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Kimpton

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[54] **APPARATUS FOR CONTROLLING THE TENSION OF YARN, WIRE, CORD OR THE LIKE**

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[52] **U.S. Cl.** **242/156.2,** 242/75.46

[51] **Int. Cl.** **B65h 59/04**

[58] **Field of Search** .. 242/156.2, 156, 156.1, 129.8, 242/75.46

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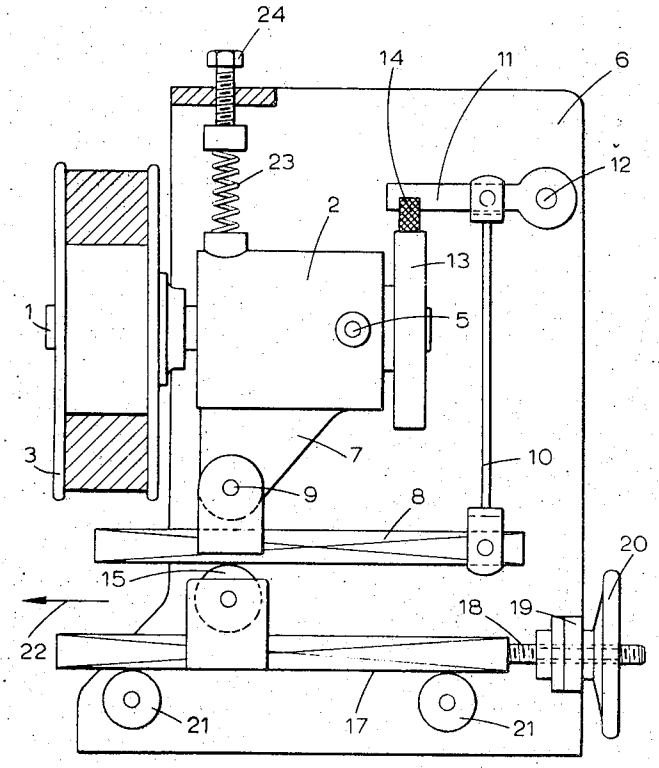
Primary Examiner—Stanley N. Gilreath

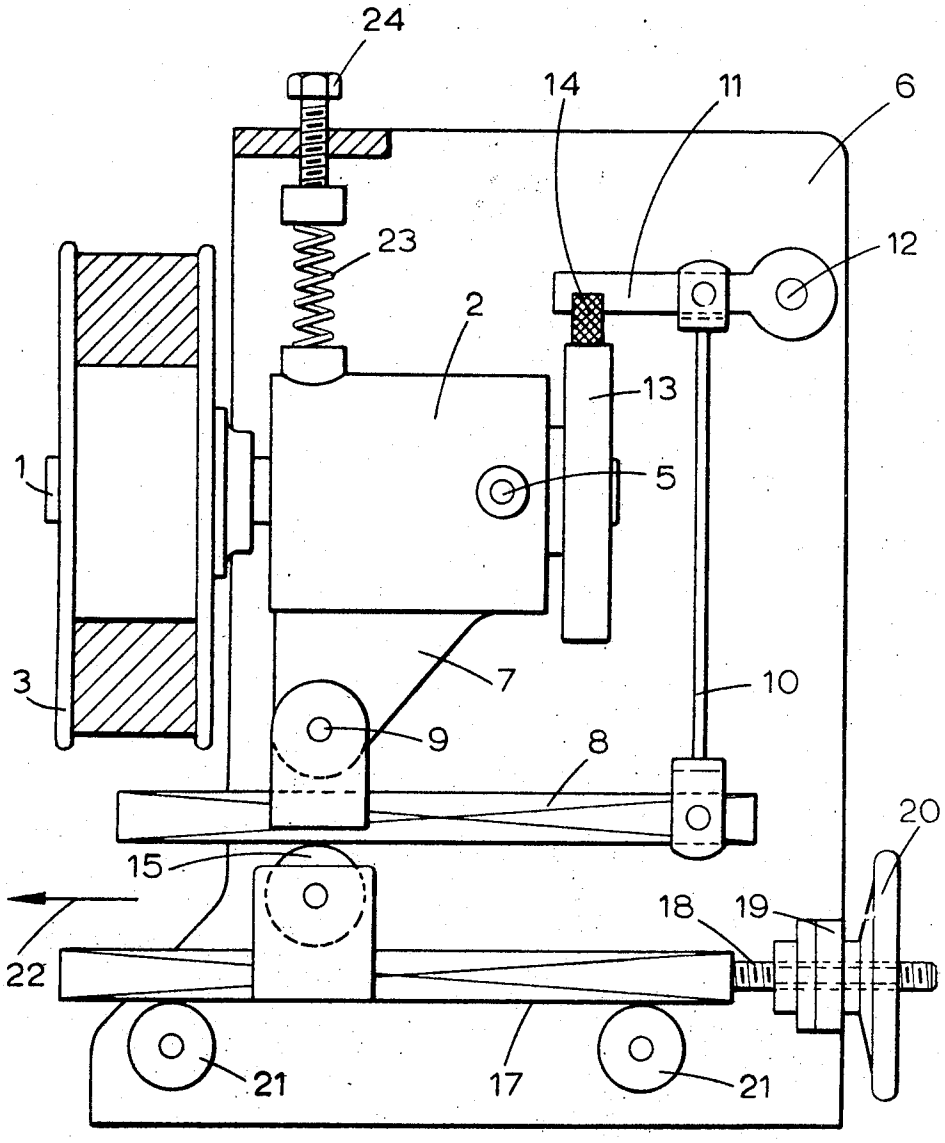
Attorney, Agent, or Firm—William R. Liberman

