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TRAINING DEVICE FOR CONVEYER BELTS

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Fig. 1.

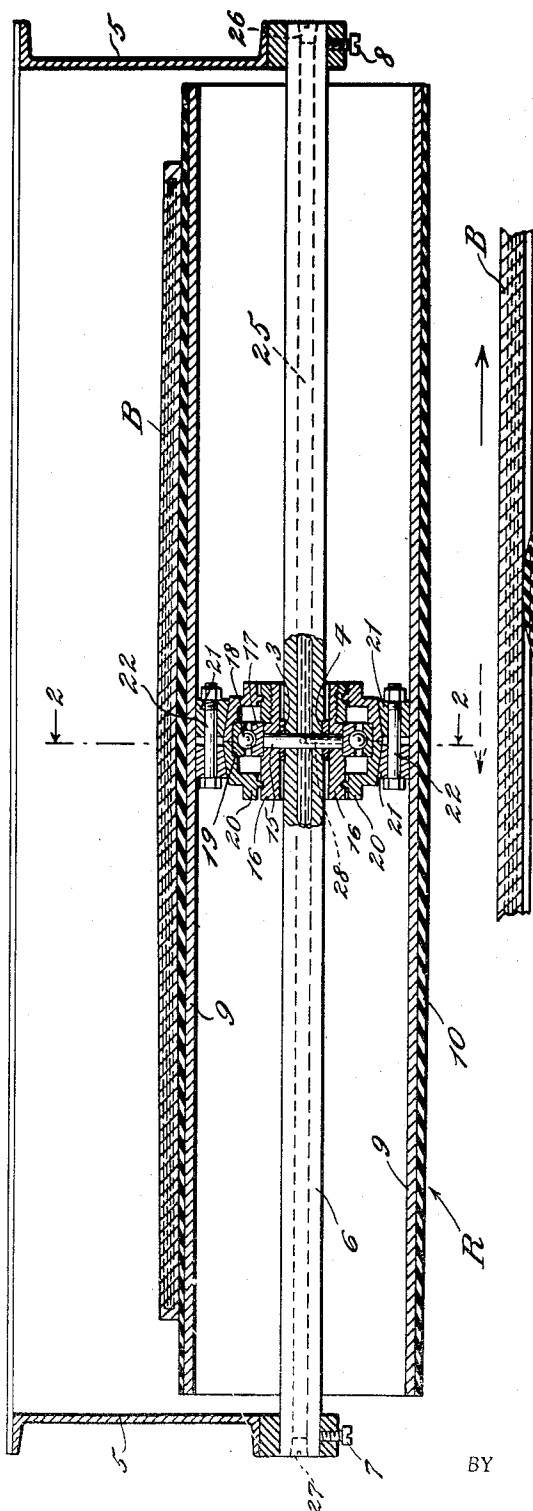
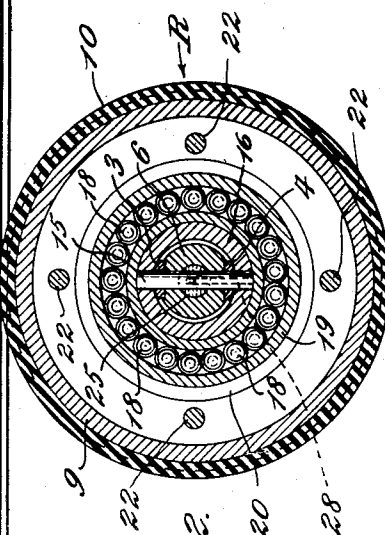


Fig. 2.

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TRAINING DEVICE FOR CONVEYER BELTS

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6 Claims. (Cl. 198—202)

This invention relates to training devices for conveyer belts and particularly to training rolls or trainers. Such rolls are designed to support a conveyer belt and keep it running along a substantially central line midway between the ends of the roll.

A crowned idler roll mounted so that its axis of rotation is stationary and disposed at right angles to the direction of belt travel has no appreciable training effect on a conveyer belt, because such belt makes only a tangential contact with such an idler roll. In order that the crown on a pulley or roll be effective to produce a training effect, the belt must be wrapped around such pulley or roll a substantial part of the periphery thereof. Crowned idler rolls on a stationary axis of rotation are ineffective as training devices for conveyer belts.

