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Küfner

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[54] **JOURNAL FOR ROLLS**

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[51] **Int. Cl.** **F16c 13/00,** F16c 33/72

[58] **Field of Search** 308/36.1, 187, 15, 22, 308/8.2

[56] **References Cited**

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Assistant Examiner—Frank Susko
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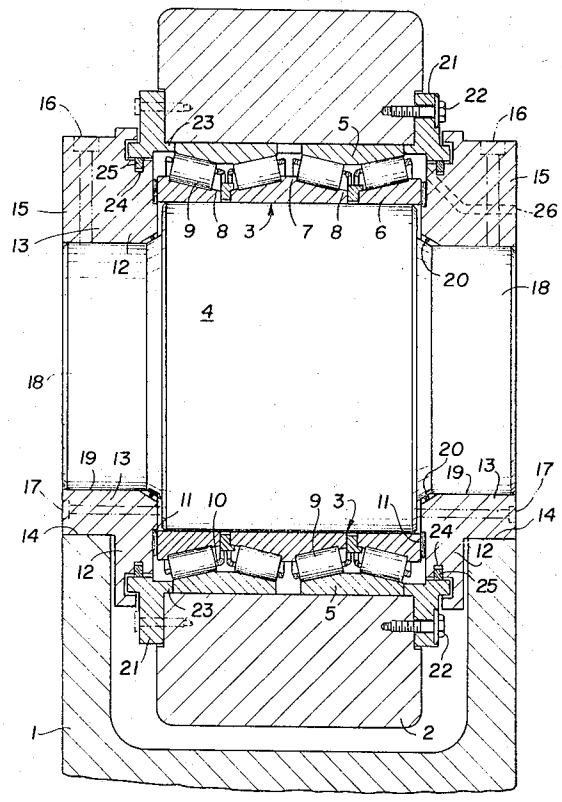
[57] **ABSTRACT**

A journal for universal mill rolls and the like wherein a mill roll is located in a supporting structure having opposed walls. The mill roll is provided with a roller bearing and axle located within its bore and is supported on the side walls. A ring shaped cover member seals each of the axial ends of said roller bearing. The ring shaped covers are formed integrally with a slide member having a rectangular shape when viewed in plan. The slide member is insertable within a rectangular opening in the side wall of said supporting structure and has a pair of extending arms engaging the edge of the side wall and means for removably connecting the arms to the side wall.

