Jan. 28, 1958 C. D. SCHOTT 2,821,291

BELT TRAINING IDLER

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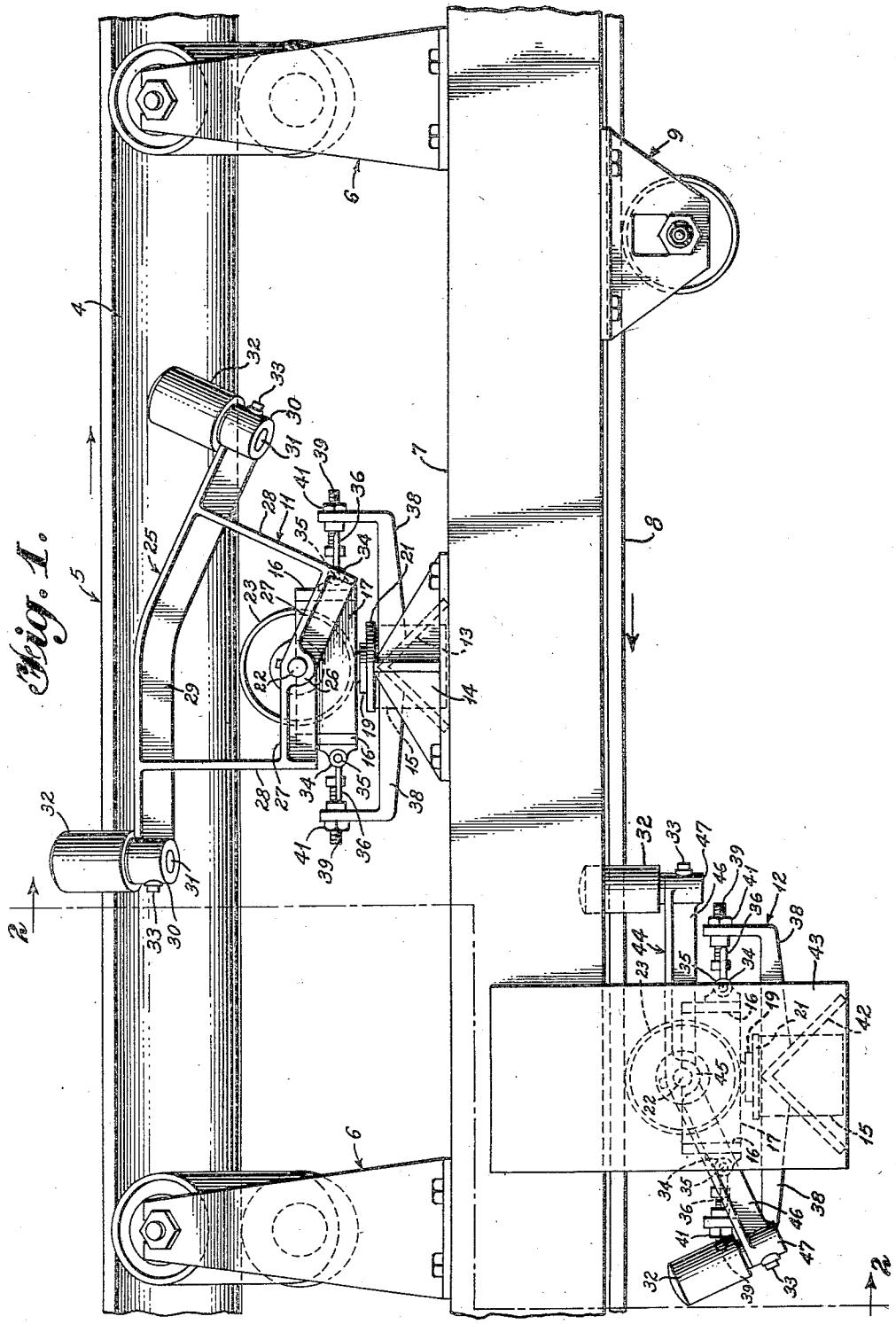


Fig. 1.

