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3,308,643

ROLLING FRAME FOR PILGRIM MILL

Filed July 7, 1964

4 Sheets-Sheet 1

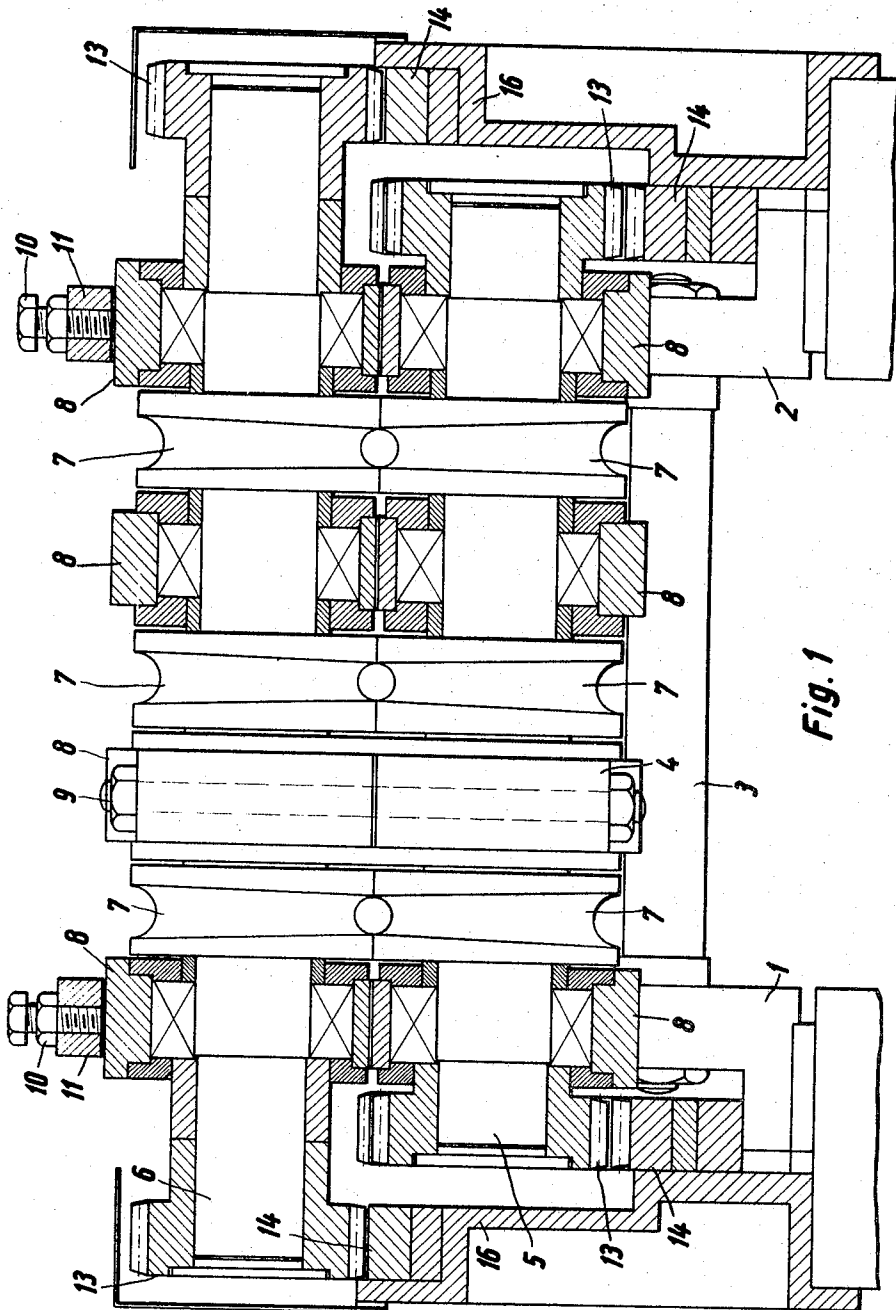