8 Claims, 4 Drawing Figures



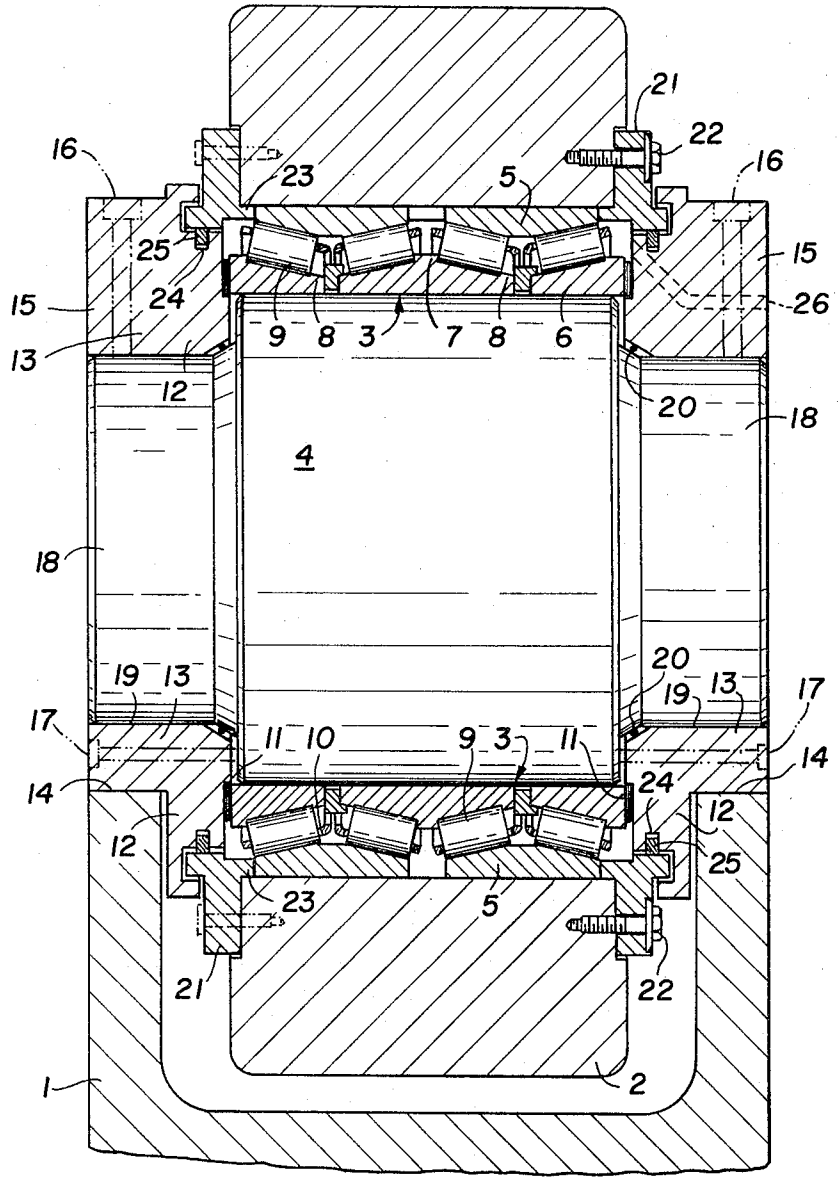

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FIG. 1

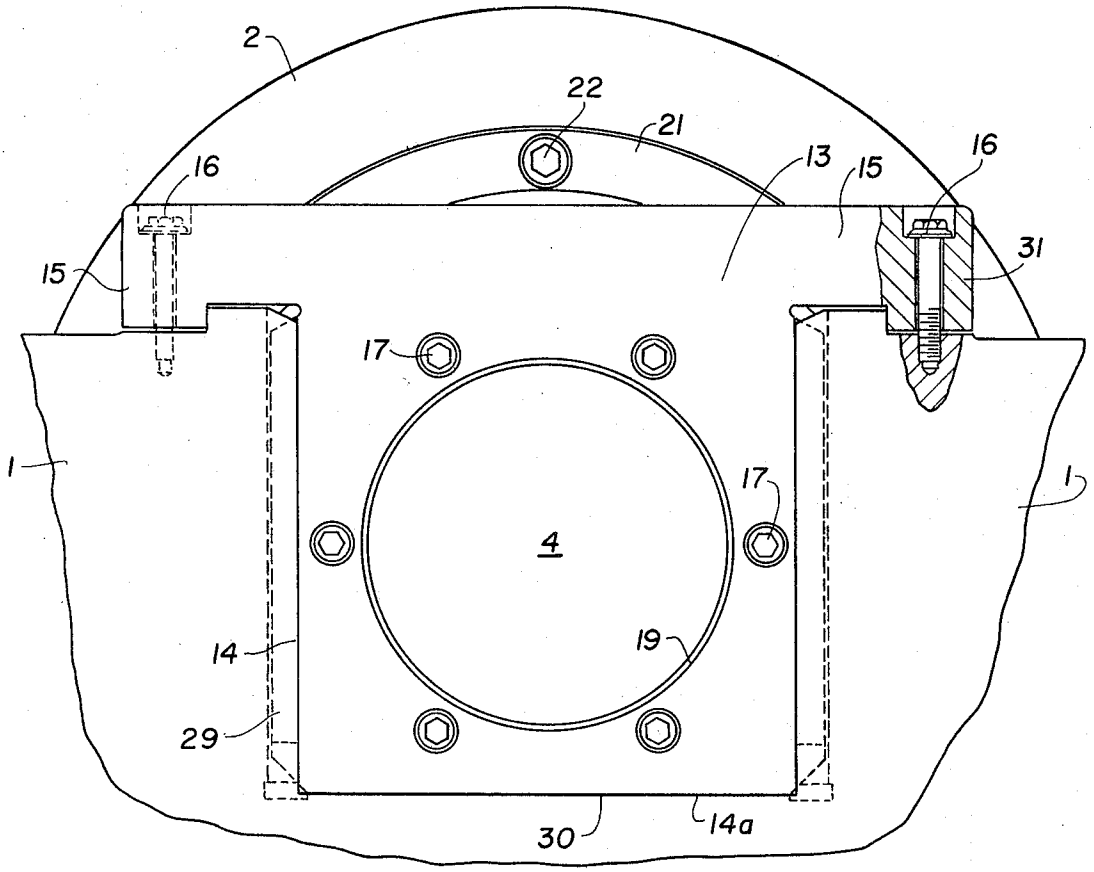
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FIG.2

