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<td><strong>Related Art</strong></td>
<td>FR 2688768 A1 (BRUNONE) 24 September 1993</td>
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<td><strong>Abstract, figures</strong></td>
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Abstract

A roller support device 10 is arranged to support rollers 11 which bear a conveyor belt 12. The rollers 11 contact the conveyor belt 12 at a nip point 13. The roller support device 10 has a number of support members 20 for supporting the load placed on the rollers 11, the conveyor belt 12, and the material carried on the belt. The support members 20 restrict access to the nip point 13 and thereby minimises the draw-in safety hazard associated with the nip point 13.
Applicant:

GHD PTY LTD

Invention Title:

ROLLER SUPPORT DEVICE

The following statement is a full description of this invention, including the best method of performing it known to me/us:
FIELD OF THE INVENTION

The present invention relates to a roller support device for supporting the rollers of a conveyor belt.

BACKGROUND OF THE INVENTION

A draw-in safety hazard exists on conveyor belts at the nip point between the conveyor belt and the rollers. Serious injuries and fatalities have occurred as a result of this hazard.

Attempts have been made to minimise this hazard by attaching plates to the structure in front of the rollers or enclosing the rollers in a box or the like. However, conveyors may run for many kilometres and thus have thousands of rollers. Therefore, attaching plates or boxes to thousands of rollers is costly and inefficient. Furthermore, in order to provide maintenance to the rollers, the plates or boxes have to be removed and reapplied, thus making them also impractical as conveyor rollers require regular and quick access to replace the rollers.

SUMMARY OF THE INVENTION

In a first aspect of the present invention there is provided a roller support device for supporting at least one roller of a conveyor belt, the roller support device comprising a roller support member arranged to substantially bear the load placed on the roller and restrict access to a nip point between the roller and the conveyor belt.

Advantageously, the present invention enables the roller support device to achieve the dual functions of supporting the roller and restricting access to the nip point.

The roller support member is typically positioned towards the belt entry side of the roller. The belt entry side of the roller is the side of the roller which the belt approaches.
Preferably, positioning of the roller support member towards the belt entry side of the roller substantially restricts access to the nip point. The nip point is located where the roller contacts the belt.

The roller support device may support more than one roller. Preferably, the roller support device comprises a support member for each roller; the support members arranged to substantially bear the load placed on their respective rollers. Alternatively, the roller support device may comprise a single support member arranged to substantially bear the load placed on all the rollers.

Preferably, the support member is torsionally rigid.

Preferably, the support member is a hollow tube. Preferably, the support member provides a safety distance between the nip point and the furthest edge of the support member away from the roller. The safety distance should be sufficiently wide so that if an object such as a person’s finger, hand or tool handle should pass through the gap between the underside of the belt and the top of the support member, it is extremely difficult for the object to reach the nip point.

Preferably, the safety distance is greater than approximately 120 mm.

Preferably, the top of the support member is located sufficiently close to the underside of the belt to reduce the possibility of access to the nip point. More preferably, the top of the support member is spaced less than approximately 20 mm from the underside of the belt.

Preferably, the top of the support member is spaced approximately 16 mm from the underside of the belt. Preferably, the side of the support member closest to the roller is located relative to the roller so as to reduce the possibility of access to the nip point.

Preferably, the side of the support member closest to the roller is spaced approximately 16 mm away
from the roller.

Preferably, the support member also comprises two arms which extend from either end of the support member to either end of the roller.

5 Preferably, the arms each have slots.

Preferably, the roller shaft, in use, is cradled in the slots of the arms.

Preferably, the roller support device further comprises end plates connected to the arms on either end of the roller support device to restrict access to the nip point from above the nip point.

Preferably, the roller support device also comprises end brackets on either end of the roller support device.

10 Preferably, the end brackets enable the roller support device to be connected to a conveyor frame.

The arms on either end of the roller support device may be integrally formed with the end brackets. Alternatively, the arms on either end of the roller support device may be bolted, or otherwise secured, to the end brackets.

Preferably, the roller support device also comprises a V-shaped bracket for connecting the support members for adjacent rollers to each other.

