

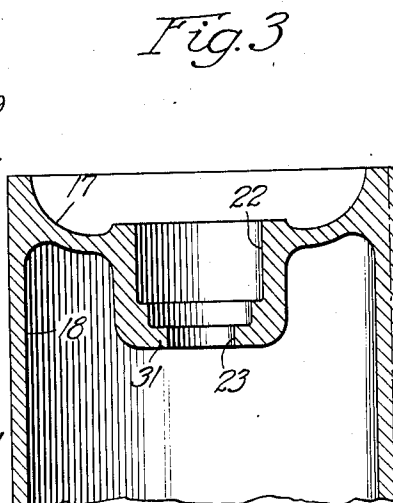
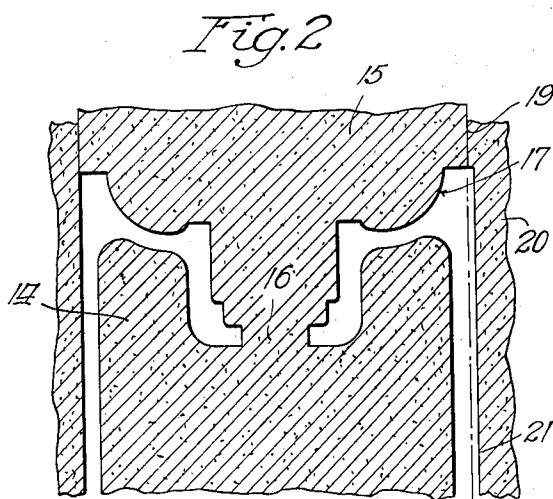
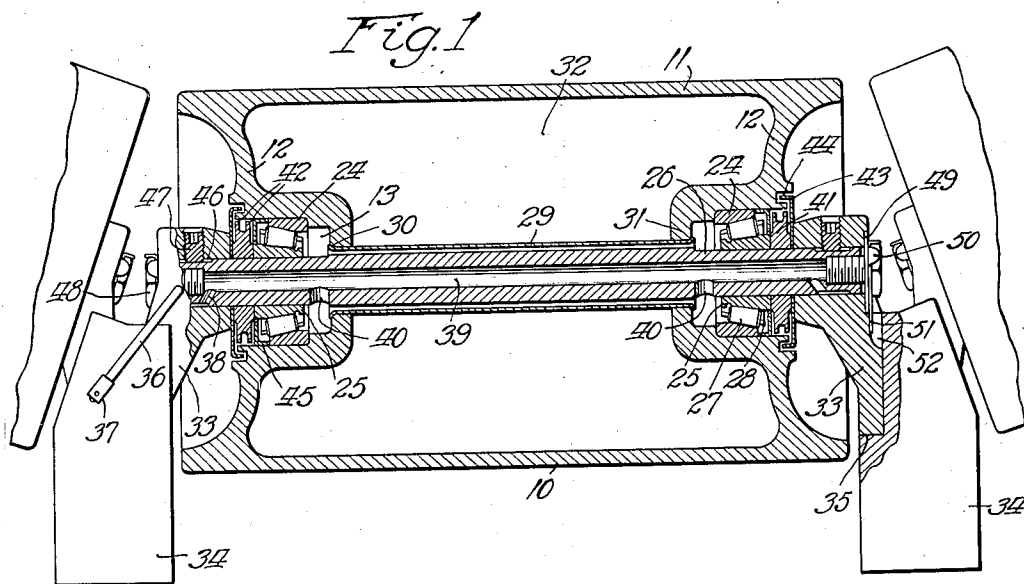
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G. N. VAN DERHOEF

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ROLL

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Inventor
George N. Van Derhoef.

Emery, Booth, Janney & Varney
Attys.

UNITED STATES PATENT OFFICE

GEORGE N. VAN DERHOEF, OF MISHAWAKA, INDIANA, ASSIGNOR TO DODGE MANUFACTURING CORPORATION, OF MISHAWAKA, INDIANA, A CORPORATION OF DELAWARE

ROLL

Application filed June 22, 1927. Serial No. 200,566.

