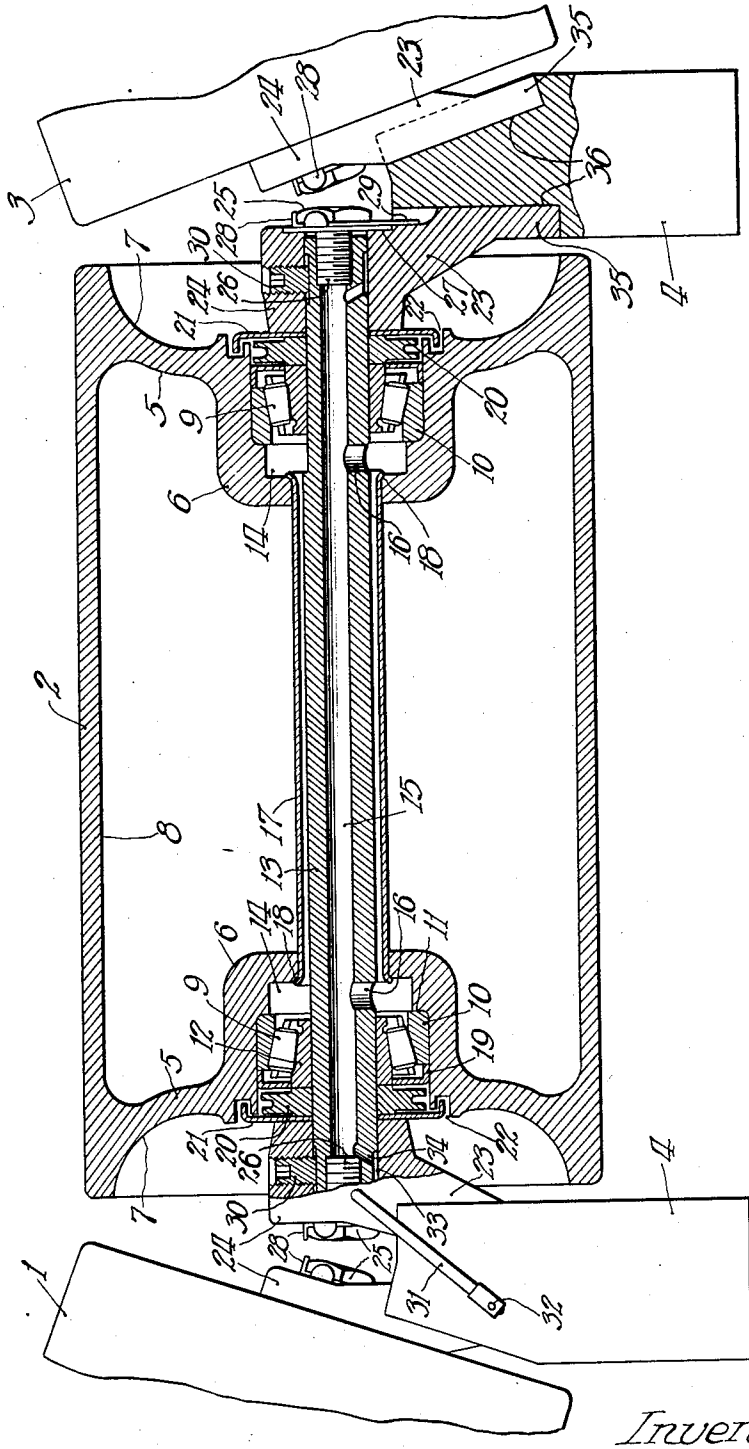
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CONVEYER ROLL

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CONVEYER ROLL

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10 Claims. (Cl. 308—20)

This invention (for which the present application is filed as a division of my application Serial No. 200,566, filed June 22, 1927) relates to conveyer rolls, more particularly for belt supporting installations. The object of the invention is to obtain a very efficient and practicable conveyer belt supporting installation comprising rolls or idlers, and to provide an improved idler therefor.

The invention will be explained by reference to an illustrative embodiment thereof shown in the accompanying drawing, and will be more particularly pointed out in the claims annexed to this description.

