June 14, 1938. P. BARTH 2,120,539

ROLLING MILL

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Fig. 1.

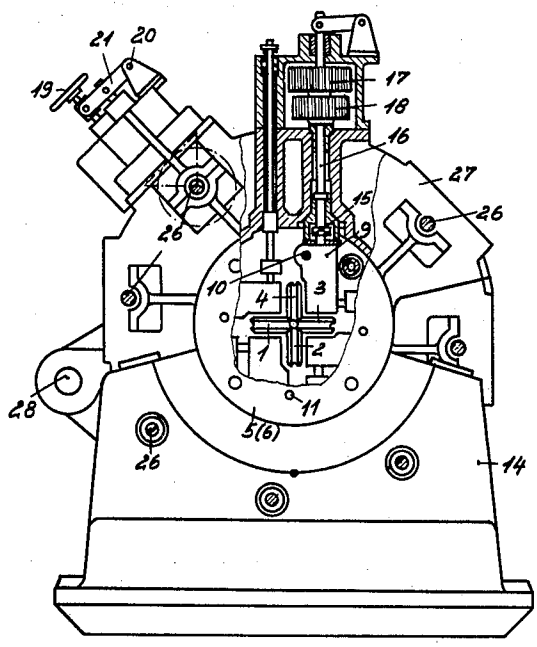
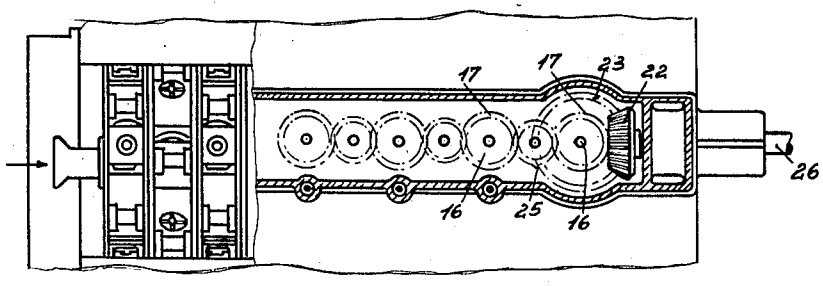


Fig. 2.



Inventor
P. Barth:
by
W. E. Evans.
Attorney.

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Fig. 3.

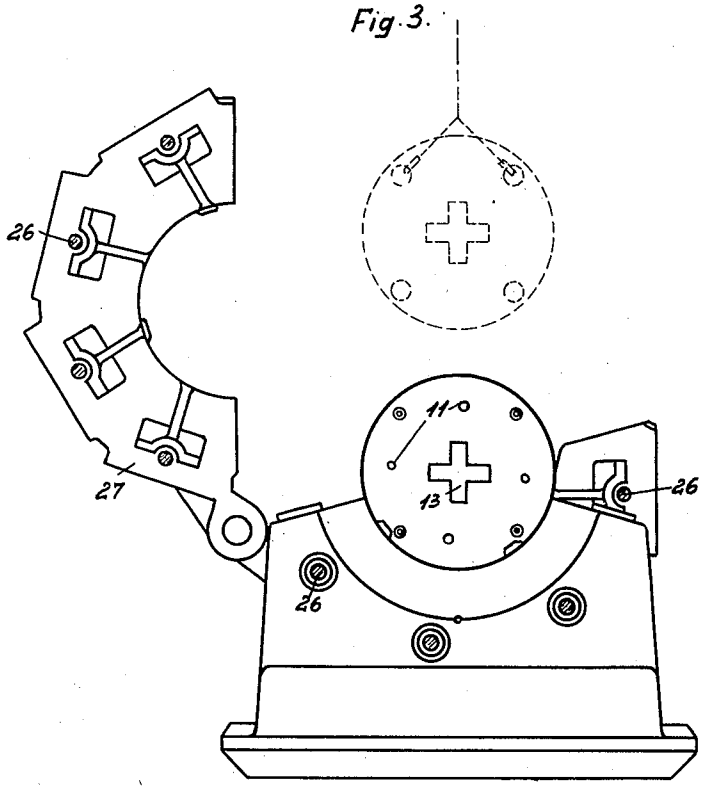


Fig. 4.