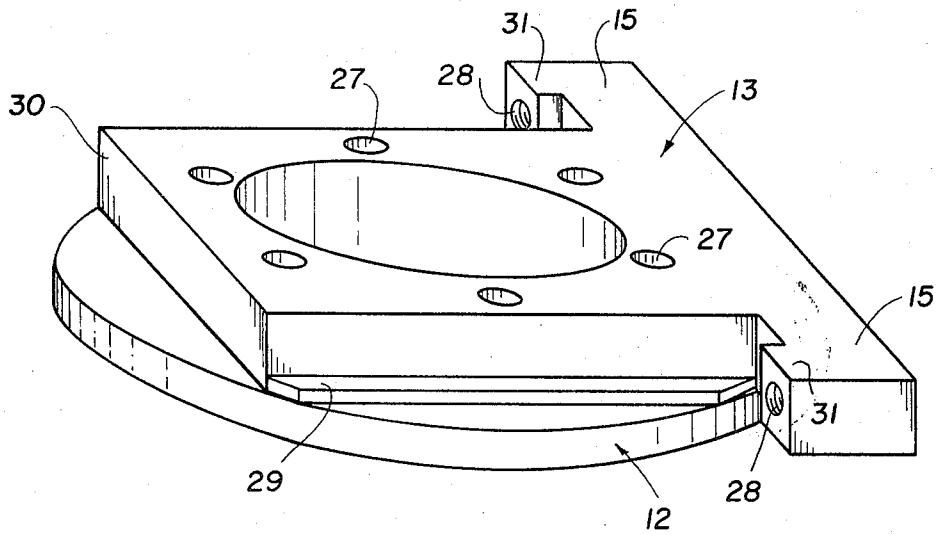
31
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FIG.4

