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(54) Rolling mill roller guide

(57) A guide (10) for directing a hot rolled product (22) along a path (P) in a rolling mill comprising at least one annular roller (18) arranged to contact the product (22). The roller (18) is rotatably supported on a shaft (20) by bearings defining an axial gap therebetween. Fluid is delivered under pressure into the gap and internal vanes respond to the thus delivered fluid by rotatably driving the rollers (18).

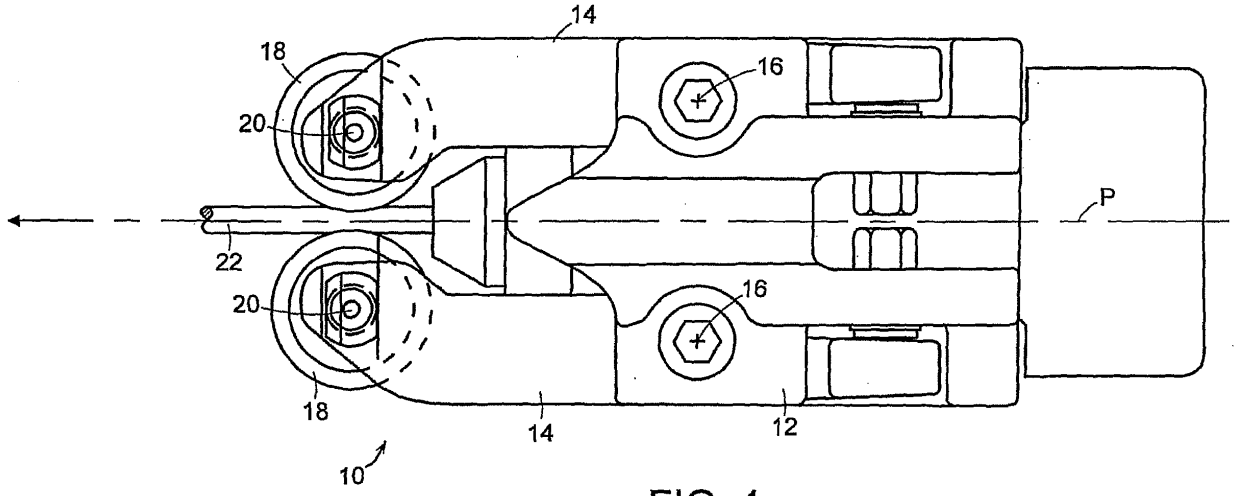

FIG. 1

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Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates generally to rolling mill roller guides, and is concerned in particular with an improved means for pre-spinning the guide rollers in advance of the arrival of a mill product therebetween.

Description of the Prior Art

[0002] As disclosed in U.S. Patent Nos. 6,151,946 and 4,373,367, it is known to pre-spin the rollers of rolling mill entry guides by impinging a pressurized fluid, typically cooling water, on vanes formed on the exterior sides of the rollers. The vanes are formed on both sides of the rollers so as to permit reversal of the rollers after they have operated for a period of time in one direction of rotation. The drawbacks to such arrangements include the costs associated with forming the vanes on both exterior sides of the rollers, the need to divert cooling water from other locations for dedicated application to the rollers, and the danger that externally applied cooling water may contaminate the roller bearings.

SUMMARY OF THE INVENTION

[0003] The objective of the present invention is to provide an improved means for driving the guide rollers that avoids the aforementioned drawbacks of the prior art.

[0004] In accordance with one embodiment of the present invention, a roller entry guide has mutually spaced annular rollers arranged to contact opposite sides of a product, e.g., hot rolled steel rod, moving at high speed along a path. The rollers are supported on respective shafts by bearings defining axial gaps therebetween. The gaps are surrounded by vanes carried by the rollers. A pressurized fluid, typically an oil mist, is delivered to the axial gaps via passageways in the shafts. The oil mist impinges on the vanes to rotatably drive the rollers, and also serves as a lubricant for the roller bearings.

