BELT GUIDE AND TENSIONING DEVICE

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Fig. 1.

Fig. 2.

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BELT GUIDE AND TENSIONING DEVICE

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7 Claims. (Cl. 74—241)

1 The present invention relates generally to belt

guides for centering a belt or traveling web upon

a pulley or carrier roll.

The invention has primarily for its object to pro-

vide a comparatively simple and highly sens-

itive device, actuated upon transverse shifting of

a belt or web to cause the same to center itself

upon a pulley or carrier roll.

Incidental to the foregoing, a more specific

object of the invention resides in the provision

of a device of the foregoing character for vary-

ing the tension upon opposite sides of a belt upon

transverse shifting of the same, causing the belt

to center itself.

Another object is to accomplish the foregoing

by means of a transverse tension roller engaging

a stretch of belt and pivotally mounted about an

axis at a right angle to the plane of the belt sur-

face and the longitudinal axis of said roller, to

increase tension upon one side of the belt and

relieve the same upon the opposite side upon

oscillation about its pivotal axis in symphysis

with lateral shifting of said belt.

Still another object is to automatically deter-

mine the angular position of the tension roller

with relation to the belt, by means effected by

either one or both edges of the belt.

A further object of the invention resides in

the provision of a combination tensioning and

guide.

In addition to all foregoing, other objects will

appear as the description proceeds, and while

the accompanying drawing illustrates one com-

plete physical form of the invention in accord-

ance with the best mode so far devised, it is to

be understood that changes in the precise em-

bodiment of the invention are contemplated

within the scope of the appended claims.

In the drawing:

Fig. 1 is a longitudinal sectional view of a belt

guide and tensioning device incorporating the

principles of the present invention, the same

being taken substantially on the line 1—1 of

Fig. 2; and

Fig. 2 is a plan view with parts broken away

to more clearly illustrate structural detail.

For the purpose of explanation the present

invention has been illustrated, and will be described,
in connection with a continuous belt or con-

veyor. However, it is to be understood that the

same is equally applicable to a web traveling over

carrier roll, such as in rewinding apparatus,

paper making machines, and the like. There-

fore, in referring to a pulley and belt throughout

the specifications and claims, it is to be under-

stood that the terms also include traveling webs

of any character and carrier rolls.

Referring now more particularly to the accom-

panying drawing, the numeral 1 designates a

frame in which a pair of spaced rolls 2 are jour-

naled to carry a continuous belt or conveyor 3.

A pair of brackets 4 secured to opposite sides

of the frame 1, support a channel cross-beam 5

to which a depending bearing 5 is secured inter-

mediate its ends and centrally of the belt 3.

Journalled within the bearing 6 is a pindle 7 that

carries a cross-arm 8 secured to its upper end for

oscillatory movement about the vertical axis of

the pindle.

A pair of brackets 9 secured to the opposite

ends of the cross-arm 8 have journaled therein

a pair of spaced tension rollers 10, transversely en-

gaging the upper face of the lower stretch 11 of

the belt 3. By the foregoing arrangement it will

be apparent that the weight of the roller assem-

by, including the pindle 7 and cross-arm 8, cre-

ates a tightening tension on the belt, which in addition

to the weight of the assembly can be regulated throu-

gh adjustment of a set collar 11' secured

to the lower end of the pindle 7 to determine the

upper position of the tension rollers.

Adjustably secured upon the pindle 7 inter-

mediate the cross-beam 5 and cross-arm 8 is a

split clamp 12, to which a lever 13 is attached

and provided at its free end with oppositely

extending arms 14, upon which grooved rollers

15 are mounted for engaging opposite edges of

the lower belt stretch 11.

In operation, with the belt normally central-

dized on the carrier rolls 2, the lever 13 is ad-

justed on the pindle 7 to accurately position the

tension rolls 19 at an exact right angle to the

longitudinal axis of the belt 3, thus creating a

uniform tension upon the belt across its entire

width.

