United States Patent [19]

Rawson

[11] **3,708,844**

[45] **Jan. 9, 1973**

[54] REPLACEABLE ROLL ASSEMBLY

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[52] **U.S. Cl.**.....**29/123,** 193/35

[51] **Int. Cl.** **B65g 13/00,** B21b 31/08, B60b 7/04

[58] **Field of Search**.....29/119, 123, 124, 125, 129, 29/130; 198/127; 193/35

[56] **References Cited**

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Primary Examiner—Richard E. Aegerter

Attorney—Wells, St. John & Roberts

[57] **ABSTRACT**

A roll assembly for heavy conveyor use, such as in the feed assembly for a wood planer. The cylindrical shell or roll is replaceable on a mounting shaft assembly and can be reversed between adjacent roll assemblies to increase its useful life. The shell is rigidly supported by complementary hubs permanently mounted to a central shaft so as to be capable of withstanding heavy loading forces in use.

2 Claims, 12 Drawing Figures

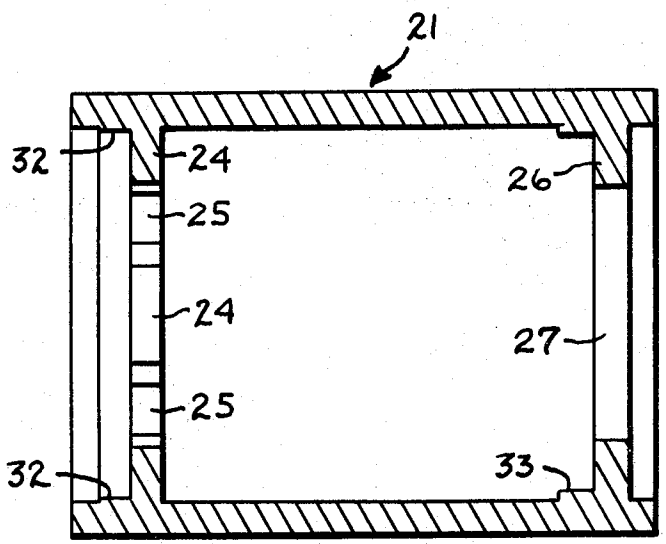


FIG. 1

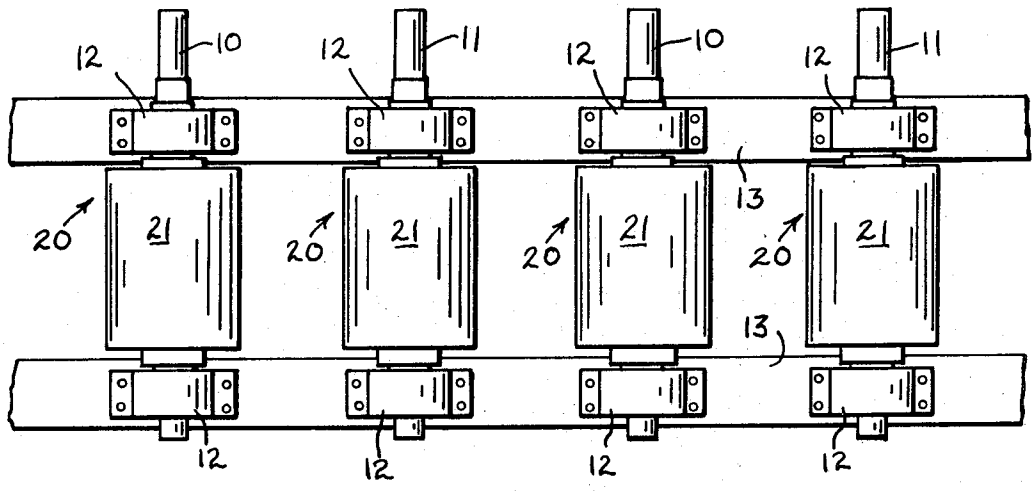


FIG. 2

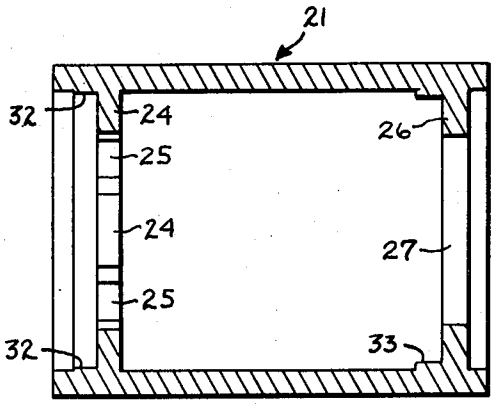


FIG. 3

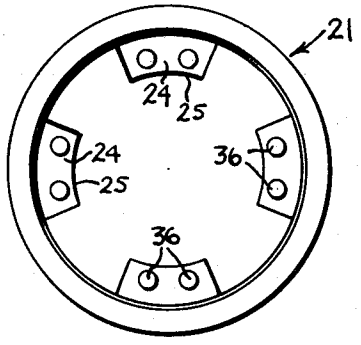


FIG. 4

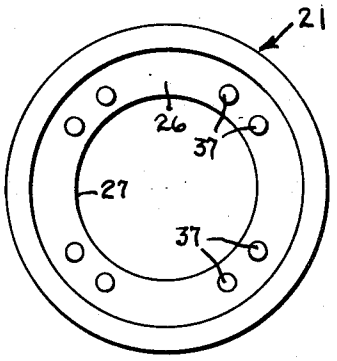


FIG. 5

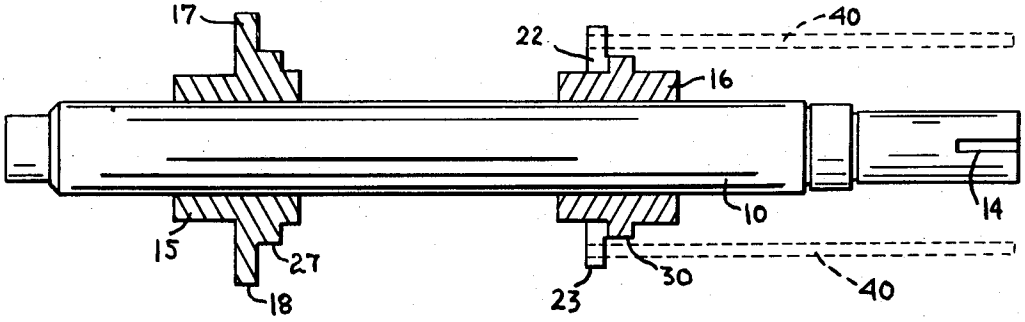


FIG. 6

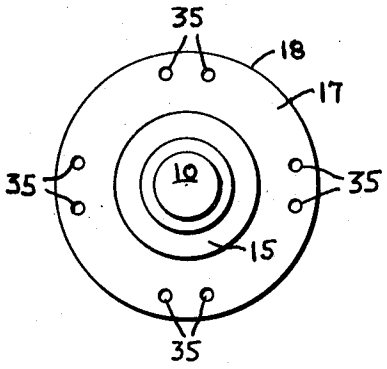


FIG. 7

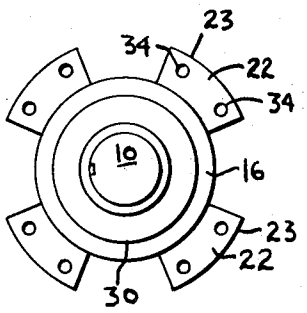


FIG. 8

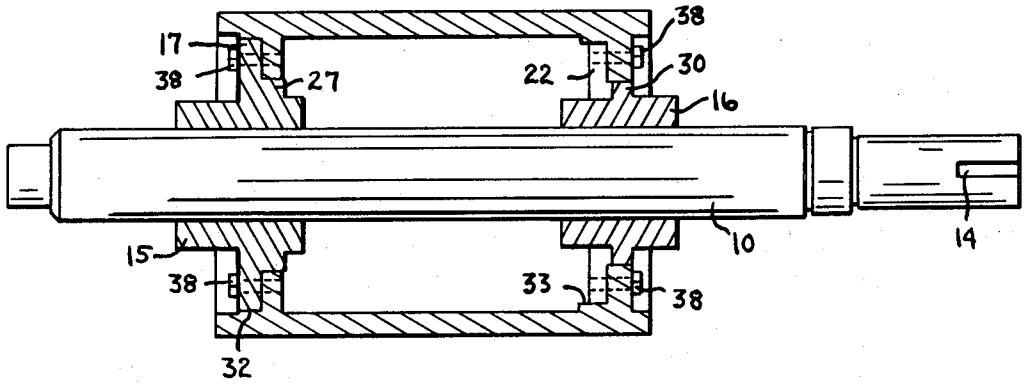


FIG. 9

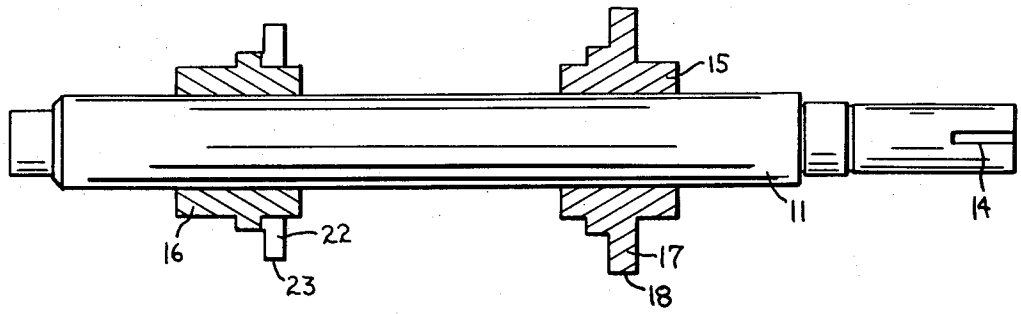