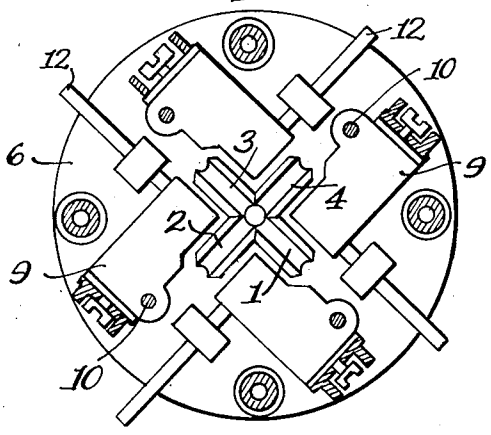
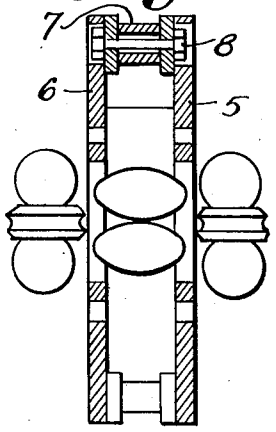


Fig. 5.



Inventor
P. Barth
by
W. E. Evans
Attorney.

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UNITED STATES PATENT OFFICE

2,120,539

ROLLING MILL

Paul Barth, Duisburg, Germany, assignor to Demag Aktiengesellschaft, Duisburg, Germany

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4 Claims. (Cl. 80—34)

Reducing tubes by the continuous rolling method has the disadvantage that the wall of the tube is thicker at the ends. Tubes with such thickened parts have a small value or are useless.

This extra thickness in the wall of the tube is attributable to the fact that, in passing through the reducing mill, the tube is less tensionally stressed at the ends than in the other parts. In constructing reducing mills the endeavour must be—and is—directed to arrange the planes of the rolls of the one pass as close as possible to those of the next so as also to reduce the length of the thick portions at the ends of the tubes.

Although existing types of mill housings allow the facing pass rolls of adjacent sets to be brought close together, this is possible in existing methods of drive, in which all the rolls of a set are geared together direct, only when the pass rolls are of correspondingly large diameter. Moreover, the gearing mounted on the housings determines the possible spacing, the distance between the planes of the rolls of adjacent sets remaining relatively large in the known types of construction.

According to the invention, instead of effecting the operative connection between the individual rolls of one and the same set by driving wheels mounted on the housing itself, the individual rolls of the similarly arranged sets are coupled together, so that the drives of the rolls of a set are separate from one another. In order to facilitate the attainment of the differences in speed, each of the roll spindles is driven by the preceding spindle by a set of spur pinions with the desired ratio of transmission. The fact that the successive sets of rolls are mutually staggered has the consequence that the driving elements on the roll spindles and the corresponding bearing casings do not prevent the roller housings from being placed close together.

The object of the invention is effectively attained by mounting each set of pass rolls in a separate hollow housing, the ends of the spindles which project from the housing carrying the driving pinions. The individual housings are advantageously formed of two plates held together by screws and maintained apart by distance members, the housing plates being provided, as shewn in the drawings, with openings for accommodating the bearings for the pivots of the rockable bearing arms of the roll spindles. The movement which the shaft in the casing is capable of making, which is necessary for mounting, renders it necessary to divide the shaft while interposing a coupling hinged within small limits.

According to the invention the housings hereinbefore referred to which carry the sets of rolls are removably mounted in a longitudinally divided bed, the coupling referred to being provided, in the zone of separation between the bed housing and that of the sets of rolls. These couplings can be disengaged to enable the removable part of the housing bed to be removed from its operative position or, as is shewn in the drawings, to be swung outwardly, so as to simplify the changing or replacement of the rolls.

The invention is diagrammatically illustrated by way of example in the accompanying drawings.

Figure 1 is a sectional elevation of the delivery side of a rolling mill.

Fig. 2 is a plan view corresponding to Figure 1, the upper portion of the bed housing being removed, and also illustrates a partial horizontal section through the housing in which the driving pinions are mounted.

Figure 3 is an end elevation of the bed housing with the upper member in its raised position.

Figures 4 and 5 show in two positions a housing provided with a single set of rolls.