This invention relates to rolls, such as conveyor rolls, and to their manufacture; and among other objects aims to provide an improved roll of this character which is at the same time economical to manufacture.

The invention may be readily understood by reference to one illustrative embodiment thereof illustrated in the accompanying drawing.

In said drawing:

Fig. 1 is an axial sectional elevation of a belt conveyor roll and a portion of its supporting structure. Parts of adjacent rolls of the same unit are shown,—in this case these adjacent rolls have their axes inclined to support the conveyor belt in trough form.

Fig. 2 is a diagrammatic section of a portion of a mold and core employed in the illustrative method of making the roll, and

Fig. 3 is an axial section of a portion of the roll formed in the mold illustrated in Fig. 2.

Both Figs. 2 and 3 have been somewhat exaggerated to illustrate the effect of the failure to center the core exactly in the mold, thereby producing a non-uniform casting.

The illustrative roll 10 is advantageously made of a good quality of cast iron and comprises a hollow cylindrical body which provides the rim 11 of the roll and bearing webs 12 adjacent each end, which in this case are imperforate except for the central bearing openings or recesses 13 hereinafter more fully described.

In casting the roll the interior is cored out by a core 14, in this case cylindrical in shape and having an extended portion 15 connected with the main body of the core by the portion 16 which cores out the bearing recesses 13. In forming the core the portion 15 (in this case one such portion is provided at each end of the main body of the core) is made exactly co-axial with the axis of the main body of the core 14 to provide a surface 17 on the casting (in this case at each end of the roll) which is co-axial with the axis of the core 14 and, therefore, with the axis of the cylindrical interior surface 18 of the casting. The core may be made in two parts (divided axially of the core) to simplify the

making of the core. The assembled halves of the core are supported by the end portions 15 in appropriate core prints 19 in the mold 20.

If the core be improperly positioned in the mold or if it be displaced during the formation of the casting so that its longitudinal axis does not exactly coincide with the axis of the cylindrical surface 21 of the mold, the rim of the casting will be of non-uniform thickness (this is illustrated in exaggerated form by the dot and dash line in Figs. 2 and 3); but the surface or surfaces 17 of the casting will always be co-axial with the interior cylindrical surface 18 regardless of the position of the core in the mold. In most casting processes, the above described non-uniformity of casting results, either because of misplacement or of displacement of the core relative to the mold. The degree of non-uniformity of rim thickness obviously will vary considerably.

In the present case after the casting has been removed from the mold and the interior of the casting is cleaned, the casting is mounted in a finishing machine (such as a boring mill or lathe) by engagement of the machine with the concave surface or surfaces 17 so that the operating axis of the machine will be co-axial with the concave surface 17 (and therefore co-axial with the axis of the cylindrical interior surface 18) of the roll. By this means of centering the roll, the bearing recesses 13 and the outer surface of the rim may be finished by any process such as boring, turning or grinding until the outer surface of the roll is fully concentric with the operating axis of the machine.

For example, the bearing recesses 13 at the ends of the roll may be bored out and reamed to exact size and accurately centered with reference to the axis of the cylindrical inner surface 18. In this case such operation includes the finishing and centering of the surfaces 22 and 23 of the bearing recesses. By this process of finishing, the exact longitudinal alinement of the opposite bearing recesses may be insured.

While the roll is thus centered or by centering it by the use of the accurately centered

bearing recesses, the outer surface of the roll is finished by grinding, for example, until such surface is fully concentric with the axis of the surface 18. This operation obviously removes the unevenly distributed metal illustrated in Fig. 3. The grinding or finishing may be continued if desired to remove any surplus thickness of the rim to reduce weight of the roll to a point which is consistent with adequate strength.

By means of this process it is possible to make a roll of minimum rim thickness without running the risk of developing any regions which are of less than minimum thickness; and the tolerance usually allowed for defects and inaccurate casting may be considerably reduced.