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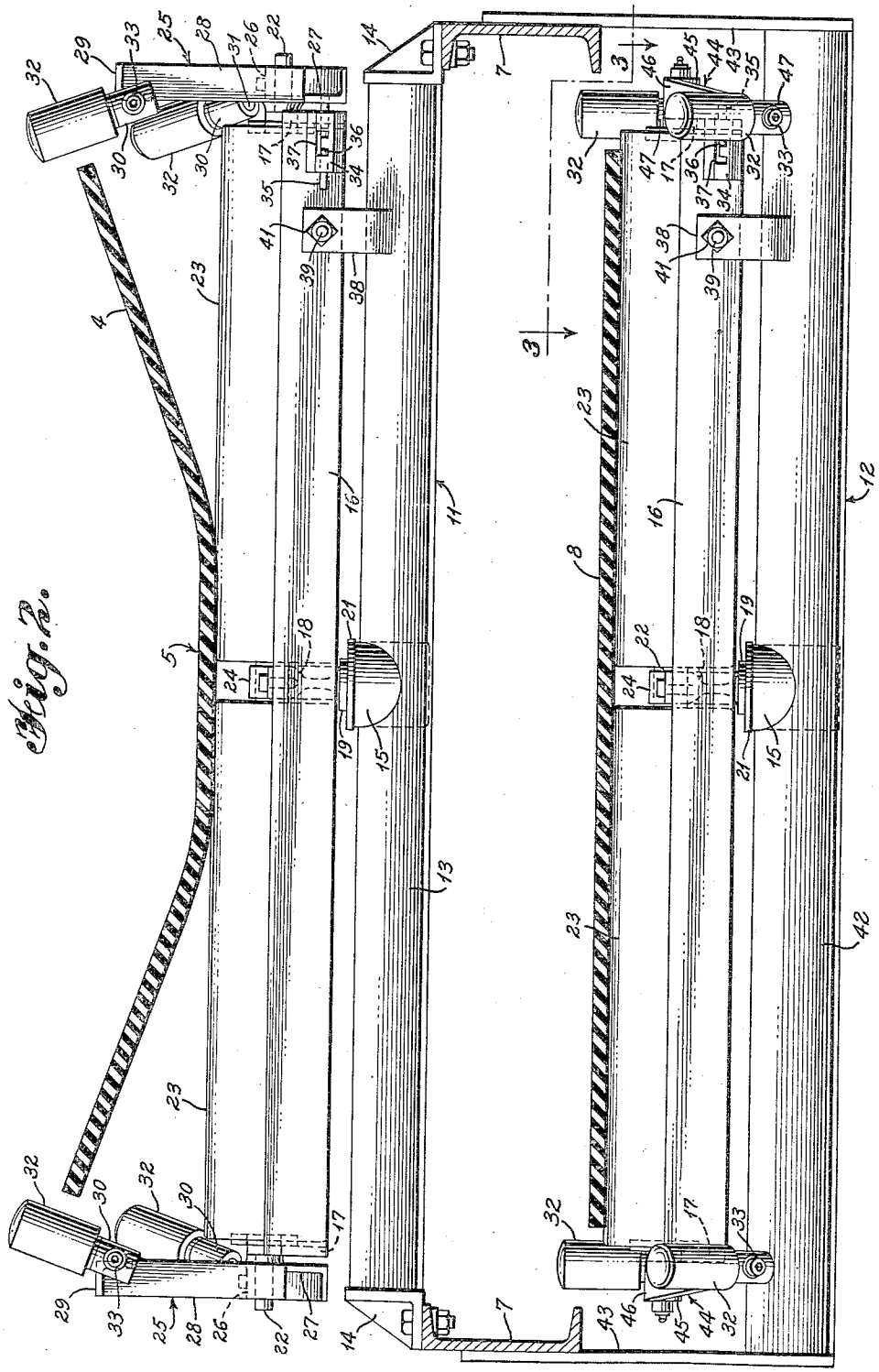


Fig. 2.