Fig. 1

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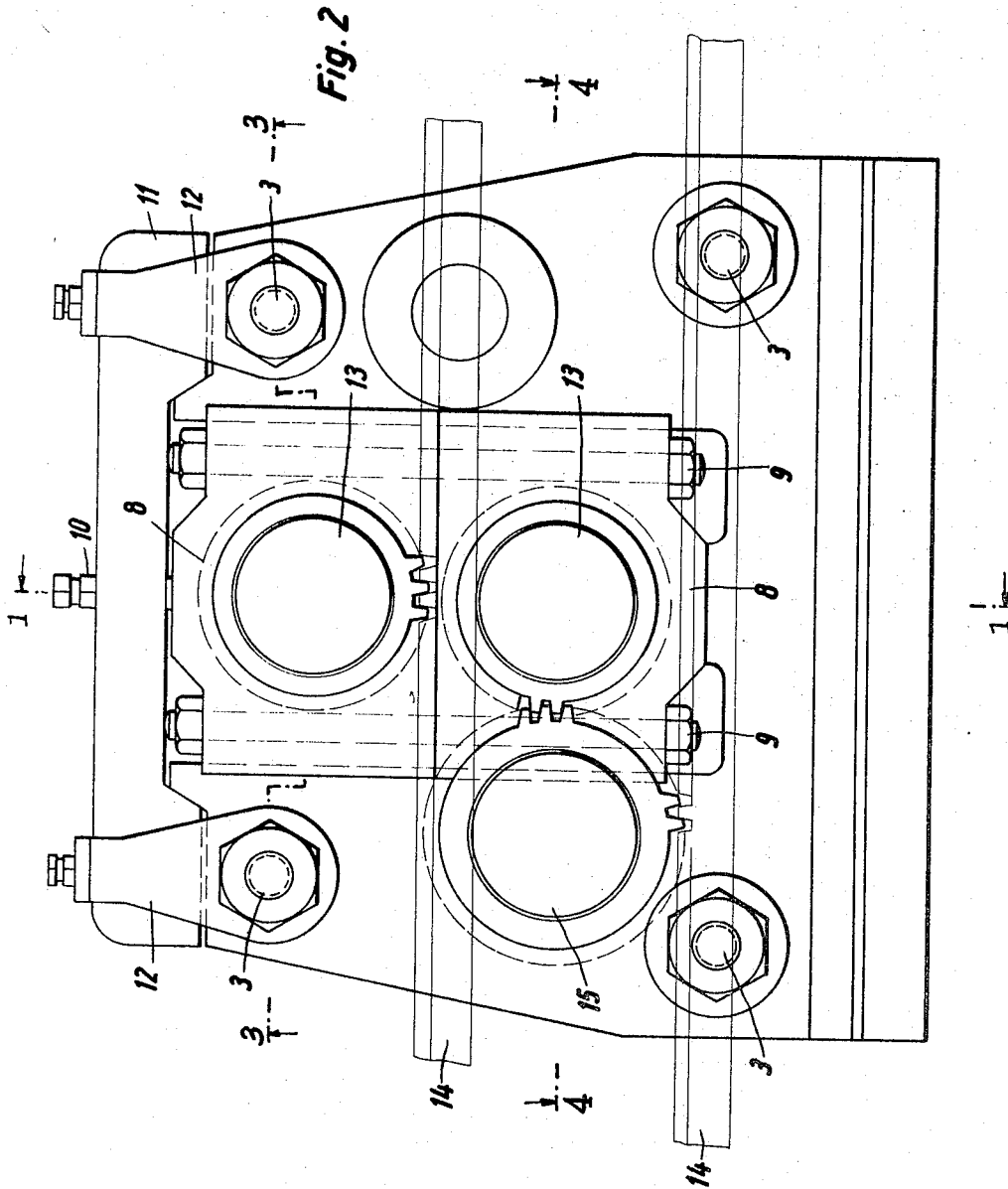
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4 Sheets-Sheet 2