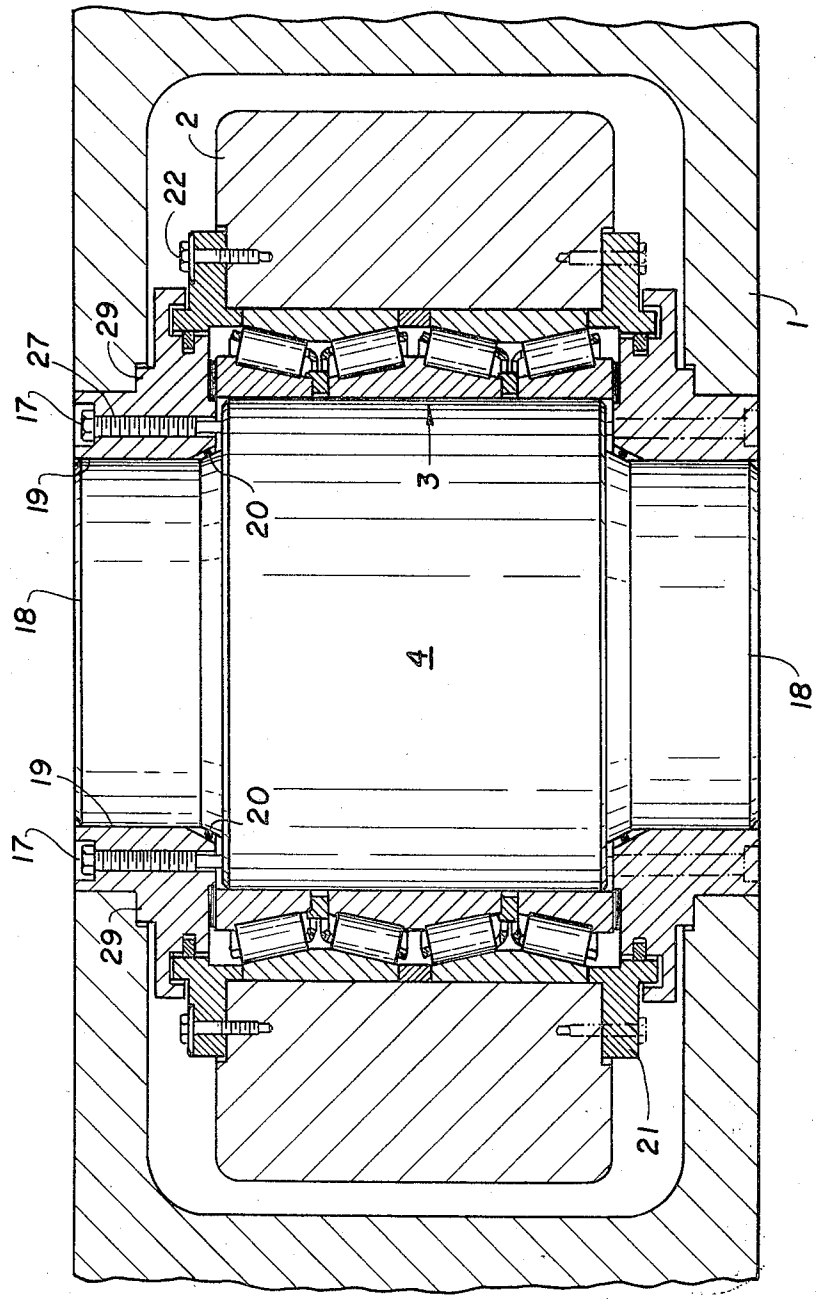

FIG. 3

JOURNAL FOR ROLLS

BACKGROUND OF THE INVENTION

The present invention relates to roller bearing means for journaling roller cylinders in a universal mill roll support.

Mill roll supports comprise an open sided box-like structure in which a supporting axle, passing through the center bore of the mill roll, is mounted. A multi row roller bearing is interposed between the axle and the roll and is provided at both ends with an annular disc shaped cover member which seals the bearing.

A great deal of difficulty arises during the assembly and disassembly of the roller bearing and during the change of individual rollers therein. This is a particularly difficult problem in universal mill roll supports of the type under discussion because of the very narrow dimensions and spacial relationships prevents and makes virtually impossible the use of any hoist or crane with which to lift the roll. As a result the assembler and/or repairman must exert considerable bodily effort and work in order to perform the necessary tasks. Over and above this the surface faces of the roll must be repeatedly remilled and the supporting sides of the bearing employed requires a repeated change of rollers.

A roll supporting frame is known in which means are provided so that the roll may be removed in a vertically upward direction. This means comprises a structure which is slidably movable during assembly or disassembly along guide rails and in which the driver of the mill roll is seated in an intermediate piece journaled in the frame. The intermediate piece removably carries the drum spindles.

It is an object of the present invention to provide a journal by which the mill roll may be horizontally or vertically installed or disassembled.

It is a further object of the present invention to provide a bearing for mill rolls wherein the bearing and mill roll form a unitary assembly which may be removed bodily from the box-like support in which it is housed.

It is a further object of the present invention to provide a bearing for mill roll support which while being removable from the box-like support is capable of being remilled directly in the bearing.

These objects, as well as other objects, are set forth in connection with the description of the preferred embodiment of the present invention and are not limiting of the advantages to be found in the present invention.

SUMMARY OF THE INVENTION

According to the present invention the objects thereof are accomplished by providing a roller bearing having a box-like supporting structure open on one side, in which the mill roll can be inserted. In the axial bore of the mill roll there is located an axle about which an annular plural rowed roller bearing is arranged. The axle is provided with a pair of annular ring shaped side covering members which enclose the bearing. Each of the ring shaped covering members is formed as a part of a unitary integral slide which in plan view is rectangular. The slide is adapted to fit into a similarly shaped rectangular opening formed in the box frame from its open side. Further, the slide is provided with a pair of lateral arms which fit over the open edges of the box and which may be removably fastened to the box support structure.

The mill roll forms with the roller bearing and the side bearing cover pieces form with the slide member a completely enclosed unitary assembly which can be easily removed from the box supporting structure by lifting the entire assembly in a direction counter to the direction of its load. Furthermore, when it is necessary to remill the external surfaces of the mill roll, the entire unitary assembly can be turned while still maintained directly in the roller frame. By this construction an excessive number of box supporting frames is not necessary. Furthermore, the present construction has the advantage in that only a very little amount of space is necessary in order to install or disassemble the arrangement and hoists or lifting tools may be used to lift the entire assembly. Still a further advantage arises from the fact that both axial and radial forces are more assuredly absorbed by the box-like structure when the bearing of the present invention is employed.

In a preferred form of the invention, at least one step like guide rail is arranged between the annular disc like cover and the slide. These guide rails make the task of sliding the bearing in and out of the box supporting structure much easier.