FIG. 10

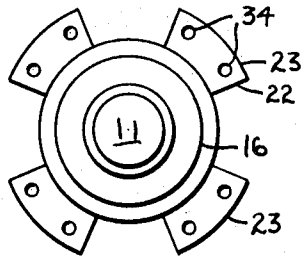


FIG. 11

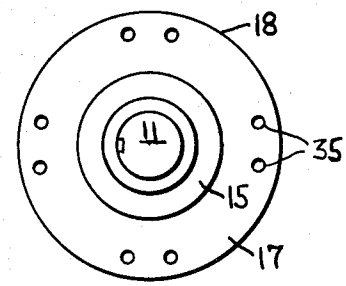
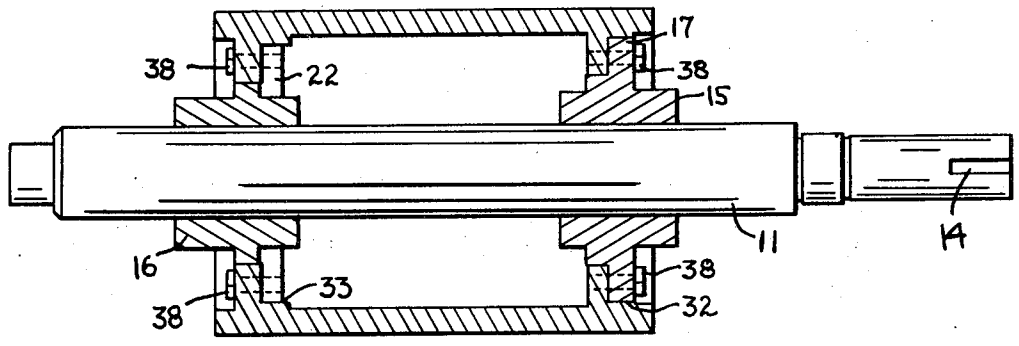


FIG. 12



REPLACEABLE ROLL ASSEMBLY

BACKGROUND OF THE INVENTION

This invention relates to the structural design of heavy conveyor rolls, such as are used in wood planers as feed rolls. In such installations, the rolls are subjected to heavy loading forces and the outer surfaces of the rolls wear toward one end, where the bulk of the incoming lumber engages the roll assembly. It is therefore desirable that the roll be replaceable and reversible, but this poses considerable problems with respect to the structural strength requirements of such an assembly.