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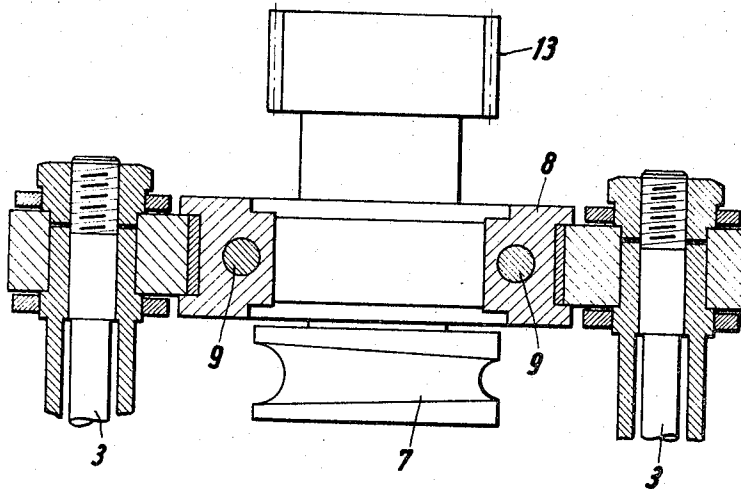
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Fig. 3



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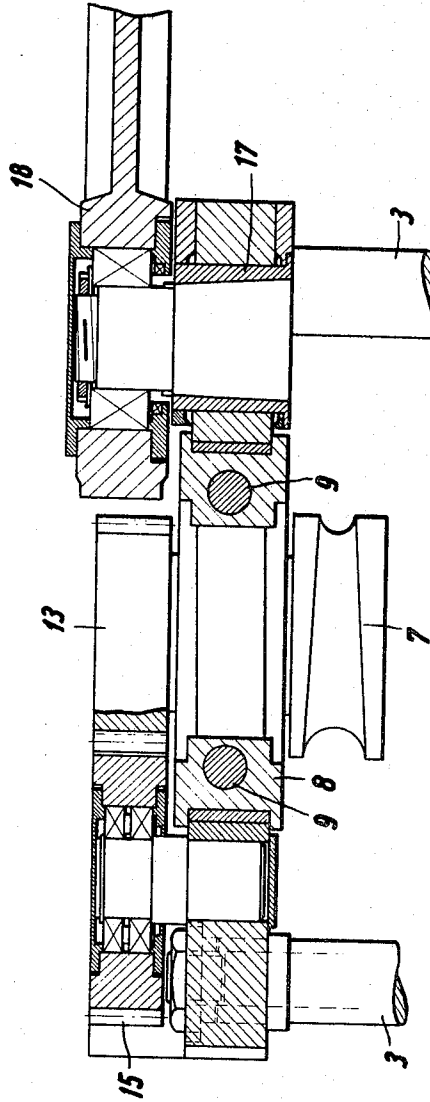
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Fig. 4



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ROLLING FRAME FOR PILGRIM MILL

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6 Claims. (Cl. 72-238)

The invention relates to rolling mills, and relates more particularly to rolling frames for multiple cold rolling mills of the step-back type, the latter also sometimes being referred to as "pilgrim" type rolling mills.

Rolling frames of this type include rolls with one or more roll grooves and which perform rotational oscillating movements; the oscillating roll movement is accomplished by means of cooperating pinions and racks.

Rolling frames of this, the step-back, type that have been used heretofore were, however, inefficient due to the large weight of their moving masses and of their frames.

Attempts have therefore been made in the past to lighten the weight of these masses. These attempts were intensified after a change-over occurred from single rolling frames to multiple rolling frames as in multiple rolling frames additional elements, such as take-up rolls and supporting rings, added weight to the previous overall mass.

It has therefore been proposed in the past to reduce the diameters of the shafts and their rolls by applying so-called ring grooves; yet, these required reinforcement of the posts of the rolling frames, as the radial forces were taken up by these posts by means of through bolts.