The drawing represents a troughing support comprising in this instance three rolls or idlers, of which the intermediate roll is shown in section and the adjacent end portions of the outer or flanking rolls are shown in elevation.

In the drawing, the three rolls referred to are respectively designated by the numerals 1, 2 and 3. These are arranged end to end on relatively inclined axes. They are closed spaced so as to bring the adjacent roll ends near together at the top, in order to provide a nearly continuous support for the conveyer belt and thus avoid objectionable sagging of the belt between rolls.

The rolls are carried between suitable supporting brackets, being individually removable as hereinafter explained. Intermediate brackets for supporting adjacent roll ends are indicated at 4, these being arranged in the gaps between the roll ends, below the axles of the rolls. The rolls at their adjacent ends are supported through their axles from these brackets or intermediate supports. It will be understood that the rolls 1 and 3 are similarly supported at their outer ends from suitable brackets (not shown).

The construction of the individual rolls and their accessories will be understood by reference to the intermediate roll 2, which together with a portion of its supporting brackets 4 is shown in section. The description with reference to this roll will be understood as applying to the others.

In the construction shown, the roll 2 is a hollow cast-iron roll having integral dished heads 5 formed with inwardly-extending bearing-encasing hubs 6. By a method described in my aforesaid parent application Serial No. 200,566, the roll may be cast with the annular concave surfaces 7 truly concentric with the interior cylindrical surface 8 of the roll; and the said annular surfaces 7 may be utilized for centering the roll in the machines for the boring, turning and finishing operations, so that the bearing-encasing hubs may be bored in exact alinement and interiorly finished in true concentricity with the surface 8, and the outer surface of the roll may be turned and finished precisely parallel and in true concentricity with said interior surface. The roll so manufactured is claimed by me as an improved article of manufacture in my said parent applications, and the method of manufacture is claimed by me in a divisional application Serial No. 293,272, filed July 16, 1928.

Use of a cast iron roll for a conveyer belt supporting idler is advantageous from the standpoints of strength, sturdiness, and resistance to abrasion, as well as for economy of manufacture, while a cast roll of the character stated has the special advantage that it will run in true balance, resisting wear of the bearings and wearing of the conveyer belt which often results from unbalanced rolls.

Bearings comprising tapered bearing rollers 9 and cup and cone rings therefor are mounted in the hubs 6, the two bearings being symmetrically arranged to sustain radial load and opposite end thrusts. As shown, the bearing cup rings 10 are fitted in the hubs against thrust shoulders 11 at the inner sides of said cup rings, and the cone rings 12 are fitted on a steel axle 13 extending through the roll and on which the roll freely revolves through the interposed bearings. The exact alinement and true concentricity of the bearing recesses in the hubs makes it possible to locate the bearing cups truly co-axial with the bearing cones and shaft axis, thereby insuring proper operation of the bearings and maintenance of the rolls in balance, provided the bearings be maintained in proper adjustment. The bearing cup rings 10 may be advantageously forced into the recesses of the roll hubs with a press fit, and the cone rings 12 may be forced with a press fit on the axle 13.

The bearing-encasing hubs of the rolls are formed to provide grease chambers in their inner ends, to which grease or lubricant is supplied through the axle. In the specific construction shown the axle is hollow to provide a grease conduit 15 communicating through the apertures 16 with the grease chambers 14. The lubricant is introduced into the axle ends as hereinafter described, and enters the bearings through the reservoirs or chambers 14 on the inner sides of the bearings and travels outward toward the grease seals at the outer sides of

the bearings, giving a positive circulation which prevents the accumulation of old grease.

Means cooperating with the inner ends of the bearing-encasing hubs and the axle to confine the grease and prevent its escape into the interior of the roll is represented by a grease tube 17 surrounding the axle and having its ends tightly jointed to the hubs. The ends of the grease tube may pass through the openings in the inner ends of the hubs and may be beaded thereto at 18. The beading operation may place the tube in sufficient tension to maintain tight joints with the hub throughout the life of the roll. The sealing of the hubs around the axle by the grease tube 17 is advantageous in a hollow cast roll because of the possibility that in practice all coarse sand or other abrasive material might not be removed from the interior of the roll.

