

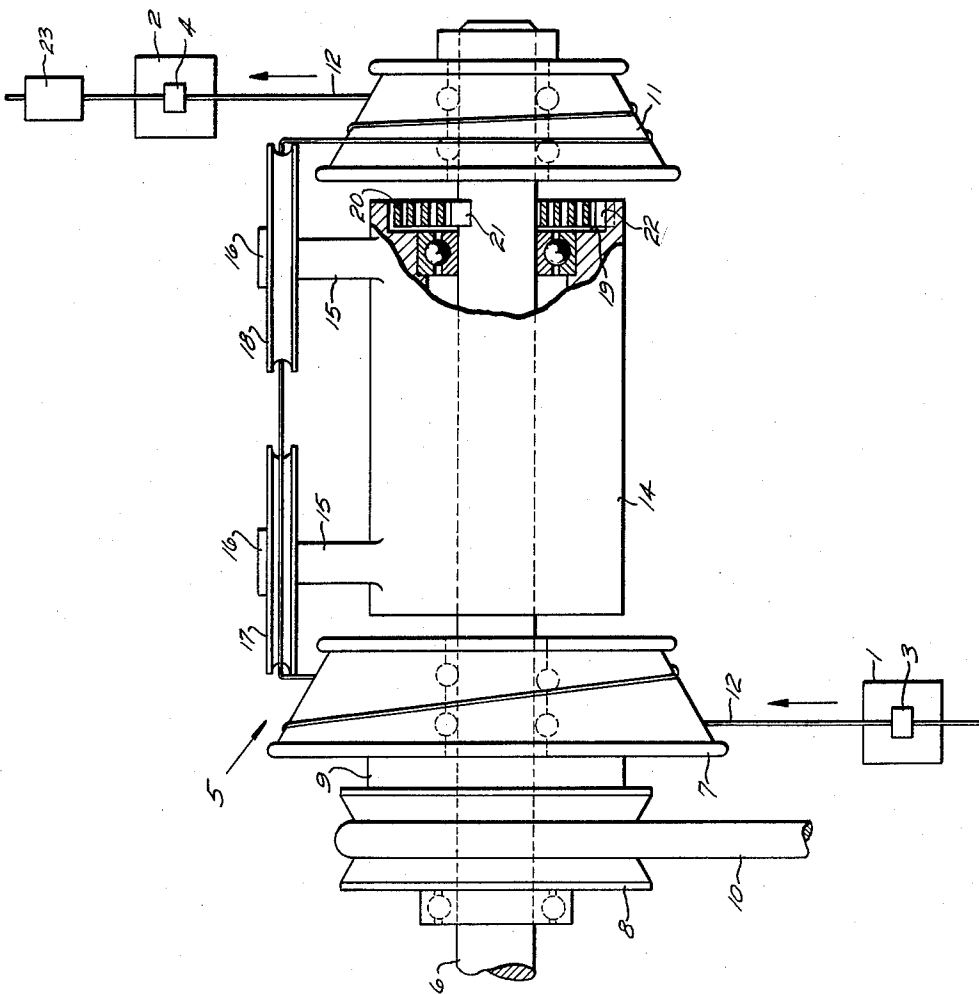
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A. C. NYSTROM

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WIRE TENSIONING DEVICES

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INVENTOR
A.C. NYSTROM

W. A. Johnson
ATTORNEY

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WIRE TENSIONING DEVICES

Axel C. Nystrom, Rutherford, N.J., assignor to Western Electric Company, Incorporated, New York, N.Y., a corporation of New York

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5 Claims. (Cl. 205—16)

This invention relates to tension devices, particularly tension devices having wire drawing units.

There are many applications, particularly in the wire industry where over-running capstans are employed to control tension in a moving wire. All capstans in wire drawing machines located between a string of dies operate in a range of approximately 2% overdrive. This is to insure a sufficient supply of wire to the drawing die, regardless of unevenness of wear in the die string. It is necessary to maintain some back tension in the wire or filament feeding into the die following the overdriven capstan to prevent an excessive buildup. It is also necessary to provide sufficient tension in the wire or filament to draw the wire through the die ahead of the over-running capstan. At present, this control is accomplished by winding a number of turns on an over-running capstan which has been determined from trial and error and the variation can only be controlled by a complete turn of 360°.

An object of the present invention is a tension device wherein any predetermined tension may be preset therein for a wire it is to control.

In accordance with the object, the tension device is for wire processing units including a driven capstan having a variable pulling force on a wire by a variable number of partial turns of the wire thereon to pull the wire through one unit, a rotatable shive having a number of partial turns of the wire thereon, and means interposed between the capstan and the shive to maintain a predetermined tension in the wire by transferring partial turns from the shive to the capstan when the tension increases to increase the pulling force of the capstan.

