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APPARATUS FOR AUTOMATICALLY CENTERING MOVING ENDLESS BELTS

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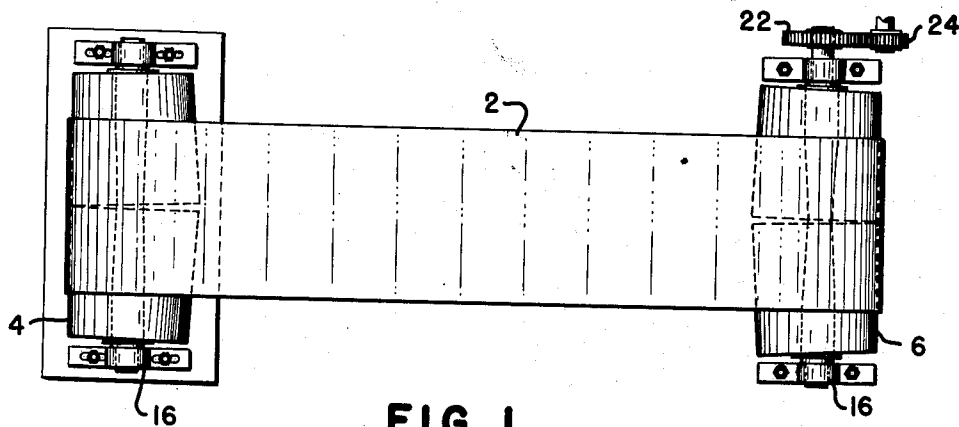


FIG. 1

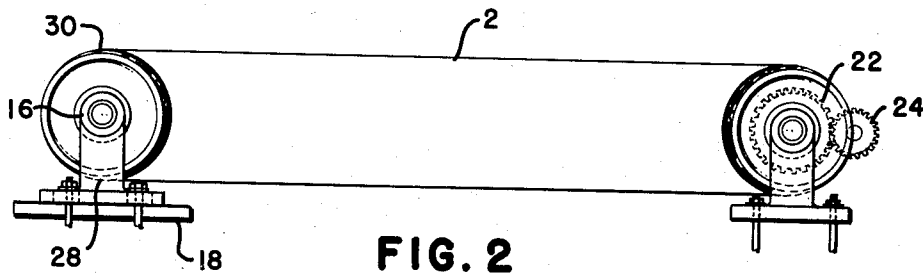


FIG. 2

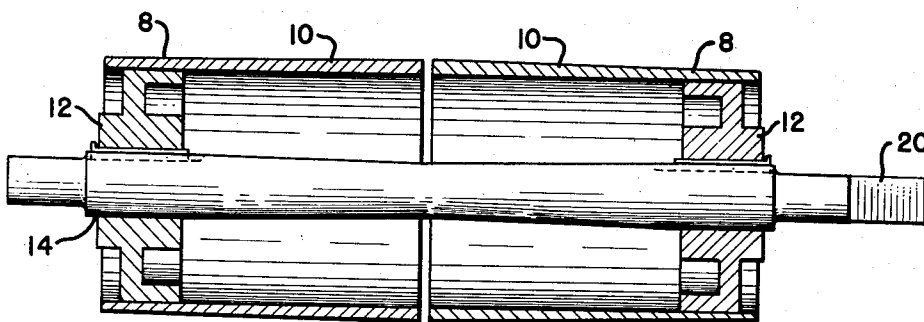


FIG. 3

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3 Claims. (Cl. 74-241)

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This invention relates to apparatus for automatically centering a moving endless belt and more particularly for centering a metallic belt which transmits power. It has been proposed to use metallic belts for this purpose but such use has never been completely successful because of difficulties encountered in maintaining the belt centered on the pulleys. For the same reason the use of metallic belts for conveying materials has not been successful. In an attempt to keep the belt centered the tension to which the belt is subjected has been increased. This requires heavier and stronger belts as well as stronger pulleys and supports. The high tensions also cause more wear and tear on the entire conveyor equipment and increases the power required to operate the tightly strung conveyor system. Thus, metallic belts are seldom used and have been replaced by rubber, leather and composition belts having a relatively low modulus of elasticity. Such belts can be kept in a substantially centered position by using common crowned pulleys and low tensions. However, even with belts of low modulus of elasticity, there is a tendency for the belt to get off-center when the belt is of great length, thus damaging the edges of the belt.