[0005] Claim 1 provides a guide for directing a hot rolled product along a path in a rolling mill, said guide comprising: at least one annular roller arranged to contact the product moving along said path, said roller being rotatably supported on a shaft by bearings defining an axial gap therebetween; means for delivering fluid under pressure into said gap; and means responsive to the thus delivered fluid for rotatably driving said roller.

[0006] Preferably, the means responsive to the thus delivered fluid comprises vanes on interior surface of said roller.

[0007] Preferably, said vanes are integrally formed on the interior surface of said roller.

[0008] Further, said vanes are preferably formed on the interior surface of a bushing pressed into said roller.

[0009] Further, said means for delivery fluid preferably includes networks of passageways in said shaft through which said fluid is delivered to said gap.

[0010] According to another preferred embodiment, said means for delivering fluid further comprises a spacer element between said bearings, said spacer element having nozzles communicating with said passageways and arranged to direct said fluid towards said vanes.

[0011] According to another preferred embodiment, said bearings are ball bearings having inner races fixed with respect to said shaft, and outer races fixed with respect to said roller, said spacer element being fixed with respect to said shaft between said inner races.

[0012] Preferably, said fluid includes a lubricant for said bearings.

[0013] Claim 9 provides a guide for directing a hot rolled product along a path in a rolling mill, said guide comprising: mutually spaced annular rollers arranged to contact opposite sides of the product moving along said path, said rollers being rotatably supported on respective shafts by bearings defining axial gaps therebetween; means for delivering fluid under pressure into said gaps; and means responsive to the thus delivered fluid for rotatably driving said rollers.

These and other features and attendant advantages of the present invention will now be described in greater detail with reference to the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

Figure 1 is a plan view of a roller entry guide in accordance with the present invention;

Figure 2 is a horizontal sectional view on an enlarged scale taken through one of the guide rollers;

Figure 3 is a sectional view taken along line 3-3 of Figure 2;

Figure 4 is a view similar to Figure 2 showing an alternative embodiment of the invention; and

Figure 5 is a sectional view taken along line 5-5 of Figure 4.

DETAILED DESCRIPTION

[0015] With reference initially to Figure 1, a roller entry guide in accordance with the present invention is generally indicated at 10. The guide includes a housing 12 supporting a pair of arms 14 pivotally adjustable about axes 16. The projecting distal ends of the arms carry annular guide rollers 18 rotatably mounted on respective shafts 20. The guide rollers are arranged to contact opposite sides of a product, typically hot rolled steel rod 22,

moving at high speed along a path "P" into a roll stand (not shown).

[0016] With reference additionally to Figures 2 and 3, it will be seen that each guide roller 18 is rotatably supported on its respective shaft 20 by bearings 24 defining an axial gap 26 there between. The bearings preferably comprise roller bearings having inner races 24a fixed with respect to the shaft 20, and outer races 24b fixed with respect to the interior of the roller 18.

[0017] A spacer 28 is interposed between the inner bearings races 24a. The spacer is surrounded by a series of vanes indicated typically at 30 and formed on an interior surface of the guide roller 18. An axially extending passageway 32 in shaft 20 is arranged to direct a flow of pressurized fluid to radial passageways 34 communicating with a circular passageway 36 formed by confronting grooves in the shaft 32 and spacer 28. Nozzles 38 in the spacer lead from the passageway 36 and are arranged to direct the pressurized fluid against the vanes 30 to thereby rotatably drive and pre-spin the rollers 18. The pressurized fluid is advantageously an oil mist which serves the added purpose of lubricating the bearings 24.

[0018] The embodiment shown in Figures 4 and 5 is largely identical to that shown in Figures 2 and 3, except that the vanes 30' are formed on the interior of a bushing 40 pressed into the interior of the guide roller 18.

[0019] In light of the foregoing, it will now be understood that in accordance with the present invention, each roller need only be provided with one array of internal vanes. The rollers are rotatably driven by the same pressurized fluid that also serves as the lubricant for the roller bearings. No potentially troublesome external application of cooling water is required, and the internal vanes can serve to rotate the rollers in either direction, thus enabling the rollers to be reversed.