Referring to the drawings, the housing which is provided with the pass rolls 1, 2, 3 and 4 disposed in one plane is formed of two circular plates 5 and 6 (Figures 4 and 5), which are held together by screws 8 with the aid of distance members 7. The spindles of the pass rolls are mounted in bearing members 9, provided with pivot pins 10. Holes 11 in the plates 5 and 6 form, with the pivot pins 10, a swinging bearing for the roll bearing member 9, to enable the rolls to be inserted into position. 12 represents the adjustment spindles for the several rolls 1, 2, 3 and 4. The housings for the sets of rolls, which are provided with apertures 13 for the passage of the tube and the rolls 1, 2, 3 and 4, are inserted in a housing bed in juxtaposed position, as shown in Figure 2 on the left-hand side thereof. By this means, the pass rolls are brought as near together as is practically possible. The bed for the reception of the roll housings 5, 6 consists of an upper member 27 and a lower member 14. The upper member 27 is pivoted at 28 and can be raised for the purpose of releasing the housings 5, 6 and for enabling the said housings carrying the set of rolls to be inserted into position (Figure 2). The roll spindles mounted in the bearing members 9 are connected by means of couplings 15 to the driving shafts 16. The shafts

16 pass through the housing bed; each carries externally spur pinions 17 and 18 and is adapted to slide axially in the pinions 17 and 18 for the purpose of engaging and disengaging from the roll spindle mounted in the bearing member 9. This uncoupling of the shafts 16 is effected before the roll sets 1, 2, 3 and 4 are exposed by raising the upper member 27 of the bed.

The axial movement necessary for uncoupling can be effected by means of a hand wheel 19, by the use of a lever 21, pivoted at 20 (Figure 1). The roll sets 1, 2, 3 and 4 are mutually staggered in known manner. In order to facilitate the increase in speed of the rolls in the direction of travel of the tube, the shafts 16 of the rolls are geared together in such manner that this connection is provided only between the corresponding rolls of the similarly mounted sets. This geared connection is illustrated in Figure 2. In this figure a bevel pinion 22 drives one of the shafts 16 through the corresponding bevel pinnion 23. The said shaft 16 carries a spur pinion 17; this meshes with an intermediate pinion 25 which is geared to the pinion 17 of the adjacent shaft 16. The last mentioned shaft 16 is provided with a pinion 18 which, in turn, transmits rotation, through an intermediate pinion, to the next shaft 16, which is parallel with the preceding shaft.

It is evident that this manner of connecting the pinions enables the progressive speeding up to the shafts 16 from the feed end to the delivery end of the mill to be easily obtained. Under very precise conditions this is obtained by using spur pinions with helical teeth, as this enables the constructor to work with fractions of or variations from the normal tooth pitch, that is to say, the pitch taken in the direction normal to the sides of the teeth. These conditions of transmission cease to exist when, as is also provided for by the invention, the pinions 17 and 18 are replaced by a flange motor, that is to say, a motor provided with an end securing flange, the plant being thereby equipped with independent drive for the rolls. The shafts driving the individual groups of pass rolls are indicated by 26. It will be understood that the shafts 26 passing through the hinged housing 27 must be provided with a coupling for permitting the raising of the upper member 27 of the bed. The several shafts 26 are driven by a suitable common drive.

I claim:

1. A rolling mill adapted for reducing tubes in a number of roll passes disposed one behind the other and comprising a number of groups of working rolls, each group consisting of at least three rolls, corresponding frames for supporting the respective groups of rolls, the said rolls being staggered mutually from frame to frame, a roll spindle for each roll, connecting spur gearing by which those roll spindles lying in a common plane are connected together, and means for imparting a drive to the said gearing so that each of the said roll spindles receives a drive from the preceding roll spindle in the common plane.

2. A rolling mill according to claim 1, wherein a separate housing is provided for each group of rolls and a two-part bed is provided to receive the said housings, one of the parts of the bed being removable.

3. A rolling mill according to claim 1, wherein a separate cylindrical housing is provided for each group of rolls and a two-part bed is provided to receive the said cylindrical housings, one of the parts of the bed being removable.

4. A rolling mill according to claim 1, provided with roll spindles that are axially movable and with couplings for connecting and disconnecting the said rolls from the connecting gear.

PAUL BARTH.