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APPARATUS FOR CONTROLLING TENSION IN CORD WOUND FROM ONE PACKAGE TO ANOTHER

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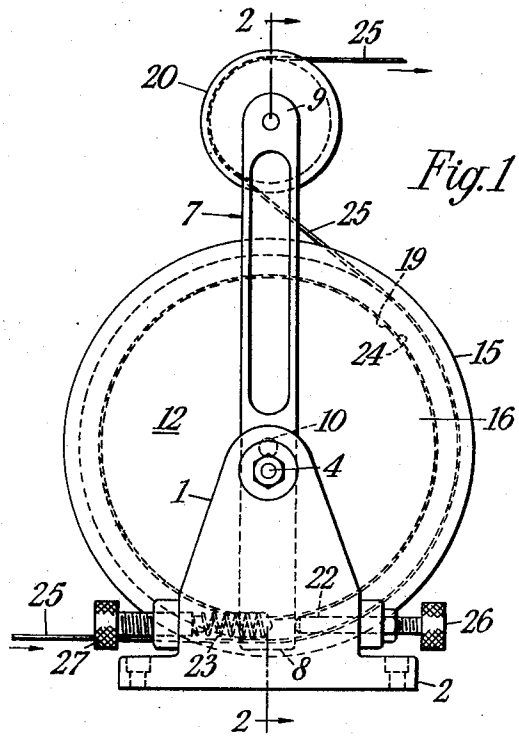



Fig. 1

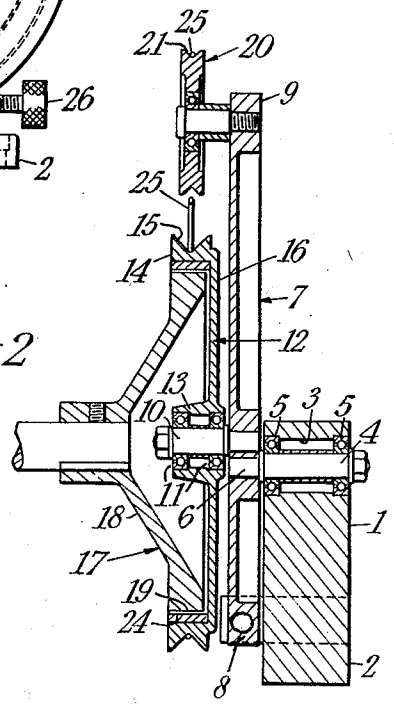



Fig. 2

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# APPARATUS FOR CONTROLLING TENSION IN CORD WOUND FROM ONE PACKAGE TO ANOTHER

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Claims priority, application Great Britain July 19, 1955

8 Claims. (Cl. 242—45)

This invention relates to apparatus for controlling tension in textile and like material as it is wound from one package to another.

The object of the invention is to provide an improved tension-controlling apparatus for textile and like material.

According to the invention apparatus for controlling the tension in a textile or like material and maintaining it at a predetermined value during winding on a package or other support comprises a driving member rotatable at a predetermined speed, a rotatable drum to be engaged by said textile or like material and adapted to be driven by said member, a lever angularly-movable against spring means by the tension in said textile or like material on the output side of the apparatus and means associated with said lever for moving the drum into and out of engagement with the driving member if the tension in the textile or like material respectively rises above or falls below a predetermined value.

Preferably the lever is secured intermediate its ends to a spindle rotatably mounted in a bracket and one end of the lever is spring-loaded against an adjustable stop to maintain it central relative to the bracket. The other end of the lever is provided with a pulley. A drum is rotatable about a spindle mounted on the lever, said two spindles being spaced slightly apart along the longitudinal axis of the lever. A driving member rotates within the drum, being normally spaced therefrom and co-axial therewith, but on angular movement of the lever in one direction, i. e., against said spring, the drum is angularly-moved to contact, and be driven by, the driving member. The pulley and drum may be provided with peripheral grooves.

A particularly important application of apparatus in accordance with the invention is in connection with the production of tyre casings from long lengths of cord as described in co-pending application Serial Number 491,295, filed March 1, 1955.

A preferred embodiment of the invention will now be described with reference to the accompanying drawings, of which:

Figure 1 is a side elevational of an apparatus constructed according to the invention, and

Figure 2 is a section taken on the line 2—2 of Figure 1.

According to this embodiment of the invention the apparatus comprises a bracket 1 of substantially triangular shape, the base 2 thereof being bolted to a fixed support. A hole 3 is provided through the apex of the bracket 1 and a bracket spindle 4 is rotatably secured in bearings 5 therein and projects outwardly of one end thereof at 6. A lever 7 is mounted on said projecting end 6 of the spindle 4, one end 8 of said lever 7 being located substantially between the ends of the base 2 of the bracket 1, and the other end 9 of the lever 7 projecting away from the apex of the bracket 1. The lever is thus angularly



movable in a plane parallel to that of the triangular bracket 1.

Secured to the lever 7 on the longitudinal axis thereof, immediately adjacent said bracket spindle 4 and on the side thereof remote from the base 2 of the bracket 1, is a drum spindle 10 which extends axially away from the apex of the bracket 1. The axis of the drum spindle 10 is parallel to that of the bracket spindle 4 and the two axes are spaced apart on the longitudinal axis of the lever arm 7 by a short distance only, e. g. half an inch. Mounted on bearings 11 on said drum spindle 10 is a drum 12 comprising a hub 13, an axially-extending flange 14 having a grooved outer periphery 15 and an annular web 16 connecting the hub 13 with the edge of the flange 14 adjacent the lever arm 7.