20 Preferably, the V-shaped bracket comprises adjacent arms which are integrally connected to form the V-shaped bracket.

The roller support device may be arranged to support carry rollers and/or return rollers of the conveyor belt.

According to a second aspect of the present invention, there is provided a conveyor comprising a plurality of roller support devices according to the first aspect of the present invention.

According to a third aspect of the present invention, there is provided a conveyor comprising a plurality of roller support devices, wherein at least one
of the roller support devices is a retro-fitted roller support device according to the first aspect of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a front view of a roller support device for a carry roller of a conveyor belt according to a preferred embodiment of the present invention;

Figure 2 is a cross-sectional view along line X-X of the roller support device of Figure 1;

Figure 3 is an end elevation view of the roller support device of Figure 1;

Figure 4 is a front view of a roller support device for a return roller of a conveyor belt according to a preferred embodiment of the present invention;

Figure 5 is a cross-sectional view along line Y-Y of the roller support device of Figure 4; and

Figure 6 is an end elevation view of the roller support device of Figure 4.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

In a preferred embodiment of the present invention, a roller support device 10 supports a number of rollers 11 which bear a conveyor belt 12. The rollers 11 contact the belt 12 at a nip point 13. Figures 1 to 3 show the roller support device 10 arranged to support carry rollers 11a, 11b and 11c.

The support structure 10 comprises a number of support members 20a, 20b and 20c for supporting the load placed on respective rollers 11a, 11b and 11c by the belt 12 and material carried by the belt. Each support member 20 is torsionally rigid and supports its respective roller 11 from the belt entry side of the roller 11 rather than from below the roller 11 which is conventional in prior
The arrangement of the present invention enables the support member 20 to achieve the dual functions of supporting its respective roller 11 and restricting access to the nip point 13. Furthermore, a result of this arrangement of the support member 20, is that the roller support device 10 is manufactured from the same amount of material and hence is approximately the same weight as conventional roller support devices. A preferred embodiment of the support member 20 is shown in Figure 2 as a hollow tube.

The side 25 of each support member 20 closest to its respective roller 11 is spaced a distance A away from the roller 11 to reduce the possibility of any contact between the roller 11 and the support member 20. Distance A is approximately 16mm and would typically be a maximum of 20 mm.

Because the support members 20 are located towards the belt entry side of the rollers 11, they also act to guard against entry to the nip point 13 between the rollers 11 and the belt 12. To minimise this risk whilst reducing the possibility of contact between the belt 12 and the support members 20, the top 26 of the support members 20 are slightly spaced apart from the underside of the belt 12 by distance B. Distance B is approximately 16mm and would typically be a maximum of 20 mm. The support members 20 are also of sufficient width so that they provide a safety distance C between the nip point 13 and the furthest edge 27 of the support member 20 away from its respective roller 11 (ie. the closest point of access to the nip point 13 from the belt entry side of the roller 11). The safety distance C should be sufficiently wide so that if an object such as a person’s finger, hand or tool handle (not shown) should pass through the gap defined by distance B between the underside of the belt 12 and the top 26 of the support member 20, that it is extremely difficult for the object to reach the nip point 13. Distance C is typically 120 mm to 150 mm.
The support members 20 also comprise arms 21 which extend from either end of each support member 20 to either end of its respective roller 11. The arms 21 have slots 22 in which the roller shaft 23, in use, is cradled. The roller support device 10 also comprises end plates 24 connected to the arms 21 on either end of the roller support device 10 to restrict access to the nip point 13 from above the nip point 13.

Referring in particular to Figure 1 the roller support device 10 also comprises end brackets 30 on either end of the roller support device 10 which enable the roller support device 10 to be connected to a conveyor frame. The arms 21 on either end of the roller support device 10 may be integrally formed with the end brackets 30 or alternatively may be bolted to the end brackets 30. In the case of the carry roller structure 10 shown in Figure 1, the end brackets 30 are bolted to upper conveyor frame members 15. The upper conveyor frame members 15 are arranged substantially parallel to the conveyor belt 12.