It is therefore an object of my invention to provide apparatus which can automatically center a moving endless belt of either high or low modulus elasticity.

This and other objects will be more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is a top plan view of the apparatus of my invention;

Figure 2 is a side view of the apparatus of Figure 1; and

Figure 3 is a sectional view of a pulley used in Figure 1.

Referring more particularly to the drawings, the reference numeral 2 indicates an endless metal belt which passes round the spaced apart pulleys 4 and 6. As shown, each of the pulleys 4 and 6 is an automatic centering roll of the type shown in my copending application, Serial No. 145,648, filed February 23, 1950, now Patent No. 2,593,158, dated April 15, 1952. However, these automatic centering rolls may also be of the type disclosed in my copending applications, Serial No. 97,218, filed June 4, 1949, now Patent No. 2,593,157, dated April 15, 1952, and Serial No. 138,389, filed January 13, 1950, now Patent No. 2,592,581, dated April 15, 1952. Each of the pulleys 4 and 6 is made up of a pair of opposed

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frusto-conical rolls 8 which are arranged with the large diameter ends of the rolls adjacent each other. In actual practice the inner ends of the rolls 8 need only be three to ten thousandths larger in diameter than the outer end of the roll. Each of the rolls 8 consists of a rim portion 10 fastened to a hub portion 12 which is keyed to a rotatable shaft 14. The shaft 14 is mounted in bearings 16. The bearings 16, for at least one of the pulleys, are mounted for adjustment on a bed plate 18 in order to permit alignment of the axes of the pulleys 4 and 6. One of the shafts 14 extends beyond the bearing 16 in order to provide means for driving the roll. For example, a shaft extension 20 may have a gear 22 mounted thereon which is driven by a pinion 24. The slight normal resilience in the materials of which the roll assembly is constructed is utilized to secure deflection and resultant progressive tilting and inward movement of the rotating rims of rolls 8 at the large ends of the rolls on the strip approach side when the assembly is under belt pressure.

As shown in Figure 2, the belt 2 is rotating in a clockwise direction and will contact the left hand pulley at point 28 and will leave the roll at point 30. Between points 28 and 30 each increment of surface area on the rolls 8 will converge toward the transverse center of the shaft, while between points 30 and 28 each increment will diverge. Thus, between points 28 and 30 there will be a centering restoring force which will center the belt 2 on the pulleys. This centering force is due to the deflection and resultant progressive tilting and inward movement of the rotating rims 10 at the large ends of the rolls on the strip approach side. In some systems only one automatic centering roll need be used while the other pulley can be a regular pulley. The total pressure on belt 2 against each conical roll 8 must always be the same. Therefore, if the unit pressure on one conical roll is different than on the other conical roll, the centerline of the belt 2 will move off the center pass line of the pulley in the direction of least unit pressure until the total pressure on the conical rolls is in balance. The belt will then continue to pass over the pulleys in this exact position. If the belt 2 is operating off the center pass line it can be moved to the center pass line by tilting either pulley slightly in a direction parallel to the direction of strip travel. This equalizes the unit bearing pressures between the strip and each conical roll of the pulley.

While one embodiment of my invention has been shown and described it will be apparent that

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other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. Apparatus for automatically centering a moving endless belt comprising a pair of rotatable pulleys around which the belt passes, at least one of said pulleys being a transversely split automatic centering roll in which each increment of surface area of the roll in contact with the belt will converge toward the center of the roll, and in which means are provided to positively cause both parts of the roll to rotate at the same angular velocity.

2. Apparatus for automatically centering a moving endless belt comprising a pair of rotatable pulleys around which the belt passes, at least one of said pulleys comprising a pair of opposed frusto-conical rotatable rolls with the large diameter ends of said rolls being adjacent each other, the rotating rims of said rolls being free to deflect and move toward each other progressively on the belt approach side, and means for causing both rolls to rotate at the same angular velocity.

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3. Apparatus for automatically centering a moving endless steel belt comprising a pair of rotating pulleys around which the belt passes, each of said pulleys comprising a pair of opposed frusto-conical rotatable rolls with the large diameter ends of said rolls being adjacent each other, the rotating rims of said rolls being free to deflect and move toward each other progressively on the belt approach side, means for causing both rolls to rotate at the same angular velocity, and means for changing the position of the axis of rotation of one pulley in respect to the axis of the other pulley.

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