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ROPE FRAME CONVEYOR AND ARTICULATED IDLER ASSEMBLY THEREFOR

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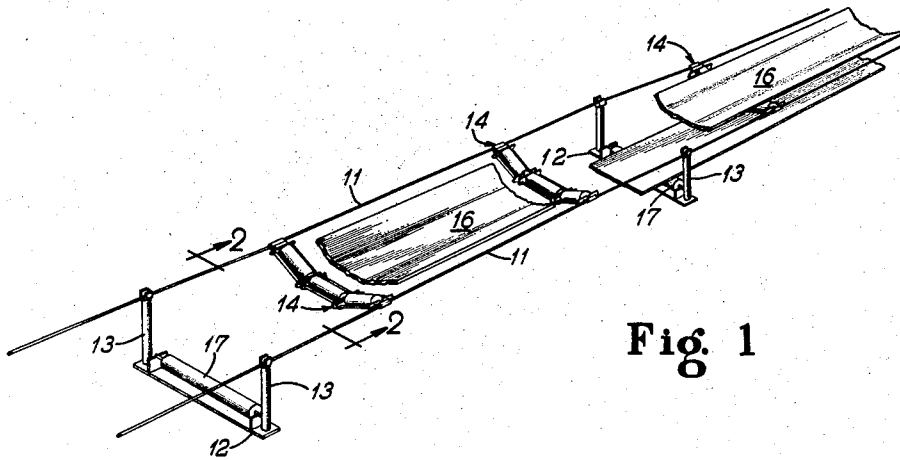


Fig. 1

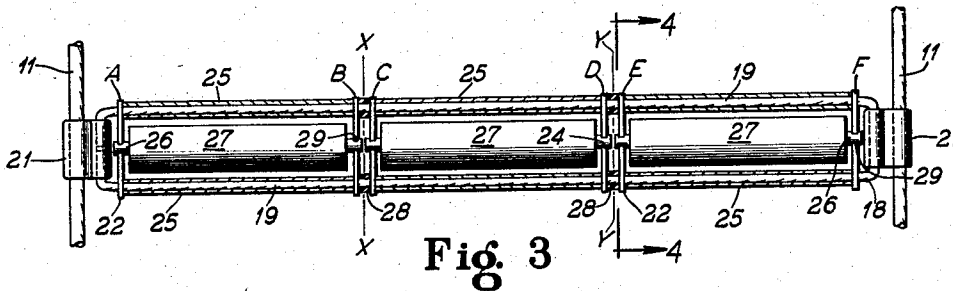


Fig. 3

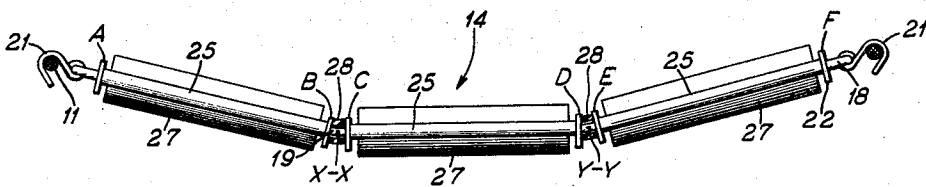


Fig. 2

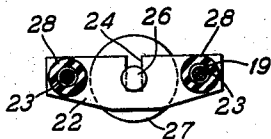


Fig. 4

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This invention relates to conveyors and particularly to an improved rope frame conveyor and flexible troughing idler assembly therefor which is characterized by three dimensional flexibility for maximum impact absorption, load carrying ability, and ease of operation and maintenance.

It is a primary object of the present invention to provide a rope frame conveyor having a main frame consisting simply of a pair of wire ropes, chains, or the like, stretched and tensioned parallel to one another, and a series of flexible idler assemblies carried transversely between the wire ropes and comprising a number of idler-carrying frame sections disposed in end-to-end relationship with one another and pivotally interconnected to one another about axes running longitudinally of the wire ropes. Thus, impacts are absorbed in all directions by flexing of the wire ropes and idler assemblies.

Another object of the present invention is the provision of an improved flexible idler assembly in which idlers are carried on separate, pivotally interconnected, frame sections.