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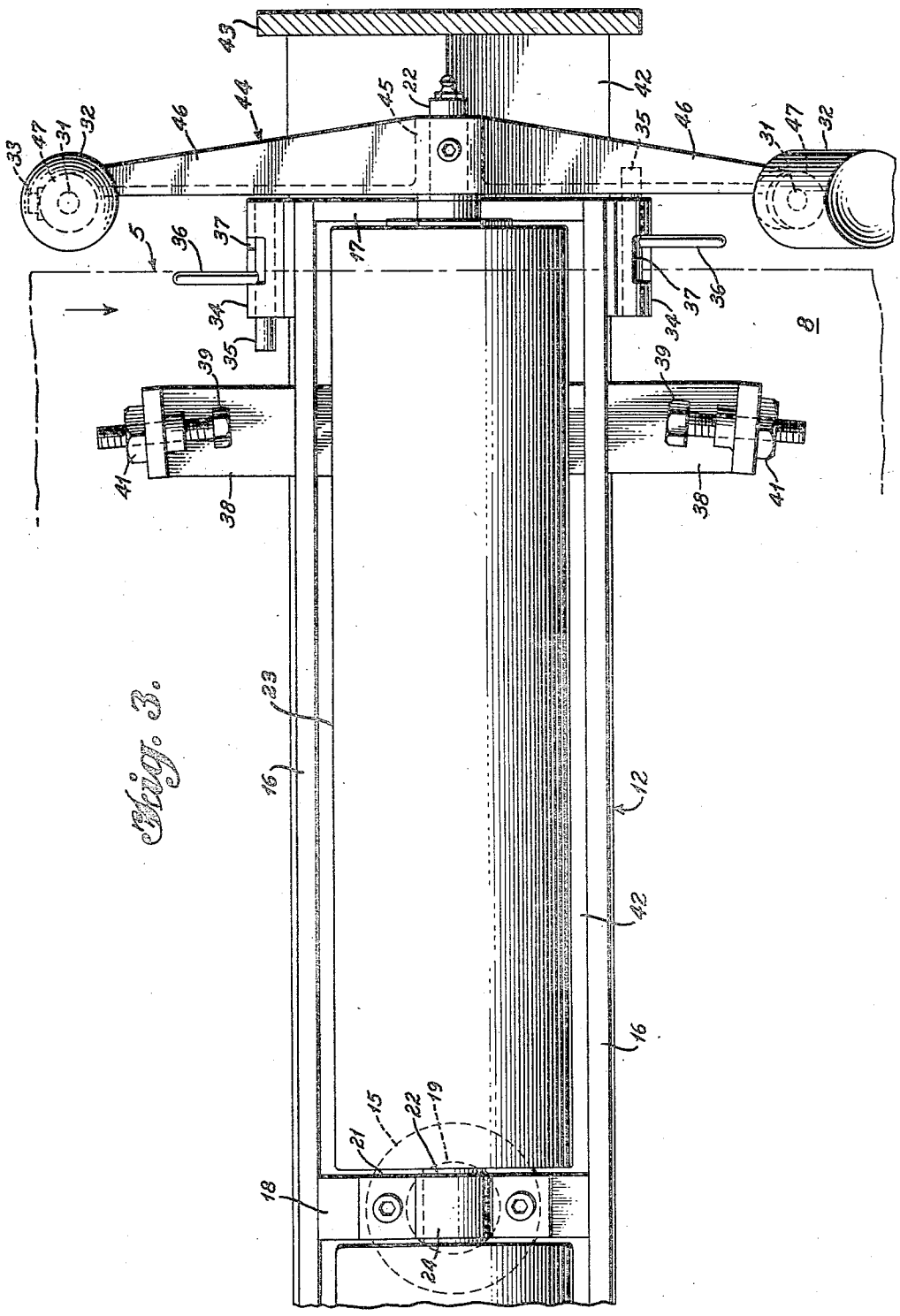


Fig. 3.

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BELT TRAINING IDLER

Charles D. Schott, Indianapolis, Ind., assignor to Link-Belt Company, a corporation of Illinois

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7 Claims. (Cl. 198—202)

This invention relates to new and useful improvements in conveyor belt training idlers and deals more particularly with training idlers of the positive action type for use in connection with reversible belt conveyors.

Belt training idlers have been widely used in the past for maintaining proper alignment of conveyor belts on the supporting idlers in both the load carrying and return runs of the conveyors. Known types of training idlers, however, have been specifically designed and adapted for use in connection with conveyors which are to be operated in a prescribed manner. For example, positive action type training idlers have been preferred in those instances where the belt always travels in a given direction. This type of training idler, however, could not be used with reversible belt conveyors because the aligning action has been initiated by engagement between the side portions of a misaligned belt and guide members which were mounted on the side of the idler from which the belt approached. A reversal in the direction of movement of the belt, therefore, would cause the prior types of positive action training idlers to increase rather than correct any misalignments of the belt. As a result of this difficulty, reversible belt conveyors have conventionally employed other types of training idlers, the aligning action of which is neither positive nor necessarily proportional to the degree of misalignment of the belt.

It is the primary object of this invention to provide a positive action belt training idler which, without the addition or removal of any elements, will correct the misalignment of a belt traveling in either direction thereon.

A further important object of the invention is to provide a belt training idler having guide elements positioned at opposite sides of the belt which are jointly movable into lateral alignment with the opposite side edges of a belt for conditioning the idler to correct the misalignment of a belt traveling in either direction.