By the above illustrated process all parts of the roll are finished so as to be co-axial with the axis of the interior cylindrical surface of the roll and rendered uniform in dimension so as to effect an axial balancing of the roll and to insure that the axis of rotation of the roll will coincide with the axis of the inner and outer cylindrical surfaces of the roll. This is particularly advantageous in conveyor rolls and the like where with long conveyor belts, the friction of a large number of unbalanced rolls on the expensive belt would not only cause a serious wearing of the belt but would require a much stronger belt because of the increase in tension placed on the belt by reason of the unbalanced rolls. Since a conveyor belt is costly and a very large item of expense in a conveyor system of this character, smoothly running and accurately balanced rolls permit a substantial reduction in belt thickness and, therefore, in cost of the belt.

A cast roll of this character is well suited to resist the destructive wear which often results in other types of rolls where the conveyor handles abrasive materials.

In the present case the roll is provided with roller bearings mounted in the bearing recesses adjacent each end of the rolls. Such bearings comprise the cup 24 having a tapered surface and advantageously forced into the recess 13 by a press fit, and the cone 25 having a tapered bearing surface, the cone being forced by a press fit on the roll shaft 26. Between the rings are series of tapered bearing rollers 27 held uniformly separated by the cage 28. The exact alinement of the bearing recesses 13 makes it possible to locate the bearing cup axis co-axial with the gearing cone and shaft axis, thereby insuring proper operation of the bearings.

Surrounding the shaft and spaced therefrom is a grease tube 29 extending through the roll and having its ends tightly beaded at 30 to the flanges 31 projecting inwardly adjacent the inner edge of the bearing recess 13. The beading operation may place the tube in sufficient tension to maintain a tight point

throughout the life of the roll. Tube 29 serves not only as a grease reservoir but seals the interior 32 of the casting from any communication with either the grease space or the bearings. This is advantageous in a hollow casting of this character, because of the possibility that in practice, all core sand or other abrasive material may not be removed from the interior of the casting.

The roll is supported by end pieces 33 fitting over the opposite ends of the roll shaft 26 and mounted in supporting members 34. In the present case the stems of the end pieces 33 enter fairly closely fitted open recesses 35 in the supports 34 which hold the end pieces securely but enable a roll to be removed simply by lifting it until the end pieces clear the recesses and supports. The rolls are supplied with lubricant (which need be replenished only at long intervals) through a lubricant tube 36 (having an appropriate fitting 37 at the end) by means of which lubricant may be forced through a registering opening in the end piece 33 and through an opening 38 into the interior 39 of the shaft (which is made hollow for this purpose). The lubricant pipe 36 extends downwardly at an angle from the end piece to a point which will permit a lubricant supply means to be attached without interrupting the operation of the conveyor. The interior of the roll shaft communicates through openings 40 with the space immediately adjacent the bearing. Surplus lubricant may be accumulated not only on the interior of the shaft but in the grease tube 29 surrounding the shaft.

A grease pipe may be applied to whichever end piece 33 is most convenient. In ordinary practice it is necessary to employ only one grease supply pipe per roll, the passage in the other end piece being closed by an ordinary plug.

Grease sealing means represented by a labyrinth packing (providing successive restricted and enlarged passages) are mounted on each shaft at the outer ends of the bearing. In the present case the labyrinth packing comprises a disk 41 (providing adjacent its outer edges two constricted passages 42 and an intermediate enlarged space), and an outer plate 43, the flange 44 of which enters a circular groove in the end web of the casting and providing further restricted passages which resist escape of grease. A collar 45 comprising an annular flanged plate, fits in the bearing recess adjacent the bearing and provides an additional restricted passage between its inner edge and the ring 25. The grease seal above described effectively prevents the escape of grease.

Adjacent the grease hole 38 in the shaft is a circumferential recess 46 in the shaft 26 which provides a passage for the travel of grease in the event hole 39 does not register

fully with the end of the grease pipe 36. A set screw 47 in the end piece engages the shaft 26 after the hole 38 has been brought into register with the grease hole in the end piece and prevents relative rotation.