[57] **ABSTRACT**

An apparatus for controlling the tension of yarn, wire, cord or similar elongate material being withdrawn from or taken up on to a package. A spindle is mounted for rotation about its longitudinal axis and is also rotatable about a pivot at right angles to the longitudinal axis of the spindle in dependence on the weight of the package. Brake means are operable to apply a braking force to the spindle and a lever is movable in accordance with movement of the spindle about its pivot to control the braking force. A fulcrum bears on the lever. The position of the fulcrum is adjustable lengthwise of the lever. Means are provided for applying an adjustable pressure loading on the spindle to bias movement of the spindle about its pivot.

4 Claims, 1 Drawing Figure




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APPARATUS FOR CONTROLLING THE TENSION OF YARN, WIRE, CORD OR THE LIKE

BACKGROUND OF THE INVENTION

When it is required to pull wire or cord from a package, the usual procedure is to place the package on a free-running spindle so that it may rotate as the wire or cord is drawn from the package. Braking means are provided to obtain a steady drag or tension to the wire or cord as it is drawn from the package. A simple way of doing this is to fit a pulley to the spindle and hang a strap with weight in a position to apply the friction of the strap to the face of the pulley.

If, for example, the full wound package is of 12 inches in diameter, and a force is applied to the pulley to give a pull or drag on the wire cord of 1 lb., then as the material is withdrawn from the package and diminishes in diameter, the tension in the cord or wire increases. This is because, the drag has remained constant, but the distance of the wire or cord from the centre of the spool as it is drawn off the spool has reduced due to the reduction of the diameter of the wound spool and the tension in the wire or cord is therefore increased to produce a force still sufficient to overcome the drag.

In applications where constant or substantially constant tension in wire or cord is important, it is necessary continually to decrease the drag provided by the braking means and this of course means constant supervision.

The present invention is based on the realization that, as the wound package decreases in diameter so also does its weight.

The accompanying drawing is a sectional elevation of a tension control device according to the invention.

DESCRIPTION OF A PREFERRED EMBODIMENT

The device illustrated in the drawing comprises a spindle **1** mounted on two ball raises (not shown) in a housing **2** so that it can rotate about its longitudinal axis. In this way, the spindle **1** is provided with a substantially play-free support. A package or spool **3** containing wire or other material is mounted on an end portion of the spindle **1**. The bearing housing **2** is mounted on a pivot **5** on a frame **6** so that it is capable of movement about an axis at right angles to the longitudinal axis of the spindle **1**. Obviously, the spool **3** will tend to fall around the pivot **5** under the action of gravity.

The housing **2** has lugs **7** (only one of which is visible on the drawing) integral with it and a brake control lever or bar **8** is carried by a pivot pin **9** extending between these lugs. A rod **10** connects one end of the bar **8** with a lever **11** mounted on a pivot pin **12** on the frame. A brake pulley **13** is mounted on the end of the spindle **1** opposite to that carrying the spool **3**.

A brake pad **14** of suitable material is carried by the lever **11** and bears on the periphery of the pulley **13**.