Another important object of the invention is to provide a positive action belt training idler having guide elements on opposite sides of the belt which are jointly movable and which may be easily and quickly locked in alternate positions for cooperation with a belt moving alternately in opposite directions.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like reference characters are employed to designate like parts throughout the same,

Figure 1 is a fragmentary side elevational view of a belt conveyor showing belt training idlers embodying the invention associated with the active and return runs of the belt,

Figure 2 is a vertical sectional view taken on line 2—2 of Fig. 1, and

Figure 3 is a horizontal sectional view taken on line 3—3 of Fig. 2.

In the drawings, wherein for the purpose of illustration is shown the preferred embodiment of the invention, the active run 4 of the conveyor belt 5 is supported by conventional troughed belt idlers 6 which are mounted on channel beam stringers 7 which extend longitudinally along opposite sides of the belt 5 below the active run 4. The return run 8 of the belt 5 is supported at spaced points along its length by conventional return belt idlers 9 which are mounted on the bottoms of the stringers 7 as illustrated in Fig. 1.

Both the troughed, active run 4 and flat, return run 8 of the belt 5 are subject to misalignment on the idlers 6 and 9, respectively, particularly in those installations where the belt is subject to unequal stretch or off-center loading, or where the belt is subjected to side wind forces. In order to prevent excessive misalignment of either the active run 4 or return run 8 of the belt 5, belt training idlers 11 are mounted on the stringers 7 for association with the active run of the belt and belt training idlers 12 are suspended from the stringers 7 for association with the return run of the belt. The spacing between the training idlers 11 along the active run 4 and the training idlers 12 along the return run 8 will vary according to the extent to which the belt 5 is subject to misalignment, but will always exceed the spacing between the troughed belt idlers 6 or return belt idlers 9.

Referring now to Figs. 1 and 2 for a detail description of the training idler 11 associated with the active run 4 of the belt 5, a stationary base is provided by the angle member 13 which opens downwardly and has mounted on its opposite end portions brackets 14, the bottom flanges of which are secured to the tops of the stringers 7. At the mid-point of the angle member 13, an opening is provided for receiving the cylindrical base member 15 which is securely fastened to the angle member 13 with its axis vertically arranged at the centerline of the conveyor.

Mounted for pivotal movement on the cylindrical base 15 is an elongated rectangular frame formed of spaced side bars 16 which extend transversely of the conveyor and are connected at their opposite ends by bars 17. The bars 16 are connected at their mid-points by a bracket 18 having a base 19 which rests on and is supported by the cap 21 of the cylindrical base member 15. Connected to the bottom of the base 19 and depending therefrom into the interior of the cylindrical base member 15 is a pin, not shown, which is engaged by suitable bearing members within the base member to permit free pivotal movement of the bracket 18 about the axis of the base member.

The end bars 17 and bracket 18 are provided with aligned, upwardly opening notches for receiving a shaft 22 upon which is rotatably mounted a pair of belt supporting rolls 23. The rolls 23 are arranged on opposite sides of, and extend between, the bracket 18 and the end bars 17. A cap 24 is fitted over the shaft 22 between the rolls 23 and is secured to the bracket 18 to retain the shaft in its above described position. Opposite end portions of the shaft 22 extend laterally outwardly beyond the bars 17 and have rigidly mounted thereon guide arms 25 which are arranged in like radial positions on the shaft. Movement of one arm 25, therefore, will effect like movement of the other and both arms may be maintained in a selected position by maintaining one arm in the position.

Each of the arms 25 is formed with a hub 26 having two spokes 27 extending radially therefrom, the included angle between the spokes being an obtuse angle. Connected to the outer ends of the spokes 27 by spacer bars 28 is a roller mounting bracket 29 the opposite end portions of which are arranged in parallel relationship with the spokes. At each end of the roller mounting bracket 29 there is provided a sleeve 30 for receiving the stub axle 31 of a guide roller 32 and set screws 33 are threaded through the sleeves to retain the rollers in place on the bracket. The laterally opposed sleeves 30 of the two arms 25 are oppositely inclined from the

vertical to support the laterally opposed guide rollers 32 in normal relationship with the adjacent inclined edge portion of the troughed belt 5 when the arms are rotated to position the rollers opposite the belt edges.

