May 30, 1939. M. LANDRIEU 2,160,742

TUBE ROLLING MILL

Filed Aug. 13, 1936

Fig. 2

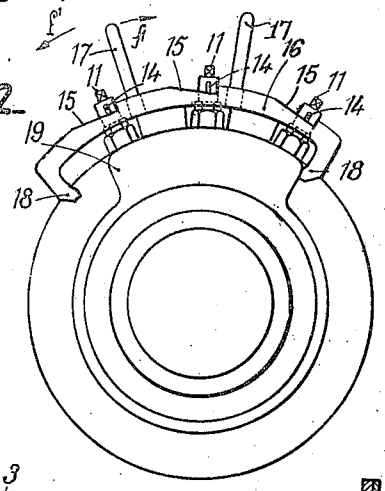


Fig. 1

Fig. 3

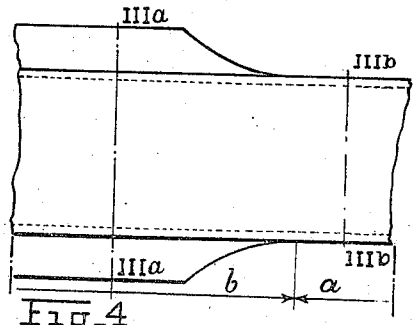


Fig. 3a.

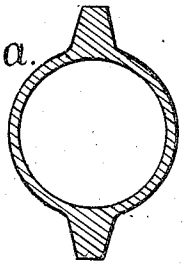


Fig. 3b.

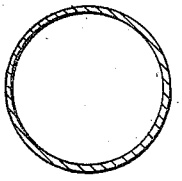


Fig. 4

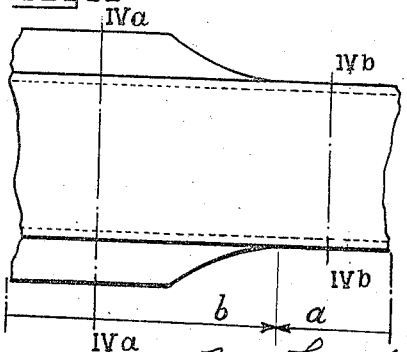


Fig. 4a.

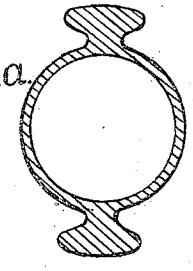
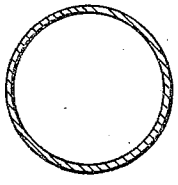


Fig. 4b.



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UNITED STATES PATENT OFFICE

2,160,742

TUBE ROLLING MILL

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Application August 13, 1936, Serial No. 95,909
In France February 27, 1936

1 Claim. (Cl. 80—14)

This invention relates to tube rolling mills in which the rolling is effected in the well known manner by means of external rolls and of an internal mandrel which carries the tube blank and is arranged to receive a to-and-fro movement towards and away from the rolls and to be rotated about its axis when moved in one sense.

The reciprocation of the mandrel is usually arranged to be effected by piston mechanism comprising a rod member moving with the mandrel and provided with a steep-pitched external screw thread adapted to cooperate with an internally screw-threaded rotatable nut in such a manner that during the reciprocation of the rod member in one direction the nut is prevented from rotating by a pawl and ratchet mechanism so as to cause the rotation of the rod member and the carriage through one quarter of a revolution while during reciprocation of the rod member in the opposite direction the nut is free to rotate and the rod member moves longitudinally without rotation. With this arrangement it will be evident that four complete to-and-fro movements of the rod member and the carriage and rolls mounted thereon is required for effecting one revolution of these elements of the apparatus.

The present invention has for its object to provide arrangements whereby tube rolling apparatus of the kind above described may be utilised to produce a tube of circular cross-section along any desired portion or portions of its length and of a different non-circular special profile along another portion or portions thereof.

According to the invention the action of the nut cooperating with the screw-threaded rod member to produce rotation of this member is arranged to be superseded by any suitable mechanism during each stage of the rolling operation at which the corresponding portion of the tube is to have a non-circular profile, this being produced by providing rolls on the carriage of corresponding profile.

The invention will now be described by way of example with reference to the accompanying drawing, of which:

Figure 1 is a sectional view of a mechanism for carrying the invention into practice.

Figure 2 is an end view corresponding to Figure 1.

Figure 3 is an elevational view of one type of rolled tube.

Figure 3*a* is a sectional view of the tube taken on the line IIIa—IIIa of Fig. 3.

Figure 3*b* is a sectional view of the tube taken on the line III*b*—III*b* of Fig. 3.