A roller **15** bears on the underside of the bar **8** and is supported by a support bar **17** having a threaded aperture and a complementary threaded shaft **18** rotatably mounted in a bracket **19** fixed to the frame **6**. The threaded shaft **18** carries a turning knob **20** so that the position of the bar **17**, which is supported on rollers **21** can be adjusted lengthwise of itself by rotation of the knob **20**. The roller **15** acts as fulcrum for the bar **8**.

It will be appreciated, that if the axes of the pivot pin **9** and roller **15** are vertically in line, the roller **15** will support all the weight created by the spool **3** and all the components between the spool and the pivot **5**. Thus, the brake pad **14** will not apply any load or braking force to the pulley **13**.

If the roller **15** is moved in the direction of the arrow **22** by suitable rotation of the knob **20**, the connecting rod **10** will act on the lever **11** so that a load is applied to the brake pad **14**. Obviously, the greater the movement of the roller **15** in the direction of the arrow **22**, the greater the load applied by the brake pad **14** to the pulley **13** and there will consequently be a greater drag on wire being pulled from the spool **3**. As wire is unwound from the spool, the latter obviously becomes lighter in weight and the pressure between the brake pad **14** and the pulley **13** becomes less.

In a typical practical example, a fully wound spool **3** has a weight of 40 lbs., a diameter of 10 inches and when empty, a diameter of 5 inches and a weight of only 5 lbs. Thus, the diameter ratio or leverage factor is 2:1 but the weight ratio is 8:1. As the weight is used to effect braking of the spindle **1**, it is necessary to compensate for the differences in these ratios. In the present invention this is done by adding bias pressure or weight to the rotating spool **3**. In this typical example 30 lbs, would be added to make full bobbin weight 70 lbs, and the empty 35 lbs, so as to create a weight ratio of 2:1 which is the same as the leverage factor. Thus as the spool **3** empties, the decrease in the diameter of the spool (resulting in an increase in the yarn or wire tension), reduces the weight of the spool, and thus the braking force applied by the brake pad **14** to the pulley **13** decreases in substantial proportion thereto.

This additional pressure to be applied to the spool is affected by means of a spring **23** bearing on the housing **2**. The loading of the spring **23** can be adjusted by rotation of a screw **24**. By this means additional pressure may be easily adjusted as required. Final adjustments may be made by turning the knob **20** to alter the position of the fulcrum provided by the roller **15**.

If desired, a piston and cylinder device may be used instead of the spring **23**.

Although the invention has been described in connection with the withdrawal from a package, i.e., as applied to a package which progressively reduces in size, it will be appreciated that it is also applicable to the reverse operation to produce an increasing pressure of the braking means as the size of a package increases when yarn or the like is taken up on to a package.

What I claim is:

1. An apparatus for controlling variation in the tension of wire, yarn or other material being withdrawn from or taken up on to a rotating package comprising a spindle mounted for rotation about its longitudinal axis and also rotatable about a pivot at right angles to the longitudinal axis of the spindle in dependence on the weight of the package, brake means operable to apply a braking force to the spindle, a lever movable in accordance with movement of the spindle about its pivot to control the said braking force, a fulcrum bearing on the lever, means for adjusting the position of the fulcrum lengthwise of the lever, and means for applying an adjustable pressure loading on the spindle to bias movement of the spindle about its pivot.

2. An apparatus as claimed in claim 1 and including a bearing housing rotatable about said pivot at right angles to the longitudinal axis of the spindle, the said spindle extending through the housing and projecting from each end thereof; said brake control lever being carried pivotally from the bearing housing; said brake means including a brake pulley on one end of the spindle and a brake pad bearing on said brake pulley and connected with the brake control lever so that the braking force applied to the brake pulley is dependent on the pivotal movement of the brake control lever; and said fulcrum including a roller bearing on the brake control lever.

3. An apparatus as claimed in claim 2, wherein said means for adjusting the position of the fulcrum roller includes a support bar mounting said roller and a screw threaded shaft connected to said bar whereby rotation of the shaft adjusts the position of the fulcrum roller lengthwise of the brake control lever.

4. An apparatus as claimed in claim 3, wherein said means for applying an adjustable pressure loading on the spindle includes a spring bearing on the bearing housing between the package and the pivot of the housing to bias movement of the spindle about its pivot, and means for adjusting the loading of the spring.

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