Dec. 27, 1960 M. A. GLEESON 2,966,255

FLEXIBLE TROUGHING ROLLER ASSEMBLY FOR A BELT CONVEYOR

Filed Dec. 3, 1956 2 Sheets-Sheet 1

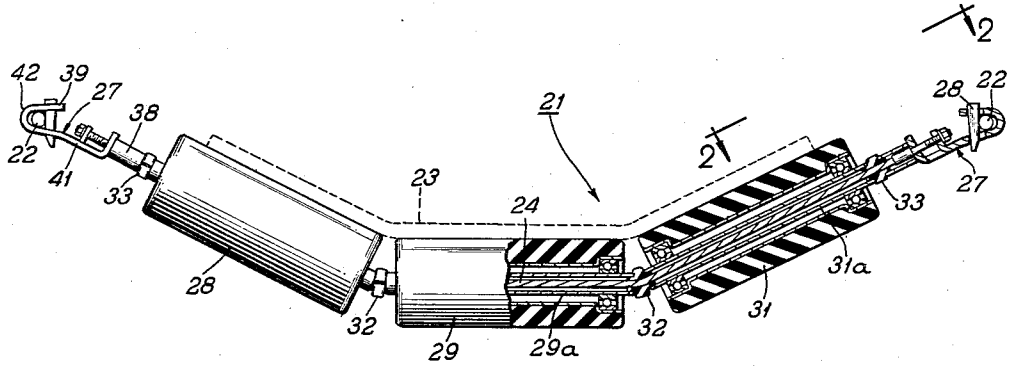

Fig. 1

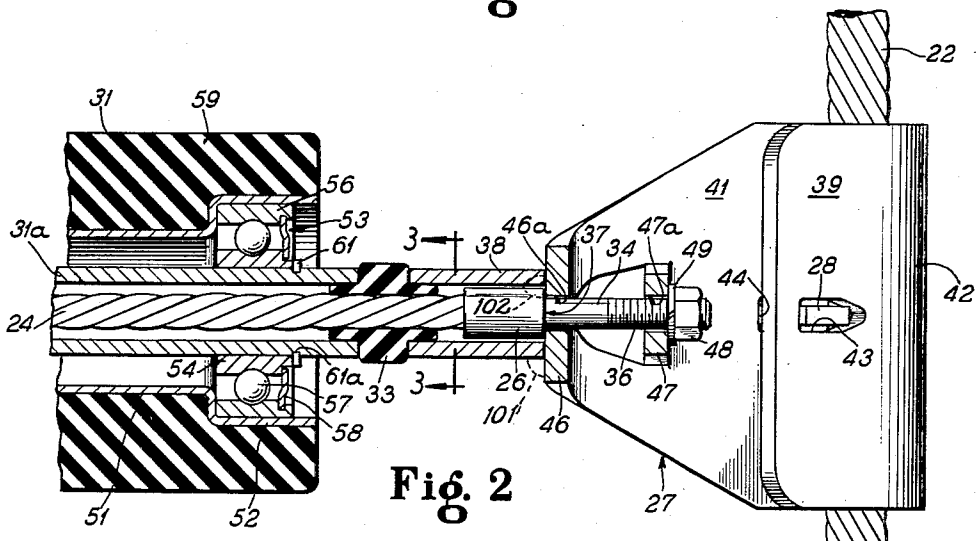

Fig. 2

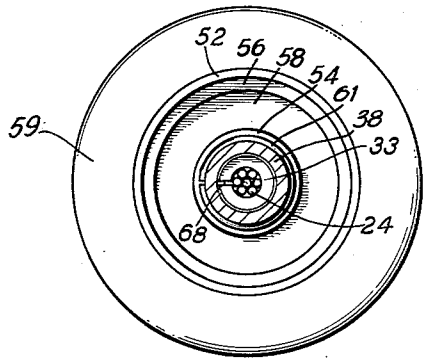

Fig. 3

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Dec. 27, 1960 M. A. GLEESON 2,966,255