It has also been proposed to take up the forces of the rolling pressure by means of so-called tunnel constructions, but also these did not prove to be very efficient, as the take-up rolls were still needed which required special raceways and constituted an additional weight for the rolling frame. Furthermore, these constructions were attended by the further drawback that they obstructed easy observation of, and easy access to, the rolling frame.

It is accordingly among the principal objects of the invention to avoid the drawbacks of the prior art, and yet to provide rolling frames, for rolling mills of the instant, the so-called step-back, type, with reduced oscillating masses and simplified labor-saving exchangeability of the rolls with their bearings.

It is an other object of the invention to provide such rolling frames, that permit considerably increased rolling speeds.

It is a further object of the invention to provide such a rolling frame that has a series of bearing housings for the shafts of each pair of rolls, each housing including two opposite bearing members, one for each shaft, that are bolted together.

It is still an other object of the invention to provide a rolling unit composed of a pair of shafts carrying the rolls and the aforesaid series of bearing housings, the rolling unit permitting interchange in its entirety in the rolling frame.

It is still a further object of the invention to provide such a rolling frame wherein the driving pinions that cooperate with the driving racks are so arranged that upon interchange of rolling units the pinions may be freely disengaged from the racks.

It is yet an other object of the invention to provide the lower shaft on each end with a pair of pinions, the rack meshing with the outer pinion, and the outer pinion with the inner pinion while the inner pinion drives the

lower shaft; while the upper shaft is provided only with one pinion on each end meshing with the respective racks; by this arrangement, movement in the same direction by all the racks will cause turning of the two shafts in opposite rotational directions relative to each other.

The foregoing and other objects of the invention will be best understood from the following description of an exemplification thereof, reference being had to the accompanying drawings, wherein:

FIG. 1 is a fragmentary vertical sectional view taken at right angle to the direction of rolling on the line 1-1 of FIG. 2, showing a three-groove rolling frame of a step-back rolling machine for cold rolling;

FIG. 2 is a schematic end elevational view parallel to the rolling direction;

FIG. 3 is a fragmentary sectional view taken on the line 3-3 of FIG. 2; and

FIG. 4 is a fragmentary sectional view taken on the line 4-4 of FIG. 2.

In carrying the invention into effect in one of the embodiments which has been selected for illustration in the accompanying drawings and for description in this specification, and referring now particularly to FIGS. 1 and 2, there is provided a three-groove rolling frame that comprises two end posts 1 and 2, and a rolling unit 4. The posts 1 and 2 are held together by means of four spacer bolts 3.

The rolling unit 4 comprises a lower roll shaft 5 and an upper roll shaft 6, each provided with end pinions; and each shaft carries mounted thereon, for instance shrunk thereon, rolls 7; on each side of each roll 7 there is mounted a bearing member 8.

Each bearing member 8 of one shaft is disposed adjacent and opposite a bearing member of the other shaft and is connected thereto to form a bearing housing. The connection of the two bearing members 8 of each housing is made by two bolts 9 which are so pre-tensioned that during rolling there occurs substantially no resilient longitudinal yield by the bolts.

Thus, each pair of rolls of the two shafts is flanked on each side by a bearing housing that is composed of two bearing members 8; each bearing member 8 journals one of the shafts, and each pair of bearing members is united into a bearing housing by the pre-tensioned bolts 9. In the exemplification of FIG. 1, there are provided three pairs of rolls 7 which have four bearing housings, each composed of a pair of bearing members 8 and held together by the bolts 9. The end bearing housings are mounted on the end posts 1 and 2, respectively.

As best shown in FIG. 2, each end post has a U-shaped cut-out that serves as a receptacle, open on top, for the end housing. Each end housing may, as shown in FIG. 3, be in sliding engagement, for instance by a tenon and kerf construction in the U-shaped receptacle, and be supported at the bottom by a raised portion formed in the receptacle. The receptacle is closed by a removable beam 11, which includes a set screw that is mounted on the beam 11 and adjustably bears down on the housing below it in the receptacle. The beam of each end post is held in position by two tiltable holders 12 that are pivoted to the respective end post.