According to the present invention, the shell of the roll assembly is removable at one end of each shaft assembly and can be mounted in reverse positions on alternate shafts. When placed on a shaft assembly, the shell is rigidly supported by peripheral bearing surfaces machined so as to eliminate any rotational or axial movement of the shell relative to the shaft assembly. No cam surfaces or conical surfaces which might loosen during usage of the roll are included in the apparatus. The shell completely covers the mounting elements of the shaft assembly to thereby protect them from damage. An example of an early patent relating to this type of feed roll is shown in U.S. Pat. No. 342,228, patented May 18, 1886. Another feed roll for wood planers is shown in U.S. Pat. No. 2,604,128, granted July 22, 1952.

SUMMARY OF THE INVENTION

The disclosed invention relates to a replaceable roll in combination with a shaft assembly. The shaft, which includes a central longitudinal axis, has a first annular shoulder that projects outwardly adjacent one shaft end and presents a continuous cylindrical outer surface, and a second annular shoulder projecting from the shaft adjacent its remaining end, presenting a discontinuous segmented cylindrical surface. The covering cylindrical shell that is fitted over these shoulders has a discontinuous segmented inwardly projecting shoulder at one end complementary to the second shaft shoulder and a continuous inwardly projecting shoulder at the remaining end adapted to overlap the second shoulder in an abutting position. Aligned apertures are provided in the shoulders of the shaft and shell for axially securing the shell in position with the shoulders mating one another to prevent any movement between the shell and shaft assembly.

It is a first object of this invention to provide a relatively simple roll assembly wherein the shell of the roll can be replaced without modification of the mounting elements on the shaft.

Another object of this invention is to provide such an assembly which can be readily realigned on alternate shafts to permit reversal of the shells and thereby prolong their useful life in a planer feed arrangement.

Another object of this invention is to provide a replaceable shell for a planer feed roll where the shell completely covers all of the mounting elements on the shaft assembly to which it is secured.

These and further objects will be evident from the following disclosure, taken also with the accompanying drawings, which illustrate a preferred form of the invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a typical conveyor utilizing the present roll assembly;

FIG. 2 is a longitudinal sectional view through a single shell;

FIG. 3 is an end view of the shell as seen from the left in FIG. 2;

FIG. 4 is an end view of the shell as seen from the right in FIG. 2;

FIG. 5 is a longitudinal sectional view through a first shaft assembly;

FIG. 6 is an end view taken from the left in FIG. 5;

FIG. 7 is an end view taken from the right in FIG. 5;

FIG. 8 is a longitudinal sectional view showing a shell mounted to the shaft assembly of FIG. 5;

FIG. 9 is a longitudinal sectional view through a second shaft assembly;

FIG. 10 is an end view taken from the left in FIG. 9;

FIG. 11 is an end view taken from the right in FIG. 9; and

FIG. 12 is a longitudinal sectional view showing a shell mounted to the shaft assembly of FIG. 9.

DESCRIPTION OF THE PREFERRED EMBODIMENT

This disclosure relates to conveyor rollers, specifically to rolls such as are used in wood planers for feeding lumber to the planer knives. Such rolls must be positively driven and capable of withstanding considerable force. Because lumber is fed to a planer against one guiding edge, considerably greater wear occurs at one end of each roll than at the other. It is therefore desirable that the rolls be reversible to increase their useful life. This is accomplished according to the present invention by reversing the position of the roll shells on adjacent roll assemblies.

A typical row of rollers is generally illustrated in FIG. 1. Each roll assembly **20** includes a mounting shaft **10** or **11** and an outer cylindrical shell **21** fixed thereto. As will be described below, shafts **10** and **11**, while identical, carry positioning hubs in alternate locations. Shafts **10**, **11** are rotatably supported by conventional bearings **12** mounted to supporting frame members **13**. One end of each shaft **10**, **11** is provided with a conventional keyway **14**, adapted to be drivingly connected to a sprocket or other drive mechanism to power the roll assemblies **20**.

The details of the elements permanently fixed to shaft **10** and **11** are illustrated in FIGS. **5–7** and **9–11** respectively. As noted above, the shafts **10**, **11** are identical. The hubs **15**, **16** fixed to them are also identical, but are located at opposite ends of the respective shafts.

