July 28, 1936. H. EDELMEIER 2,049,202

RING ROLLING MILL

Filed Feb. 14, 1935

Fig. 1.

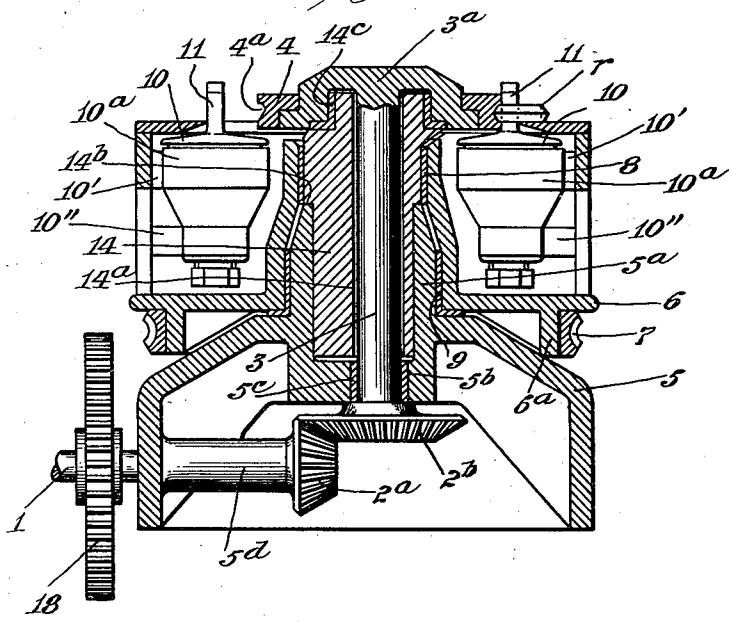
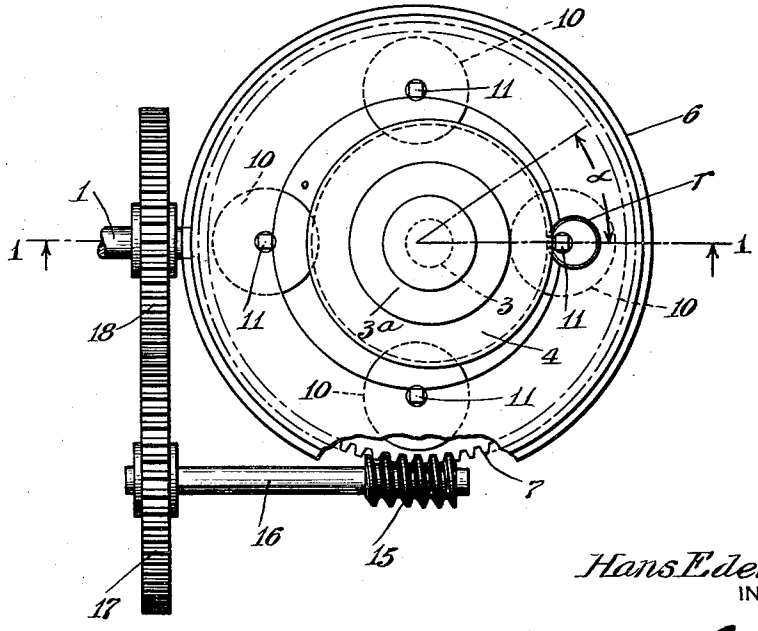


Fig. 2.



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Patented July 28, 1936 2,049,202

UNITED STATES PATENT OFFICE

2,049,202

RING ROLLING MILL

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Application February 14, 1935, Serial No. 6,475
In Germany February 15, 1934

2 Claims. (Cl. 80—5)

My invention relates to rolling mills adapted for the mass production of rings such as the spring rings for the so-called ring springs described, for instance, in the United States Patents Nos. 1,501,220 and 1,515,346, or the annular races for ball bearings or other rings of similar construction or purpose.

More particularly, my invention relates to ring rolling mills of the type which comprise a rotary main or profile roll and a rotary rolling table carrying a plurality of individual, loosely mounted pressure rolls which, during rotation of the table, are adapted to cooperate alternately or successively with the said main or profile roll.

In the known ring rolling mills of this kind, the said rotary table carrying the pressure rolls is arranged outside the said main or profile roll, and the pressure rolls are suitably distributed over the periphery of the rotary table. Such ring rolling mill is, for instance, described and illustrated in the German Patent 438,542.

These known mills have the inconvenience that owing to said arrangement of the rotary table outside the main roll, the rolling angle which determines the length on which the deformation of the ring to be rolled is accomplished, is very small so that the rolling pressure must be correspondingly heavy. Furthermore, it is necessary to use a main roll having a comparatively large diameter in order to distribute the rolling work over a larger periphery of the main roll.

The object of my invention is to obviate the said drawbacks of the known ring rolling mills.

For this purpose, one feature of my invention resides in the fact that the rotary table carrying a plurality of individual, loosely mounted pressure rolls, is shaped annularly and arranged to enclose the main roll eccentrically. The above mentioned rolling angle is thus increased, and the rolling pressure to be exerted can be reduced correspondingly. It is also possible to use a main or profile roll having a smaller diameter than heretofore. Moreover, the overall dimensions of the ring rolling mill as well as the weight thereof and the costs of manufacture and operation are essentially reduced.