Mounted within the drum 12 is a driving member 17 comprising a dished annulus 18, the outer periphery 19 of which is very slightly smaller, e. g. 0.015 inch, than the inside diameter of the drum 12. This member 17 is adapted to be driven at a constant and predetermined speed.

A grooved pulley 20 is rotatably mounted on the end 9 of the lever 7 remote from the base of the triangular bracket 1, the groove 21 of said pulley being in line with the groove 15 in the outer periphery of the drum 12. The other end 8 of the lever 7 is forced against an adjustable stop 22 associated with the base 2 of the bracket 1 by means of an adjustable spring 23, also associated with said bracket 1. With the lever 7 in a substantially central position relative to the base 2 of the bracket 1 the drum 12 is positioned co-axially relative to the driving member 17 so that the outer periphery 19 of said driving member 17 is spaced an equal distance all round from the inner periphery 24 of the drum 12.

In operation, rubber-coated cord 25 from a rubber-extruding device of known type is passed around part of the grooved periphery 15 of the drum 12 and thence around part of the periphery 21 of the grooved pulley 20 from where it passes to the arm of a tyre-winding apparatus. The direction of the cord 25 from the output side of the grooved pulley 20 is such that on tensioning the cord 25 the lever 7 is moved angularly against its spring 23 and on releasing the tension the lever 7 is forced back by the spring 23 to its central position. On angularly moving the lever 7 from its central position the drum 12, which rotates about the spindle 10 carried by said lever 7, is moved so that the inner periphery 24 thereof contacts the outer periphery 19 of the driving member 17.

The apparatus is set for any desired cord-output tension by adjusting the load of the spring 23 on the end 8 of the lever 7. The driving member 17 is rotated in the appropriate direction at a uniform speed which, when said member 17 is in driving engagement with the drum 12, will rotate the drum 12 to give a peripheral speed greater than the required cord speed of the tyre-winding apparatus. The cord 25 is rubber-covered and there is no slip between it and the drum 12.

If the cord tension on the output side of the apparatus increases above a predetermined value it angularly moves the lever 7 against its spring 23 and thus moves the drum 12 from a position in which it is coaxial with the driving member 17, so that there is no driving engagement, to a position in which a portion of the inner periphery 24 of the drum 12 contacts a portion of the periphery 19 of the driving member 17, thus effecting driving engagement between the member 17 and the drum 12. The rotating drum 12 draws the cord 25 through the extruder and decreases the tension on the output side of the apparatus. When the tension decreases below the predetermined value the lever 7 is moved back by the spring 23 to a central position in which the drum 12 is once more disengaged from the driving member 17.

Owing to the very small angular movement of the lever **7** necessary to engage and disengage the drive, this "hunting" of the device is extremely rapid, and in practice it has been found possible to maintain a constant output tension within very fine limits.

The apparatus may be slightly modified to facilitate laying the cord **25** around the drum **12** and pulley **20**, and in another embodiment of the invention, the lever **7** is cranked at right angles midway between its ends, the base of the triangular bracket **1** thus being parallel to the portion **9** of the lever **7** to which the pulley **20** is attached. The apparatus is otherwise as hereinbefore described. The advantage of this form of construction is that a loop of cord **25** may be directly fitted to the drum **12** without the necessity of having to thread one end between the bracket **1** and the motor for driving the driving member **17**.

The engaging surfaces **19**, **24** of the drum **12** and driving member **17** are preferably of a suitable metal, or two dissimilar metals. Alternatively one or both may be made of a brake lining material or any other similar suitable material. Wear of these surfaces can be compensated for by adjustment of the stop **22** and spring **23** by the respective adjusting screws **26**, **27**.

Although the apparatus has been specifically described in relation to the tensioning of a cord it is not intended that the invention should be limited to its application to cord only, as it will be clear from the foregoing disclosure that the apparatus can readily be adapted to controlling the tension in, e. g. ribbands and tapes, and other textile materials of a like nature.

Having now described my invention, what I claim is:

1. Apparatus for controlling the tension in a textile material and maintaining it at a predetermined value during winding on a package or other support comprising a driving member rotatable at a predetermined speed, a rotatable drum to be engaged by said textile material and adapted to be driven by said member, a lever angularly-



movable against spring means by the tension in said textile material on the output side of the apparatus and means associated with said lever for moving the drum into and out of engagement with the driving member if the tension in the textile material respectively rises above, or falls below, a predetermined value.

2. Apparatus according to claim 1 wherein said lever is secured intermediate its ends to a spindle rotatably mounted in a bracket, one end of said lever being spring-loaded against an adjustable stop whereby said lever is spring-urged to a position in which the drum is out of engagement with the driving member.

3. Apparatus according to claim 2 wherein said drum is rotatable about a spindle mounted on said lever, said drum spindle and said lever spindle being spaced apart on the longitudinal axis of said lever.

4. Apparatus according to claim 1 wherein said driving member rotates within said drum and is normally spaced therefrom, angular movement of said lever against said spring displacing said drum in relation to said driving member to effect frictional engagement between said drum and driving member.

5. Apparatus according to claim 4 wherein a pulley to be engaged by said textile material is rotatably associated with the end of said lever remote from said spring.

6. Apparatus according to claim 5 wherein said lever is adapted to be moved against said spring by an increase in the tension on the output side of the textile material being drawn in opposite senses around said drum and said pulley respectively.

7. Apparatus according to claim 6 wherein said pulley is peripherally grooved.

8. Apparatus according to claim 1 wherein said drum is peripherally grooved.

No references cited.