Mounted on the outer surface at one end portion of each bar 16 is a sleeve 34 the axis of which extends transversely of the conveyor. Each sleeve 34 has positioned therein a latch pin 35 having an operating lever 36 extending radially outwardly therefrom through the U-shaped notch 37 in the outer side of its sleeve 34. The pin 35, therefore, can be moved between and maintained in a laterally extended or retracted position by movement of the operating lever 36 from one leg to the other of the notch 37. An inwardly opening recess is formed in each spoke 27 of the arm 25 adjacent the pins 35 at the same radial distance from the axis of the hub 26 as that of the pins so that the arm may be rotated to position the recess of either spoke 27 in alignment with its associated pin 35. The pin 35 may thereupon be moved outwardly into the recess and locked in its extended position to prevent further movement of the arm 25. The sleeves 34 are so positioned that when either one of the pins 35 is latched in the recess of its associated spoke 27, the other spoke will lie in parallel relationship with the belt 5. The corresponding end portion of the bracket 29 will also lie in parallel relationship with the belt 5 and the rollers 32 mounted thereon will be supported in laterally spaced relationship with the adjacent edge of the belt 5. The roller 32 at the opposite end of the bracket 29, however, will be lowered into a position below the adjacent edge of the belt.

Pivotal movement of the frame provided by the bars 16 and 17 may be limited by the provision of bracket arms 38 which are mounted on the angle member 13 and are provided with upwardly extending end portions arranged in outwardly spaced relationship with the bars 16. Threaded through the upturned end portion of each arm 38 is a stud 39 the position of which may be varied to increase or decrease the maximum angle of pivotal movement of the side bars 16 before they engage the head of the stud. The studs 39 are locked in their adjusted positions by nuts 41.

The operation of the belt training idler 11 will be described in detail as follows:

Presuming first that the belt is to be driven in the direction indicated by the arrow of Fig. 1, the arms 25 are jointly rotated to and latched in positions at which the guide rollers 32 on the approach side of the rolls 23 are aligned with the opposite edges of the belt 5. In other words, the guide rollers 32 aligned with the edges of the belt 5 are on the side of the rolls 23 from which the belt approaches the rolls. Since both of the arms 25 are mounted rigidly on the same shaft 22 the positioning and latching of one of the arms will similarly position and latch the arm at the opposite side of the conveyor.

The belt 5 is thereafter set into motion and, for so long as the belt is centered on the troughed belt idlers 6, the rolls 23 will maintain the shaft 22 in a position normal to the direction of travel of the belt 5. In other words, any movement of the shaft 22 out of normal relationship with the direction of travel of the belt 5 is immediately corrected by the frictional drag created between the belt and the skewed rolls 23 as the belt moves across the rolls. If, however, the belt 5 becomes misaligned on the troughed belt idlers 6, the lateral movement of the belt will cause the edge of the belt to engage the guide roller 32 on the side of the conveyor toward which the belt is misaligned. This engagement between the edge of the belt 5 and the guide roller 32 will apply a force to the arm 25 causing the pivotally supported portion of the training idler 11 to be rotated slightly about its pivot point on the cylindrical base member 15. The rolls 23, therefore, will be slightly askew from their positions normal to the direction of travel of the belt 5 and the belt while moving across the rolls will be given a slight component of movement in a lateral direction to return the belt to its initially centered position.

When the direction of movement of the belt 5 is to be reversed, the operating lever 36 of the latched pin 35 is moved to retract the pin and the arms 25 are rotated to align the other pin 35 with the recess in its associated spoke 27. This latter pin 35 is then moved into its extended position to latch the arms 25 and the training idler 11 is again ready for operation of the belt in a reverse direction. It will be noted that the repositioning of one arm 25 will automatically effect the proper repositioning of the arm 25 at the opposite side of the conveyor and that the repositioning of the arms may be easily and quickly accomplished without tools and without the addition or removal of any element of the belt training idler 11.

Referring now to Figs. 1, 2 and 3, it will be noted that the belt training idler 12 associated with the return run 8 of the belt 5 is identical to the belt training idler 11 with the following exceptions:

The stationary angle member 42 of the training idler 12 is equal in length to the spacing between the outer surfaces of the stringers 7 and the angle member is mounted on the stringers by means of plates 43 which are suitably connected to the ends of the angle member and to the outer surfaces of the stringers 7.

The guide arms 44 of the belt training idler 12 are also modified to accommodate the flat return run 8 of the belt 5. Each arm 44 includes a hub 45 with roller mounting bracket arms 46 extending radially outwardly therefrom and with the included angle between the arms being an obtuse angle. The sleeves 47 mounted at the outer ends of the bracket arms 46 are each provided with a bore, the axis of which is arranged in a vertical plane.