In a further preferred form of the present invention, the arms of the slide are provided with seats which cooperate with the edge of the box supporting structure to provide an interlocking engagement between the two.

For the sake of uniformity, it is preferred that both ends of the axle be provided with covers having slides which are similarly formed so that the members at each end of the assembly are the same. This reduces the number of parts necessary and makes the task of assembly much easier.

Full details of the present invention are shown in the accompanying drawings and are fully described in the following description.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a sectional view through a vertical mill roll and bearing having mill roll, which is removable in the direction of the enlarged arrow,

FIG. **2** is a plan view of the apparatus shown in FIG. **1**,

FIG. **3** is a sectional view similar to FIG. **1** wherein the fastening of the covers on the mill roll is shown,

FIG. **4** is an isometric view of the unitary slide and cover employed in the present invention.

DESCRIPTION OF INVENTION

In FIG. **1** a box-like supporting structure **1** is shown having one of its sides open. A vertical mill roll **2** is located within the box supporting structure and is journaled by means of a multi row roller bearing **3** about an axle **4** which is fixedly mounted in a manner to be seen. Preferably, the roller bearing **3** comprises four rows of tapered or conical roller elements set between an outer ring **5** and an inner ring **6**. The inner ring **6** is provided with guide rims **7** and a retaining rim **8**. The tapered roller elements generally bearing the reference numeral **9** are held within a cage **10** in conventional manner.

Compensating discs or shims **11** are arranged at each of the axial sides of the multi rowed roller bearing. A

ring-like or annular disc shaped cover **12** is pressed against each of the shims **11**. As seen in FIG. **2** the ring shaped cover is one piece with a slide **13** which in plan view is rectangularly shaped. Preferably the cover and slide unit is formed from a single casting or single piece of machine worked metal. The rectangular slide is slidable in a similarly shaped rectangular opening **14** formed in the side of the box supporting structure **1** opening from its upper edge. Extending in opposite directions from the upper edge of the slide **13** are arms **15** which are adapted to rest on the upper edge of the box-like supporting structure and which are by means of bolts **16** removably fastened to the box **1**. The slide **13** is also secured to the axle **4** by means of bolts **7** as seen more clearly in FIG. **3**.

The opposite end pieces **18** of the axle **14**, which are reduced in diameter are located in a circular opening **19** formed in the slide **13**. Between the slide **13** and the tapered portion of the axle **4** is a sealing ring **20** which serves to seal the multi rowed taper roller bearing **3**. An annular cover ring **21** is fastened to the mill roll **2** by means of bolts **22**. The lateral edge **23** of the annular ring **21** bears against the outer ring **5** of the bearing **3**. That portion of the annular disc bearing **12** facing the annular covering ring **21** is formed with a groove **24** in which a rectangular sealing member **25** is located. The sealing member **25** is similar to a piston seal ring and acts to seal the roller bearing **3** from the radially external side while permitting the mill roll **2** to rotate about the bearing. An inlet bore **26** extends from the exterior of the device into the chamber formed by the inner and outer rings of the bearing **3**. Through this inlet bore **26** conventional and suitable lubricant can be fed to the bearing.

It will be observed that the bearing **3** is symmetrically formed and that the both sides are the same. Further, the construction of the slide members and its integral covering ring **13** and **12**, respectively, are also the same at both of the lateral sides of the device.

By turning to FIG. **4** the cover **12** and the slide **13** will be clearly seen in isometric form. In this figure the holes **27** for the bolts **17** and the holes **28** for the bolts **16** will be observed. In addition, similar reference numerals are used to denote the elements previously described in connection with FIGS. **1** through **3**. Further, FIG. **4** shows clearly the guide rails **29** which are shown in cross section in FIG. **3** and in the dot-dash in FIG. **2**. These guide rails are set at the junction of the annular cover **12** and the slide **13** and fit within a correspondingly formed slot in the edges of the rectangular opening in the sides of the box supporting structure. These guide rails transmit the axial forces to the box support structure **1**. The slide **13** is formed with a flat edge **30** which when it is placed in position rests contiguously on the bottom edge **14***a* of the rectangular opening **14** in the box-like support. This edge **30** transmits the radial forces to the box-like structure. The arms **15** extending laterally from the slide **13** are formed with extending seats **31** which are adapted to seat within a correspondingly formed receiving seat on the upper edge of the box supporting structure **1** to form with it an interlocking engagement.