[0020] While the internal pre-spinning and lubrication system of the present invention has been described with reference to roller entry guides, it should be understood that the same concept can be utilized to pre-spin and lubricate rollers in other rolling mill applications where rollers are used to guide the hot rolled product along curved paths. One non-limiting example of such an application would be to pre-spin and lubricate the rollers of a rollerized guide directing the hot rolled product into an inclined laying head.

Claims

1. A guide for directing a hot rolled product along a path in a rolling mill, said guide comprising: at least one annular roller arranged to contact the product moving along said path, said roller being rotatably supported on a shaft by bearings defining an axial gap therebetween; means for delivering fluid under pressure into said gap; and means responsive to the thus delivered fluid for rotatably driving said roller.

2. The guide as claimed in claim 1 wherein the means responsive to the thus delivered fluid comprises vanes on interior surface of said roller.

3. The guide as claimed in claim 2 wherein said vanes are integrally formed on the interior surface of said roller.

4. The guide as claimed in claim 2 wherein said vanes are formed on the interior surface of a bushing pressed into said roller.

5. The guide as claimed in claim 2 wherein said means for delivery fluid includes networks of passageways in said shaft through which said fluid is delivered to said gap.

6. The guide as claimed in claim 5 wherein said means for delivering fluid further comprises a spacer element between said bearings, said spacer element having nozzles communicating with said passageways and arranged to direct said fluid towards said vanes.

7. The guide as claimed in claim 6 wherein said bearings are ball bearings having inner races fixed with respect to said shaft, and outer races fixed with respect to said roller, said spacer element being fixed with respect to said shaft between said inner races.

8. The guide as claimed in claim 7 wherein said fluid includes a lubricant for said bearings.

9. A guide for directing a hot rolled product along a path in a rolling mill, said guide comprising: mutually spaced annular rollers arranged to contact opposite sides of the product moving along said path, said rollers being rotatably supported on respective shafts by bearings defining axial gaps therebetween; means for delivering fluid under pressure into said gaps; and means responsive to the thus delivered fluid for rotatably driving said rollers.