All of the remaining elements of the training idler 12 are identical to those of the training idler 11 and have been given corresponding reference numbers. Further, the operation of the training idler 12 is the same as that of the training idler 11 and will not be described again.

It is to be understood that the form of this invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described the invention, I claim:

1. A training idler for a reversible belt conveyor, comprising a frame mounted for pivotal movement about an axis normal to the transverse middle portion of the belt, a shaft journaled on said frame in normal relationship with the pivotal axis of the latter, roll means rotatably mounted on said shaft for supporting said belt, two guide arms rigidly mounted on spaced portions of said shaft and each having portions arranged on opposite sides of the shaft along the edges of the belt, an upwardly extending guide roller mounted on each of said guide arm portions, said arms being jointly rockable through their connections to said shaft to alternately position the rollers of the correspondingly arranged portions of the two guide arms in operative relationship with the edges of the belt, and means for holding said guide arms and rollers in their alternate positions.

2. A training idler for a reversible belt conveyor, comprising a frame mounted for pivotal movement about an axis normal to the transverse middle portion of the belt, a shaft journaled on said frame in normal relationship with the pivotal axis of the latter, roll means rotatably mounted on said shaft for supporting said belt, two guide arms rigidly mounted on spaced portions of said shaft for rocking movement therewith, said guide arms each

having portions arranged on opposite sides of the shaft alternately rockable to positions extending along the edges of the belt, an upwardly extending guide roller mounted on each of said guide arm portions for alternate movement therewith into and out of an operative position in normal relationship with the adjacent edge of the belt, and means for holding said guide arms and rollers in their alternate positions.

3. A training idler for a reversible belt conveyor, comprising a frame mounted for pivotal movement about an axis normal to the transverse middle portion of the belt, means for limiting the pivotal movement of said frame, a shaft journaled on said frame in normal relationship with the pivotal axis of the latter, roll means rotatably mounted on said shaft for supporting said belt, two guide arms rigidly mounted on spaced portions of said shaft for rocking movement therewith, said guide arms each having portions extending in opposite directions along said belt from said roll means and alternately rockable to positions adjacent the edges of the belt, an upwardly extending guide roller mounted on each of said guide arm portions for alternate movement therewith into and out of an operative position in normal relationship with the adjacent edge of the belt, and means for holding said guide arms and rollers in their alternate positions.

4. A training idler for a reversible belt conveyor, comprising a frame mounted for pivotal movement about an axis normal to the transverse middle portion of the belt, a shaft journaled on said frame in normal relationship with the pivotal axis of the latter, stop means engageable by said frame to limit the movement of the shaft from a position extending transversely of the belt, roll means rotatably mounted on said shaft for supporting said belt, a pair of guide arms rigidly mounted on opposite end portions of said shaft for rocking movement therewith, said guide arms having portions spaced in opposite directions along said belt from said roll means, an upwardly extending guide roller mounted on each of said guide arm portions, the guide rollers of each arm being rockable therewith to alternately move the rollers of the corresponding portions of the two guide arms into and out of operative positions in normal relationship with the edges

of the belt, and means for holding said guide arms and rollers in their alternate positions.

5. A training idler for a reversible belt conveyor, comprising a frame mounted for pivotal movement about an axis normal to the transverse middle portion of the belt, a shaft journaled on said frame in normal relationship with the pivotal axis of the latter, roll means rotatably mounted on said shaft for supporting said belt, a pair of guide arms rigidly mounted on opposite end portions of said shaft for rocking movement therewith through a selected angle, means for latching said guide arms in alternate positions at the limits of said selected angle, and a pair of guide rollers mounted in corresponding positions on each of said guide arms, the corresponding guide rollers of the two guide arms being alternately supported in operative relationship with the opposite edges of the belt in opposite directions along the latter from said roll means when said arms are latched in their alternate positions.

6. A training idler for a reversible belt conveyor, comprising a transversely extending frame mounted beneath the belt for pivotal movement about an axis normal to the transverse middle portion of the belt, roll means rotatably mounted on said frame for supporting said belt, a guide arm rockably supported intermediate its ends on each end portion of the frame outwardly of the adjacent edge of the belt, an upwardly extending guide roller mounted on each end portion of each guide arm, both of said guide arms being rockable to place the guide rollers supported on their correspondingly arranged end portions alternately in operative positions relative to their associated edges of the belt, and means for holding said guide arms and their guide rollers in each of said alternate positions.

7. A training idler as defined in claim 6 further characterized by means extending between and connected to both of the guide arms so that the rocking movement of one of said arms will bring about a corresponding movement of the other arm.

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