To disassemble the mill roll **2**, the bolts **16** are removed and the cover **12** with its integral slide **13**, the bearing **3** and the mill roll itself are removed in the horizontal direction shown by the enlarged arrow. In this manner the entire bearing assembly axle and mill roll can be removed bodily from the supporting structure. The entire assembly can then be placed on a work structure having similar supporting elements which supporting structure allows sufficient room for the operator to work and which will allow the mill roll to be turned and milled. Thus, it is no longer necessary to attempt to make repairs or changes in place and therefore the operator is no longer restricted by any of the narrow dimensional relationships existing in the mill roll itself. The use of a supporting structure away from the mill roll apparatus has a further advantage in that in such a supporting structure suitable measuring and testing apparatus may be freely employed to test the proper functioning of the mill roll. For example, an impact impulse testing apparatus may be used. Further, correction or repair can be more easily made at this remote position.

After remilling the mill roll the entire bearing unit, axle and mill roll itself are reinstalled within the box-like supporting structure against the direction of the arrow, making sure that the slide **13** and its guide rails **29** fit properly in the appropriate guide slots within the opening **14** in the sides of the supporting box-like frame **1**.

While FIGS. **1** through **4** show the adaption of the present invention for handling vertical mill rolls, it will be obvious to those skilled in this art that the same apparatus and the same principles can be employed for journalling horizontal mill rolls.

By turning the apparatus shown in FIG. **1** clockwise about a 90° angle and the apparatus as shown in FIG. **4** counterclockwise in a 90° angle, such a horizontal mill roll bearing will be apparent. FIG. **2** will then become a side elevation view while FIG. **3** becomes a horizontal cross section through the bearing shown in FIG. **1**. Because of the symmetry of the apparatus and because the axial and radial forces are absorbed completely in either direction this disposition from vertical to horizontal can be made without any modification or changes required. The mill roll, its axle and multi rowed bearing assembly constitute a single unit which can be fastened to the box-like supporting structure in both vertical and horizontal positions.

A further advantage arises out of the present construction wherein the covers **12** fit axially over the end portions of the central axle **4**. The covers **12** bear axially against each edge of the bearings **3** and thus by use of annular shims **11** of uniform thickness the central location of the bearing **3** and mill roll **2** can be insured with respect to the hollowed out opening of the box-like supporting structure. Furthermore, this construction insures that the bearing **3** itself is centered within the bore of the mill roll **2** and lies symmetrically with respect to the central plane of the mill roll.

From the foregoing, it will be obvious that the objects and advantages enumerated heretofore have been easily obtained by providing means by which the mill roll and its supporting axle can be unitarily assembled and provided with its multi rowed bearing. This enables the mill roll to be lifted and transported as a unit directly from its box-like support and may be handled by conventional hoist and crane equipment which can manipulate and grasp the end slide members. The step-like guide rail insures proper seating of the assembly in the box-like structure.

Various modifications and changes have been suggested herein, other variations will be obvious to those

skilled in the present art. It is intended therefore that the present disclosure be illustrative only and not limiting the scope of the present invention.

What is claimed:

1. A journal for universal mill rolls and the like comprising a mill roll located in a supporting structure having opposed side walls, said mill roll being provided with a roller bearing and axle located within its bore and supported on the side walls, ring shaped cover members sealing each of the axial ends of said roller bearing, said ring shaped covers being formed integrally with a slide member having a rectangular shape when viewed in plan, said slide member being insertable within a rectangular opening in the side wall of said supporting structure and having a pair of extending arms engaging the edge of said side wall and means for removably connecting said arms to said side wall.

2. The journal according to claim 1, said supporting structure being box-like and having one of its sides open.

3. The journal according to claim 1 wherein the roller bearing comprises a plurality of annular rows of tapered roller bearing elements.

4. The journal of claim 1 including at least one step shaped guide rail arranged between the juncture of the slide and the ring cover seal.

5. The journal according to claim 1 wherein each of the arms of the slide member are provided with seats cooperating with engaging means on the edge of the supporting wall.

6. The journal according to claim 1 wherein the ring cover seal on each end of the bearing is similarly formed with a slide member adapted to fit within a rectangular groove in the supporting walls.

7. The journal according to claim 4 wherein the opening in the supporting wall is formed with a slot cooperating to receive the guide rail.

8. The journal according to claim 1 including spacer means interposed between each of the ring cover seals to center said roller bearing within the mill roll.

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