Still another object is the provision of an articulated idler assembly having a frame consisting of auxiliary wire ropes extending between mounting brackets which themselves are attachable to the main frame wire ropes, and pairs of supporting members spanning the auxiliary ropes and supporting idlers thereon.

Other objects and advantages will be seen in the following description taken in connection with the drawings in which:

Figure 1 is a fragmentary, perspective view of a rope frame conveyor illustrating a preferred form of the present invention;

Figure 2 is an enlarged cross sectional view of Figure 1 taken along the line 2—2 and showing a preferred embodiment of flexible idler assembly in accordance with the present invention;

Figure 3 is a plan view of Figure 2; and

Figure 4 is a cross-sectional view of Figure 3 taken along the line 4—4.

Referring now more particularly to the drawings, the main frame of the conveyor comprises a pair of flexible wire ropes or strands 11, 11 which may be tensioned by stretching them between suitable anchoring means (not shown), as for instance by the anchoring means disclosed in the co-pending Madeira application Serial Number 447,769 on Endless Conveyors. The ropes 11, 11 are supported at a predetermined height and spacing by stands 12 having upstanding arms 13, 13 engaging them. Flexible idler assemblies, in accordance with the present invention, and generally designated 14 in Figure 1, are suspended transversely between the ropes 11, 11 and in turn support the upper, load-carrying reach of a belt conveyor 16. The conveyor return reach is supported at relatively greater intervals by rollers 17 carried by the stands 12.

The improved articulated idler assembly comprises, in

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the present form, a wire rope 18 extending in two strands 19, 19 between brackets 21, 21. Each of the latter is generally S-shaped in cross-section, as shown in Figure 2, having one portion which may be crimped to grip the wire rope 18 and the other portion being partially open to engage the main frame ropes 11, 11.

As shown in Figure 4, idler support members 22 may be formed of a punched plate having spaced apertures 23, 23 with an open-sided recess 24 therebetween.

The idler assembly includes a plurality (in this case three) of pairs of the support plates 22 assembled onto each of the auxiliary wire rope strands 19, 19, with the apertures 23, 23 threaded onto the strands 19, 19 with the recesses 24 facing upwardly. An idler shaft 26, having a roller or idler 27 rotatably journaled on it, is engaged in the recesses of adjacent supports 22, 22, as shown.

While, in the present case, the supports 22, 22 are all illustrated as being identical, it is believed that it would be helpful in clarifying the following description to further identify their positions in the drawings as A, B, C, D, E and F, respectively. Between B and C, and between D and E, there are provided elastic spacer bushings 28, made of rubberlike grease-resistant material such as neoprene, and spooled or threaded onto the auxiliary strands 19, 19 for the double purpose of providing end clearance between the roller shafts whereby they may pivot up and down about axes X—X and Y—Y which run longitudinally of the conveyor through each pair of neoprene spacers. Between points A and B, C and D and E and F, tubular spacing sleeves 25 are fitted over the strands 19, 19 to correctly space the supports 22 for ease of roller installation and to maintain the supports a predetermined distance apart.

Each shaft is preferably milled with double, diametrically opposed, parallel surfaces 29, 29 at each end engageable snugly within the support plate recesses 24.

Thus, it will be seen that the idler assembly of the present invention comprises a plurality (in this case three) of frame sections, each including a pair of opposed wire rope portions, a pair of opposed supports 22, 22 spanning and carried by the wire ropes, and an idler roller, these frame sections being disposed in end-to-end relationship and pivotally interconnected about axes X—X and Y—Y, each section preferably, but not necessarily, being separated by the elastic separators shown.

One of the advantages of this roller assembly as applied to a rope frame conveyor is that it is free for up and down pivotal movement to absorb impact loads but it is relatively highly resistant to distortion in the direction longitudinal to the belt; another advantage is that it avoids the use of pivotal interconnections between the idler shafts themselves which connections would be subject to wear and distortion; it is easy for a man to carry such a roller assembly even in the limited head room commonly found in underground mines simply by draping the frame itself over his shoulder and carrying the rollers in his arms; and faulty rollers can be replaced easily.