Grease sealing means represented by labyrinth packings are provided at the outer sides of the bearings. In the present case each labyrinth packing is provided by a sheet metal flanged ring 19, a peripherally grooved disc 20, and an outer sheet metal plate 21 having a circular flange which enters a circular groove 22 in the outer end of the hub. The ring 19 fitted in the hub provides a restricted passage between its inner edge and the bearing cone ring 12. The disc 20, mounted on the axle within the hub, is formed to provide a slight clearance between the opposite sides of the disc and the plates 19 and 21, and the grooved periphery of the disc provides a pair of constricted passages and an intermediate enlarged space between the said periphery and the interior of the hub. The flange of the plate 21 entering the circular recess 22 provides an additional restricted passage around said flange. The labyrinth seal described effectively prevents the escape of grease.

The end portions of the axle 13 project outside the bearings and are provided with end pieces 23 detachably affixed on the supporting brackets 4. These end pieces 23 embody collars 24 enclosing the axle ends and abutting against the bearing devices for positioning the bearings relative to the axle. The collars 24 are held in place by the bolt heads 25 of fastening and adjusting screws or bolts 26 screwed into the axle ends. Washers interposed between the bolt heads and the collars are indicated at 27. The bolts are held from turning by locking devices in the form of washers having bendable lugs 28 engaging the bolt heads, these locking devices having extensions 29 engaging recesses in the end pieces 23 to prevent the locking devices from turning relative to the end pieces. Set screws 30 in the collars engage the axle to hold it against rotation.

The length of the axle 13 is less than the distance between the outside faces of the two collars 24 when the latter are clamped against the bearing devices, thus providing clearances to allow for adjusting the collars inwardly by tightening the bolts 26. In the specific construction shown, the end thrust between the collars 24 and the bearing cones 12 is transmitted through the elements 20 and 21 of the grease seals, said elements 20 and 21 here typifying spacing members appropriate for the particular axial dimensions of the collars shown, which in this instance are sufficiently long to extend clear to and abut against the plates 21. If the collars were of shorter length, compensation could be readily provided by additional interposed spacers. It will be apparent that the bolts 26 may be employed to adjust the bearings to take up wear by forcing the bearing cones 12 along the shaft relative to the bearing cups 10. Tightening the bolts will draw the collars 24 inwardly, shortening the distance between the collars, with resultant adjusting effect upon the bearings.

The roll is equipped at one end with a lubricant-introducing tube 31 having an appropriate fitting 32 for connection with a grease gun or force feeding device. The tube 31 is shown attached laterally to the collar 24 on one of the axle ends. The grease port in said collar to which said tube is connected communicates with the conduit 15 in the axle via a circumferential recess 33 formed in the outer surface of the axle and a grease port 34 in the axle. Grease forced into the axle through the tube 31 passes to the grease chambers 14 and enters the bearings at their inner sides as previously explained.

As shown, the lubricant-introducing tube projects outwardly and downwardly, positioning the valved fitting 37 at a conveniently accessible point for attachment and operation of a force feeding device. This lubricant-introducing tube may be attached to whichever end of the axle is most convenient, the necessary grease holes and passages being duplicated at the opposite ends of the axle. In practice, however, it is sufficient to employ one lubricant-introducing tube as shown, and the grease hole in the end piece 23 at the opposite end of the roll may be closed by an ordinary plug.

Downwardly projecting angle arms are provided on the axle ends by the end pieces 23 which engage and are removably supported by the brackets 4 in a manner to hold the end pieces firmly in position while allowing them to be disconnected from the brackets by lifting the roll. As shown, the end pieces are formed with bracket-engaging parts 35 fitted in recesses 36 in the faces of the brackets, the said parts 35 of the end pieces being slidably fitted in the recessed parts of the brackets and the recesses being open at the top so as to permit the end pieces to be withdrawn from or inserted into the recesses of the brackets by upward or downward movement of the roll in a direction at right angles to its axis.