FLEXIBLE TROUGHING ROLLER ASSEMBLY FOR A BELT CONVEYOR

Filed Dec. 3, 1956 2 Sheets-Sheet 2

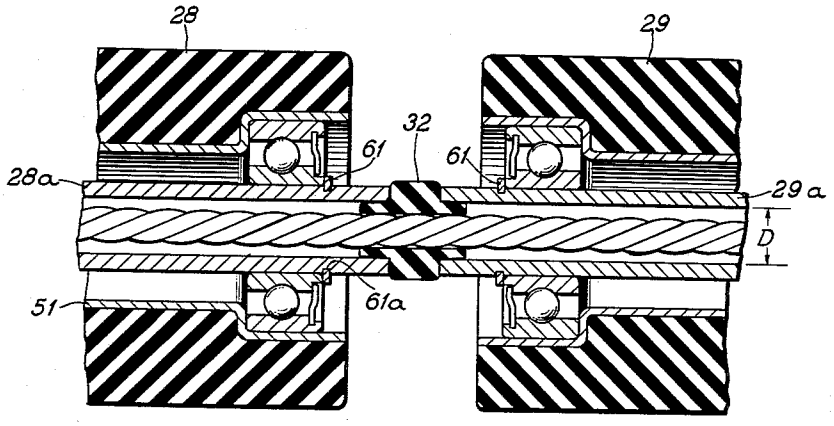

Fig. 4

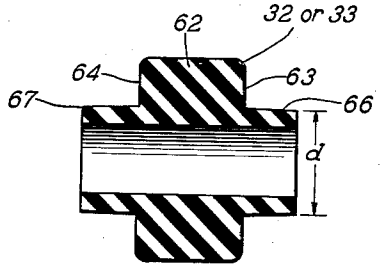

Fig. 5

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FLEXIBLE TROUGHING ROLLER ASSEMBLY FOR A BELT CONVEYOR

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6 Claims. (Cl. 198—192)

This invention relates generally to conveyors, particularly to belt conveyors, and specifically to an improved flexible troughing roller assembly for the conveying reach of a belt conveyor.

Among the objects of this invention is the provision of a troughing roller assembly having great strength, combined with flexibility and light weight, and which can readily be assembled and disassembled by the user for maintenance or repair.

This invention is concerned primarily with an improvement over the structural arrangement of the belt aligning troughing roller assembly disclosed in LoPresti application Serial No. 523,454, filed July 21, 1955 on Troughing Rollers for Belt Conveyors, now abandoned. The present invention employs the same general principles as the LoPresti assembly, in maintaining belt alignment, yet in some respects is simpler and more rugged in construction.

Other objects and advantages will be apparent from the following description, taken in consideration with the drawings in which:

Figure 1 is a fragmentary, partly cross sectioned view, of the conveying reach of a rope side frame conveyor having the preferred embodiment of a troughing roller assembly employing the principles of the present invention;

Fig. 2 is a fragmentary enlarged view of Fig. 1 taken along the line 2—2;

Fig. 3 is a sectional view of Fig. 2 taken along line 3—3;

Fig. 4 is an enlarged fragmentary cross sectional view of the troughing roller assembly shown in Fig. 1 and illustrating the details of the interconnection between adjacent rollers; and

Fig. 5 is an enlarged view illustrating the details of the spacer used in the troughing assembly.

Like parts are referred to by like reference characters throughout the figures of the drawings.

Referring now particularly to the embodiment shown in the drawings, the improved troughing roller assembly is generally designated **21** and is shown suspended between a pair of flexible strands, such as wire cables **22, 22**, such a rope side frame conveyor being disclosed in Craggs and McCann Patent No. 2,733,257 dated December 4, 1956, to which reference may be made for details. A conveying reach **23** of belting will run along the top of the roller assembly. The return reach will normally pass beneath it in the usual way but is not shown here as it forms no part of the present invention.

The roller assembly **21** comprises a flexible strand or wire rope **24**, which is freely universally transversely flexible relative to its longitudinal axis, and is provided with a sleeve **26** swaged on each end. Each sleeve **26** is fastened to a cable clamp or connector **27** which in turn is held in place by a drift pin or spike **28**. Strung or threaded on the rope **24** are a series of rollers **28, 29, 31**, which are longitudinally spaced along the rope **24** by spacers **32, 32** which enable universal transverse flexing movement of the wire rope **24** at each spacer. Other spacers **33, 33**, between the end rollers **28, 31** of the series and the corresponding clamps **27** likewise enable universal transverse flexing movement of the wire rope **24** at their locations.

In practicing the present invention, any number of rollers from one on up may be employed. For the best results, in order to obtain a maximum of beneficial self-training action of the roller assembly on the belt reach **23**, there should preferably be at least three rollers, as shown in the drawings.

It will be observed that, in the present case, the swaged-on sleeves **26, 26** are each somewhat greater in diameter than the rope **24** itself. Each sleeve has a reduced diameter section **34**, threaded at **36**, and has an outwardly facing shoulder at **37**. There is a tubular member **38** concentrically disposed with respect to the sleeve **26**. It is here shown as a separate piece but may if desired be made integral with the clamp **27** (as by welding, shown in broken lines at **101**) or with one of the sleeves **26**, (as by welding, shown in broken lines at **102**), in which cases it would simply be an inward tubular extension of the clamp or the sleeve, respectively. In either case, it would function as shown, in the manner which will be described.