A cylindrical idler roll on a pivot pin, as shown in my Patent No. 1,883,180, which permits movement of the axis of rotation of the roll in relation to the direction of belt travel is positively effective only if the pivot pin is inclined forwardly in relation to the belt travel. If the pin is inclined rearwardly, the effect is to detract or unship the belt. If the pin is disposed at right angles to the plane of the belt, the training effect is not positive. An inclined pin device such as that shown in my patent mentioned above is commercially useful only for a unidirectional belt.

I have discovered that, if a crowned idler roll, as distinguished from a cylindrical roll, is mounted on a pivot pin disposed at right angles to the plane of the conveyer belt supported by said roll, it will train with a powerful and stable training action and, since the pivot pin is at right angles to the plane of the belt, will function equally well whether the belt is running in one direction or the other.

The invention is illustrated and described as applied to an idler roll designed to support the return portion of the conveyer belt, but it may also be applied to an idler roll on the upper or load-carrying side.

In the drawing:

Fig. 1 is a longitudinal vertical section of a trainer and a conveyer belt supported thereon;

Fig. 2 is a transverse vertical section taken through 2—2 of Fig. 1.

In the illustrative embodiment of my invention, R is a training roll adapted to support belt B. Parallel supporting stringers 5 of a conveyer structure support a stationary shaft 6 which is held in place by set screws 7 and 8. Roll R has a steel body member 9 of tubular form, which carries a rubber sleeve 10. This rubber sleeve is crowned; that is, the diameter thereof at the center is greater than the diameter at each end. If desired, the rubber sleeve may be omitted, in which case the shell of the roll may be made of steel or other material, with the outer surface thereof crowned in the same general shape and contour as the outer diameter of the rubber sleeve 10.

Roll R is supported on shaft 6 in such manner that it may rotate freely in relation to said shaft and at the same time pivot or swivel on a pin 15 through a limited arc in relation to said shaft 6. Pivot pin 15 is disposed at right angles to the plane of belt B and centrally in relation to shaft 6 and serves to support thereon an inner race supporting sleeve 16 having a slightly larger internal diameter than the outside diameter of shaft 6 and spaced from said shaft by washers 3 and 4.

Sleeve 16 holds the inner race 17 of an anti-friction ball-bearing having anti-friction balls 18. The outer race 19 of the bearing is clamped between and serves to support the two halves of a suitable housing 20. Housing 20 is surrounded by a pair of lateral clamp rings 21 adapted to be drawn together by means of bolts 22, thus providing a wedge-like action to secure the body member 9 of the idler roll on the outer periphery of the clamping rings 21 and thus support the roll R on the shaft 6 through the medium of the anti-friction bearings 18 and the pivot pin 15. As a result, roll R may rotate around the shaft 16 and pivot about the pin 15 through a limited arc in a plane parallel to the plane of the belt B.

Shaft 6 preferably has a centrally disposed passageway 25 therethrough. This passageway is plugged at each end by plugs 26 and 27. Pin 15 is furnished with a duct or passageway 28 therein communicating at one end with passageway 25 and at the other end with the anti-friction ball bearings 18. Hence, the anti-friction bearing may be lubricated by forcing a suitable lubricant through passageways 25 and 28.

In operation, when the belt B moves to one side or the other of the center line of its path of travel along the various idler rolls which support it, the force acting on that side of the crowned roll to which the belt has moved will cause said roll to pivot around the pin 15 and thus move into a skewed position in relation to the moving belt, with that end of the roll which is on the side of the conveyer structure toward which the belt has shifted moved forwardly in the direction of motion of the belt. This skewed

position of the roll causes the belt to move back toward the center line of the roll and thus corrects the movement away from such center line.