Hub **15**, which is permanently pressed to shaft **10** or **11**, includes an outwardly projecting continuous cylindrical shoulder **17**, denoted herein as being a first shoulder on each shaft **10**, **11**. The outer periphery of shoulder **17** presents a continuous cylindrical surface **18** concentric about the central longitudinal axis of shaft **10** or **11**. As shown in FIG. **6** and **11**, the shoulder **17** is apertured at **35**, the pattern of apertures **35** being located in pairs positioned 90° apart about the circumference of the shoulder **17**.

Hub 16, which also is pressed to each shaft 10 and 11, includes an outwardly projecting discontinuous cylindrical shoulder 22, which is designated as the second shoulder on each shaft 10, 11. It is illustrated as being in four arcuate sections, each encompassing approximately 45° and being spaced from one another by 45°. Their outer surfaces present a discontinuous cylindrical surface designated at 23. Tapped apertures 34 are formed through the shoulders 22 in angular positions about the central axis of shafts 10, 11 intermediate the location of the previously described apertures 35.

Shell 21, which completely covers the mounting portions of hubs 15, 16, is illustrated in detail in FIGS. 2–4. It includes an uninterrupted cylindrical outer surface which is the operative roll surface that engages lumber or other elements conveyed thereon. The respective ends of shell 21 are formed to compliment the hub 15, 16. Thus, the end of shell 21 shown to the left in FIG. 2 includes a discontinuous shoulder 24 that projects inwardly and presents a segmented cylindrical surface 25. The segments of shoulder 24 span an arcuate width of 45° and are separated by an angle of 45°. Shoulder 24 is provided with tapped apertures 36 angularly aligned with the previously described apertures 35 in shoulders 17.

The remaining end of shell 21 includes a continuous inwardly projecting shoulder 26 presenting a continuous cylindrical surface 27. The inward projection of shoulder 26 is such as to overlap the previously described shoulders 22 on hubs 16. Each shoulder 26 is apertured at 37 in a pattern that matches the pattern of the tapped apertures 34 on shoulders 22.

The complementing radial and cylindrical surfaces of shoulders 17, 22, 24 and 26 are preferably machined so as to provide a metal to metal fit, whereby movement of shell 21 on either shaft 10 or 11 is eliminated. Additional bearing surface is provided by smaller shoulders on hubs 15, 16, each located to a common side of the previously described shoulders 17, 22. These include a cylindrical third shoulder 27 on hub 15, which presents a cylindrical outer surface 28 and a similar fourth shoulder 30 on each hub 16, which presents a cylindrical outer surface 31. The radius of surface 28 relative to the shaft axis is substantially identical to the radius of the shell cylindrical surface 25. Likewise, the radius of shoulder 30 is substantially identical to that of the shell surface at 27.

In addition, the shell 21 includes an inner cylindrical surface 32 adjacent to the previously described shoulder 24. The radius of the cylindrical surface 32 is substantially identical to that of the cylindrical surface 18 on each hub 15. The remaining end of shell 21 includes an additional inner cylindrical surface 33, adjacent to the shoulder 26. The radius of surface 33 is substantially identical to the radius of surfaces 23 on hub 16.

The shell 21 can be placed on each shaft 10 or 11 in the manner shown in FIGS. 8 and 12. In these two figures, shell 21 is reversed end for end, as would occur when a shell 21 as shown in FIG. 1 is moved from one shaft 10 to an adjacent shaft 11. To position shell 21 on either shaft, it is first located coaxially with the shaft, the one end of shell 21 including the discontinuous shoulder 24 leading toward the end of the shaft that includes hub 16. The angular position of shell 21 must be such as to locate the segments of shoulder 24 between the segments of the shoulder 22. This can be readily accomplished by the use of guide shafts 40, which are simply cylindrical elongated rods threaded at one end so as to engage the apertures 34 in the hub 16. Shafts 40 can then be slidably received within the apertures 37 of shoulder 26 on the shell 21, to prevent angular movement of the shell during placement along shaft 10 or 11 and to assist in accurate location of the shell for a close machined fit on the hub 15, 16. The guide shafts 40 are illustrated generally by dashed lines in FIG. 5.