Figure 4 is an elevational view of another type of rolled tube.

Figure 4*a* is a sectional view of the tube taken on the line IV*a*—IV*a* of Fig. 4.

Figure 4*b* is a sectional view of the tube taken on the line IV*b*—IV*b* of Fig. 4.

Referring now to Figure 1, it will be seen that the mechanism for reciprocating the carriage (not shown) comprises a piston 1 rigidly connected at one side to a driving shaft 2 for the carriage and at the other side to a rod member 3 having an external screw thread of one quarter turn. An internally screw-threaded nut 4 is mounted on the rod member 3 and is provided with a central circular flange 5 constituting a ratchet wheel and provided with ratchet teeth 6, the flange 5 being located in a chamber 7 formed in the cover plate 8 of a cylinder 9 containing the piston 1, so as to prevent axial movement of the nut 4.

In the chamber 7 are arranged pawls 10 which, in the example shown, are three in number, and are carried by the inner ends of rods 11 provided with control springs 12 abutting against collars 13 formed on the rods 11.

The upper ends of the rods 11 are provided with projecting keys 14, the ends of which are always in contact with ramps 15 formed on a curved member 16 concentrically arranged on the cover 8 and capable of being circumferentially displaced thereon by means of arms 17. The extent of such displacement of the member 16 is limited by the engagement of stops 18 provided at the ends of the member 16 with the sides of a projection 19 on the cover plate 8 and in the body of which are provided the necessary bores for the rods 11 of the pawls 10.

So long as the parts occupy the position shown in Figures 1 and 2, the keys 14 on the rods 11 engage the lowest parts of the ramps 15 on the member 16, the springs 12 acting on the collars 13 on the rods 11 will cause the pawls 10 to engage with the teeth 6 of the ratchet flange 5 on the nut 4. As a result, during the forward reciprocation of the piston 1, the screw threaded rod 3, in passing through the nut 4 which is prevented from rotating in a corresponding direction by the pawls 10 is forced to rotate through about one quarter of a revolution and carries with it the piston 1, the mandrel, the reciprocating carriage and the rolls mounted thereon. During the reciprocation of these parts in the backward direction, the nut 4 is rotated without

rotation of the parts above referred to so that under these conditions the apparatus operate in the ordinary well-known manner.

If, on the contrary, the curved member 16 is displaced in the direction of the arrow f, the keys 14, being forced outwards by the ramps 15, carry the rods 11 outwards against the action of the springs 12 which are compressed. The pawls 10 are therefore disengaged from the teeth 6 of the ratchet flange 5 on the screw nut 4 which, as a consequence, is freed. During the reciprocation of the piston 1 therefore the nut 4 does not exert any action upon the rod member 3, which together with the piston, mandrel and carriage, is merely given a longitudinal to-and-fro movement. The tube under these conditions is thus rolled to the profile corresponding to that of the rolls through which it passes.

If the curved member 16 is now displaced in the direction of the arrow f^1, the pawls 10, under the action of the springs 12, again come into engagement with the teeth 6 of the ratchet flange 5, so as again to restrain the nut 4 and to cause the screw thread rod member 3 during its forward displacement to turn through one quarter of a revolution.

Figures 3 and 4 show, by way of example, various profiles of tubes which can be obtained by the arrangements described above.

The circular part a is obtained by the restraining of the nut 4 so as to compel the rod member 3 to rotate during its forward displacement.

The profiled part b is obtained when the pawls 10 are disengaged from the teeth 6 on the ratchet flange 5 of the nut 4 so that the rod member 3 and its attached elements are merely given a longitudinal to-and-fro movement.

It will be understood that the invention is not limited to the production of the tube profiles shown in Figures 3 and 4 and that without exceeding the scope of the invention, it is possible to obtain any special profile desired by utilising the arrangements above described.

I claim:

In a tube rolling mill for rolling tubes between an internal mandrel and external rolls, a cylinder, a piston arranged for reciprocation in said cylinder carrying a screw with a single pitch thread and adapted for driving the mandrel, a cover plate for said cylinder, a single nut in engagement with said screw housed within a chamber in the cover plate, means permitting partially vaned tubes to rotate during working passes of the non-vaned parts comprising ratchet teeth on the outer periphery of said single nut, pawls adapted for engaging said teeth and a member with ramps shiftable about the axis of said screw and adapted for separating said pawls from said teeth in order to stop the rotation of the mandrel for rolling a tube part of non-circular section, and means carried by the cover plate adapted to be engaged by said member so as to limit the shifting thereof.

MAX LANDRIEU.