causing a lateral corrugation in thin-wall tubes, while in rolling comparatively thick-wall tubes the rollers are slipping on the tube, which impairs tube surface quality, makes the tube metal sticking on the rollers and plug to result in the reduced life of the rollers and plug.

An attempt to eliminate this disadvantage by producing sectional rollers mounted on intermediate bronze bushes or bearings failed to yield any satisfactory result, because that reduced the rigidity of the roller stand while bronze bushes were quick to wear out even at slight squeeze of the tube.

The object of the present invention is to provide a tube cold rolling method allowing the productivity of the rolling process to be substantially increased and the quality of rolled tubes to be improved.

This object is achieved due to the provision of a tube cold rolling method including tube reduction in rolls and sizing in rollers during reciprocating motion of roll and roller stands in a straightaway setup, wherein according to the invention the roll and roller stands perform the reciprocating motion in opposite directions and effect deformation of the tube metal alternately, only in their forward stroke.

Such realization of the method allows the productivity of rolling mills to be increased and the quality of rolled tubes to be improved.

A description will be given now of an actual embodiment of the tube cold rolling method with reference to the accompanying drawing giving a longitudinal elevational view of the roll and roller stands according to the invention.

Pursuant to the present invention, the method of cold rolling of tubes periodically delivered by the feed chuck to the deformation zone utilizes a roll stand **1** and roller stand **2** positioned in a straightaway setup and reciprocated in opposite directions. The roll stand **1** is reciprocated from a motor through a crank and connecting-rod gear, while the roller stand **2** is reciprocated from the roll stand **1** by means of rack-and-gear drive **3.**

The roll stand **1** incorporates periodic passes **4.** All profile sections of the passes **4** are roughing, which allows the tube **5** to be rolled in the passes of the roll stand **1** with maximum possible deformation of the tube **5** both in diameter and wall thickness, thus giving a substantial increase in productivity as compared with conventional roll stands. During this rolling process, sizing of the tube in diameter and wall thickness is effected in the roller stand **2** on a cylindrical plug **6** by rollers **7** with constant-section groove, the latter rollers running along straight supporting strips **8** and the tube rolling operations kept continuous. This makes possible to eliminate all intermediate technological operations needed after rolling tubes in stands to prepare tubes for rolling and sizing in roller stands, namely cutting, annealing, pickling, straightening, copper plating, phosphating and lubrication.

In the method disclosed herein the tube rolling process starts in the roll stand **1** on the taper plug **9** after bringing a tube billet to the deformation zone with the stand **1** moving forward, complete rough deformation (reduction) of the tube **5** in diameter and wall thickness taking place during this period. Further sizing of the tube in diameter and wall thickness, also rolling off buckle and surface polishing of the tube **5** are effected in the roller stand **2** on the cylindrical plug **6** by rollers **7** with constant groove section. The taper plug **9** of the roll stand **1** and the cylindrical plug **6** of the roller stand **2** are screwed on a common bar **10.**

In this method of rolling tubes **6** the roll and roller stands **1, 2** are moving in diametrically opposite directions with alternate relieving the passes of the roll stand

1 and rollers 7 of the roller stand 2 from contact with the metal of the tube 5 being rolled. This takes place because movable wedges 12 located in their extreme rear positions under the pads 13 of the passes of the roll stand 1 and under the supporting strips 8 of the roller stand 2 are knocked out of their seats by means of stops. With the stands 1, 2 in the extreme forward positions, the wedges 12 are driven in because of the stops 11, and with the stands 1, 2 moving forward, the tube 5 is being rolled, assuring not simultaneous but alternate rolling of the tube 5 in each working stand 1, 2, thus yielding good quality tube surface with no metal stuck on the passes, rollers and plugs.

The above described tube cold rolling method utilizes the roll and roller stands in a straightaway setup to increase productivity of tube cold rolling mills and improve quality of rolled tubes.

What we claim is:

1. A method of cold rolling tubes by reducing and sizing them comprising the steps of: placing roll and roller stands coaxially; introducing a tube to be treated into said stands and placing said tube coaxially with the stands; reciprocating said stands in opposite directions; reducing the tube when moving said stands towards each other; sizing said tube when moving the stands into opposite directions; and feeding periodically said tube along the axes of the stands.

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