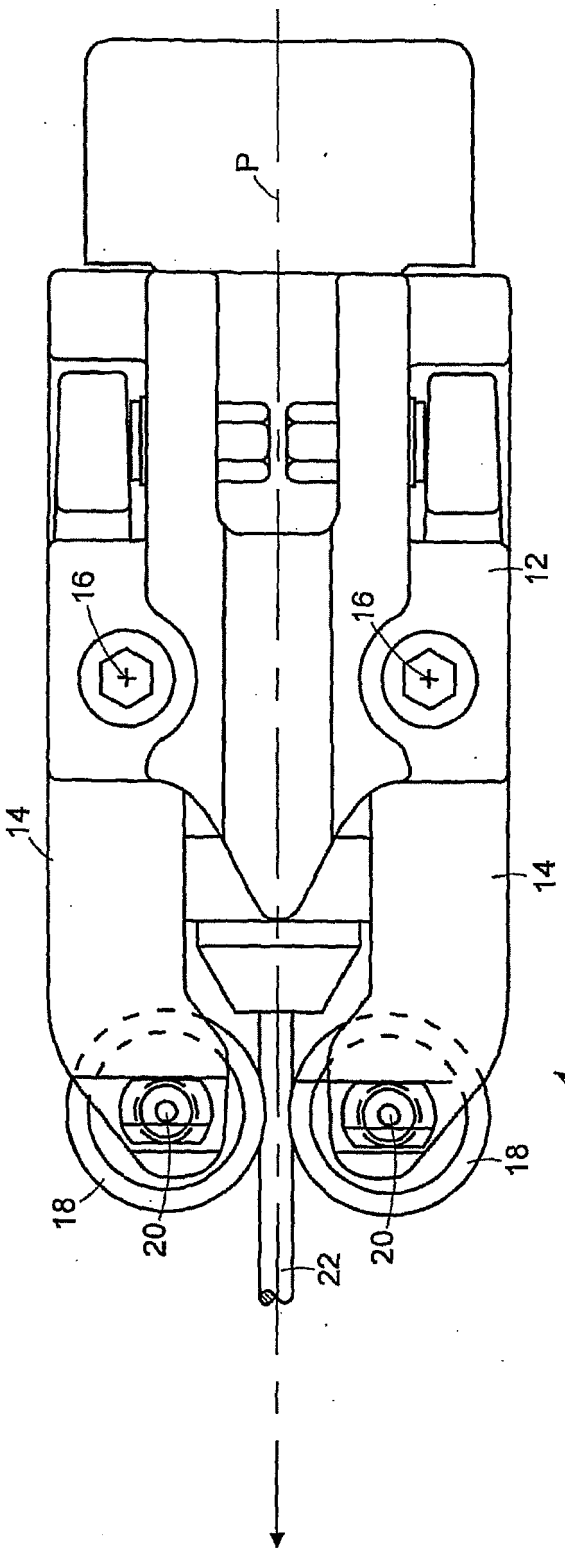

FIG. 1

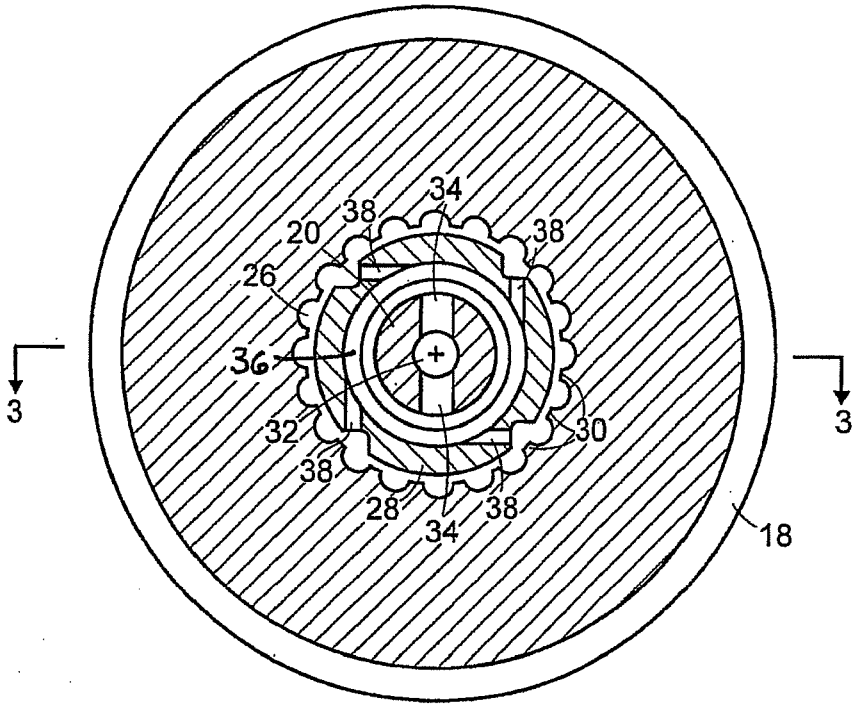
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FIG. 2

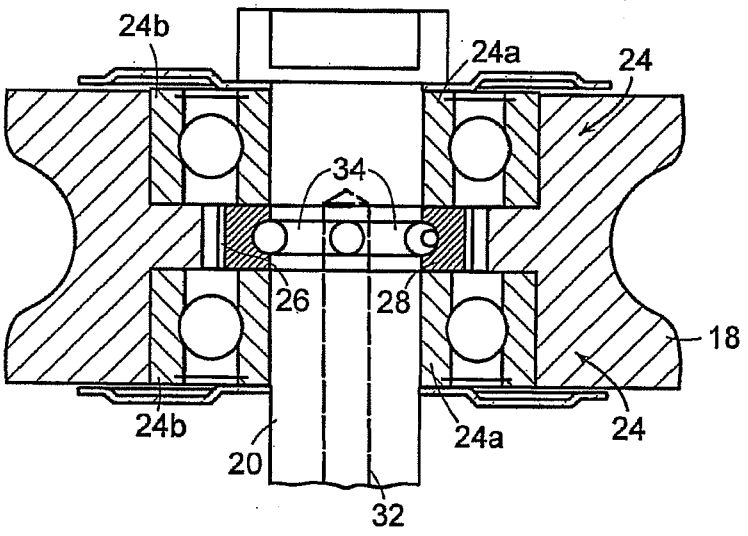
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FIG. 3