The foregoing description with reference more particularly to the roll 2 will be understood as applying to each of the rolls of the troughing support structure, each of said rolls being arranged between and removably mounted through its axle-carrying end pieces on a pair of fixed brackets, which brackets will be understood to be mounted upon any suitable decking or support. Only the intermediate brackets 4 are shown, these being arranged in gaps between adjacent roll ends and supporting the adjacent axle ends through the angle arm attachments or end pieces 23. The opposite faces of the said intermediate brackets 4 are closely adjacent to the roll ends but entirely clear thereof, and the outer ends of the rolls 1 and 3 may similarly be in close juxtaposition to the confronting faces of their supporting brackets (not shown). As indicated in the drawing, the proportions and arrangement of parts are such that, while the axle end attachments at adjacent ends of the rolls are closely juxtaposed, each roll may be lifted by movement at right angles to its axis until its axle-carrying end

pieces 23 are clear of and disengaged from the brackets, without interference by the adjacent roll end. Thus each roll may be individually removed by lifting it until its end pieces are clear of the brackets and then moving it sidewise to withdraw it from the other rolls.

The fastening and adjusting bolts 26 in the specific construction shown typify threaded fastening devices screwed to the axle ends by which to hold the axle end pieces in cooperative relation with the roll bearings, maintaining the bearings in proper position relative to the axle and securing the roll parts in assembly.

It will be seen that the invention provides an exceedingly practicable construction for a troughing support for belt conveyers having closely arranged rolls which can be individually lubricated while in place, without interfering with the operation of the conveyer, and which can be individually removed by lifting them from their supports for inspection, adjustment and repair, and the bearings of which may be adjusted in the field.

What I claim as my invention, and desire to secure by Letters Patent, is:

1. A conveyer roll having an axle and bearings thereon set inwardly from the ends of the roll, the axle ends having attachments providing depending angle arms engageable with and by which the axle ends may be removably supported by supports placed closely adjacent to the roll ends, said attachments embodying collars non-rotatably secured to and longitudinally adjustable on the axle ends and cooperating with the bearings for positioning and adjusting the same, and adjusting means screwed to the axle ends against said collars, said attachments adapted for close juxtaposition in back to back relation to like parts of other similar rolls when arranged in the relationship shown in the accompanying drawing.

2. A conveyer roll having inwardly set bearings comprising tapered bearing rollers and cup and cone rings therefor, an axle on which said cone rings are mounted, the roll having bearing-encasing hubs in which the cup rings are fitted, said bearings symmetrically arranged and disposed to be tightened by inward adjustment of the cone rings, collars on the axle ends outside said bearings cooperating with the cone rings for maintaining the bearings in proper position, said collars being non-rotatably affixed on the axle, screw bolts in the ends of the axle having heads cooperating with said collars by which the collars are held in cooperative relation with the bearing cones and may be adjusted inwardly for adjusting the bearings, and the axle ends being provided with depending arms adapted to be removably affixed on supports adjacent the roll ends.

3. A conveyer roll having inwardly set bearings comprising tapered bearing rollers and cup and cone rings therefor, an axle on which said cone rings are mounted, the roll having bearing-encasing hubs in which the cup rings are fitted, the bearings in the opposite ends of the roll being symmetrical and arranged to be tightened by inward adjustment of the cone rings, the axle end portions projecting outside said bearings and terminating proximate to the roll ends, and angle pieces on the axle end portions providing depending arms adapted to be removably affixed on supports adjacent the roll ends, said angle pieces embodying collars adjustably fastened on the axle end portions and cooperating with the bearing cone rings for adjusting the bearings, said angle pieces adapted for close juxtaposition in back to back relation to like parts of other similar rolls when arranged in the relation shown.

4. A conveyer roll for use in the class of structures described, having an axle and antifriction bearings to sustain radial load and end thrust mounted on said axle and on which the roll revolves, the said bearings being set inwardly from the roll ends and the axle ends being outside said bearings and adapted to be supported in close proximity to the roll ends, said roll having means for holding grease on the inner sides of the bearings and grease seals on the outer sides of the bearings, collars non-rotatably secured to and adjustable on the axle ends and cooperating with the bearings for positioning and adjusting the same, headed fastenings screwed to the axle ends against said collars, a grease-introducing tube laterally connected with a said collar, and a grease duct in the axle communicating with said tube and with said grease holding means at the inner side of the bearings.