While one form in which the present invention may be embodied has been shown and described it will be understood that various modifications and variations thereof may be effected without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. A rope frame conveyor having a flexible main frame consisting of a pair of spaced parallel rope-like elements under tension supported at a predetermined height above the ground and maintained at a predetermined spacing relative to one another, and a plurality of flexible idler assemblies therealong each consisting of a plurality of frame sections disposed in end-to-end relationship and

pivotally interconnected about spaced axes running parallel to said rope-like elements; bracket means on each end frame section for mounting the assembly to and suspending it between the rope-like elements and transversely thereto; each of said pivotally interconnected frame sections having means engaging an idler shaft therein, an idler rotatably journaled on each of said shafts; and a conveyor belt movable across said idlers.

2. A rope frame conveyor having a flexible main frame consisting of a pair of spaced parallel main ropes under tension supported at intervals a predetermined height above the ground, and a plurality of flexible idler assemblies therealong each consisting of a pair of spaced parallel auxiliary ropes suspended transversely across said main ropes, idler supports spanning said auxiliary ropes at intervals therealong and arranged in pairs, each pair of idler supports having a rotatable idler supported therebetween, and a conveyor belt movable across said idlers.

3. A rope frame conveyor having a flexible main frame consisting of a pair of horizontally spaced main flexible elements under tension and supported at a predetermined height, and a plurality of flexible troughing idler assemblies at intervals therealong each consisting of a pair of horizontally spaced auxiliary flexible elements suspended transversely across said main flexible elements, a plurality of troughing idlers supported in end-to-end relationship between said auxiliary flexible elements, in substantial alignment with one another and on supports spanning and bearing on said auxiliary elements, and a conveyor belt movable across said idlers.

4. A conveyor idler assembly comprising a pair of ropes extending between a pair of mounting brackets at opposite ends thereof, a plurality of idler supports disposed along and spanning said pair of ropes, each support comprising a plate having a pair of spaced apart apertures respectively threaded onto said ropes and an upwardly open recess intermediate said apertures, idler shafts having their ends engaged in recesses of adjacent pairs of supports, idler rollers rotatably journaled on said shafts, and apertured elastic spacers threaded onto said ropes between supports at the ends of adjacent rollers.

5. A rope frame conveyor having a flexible main frame consisting of a pair of spaced parallel main ropes under tension supported at intervals a predetermined height above the ground, and a plurality of flexible idler assemblies therealong each consisting of a pair of spaced parallel auxiliary ropes suspended transversely across said main ropes, idler supports spanning said auxiliary ropes at intervals therealong and arranged in pairs, spacing means

maintaining each pair of idler supports a predetermined distance apart, each pair of idler supports having a rotatable idler supported therebetween, and a conveyor belt movable across said idlers.

6. In an endless belt conveyor of the type wherein the loads on the conveying reach are transferred in laterally spaced flexible strands which are laterally displaceable in both horizontal and vertical directions in accordance with the load transferred thereinto: the combination therewith of a troughing roller assembly for transferring the aforesaid loads comprising a plurality of frame assemblies connected in freely articulating relationship including spaced side members extending laterally of said spaced strands transversely extending supports maintaining said spaced side members in properly spaced relationship, an idler roller having a shaft supported on said transversely extending supports and between said spaced side members, and means for holding the outer ends of the aforescribed assembly to said strands.

7. An idler assembly for a conveyor comprising a pair of spaced parallel flexible strands having a mounting bracket at each end thereof, pairs of idler supports spanning said flexible strands, an idler carried between each pair of supports, and elastic spacer means interposed between supports for ends of adjacent idlers.

8. In a rope frame conveyor, a pair of transversely flexible ropes trained along generally parallel courses, an elongated roller assembly disposed between said flexible ropes and comprising a center frame section flanked on each end by a pair of wing frame sections, a belt-engagable roller supported within each of said frame sections, an interconnection between each end of said center frame section and a corresponding end of a respective one of said wing frame sections, each interconnection comprising a pair of flexible joints spaced along an axis running substantially parallel to the ropes and providing relative movement between the center and wing frame sections about said axes, and a connection between each of said wing frame sections and a corresponding one of said ropes.

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