The roller support device 10 also comprises V-shaped brackets 31 for connecting the support members (such as member 20a, 20b) for adjacent rollers (such as roller 11a, 11b) to each other. The V-shaped brackets 31 comprise adjacent arms (such as arms 21a, 21b) which are integrally connected to form the V-bracket 31.

The roller support device 10 may also comprise strengthening bars 17 connected at one end to one of the end brackets 30 and at the other end to one of the support members 20a, 20b, 20c to provide additional strength to the roller support device 10.

Figures 4 to 6 show an alternative embodiment of the present invention in which a roller support device 110 is arranged to support return rollers 111a and 111b. Similar features of the roller support device 110 to the roller support device 10 in Figures 1 to 3 have been designated with the same numbers but are prefixed with the numeral 1.
The roller support device 110 comprises a number of support members 120a, 120b for supporting the load placed on respective rollers 111a, 111b by the belt 112. Each support member 120 supports its respective roller 111 not from below the roller 111 but from the belt entry side of the roller 111. Thus, the support members 120 also act to guard against entry to the nip point 113 between the rollers 111 and the belt 112.

Referring in particular to Figure 4, the roller support device 110 also comprises end brackets 130 on either end of the roller support device 110 which enable the roller support device 110 to be connected to the conveyor frame. In the case of the return roller structure 110 shown in Figure 4, the end brackets 130 are bolted to lower conveyor frame members 16. The lower conveyor frame members 16 are arranged substantially parallel to the conveyor belt 112.

In a typical conveyor (not shown), a plurality of the carry roller support devices 10 are connected to the upper conveyor frame members 15 and a plurality of the return roller support devices 110 are connected to the lower conveyor frame members 16. The upper and lower conveyor frame members 15, 16 are generally connected to each other so that the plurality of carry roller support devices 10 are arranged above the plurality of return roller support devices 110.

The support structures 10, 110 of the present invention can be retro-fitted to conveyors with conventional support structures because the location of the bolts which connect the support structures 10, 110 to the conveyor frame members 15, 16 are the same as for conventional support structures.

In the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word “comprise” or variations such as “comprises” or “comprising” is used in an inclusive sense, i.e. to specify the presence of the
stated features but not to preclude the presence or addition of further features in various embodiments of the invention.
CLAIMS:

1. A roller support device for supporting at least one roller of a conveyor belt, the roller support device comprising a roller support member arranged to substantially bear the load placed on the roller and to restrict access to a nip point between the roller and the conveyor belt.

2. A roller support device as claimed in claim 1 wherein the roller support member is positioned towards the belt entry side of the roller.

3. A roller support device as claimed in claim 1 or claim 2 wherein the support member is torsionally rigid.

4. A roller support device as claimed in any one of the preceding claims wherein the support member is a hollow tube.

5. A roller support device as claimed in any one of the preceding claims wherein the distance between the furthest edge of the support member away from the roller and the nip point is a distance of greater than about 120mm.

6. A roller support device as claimed in any one of the preceding claims wherein the top of the support member is spaced less than about 20mm from the underside of the belt.

7. A roller support device as claimed in any one of the preceding claims wherein the side of the support member closest to the roller is spaced less than about 20mm away from the roller.

8. A roller support device as claimed in any one of the preceding claims wherein the support member further comprises a slotted arm extending from each end of the support member, the slots in the arms being arranged, in use, to cradle the shaft of the roller.

9. A roller support device as claimed in any one of the preceding claims further comprising end brackets on each end of the roller support device whereby
the roller support device can be connected to a frame of the conveyor.

10. A roller support device for supporting at least one roller of a conveyor belt, the roller support device being substantially as herein described with reference to the accompanying drawings.

11. A conveyor having a plurality of roller support devices as claimed in any one of the preceding claims.

12. A conveyor having at least one roller support device as claimed in any one of claims 1-10, said roller support device having been retrofitted to the conveyor.

Dated this 19th day of August 2005

GHD Pty Ltd
By its Patent Attorneys

GRIFFITH HACK