The cable clamp **27** is preferably formed of a plate bent generally in a **U** section (as seen in Fig. 1) and having an upper portion **39**, a relatively longer lower portion **41** interconnected by a bight **42** having a radius of curvature somewhat less than the cable **22** to facilitate wedging the latter tightly within the clamp. There are two generally vertically aligned punched openings **43, 44** respectively in the upper and lower portions of the clamp, through which the drift pin **28** is driven to hold the cable **22** tightly in place. The inwardly extending lower portion **41** of the clamp is tined upwardly by a punching operation to form two upstanding ears, an inner ear **46** and an outer ear **47** having holes **46*a*** and **47*a*** punched respectively therein. The threaded portion **36** of the sleeve **26** is assembled through a corresponding pair of these holes **46*a*, 47*a*** and the sleeve is drawn tight by nut **48** and lock washer **49** engaging the outer ear **47** while shoulder **37** bears against the inner ear **46**.

Each of the rollers **28, 29, 31** includes a cylindrical steel body shell **51** having an enlarged bell-mounted section **52** at each end within which is seated a ball bearing **53** having an inner race **54**, an outer race **56**, and balls **57**, with a grease retainer **58**. A rubber, or grease-resisting rubber-like cover **59** is affixed, preferably by molding, to the outer surface of the shell **51**.

Each of the rollers **28, 29, 31** is rotatably journaled about a non-rotatable hollow tubular shaft threaded onto the wire rope **24**. There are three of these shafts and they are numbered **28*a*, 29*a*** and **31*a***, consistent with the numbering of the rollers. While they are numbered differently, they may be, and are shown, identical. The rollers are held in place against movement along the roller supporting shafts **28*a*, 29*a*, 31*a***, by snap rings **61** fitting within grooves **61*a*** of the roller supporting shafts and bearing against the outer surfaces of the inner races **54**.

The troughing rollers are maintained in predetermined spaced relationship with one another and with the connector sleeves **26** by spacers **32** and **33**, aforementioned. They are assigned different reference numerals here only because they are located at different places along the wire rope and not because they need to be structurally different. Actually, they may be, and are shown identical here.

Each spacer **32** or **33**, shown greatly enlarged in Fig. 5, is here shown as an elastic spool or rubber or grease resistant rubber-like material having a main body **62** with end surfaces **63, 64** and reduced diameter tubular bush-

ing portions 66, 67 at opposite ends. The reduced diameter portions 66, 67 have an outside diameter *d* in the order of magnitude of the inside diameter D of the roller supporting shafts 28*a*, etc. Thus, when assembled as shown, and the nuts 48 are drawn up tight, the surfaces 63, 64 of the spacers will be interposed between the ends of the roller supporting shafts 28*a*, etc., and the end tubular members 38 surrounding the sleeves 26.

The roller mounting shafts 28*a*, 29*a*, 31*a* and the tubular members 38, 38 may all be the same cross section and are so shown.

For best results, the parts should fit along the wire rope 24 so the rubber spacers 32, 33 will be under slight compression, to hold all the parts snugly in place. For this purpose, at least one of the spacers should be an elastic member of some kind. Obviously, any spacing means which biases the roller supporting shafts 28*a*, etc., toward their proper positions along the wire rope 24 and which provide transverse flexibility of the wire rope in universal directions at the spacers will be the equivalent of the spacers shown in Fig. 5 and therefore this invention is not to be interpreted as limited merely to the precise type of spacers shown in that figure. To facilitate threading the spacers 32, 33 onto the wire rope 24 over the sleeves 26, they may be oiled or covered with a grease or soap. Alternatively, they can be split, as indicated at 68 in Fig. 3, to avoid the operation of threading them over the sleeves.

To permit threading or stringing the roller supporting shafts 28*a*, etc., onto the wire rope, the internal diameter of the shafts 28*a*, etc., must be larger than the external diameter of the sleeves 26. At least said internal diameters must be larger than the external diameter of one of the sleeves 26.

The spacers 32, 33 serve the following three important functions: (1) they enable universal transverse flexing of the strand 24 in a plurality of directions at each of the spacers, (2) they hold positions of the roller supporting shafts 28*a*, 29*a*, 31*a* relative to one another and relative to the connector sleeves 26, and (3) they maintain concentricity between the rope 24 and the tubular shafts 28*a*, 29*a*, 31*a*, and members 38 and minimize the sharpness of bend of the wire rope within the spacers to give them a long life.

In assembling the improved troughing roller assembly, the rollers 28, 29, 31 and the spacers 32, 33 are threaded or strung alternately onto the rope 24, passing over one of the connector sleeves 26. The roller shells 51 will preferably have been pre-assembled onto the tubular roller, and supporting shafts 28*a*, 29*a*, 31*a*. The assembly is then completed by fastening the clamps 27 on with the nuts 48 and lock washers 49. Dis-assembly is simply the reverse of this procedure.