In the event the belt should shift laterally in

either direction, its edges engaging the pulleys

15 will cause the lever 13 to shift and oscillate

towards the adjacent carrier roll 2, serving to

increase tension on that side of the belt, while

the opposite ends of the rollers moving away

from the carrier roll relieve the tension upon

that side. Upon the crown pulley principle, the

traveling belt naturally has a tendency to shift

in a direction to equalize the tension across the

belt, which would be towards the center of the

carrier rolls, inasmuch as the increased ten-

sion upon the belt is created on the side toward
which the belt shifts. For example, should the belt shift toward the dotted line \( a \) in Fig. 1, the lever 13 would also be rotated in the same direction by the rollers 15 engaging the edges of the belt. In turn the tension rollers 10 would be rotated about the axis of the pin 7 to shift the ends \( b \) toward the adjacent carrier roll 2 to increase tension upon the edge \( c \) of the belt, and at the same time relieve tension upon the opposite side. As explained the belt then has a tendency to shift towards the center of the roll to relieve the increased tension upon the side \( c \) of the belt, and in doing so causes the lever 13 to shift and return the rollers 10 to their normal position at right angles to the longitudinal axis of the belt.

Another occurrence in the operation of the present guide resides in the fact that when the tension rollers assume an oblique angle with respect to the direction of travel of the belt, the belt naturally has a tendency to avoid friction necessarily resulting from slippage between the rollers and belt because of relative different directions of travel, and to accomplish this the belt has a tendency to follow the direction of rotation of the rollers, which is at a right angle to their longitudinal axes, and that would be toward the normal centralized position of the belt on the carrier rolls.

Another highly important feature of the invention resides in positioning the tension rollers closer to one of the carrier rolls than the other, which materially increases the sensitiveness of the device for several reasons.

For instance, if the tension rollers 10 were positioned to engage the belt 3 centrally of the carrier rolls, oscillation of the tension rolls would not effect a variation of tension upon opposite sides of the belt, as the opposite ends of the rolls would then merely equalize each other, leaving only the tendency of the belt to follow the direction of rotation of the tension rolls to return the belt to a centralized position on the carrier rolls.

By positioning the tension rollers closer to one of the carrier rolls than to the other, the angle of the stretch of belt between the tension rollers and the closest carrier roll is materially greater than the angle of the belt between the tension rolls and the other carrier roll. Therefore, oscillation of the tension rolls effects a greater ratio of variation in the respective angles of the engaged stretch of the belt, variation in the angle of the shorter stretch being materially greater than variation of the angle in the longer stretch. Also, the greater the angle of the belt between the tension rolls and one of the carrier rolls, the greater the resulting variation in tension upon opposite sides of the belt upon oscillation of the tension rolls.

From the foregoing, considered in connection with the accompanying drawing, it will be apparent that an exceedingly simple, effective and highly sensitive guide has been devised for centralizing and tensioning traveling belts or webs.

In the mechanical form of the invention illustrated and described, because of the leverage provided for oscillating the tension rolls, the device is extremely simple and accurate in operation even in the absence of close workmanship and small tolerances. Further, inasmuch as minimum pressure against the anti-friction rollers 16 is required to oscillate the tension rolls through the leverage of the lever 13, and the fact that centralizing of the belt is accomplished by rollers traveling in substantially the same direction as the belt, friction and wear upon the belt is reduced to a minimum.

Also, by increasing the angle of the belt between the tension rollers and the adjacent carrier roll over which the belt travels from the tension rolls to the direction indicated by the arrow in Fig. 2, the contact between the belt and said carrier roll is reduced to a minimum, and consequently less action is required upon the belt by the tension rolls in returning the belt to a central position.

While two tension rollers have been illustrated and described it is to be understood that the invention contemplates the use of a single roller. However, two parallel tension rolls having their longitudinal axes equally spaced from their axes of oscillation are preferred, in that the resulting plurality of spaced contacts with the belt, increases frictional action of the guide upon oscillation, over that of a single roller the longitudinal axis of which intersects its axis of oscillation, all of which adds to the sensitiveness of the device. A single roller whose longitudinal axis is offset from its axis of oscillation, preferably on the side of the axis of oscillation opposite the belt or web-engaging rollers 18, may also be employed to advantage.