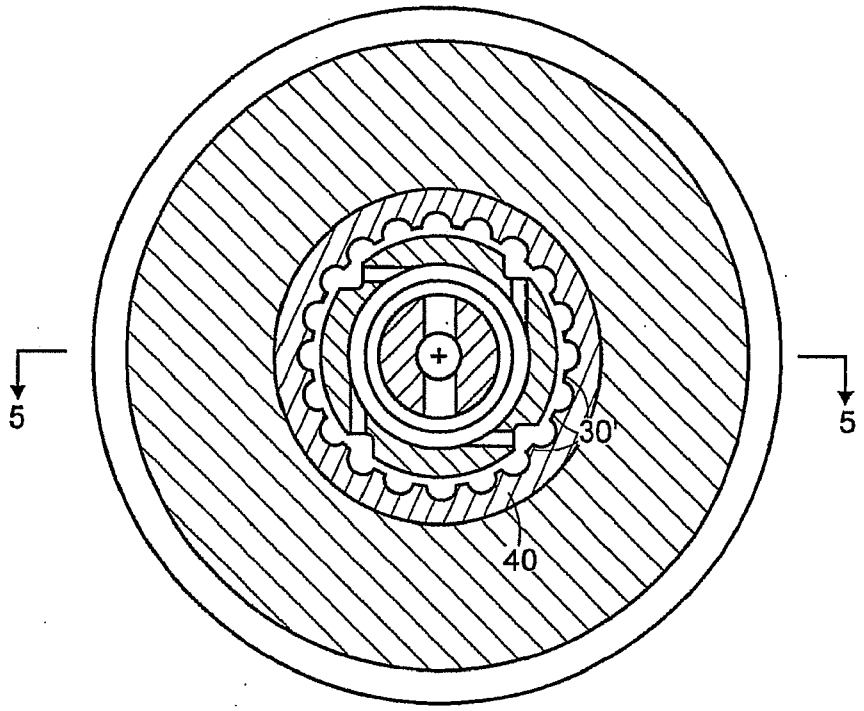

FIG. 4

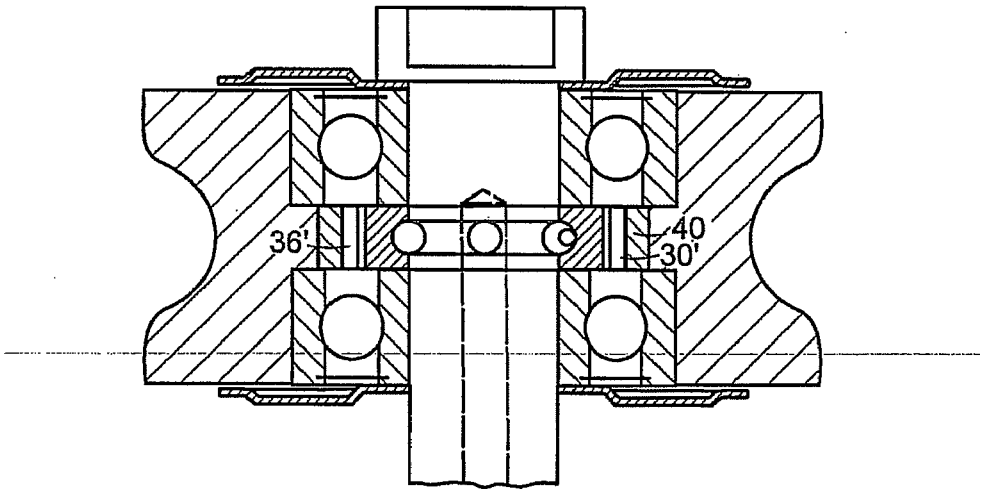

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 06 11 5318

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	12 September 2006	Forciniti, Marco

CATEGORY OF CITED DOCUMENTS

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