Thus it will be seen that the new troughing roller assembly is readily put together and taken apart for easy maintenance and repair.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that numerous details of the structure shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. A flexible troughing roller assembly for the conveying reach of a belt conveyor comprising: a series of hollow shafts each having a roller rotatably supported thereon; a flexible strand threaded through said shafts; a sleeve fixed to each end of said strand; a connector removably attached to each of said sleeves for suspending said assembly between spaced supports; each of said shafts having a passage with an internal dimension larger than a corresponding external dimension of at least one of said sleeves to enable threading of said shafts onto said strand over said one sleeve; elastic, rubberlike spacers being interposed between adjacent shafts and between each sleeve and the adjacent shaft at the corresponding end of said series; said spacers effectively maintaining the positions of the shafts relative to one another and relative to the sleeves on said strand, and enabling transverse flexing of said assembly in all directions at each of said spacers.

2. A flexible troughing roller assembly for the conveying reach of a belt conveyor comprising: a series of hollow shafts each having a roller rotatably supported thereon; a flexible strand threaded through said shafts; a sleeve fixed to each end of said strand; a pair of connectors adapted to engage spaced supports for suspending said assembly therebetween; a disengageable connection between each sleeve and a corresponding one of said connectors; each of said shafts having a passage with an internal dimension larger than a corresponding external dimension of at least one of said sleeves to enable threading of said shafts onto said strand over at least said one sleeve; a flexible spacer interposed between adjacent shafts and effectively maintaining the later spaced apart along said strand; and a flexible spacer interposed between each connector and the adjacent shaft at the corresponding end of said series and effectively maintaining said connector and end shaft spaced apart along said strand; each of said spacers being universally flexible transverse to the length of said strand to enable flexing of said assembly in all directions transverse to the length of said strand; at least said spacers between adjacent shafts being universally flexible rubberlike elements having oppositely extending tubular bushing portions fitted in end portions of said passages at the ends of adjacent shafts and bushing the clearance between the strand and the passage end portions to maintain concentricity of the strand portions at the ends of the shafts and minimize bending angles of said strand between the shafts.

3. A flexible troughing roller assembly for the conveying reach of a belt conveyor, said troughing roller assembly including, in combination, a series of hollow shafts each having a roller rotatably supported thereon, a flexible strand threaded through said shafts, said shafts being shiftable longitudinally on said strand, a connector at each end of said strand for connecting said assembly between spaced supports, elastic spacers carried by said strand and compressibly interposed between adjacent ends of said shafts and between each connector and a corresponding end shaft of said series, said spacers maintaining said shafts positioned relative to one another, and spaced radially from the strand to facilitate flexing movement of the assembly relative to said connectors, each of said elastic spacers being universally flexible transverse to the length of said strand to enable flexing of said assembly in all directions transverse to the length of said strand.

4. The flexible troughing idler assembly of claim 3 further characterized in that the hollow shafts have a substantially uniform internal diameter from end to end and the spacers between adjacent shafts extend into the ends of the shafts between the flexible strand and the shafts.

5. A flexible troughing roller assembly for a conveying reach of a belt conveyor comprising a series of hollow shafts each having bearing means rotatably supporting a roller thereon; a transversely flexible strand threaded through the hollow shafts; spacer means interposed between the strand and the hollow shafts for effectively spacing each of the hollow shafts generally transversely from the strand, said spacer means enabling said assembly to be universally transversely flexible; and a connector at each end of said strand for connecting said assembly between spaced supports.

6. A flexible troughing roller assembly for a conveying reach of a belt conveyor comprising a series of hollow shafts each having bearing means rotatably supporting a roller thereon; a transversely flexible strand threaded through the hollow shafts; spacer means interposed between adjacent hollow shafts and also inter-

posed between the strand and the hollow shafts, said spacer means enabling said assembly to be generally universally transversely flexible; and a connector at each end of said strand for connecting said assembly between spaced supports.

References Cited in the file of this patent

UNITED STATES PATENTS

981,471	Proal	Jan. 10, 1911
1,833,179	Robins	Nov. 24, 1931
2,330,923	Robins	Oct. 5, 1943
2,582,280	Robertson	Jan. 15, 1952
2,592,831	Spurgeon	Apr. 15, 1952
2,798,591	Stamos	July 9, 1957
2,948,384	Pate	Aug. 9, 1960

FOREIGN PATENTS

367,727	Great Britain	Feb. 25, 1932
871,267	Germany	Mar. 23, 1953
1,113,601	France	Dec. 5, 1955