While a positive mechanical structure has been illustrated for effecting oscillation of the tension rollers, it is to be understood that any means for accomplishing this result, are contemplated within the scope of the invention. For instance, various conventional electronic devices effective by the position of the belt on the carrier rolls may be employed for oscillating the pinle 1 in synchronism with shifting of the belt.

I claim:

1. A guide for a continuous belt or web traveling over spaced carrier rolls comprising, a tension roller transversely engaging a stretch of said belt or web intermediate the carrier rolls and maintaining it under substantial tension, said tension roller being pivotally mounted for oscillation in a plane parallel to the plane of the engaged stretch to vary tension upon opposite sides of said belt and having its longitudinal axis offset from its axis of oscillation, and means effecting by the position of said belt for oscillating said roller.

2. A guide for a belt or web traveling over spaced carrier rolls comprising, a tension roller transversely engaging a stretch of said belt or web intermediate said carrier rolls and maintaining it under substantial tension, said tension roller being pivotally mounted for oscillation in a plane parallel to the plane of the engaged stretch and about an axis perpendicular thereto and positioned centrally of the longitudinal edges of said belt to vary tension upon opposite sides of said belt, the longitudinal axis of the tension roller being offset from its axis of oscillation, and means effecting by the position of said belt for oscillating said roller about said perpendicular axis.

3. A guide for a belt or web traveling over spaced carrier rolls comprising, a tension roller transversely engaging a stretch of said belt or web intermediate said carrier rolls and maintaining it under substantial tension, said tension roller being pivotally mounted for oscillation in a plane parallel to the plane of the engaged stretch and about an axis perpendicular thereto and positioned centrally of the longitudinal edges.
of said belt to vary tension upon opposite sides of said belt, said tension roller being positioned at a point closer to one of said carrier rolls than to the other and having its longitudinal axis offset from its axis of oscillation, and means effected by the position of said belt for oscillating said roller.

4. A guide for a continuous belt or web traveling over spaced carrier rollers comprising, a tension roller transversely engaging a stretch of said belt or web intermediate said carrier rolls and maintaining it under substantial tension, said tension roller being pivotally mounted for oscillation in a plane parallel to the plane of the engaged stretch to vary tension upon opposite sides of said belt, and a lever assembly engaged by the edges of said belt and connected with said tension roller for oscillating the same upon lateral shifting of the belt, the longitudinal axis of the tension roller being offset from its axis of oscillation on the side thereof opposite the lever assembly.

5. A guide for a continuous belt or web traveling over spaced carrier rollers comprising, a tension roller transversely engaging a stretch of said belt or web intermediate said carrier rolls said tension roller being pivotally mounted for oscillation in a plane parallel to the plane of the engaged stretch to vary tension upon opposite sides of said belt, and a lever assembly engaged by the edges of said belt and connected with said tension roller for oscillating the same upon lateral shifting of the belt, the longitudinal axis of the tension roller being offset from its axis of oscillation on the side thereof opposite the lever assembly.

6. A guide for a belt or web traveling over spaced carrier rolls comprising, a horizontal tension roller transversely engaging a stretch of said belt or web intermediate the carrier rolls said tension roller being pivotally mounted for oscillation in a horizontal plane and about a perpendicular axis positioned centrally of the longitudinal edges of said belt and at a point closer to one of said carrier rolls than the other to vary tension upon opposite sides of said belt, and a lever assembly engaged by the edges of the belt and connected with the tension roller for oscillating said roller upon lateral shifting of the belt, said tension roller further being movable vertically, thereby to maintain the belt or web under substantial longitudinal tension, and the longitudinal axis of the tension roller being offset from its axis of oscillation on the side thereof opposite the lever assembly.

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