5. In a structure of the class described, the combination with conveyer rolls arranged closely adjacent end to end on relatively inclined axes, said rolls having axles and antifriction bearings thereon set inwardly from the roll ends, of supporting standards from which the rolls are removably supported by angle pieces on the axle ends, said angle pieces embodying collars non-rotatably secured on the axle and cooperating with the bearings for positioning the same, said collars having depending arms removably affixed on said standards and detachable therefrom upon lifting the rolls, screw bolts in the ends of the axle having heads cooperating with said collars for adjusting the same for adjusting the bearings, there being clearance between the roll ends and adjacent faces of the standards and between adjacent axle end attachments so that each roll can be lifted to disengage said arms from said standards and can be removed from the standards by movement at right angles to the roll axis.

6. In a structure of the class described, the combination with conveyer rolls arranged closely adjacent end to end on relatively inclined axes, said rolls having axles and bearings thereon set inwardly from the roll ends, of an interposed support and a pair of angle pieces arranged back to back removably affixed on said support and embodying collars non-rotatably secured on the axle ends, said collars cooperating with the bearings for maintaining them in position, and means for adjusting said collars relative to the axle for adjusting the bearings.

7. In a structure of the class described, the combination with conveyer rolls arranged closely adjacent end to end on relatively inclined axes, said rolls having axles and antifriction bearings thereon set inwardly from the roll ends, of supporting standards from which the rolls are removably supported by end pieces on the axle ends, said end pieces embodying collars on the axle and cooperating with the bearings for positioning the same, said collars having depending arms removably affixed on said standards and detachable therefrom upon lifting the rolls, and fastening devices screwed to the ends of the axle and cooperating with said collars for holding them in cooperative relation with the bearings, each roll with its axle and axle end pieces being

an independent unit removable from its supporting brackets without disturbing the others.

8. A conveyer roll having an axle and bearings thereon set inwardly from the ends of the roll, the axle ends having attachments embodying collars enclosing said ends and cooperating with the bearings for positioning them on the axle, said attachments providing depending angle arms engageable with and by which the axle ends may be removably supported by supports placed closely adjacent to the roll ends, and threaded fastening devices screwed to the axle ends engaging said collars for adjustably holding them in cooperative relation with the bearings, said attachments and fastenings constructed and arranged to permit close juxtaposition in back to back relation thereto of like parts of other similar rolls when arranged in the relation shown.

9. A conveyer roll having bearing-encasing hubs and bearings therein comprising tapered bearing rollers and cup and cone rings therefor, said bearings arranged with their conical bearing surfaces converging inwardly, the cup rings being fitted in said hubs which are formed with thrust shoulders engaging the inner sides of said cup rings and with grease chambers at the inner sides of said bearings, a tubular axle on which said cone rings are mounted in communication with said grease chambers, and angle pieces on the axle ends having bracket engaging portions for detachable engagement with supporting brackets adjacent the roll ends and having axle housing portions cooperating with the cone rings of the bearings for positioning the same, screw bolts screwed into the ends of the tubular axle and constituting end closures therefor, the heads of said bolts cooperating with said angle pieces to hold them in cooperative relation with said bearing cone rings and the said angle pieces having passages for communication with grease introducing means and in communication with the grease duct in the axle.

10. In a structure of the class described, the combination with conveyer rolls arranged end to end on relatively inclined axes, said rolls having axles and bearings thereon set inwardly from the roll ends, of an interposed supporting bracket and a pair of angle pieces arranged back to back removably affixed to said bracket and embodying collars on the axle ends, said collars cooperating with the bearings for maintaining them in proper position on the axle, and means comprising headed fastenings screwed to the axle ends against said collars for holding said collars in cooperative relation with the bearings and adjusting the collars to adjust the bearings.

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