After the shoulder 24 of shell 21 passes beyond the hub 16, it continues along the shaft and mates over and against the shoulders of hub 15. Because of the location of hubs 15, 16, the shoulders 26, 33 at the remaining end of shell 21 will simultaneously engage with the respective shoulders 16. Thus, the shell 21 will be securely fitted to the hubs 15, 16 with mating cylindrical and radial surfaces to prevent any movement between these elements. The shell 21 is then secured to hubs 15, 16 by threaded bolts 38 received within the apertures 37 and 35 and threadably engaged within the respective apertures 34 and 36 (FIGS. 8, 12).

To remove shell 21, the bolts 38 are disengaged and guide shafts 40 are again used to assist in proper axial movement of the tight-fitting shell 21 without damage to the surfaces. After removal of a shell 21 from a shaft 10 (FIG. 8), it can be reversed and similarly placed on an adjacent shaft 11 to assume the working position illustrated in FIG. 12.

To assist in permitting placement or removal of shell 21, the radius of surfaces 25 and 31 are preferably slightly less than the radius of surfaces 27 and 28. Similarly, the radius of surfaces 32 and 18 are preferably slightly greater than the corresponding radius of surfaces 33 and 23.

The above construction provides substantial bearing support for the removable shell 21 and the mounting arrangement will not work loose or be projected to any forces that would tend to loosen the support of shell 21 during actual use. It has been found to be far superior to conventional mounting arrangements using tapered or conical surfaces, which loosen with wear. In this particular instance, all bearing surfaces are either radial or cylindrical, and there is no opportunity for the surfaces to work against one another and change dimension.

Minor modifications might be made with respect to the specific details of this disclosure without deviating from the basic concept discussed therein. Therefore, only the following claims are intended as definitions of the invention.

Having thus described my invention, I claim:

1. A replaceable roll and shaft assembly comprising:
   - a shaft having a central longitudinal axis;
   - a first annular shoulder projecting outwardly from the shaft adjacent one shaft end and presenting a continuous cylindrical surface;
   - a second annular shoulder projecting outwardly from the shaft adjacent the remaining shaft end and presenting a discontinuous segmented cylindrical surface;
   - a covering cylindrical shell fitted over said shoulders, having a discontinuous segmented inwardly projecting shoulder at one end complimentary to the

second annular shoulder and a continuous inwardly projecting shoulder at the remaining end thereof having an inner radius less than that of the cylindrical surface of said second annular shoulder;

means for selectively securing the shoulder at said one end of said shell to said first annular shoulder and for selectively securing the shoulder at said remaining end of said shell to said second annular shoulder;

and third and fourth annular shoulders located on said shaft adjacent to the first and second annular shoulders respectively and at corresponding sides thereof;

the radius of said third annular shoulder being substantially equal to that of the shoulder at the remaining end of said shell and the radius of said fourth annular shoulder being substantially equal to that of the shoulder at said one end of said shell.

2. A replaceable roll and shaft assembly comprising:

a shaft having a central longitudinal axis;

a first annular shoulder projecting outwardly from the shaft adjacent one shaft end and presenting a continuous cylindrical surface;

a second annular shoulder projecting outwardly from the shaft adjacent the remaining shaft end and presenting a discontinuous segmented cylindrical surface;

a covering cylindrical shell fitted over said shoulders, having a discontinuous segmented inwardly projecting shoulder at one end complimentary to the second annular shoulder and a continuous inwardly projecting shoulder at the remaining end thereof having an inner radius less than that of the cylindrical surface of said second annular shoulder;

means for selectively securing the shoulder at said one end of said shell to said first annular shoulder and for selectively securing the shoulder at said remaining end of said shell to said second annular shoulder;

additional inner cylindrical surfaces adjacent each end of said shell at corresponding sides of the shell shoulders, the additional inner cylindrical surface at said one end of said shell having a radius substantially equal to that of said first annular shoulder on said shaft and the additional inner cylindrical surface at said remaining end of said shell having a radius substantially equal to that of said second annular shoulder on said shaft.

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