5 fastening and adjusting bolt 48 is screwed into each end of the shaft and is provided with a washer 49 engaging the outer face of the end piece. This bolt may be employed to adjust the bearing to take up for wear by
10 forcing the inner bearing ring 25 along the shaft relative to the outer ring 24. A locking member in the form of a washer having bendable lugs 50 thereon surrounds the bolt 48 and prevents its rotation relative to the
15 end piece. The locking member has an extension 51 extending into a recess 52 in the end piece so as to prevent rotation of the locking member relative to the end piece. The bendable lugs 50 on the locking member
20 are angularly spaced a distance corresponding to the angular separation of the faces on the head of a hexagonal bolt, for example, so that the lugs may be bent to bear against such faces.

25 Obviously the invention is not limited to the details of the illustrative embodiment thereof herein disclosed since such details may be variously modified. Moreover, it is
30 not indispensable that all features of the invention be used conjointly, since certain features may be advantageously used (without others) in other methods and combinations.

The herein described method of manufacture of the roll is the subject-matter of my
35 copending application Serial No. 293,272, filed July 16, 1928, being a division of the present application. The mechanical construction of the roll and associated parts, and the conveyor-belt supporting structure
40 comprising the rolls, is the subject-matter of my copending application Serial No. 367,357, filed May 31, 1929, being a division of the present application.

45 Having described one embodiment of my invention, I claim:

1. As an article of manufacture, a hollow cast iron roll having a rim of substantially uniform thickness and ends closed except
50 for central bearing recesses at each end, the end of said roll being constructed and arranged to provide a surface exterior of said end of circular cross section which is definitely concentric with the inner surface of said
55 rim.

2. As an article of manufacture, a hollow cast iron roll having a rim of substantially uniform thickness and ends closed except for central bearing recesses at each end, the end
60 of said roll being constructed and arranged to provide a surface which is predeterminedly concentric with the inner surface of said rim.

3. As an article of manufacture a roll of
65 the character described comprising in com-

bination a cast hollow cylindrical body with integral supporting webs at the ends providing bearing holding members, said body being provided with a gauge surface formed and arranged to provide means for holding the
70 roll in a finishing machine, said gauge surface having a definite relation to the inner cylindrical surface of the roll whereby the axis of said cylindrical surface may be determined.

4. As an article of manufacture a roll of
75 the character described comprising in combination a cast hollow cylindrical body providing a relatively thin roll rim, integral rim supporting members adjacent the ends of the
80 rim having bearing recesses therein which are co-axial with the inner cylindrical surface of said rim, said body being provided adjacent its ends with surfaces by which said
85 body may be held in a finishing machine, said surfaces being formed and arranged with a predetermined relation to said interior cylindrical surface to provide means for supporting
90 said roll in the machine co-axial with the axis of said interior surface, the outer surface of said rim being a finished surface which is co-axial with said interior cylindrical surface.

5. An article of manufacture comprising a roll formed as a cast hollow cylindrical body
95 with integral supporting webs adjacent the ends, and with end surfaces formed concentric of the inner cylindrical wall surface and available for engagement for support and alignment of said roll for finishing the outer
100 cylindrical surface in substantial parallelism with said inner wall surface.

6. An article of manufacture comprising a roll formed as a cast hollow cylindrical body with integral supporting webs adjacent the
105 ends, said webs being formed with bearing recesses, said roll being further formed with engageable surfaces definitely concentric with the inner cylindrical surface of said body, said bearing recesses being finished in
110 concentricity with said inner cylindrical wall surface.

7. A hollow cast iron roll having a cylindrical interior surface and having integral webs adjacent the ends of the roll, said roll
115 being formed exteriorly of said webs with surfaces which locate centers coincident with the axis of said cylindrical interior surface, whereby said surfaces may serve in a machining operation to mount the roll coaxially with
120 said interior cylindrical surface for machining the roll concentrically with the said interior surface.

In testimony whereof, I have signed my
125 name to this specification.

GEORGE N. VAN DERHOEF.

CERTIFICATE OF CORRECTION.

Patent No. 1,742,453.

Granted January 7, 1930, to

GEORGE N. VAN DERHOEF.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, line 56, for the word "gearing" read "bearing"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of April, A. D. 1930.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.