In a preferred design of the ring rolling mill, the bearing body of the main roll is also used as a bearing for the annular rolling table carrying the pressure rolls.

An embodiment of my invention is shown, by way of example, in the accompanying drawing, in which

Fig. 1 is an axial sectional elevation of the ring rolling mill, and

Fig. 2 is a plan view of the same.

The reference character 5 indicates the casing of the rolling mill. The said casing is provided with a central sleeve-like or tubular part 5*a* having an eccentric bore 5*b*.

Inserted in the said tubular part 5*a* of the casing, is a cylindrical body 14 having an eccentric bore 14*a*. The said body 14 fits snugly in the sleeve 5*a*, has an annular shoulder 14*b* resting upon the top edge of the sleeve 5*a*, and its upper part projects beyond the sleeve 5*a*.

The reference character 3 indicates the driving shaft of the main or prime roll 4 having the desired profile 4*a* on its periphery. The roll 4 is suitably secured to a head portion 3*a* of the shaft 3. The shaft 3 is rotatably mounted at its lower end in a suitable bearing 5*c* arranged within the eccentric bore 5*b* of the sleeve 5*a*, and with its head 3*a* engages a suitable bearing 14*c* of the cylindrical part 14. Said bearings 5*c* and 14*c* may be formed by ball or roll bearings of known and suitable construction.

Rotation is imparted to the shaft 3 by means of a bevel wheel 2*b* secured to its lower end and engaged by a bevel wheel 2*a* of a driving shaft 1 which is rotatably mounted in a suitable bearing 5*d* of the casing 5 and is rotated by an appropriate electric motor or other suitable source of power of any well known kind (not shown).

The reference character 6 indicates the casing-shaped rolling table which is pivotally mounted by means of two bearings 8 and 9, of any suitable and known construction, on the cylindrical portion 14 and the sleeve 5*a*, respectively. Rotation is imparted to the said table 6 by means of a worm wheel 7 secured to a flange 6*a* of the table, and driven by means of a worm 15 of a shaft 16. Said shaft is journaled in suitable bearings (not shown) of the casing 5 and driven by means of a gear 17 from a gear 18 secured to the above mentioned driving shaft 1.

As clearly shown in Figs. 1 and 2, the table 6 has an annular cross-section and is mounted eccentrically with relation to the shaft 3 and the main roll 4.

A plurality of rolls 10 provided with suitable heads 11 forming the pressure rolls proper are suitably distributed, as desired, over the periphery of the rotary table 6. The rolls 10 have a well known tubular shape and are in the well known manner pivotally mounted in sleeve-like bearing cases 10*a* of well known construction which are suitably secured by means of supports 10' and 10'' to the casing forming the rolling table 6.

The pressure heads 11 of the rolls 10 are adapted to form the desired roll opening for the rings to be rolled on one (in the drawing on the right hand) side of the main roll 4, as is well known. The rolls 10 with the pressure heads 11 are not directly driven but are loosely mounted and during the rolling operation are entrained by the rotating main roll 4 through the intermediary of the ring just being rolled between this roll and the respective pressure head 11.

The operation is as follows:

The rotary table 6 is constantly rotated by means of the gearing 7, 15, 16, 17, 18 by the driving shaft 1 which rotates also the main roll 4. The ring *r* to be rolled is laid upon the top plate of the rolling table 6 around the pressure head 11 which because of the rotation of the said table 6, is about to approach the main roll 4. By the said pressure head 11 approaching the rotating main roll 4, the roll opening which is formed by the profile 4*a* of the roll 4 and the pressure head 11, is continuously reduced, and, therefore, the ring *r* is rolled out between the pressure head 11 and the main roll 4. During the continued rotation of the rolling table 6, the pressure head 11 moves away from the main roll 4, and the rolled ring may be removed from between the pressure head 11 and the main roll 4. Each ring is rolled to completion by a single pressure roll 11 in cooperation with the main roll 4.

Due to the eccentric mounting of the rolling table 6 relatively to the main roll 4, the angle α is rather large. The table 6 may rotate with a uniform speed, whereas in the known mills of this kind, the small rolling angle necessitated decreasing the speed of the table during the rolling operation proper. As the casing of the rotary table is mounted on the bearing frame 5*a* of the main roll 4, the bending moments arising during the rolling process are essentially decreased so that, in spite of the small dimensions of the machine, neat and uniform rolling is ensured.

It is obvious that various changes may be made in the mill shown and described as an embodiment of the present invention, without departing from the spirit of the invention and the scope of the claims. The following claims, therefore, define the invention and its equivalents only as much as determined by the state of the art.

What I claim is:—

1. A ring rolling mill of the type specified, comprising a driven rotatable main roll, an annular rotary table eccentrically surrounding said main roll, a plurality of individual pressure rolls freely rotatable and mounted in a circle surrounding the main roll, said circle being arranged eccentrically to said main roll, and means for rotating said table to advance said pressure rolls successively and alternately into cooperation with said main roll.

2. A ring rolling mill of the type specified, comprising a driven rotatable main roll, a bearing frame for said main roll, an annular rotary table eccentrically surrounding said main roll, a casing carried by said table journalled on said bearing frame, a plurality of individual pressure rolls freely rotatable and mounted in a circle surrounding the main roll, said circle being arranged eccentrically to said main roll, and means for rotating said table to advance said pressure rolls successively and alternately into cooperation with said main roll.

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