As best shown in FIG. 1, the upper shaft 6 carries on each end a pinion 13, and a rack 14 is provided for each pinion 13 of the upper shaft 6 and is in mesh therewith. Thus there are two racks 14 for the upper shaft 6, and each is slidably supported from the respective end post by a wall 16 near the ends of the shaft 6, with the toothed portion facing upwardly.

The lower shaft 5 is shorter than the upper shaft 6, and carries at each shaft end two meshing pinions 13 and 15 (see FIGS. 2 and 4).

The pinion 13 is mounted on the shaft 5, while the

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pinion 15 is borne adjacent thereto. The pinion 15 is larger than the pinion 13, and thus is visible behind the pinion 13 in FIG. 1.

Two racks 14 are assigned to the lower shaft 5 and are slidably supported from the end posts 1 and 2, respectively, near the wall 16, and have their toothed portions facing upwardly. The racks 14 of the lower shaft 5, however, mesh with the pinions 15, so as to rotate the shaft 5 oppositely as compared to the shaft 6, when the racks 14 all move in the same direction.

As stated previously, the pinions 13 and their racks 14 of the upper shaft 6 are spaced apart for a greater distance than the pinions 13, 15 and their racks 14 of the lower shaft 5. By this arrangement, during dismounting the entire rolling unit which is composed of the shafts 5 and 6, the rolls 7 thereon, the bearing housings with the members 8 and bolts 9, and the pinions may be lifted as an entity upwardly, upon prior removal of the beams 11. By this means, the rolling unit may easily be mounted and dismounted from the rolling frame.

As shown in FIG. 4, each end post 1, 2 is provided with a bearing 17 of well-known construction for the connection of the connecting rod 18 for the main drive of the rolling frame.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus described the invention, what we claim as new and desire to be secured by Letters Patent is as follows:

1. In a rolling frame, in combination, a support including two end posts, a pair of roll shafts operable for oscillating rotary movement supported by said support, a plurality of rolls mounted on each shaft, said rolls being oppositely positioned in pairs on the shafts and defining roll grooves, oscillating driving means for said shafts including pinions mounted on each shaft and racks, each rack meshing with a pinion, and means operable for journalling said roll shafts comprising a series of bearing members journalling each shaft, each roll being disposed between two bearing members, each bearing member of one shaft being disposed opposite and connected to a bearing member of the other shaft and forming therewith a bearing housing, and pre-tensioned bolts connecting the two bearing members of each bearing housing.

2. In a rolling frame, as claimed in claim 1, the said shafts being disposed one above the other, each shaft

having one pinion mounted on each end, the pinions on the upper shaft meshing with its rack, the racks and pinions of the upper shaft being off-set in the longitudinal shaft direction from the racks and pinions of the lower shaft.

3. In a rolling frame, as claimed in claim 1, the said shafts being disposed one above the other, the lower shaft including a pair of meshing inner and outer pinions on each end, the inner pinions driving said shaft, each outer pinion meshing with the respective inner pinion and with the respective rack.

4. In a rolling frame, as claimed in claim 1, the two shafts with the rolls and at least some of the pinions and the bearing housings forming a rolling unit, mountable on and dismountable from said support including the racks, as an entity.

5. In a rolling frame, as claimed in claim 4, each post defining a receptacle open on top, the housing on each end of said unit being disposed in said receptacle, and means for closing said receptacles comprising a beam removably positioned on said post and including means bearing from above against the end housing in each receptacle, and tiltable holders for said beams pivoted on each post.

6. In a rolling frame, as claimed in claim 4, said racks being supported by said support and having the toothed portion facing upwardly, a pinion supported from each shaft end and being in mesh with a rack, the racks and pinions of the upper shaft being spaced apart for a larger distance than the racks and pinions of the lower shaft, whereby said rolling unit may be lifted, as an entity, off said racks, for dismounting.

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