The cooperation of the belt and the crowned roll, whereby automatic skewing of the roll about its vertical pivot always in a direction to train the partially displaced belt toward its mid-position, may best be explained as follows. The diameter at the center of the pulley is at a maximum while that at each end is a minimum. The contact between the belt and the roll is substantially tangential. Under these conditions there is no self-centering action such as occurs when a belt has substantial "wrap" about a crowned pulley. In order to achieve training of the belt toward a central position a skewing of the axis of the pulley is required and that end of the axis on the side to which the belt is displaced must move in the direction of belt movement. This occurs automatically with the arrangement just described because of the different diameters at the center and ends of the roll. If, for the sake of simplicity of illustration, it is assumed that the belt has moved so that it contacts with only one-half of the roll, a portion which may be considered as a truncated cone, then it will be clear that since the belt drives the roll and that maximum contact occurs at the point of greatest diameter, the roll will travel at such an angular velocity that the peripheral speed of the maximum circumference is equivalent to the speed of the belt. This means then that the speed of the belt will be greater than the peripheral velocity of the small end of the roll and therefore the belt will exert a drag on this end of the roll in the direction of movement of the belt and since this is not resisted by a corresponding drag on the opposite end of the roll, now that the belt is considered as displaced, the drag will skew the roll in the proper direction to train the belt toward mid-position on the roll. When this desired position has been achieved the roll will return to the position with its axis at right angles to the direction of movement of the belt.

I have found that a crowned pulley when mounted on a pivot disposed at right angles to the plane of the belt produces the desired skewing action at least as certainly and positively as does the mounting of the idler on an inclined pivot, with the added advantage that such an arrangement can be used with a reversible belt.

While I have shown the invention as embodied in a specific form, it is to be understood that various changes in details may be made without departing from the scope of the invention as defined by the appended claims.

I claim:

1. A training device for a conveyer belt including a crowned roll in substantial tangential contact with said belt, means supporting said roll for free rotation about its axis under the driving action of the belt and means providing free pivotal movement of said roll in a plane parallel to the plane of said belt whereby solely under the cooperation of the different diameters of the roll with the belt the roll axis is shifted in said plane in a direction to guide the belt to a central position on the roll whenever it deviates therefrom.

2. A training device for a conveyer belt which is arranged for operation in either of two directions and including a crowned roll adapted to support the belt by tangential contact therewith, means supporting said roll to be rotated about its axis by the belt, and means supporting the roll for free pivotal movement in a plane parallel to the plane of the belt whereby upon displacement of the belt from a central position on the roll the latter is so pivoted that the belt is trained toward said central position, said pivoting resulting solely from the predominant belt drag on the small diameter of the roll toward which the belt is displaced.

3. A training device for a conveyer belt including a crowned roll in substantial tangential contact with said belt, means supporting said roll for free rotation about its axis under the driving action of the belt and means providing free pivotal movement of said roll about an axis normal to the plane of the belt and intersecting the roll axis at the center of roll length whereby solely under the cooperation of the different diameters of the roll with the belt the roll axis is shifted in a direction to guide the belt to a central position on the roll whenever it deviates therefrom.

4. A training device for a conveyer belt which is arranged for operation in either of two directions and including a crowned roll adapted to support the belt by tangential contact therewith, means supporting said roll to be rotated about its axis by the belt, and means supporting the first means for pivoting about an axis normal to the plane of the belt and intersecting the roll axis substantially at the center of length of the roll whereby solely under the cooperation of the different diameters of the roll with the belt the roll axis is pivoted in a direction to guide the belt to a central position on the roll whenever it deviates therefrom in either direction of belt travel.

5. A training device for a conveyer belt which is arranged for operation in either of two directions and including a crowned roll adapted to support the belt by tangential contact therewith, bearing means for supporting said roll to permit its rotation by the belt and pivot means supporting said bearing means and roll for limited pivotal movement about an axis at right angles to the plane of the belt, whereby upon a displacement of the belt from a central position on the roll the latter is so pivoted solely by drag of the belt on different diameters thereof that the belt is trained toward a central position.

6. A training device for a conveyer belt which is arranged for operation in either of two directions and including a hollow crowned roll adapted to support the belt by tangential contact therewith, a fixed support extending through said roll, a bearing for said roll midway of the length thereof and surrounding said support, and means pivoting said bearing to said support on an axis normal to the plane of the belt, whereby upon lateral belt displacement the drag of the belt on the unexposed small roll diameter advances that end of the roll about said pivot means to train the belt back to central position.

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