Other objects and advantages will be apparent from the following detailed description when considered in conjunction with the accompanying drawing wherein:

The single figure is a top plan view of the tension device interposed between schematic illustrations of wiring processing units.

In the present illustration, the wire processing units shown schematically at 1 and 2 represent drawing dies 3 and 4. The tension device indicated generally at 5 includes a stationary shaft 6 supported in any suitable manner and having a driven capstan 7 rotatably mounted thereon. A pulley 8 rotatably mounted on the shaft 6 and fixed at 9 to the capstan is driven by a belt 10 from any suitable power means not shown. A shive 11 is rotatably mounted on the shaft 6 and is positioned to guide a wire 12 to the unit 2. The wire 12 is pulled through the unit 1 and is given a predetermined number of partial turns on the capstan 7. The partial turns may include one or more whole turns but they are not limited to all whole turns.

A tension controlling unit 14 is rotatably mounted on the shaft 6 and interposed between the capstan 7 and the shive 11. This unit includes parallel projections 15, carrying means 16 to rotatably support grooved pulleys or grooved rollers 17 and 18. The wire 12 upon leaving the capstan 7 passes in one direction about the grooved roller 17 and in a reverse direction about the grooved roller 18 after which the wire makes a given number of partial turns about the free-running shive 11. One end of the unit 14 is recessed at 19 to receive a clock-type spiral spring 20, which has its inner end fixed at 21 to the stationary shaft 6 and its outer end fixed at 22 to the unit

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14. A unit 23 may represent a takeup for the wire or another tension device 5 interposed between the unit 2 with its string of dies 4 and another unit of this type to pull the wire through the unit 2.

Operation

In the wire drawing industry, the tension desired for the wires being drawn depends upon the sizes of the wires in a particular area in the wire drawing operation. With the tension device 5, the spring 20 may be preset during the initial threading of the wire through the units 1 and 2 to create a predetermined tension in the wire in the area between the units 1 and 2. The tension in this area includes not only that desired or necessary in pulling the wire 12 through the string of dies 3 in the unit 1, but also that required in maintaining a back tension on the wire prior to moving through the string of dies 4 in the unit 2. It is important that the tensions in these areas be controlled, and in so doing only partial turns may be needed to counteract changes in the tension to bring the tension back to that desired. If the tension should decrease by a slowdown in the movement of the wire through the unit 2, there should be an equal slowdown in the pulling force of the capstan. In this instance, the force of the spring 20 will cause rotation of the unit 14 in a direction to cause the grooved roller 18 to wind additional parts of turns on the free-running shive 11 and at the same time, the grooved roller 17 will remove equal parts of turns from the capstan 7. This effectively reduces the pulling force of the capstan to balance the linear speed of the wire entering the area between the units with the linear speed of the wire leaving the area. If the tension in the area of the unit 2 should increase, a reverse action takes place in that this increased tension will work against the force of the spring 20 causing the grooved roller 18 to move the unit 14 in the opposite direction to unwind partial turns from the free-running shive 11 while at the same time causing the grooved roller 17 to add equally those same partial turns to the capstan 7. This action increases the pulling force of the capstan to increase the incoming speed of the wire to balance it with the outgoing speed of the wire relative to the area between the units 1 and 2. Similar actions are created in the tension device when tension in the wire 12, in the area of the unit 1, increases or decreases with respect to the tension in the wires in the area of the unit 2. These differences in tension in wire drawing machines in particular are the result of variations in the flow of the material in the wire, for example, through the unit 2 resulting in some instances in irregular movements of the wire in advance of the dies 4 although the wire may be pulled from the unit 2 at a constant rate of speed. Regardless of these variations, the unit 14, with the spring 20 preset to create a predetermined tension in the wire in the area adjacent the area between the units, the tension devices will function automatically to transfer partial turns from the capstan 7 to the free-running shive 11 as a result of decreasing tension and from the shive to the capstan as a result of increasing tension to respectively decrease and increase the pulling forces of the capstan.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A tension device for wire drawing units comprising:
a driven capstan having a variable pulling force on a wire created by a variable number of partial turns of the wire thereon to pull the wire through a first unit,

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a rotatable shive having a number of partial turns of the wire thereon and disposed in advance of a second unit,

means to pull the wire through said second unit, and means interposed between said capstan and said shive to maintain a predetermined tension in the wire between said units by transferring partial turns from said shive to said capstan when the tension increases to increase the pulling force of said capstan on the wire.

2. A tension device according to claim 1 in which: said last-named means being responsive to a decrease in tension to cause transferring of partial turns from said capstan to said shive to decrease the pulling force of the capstan.

3. A tension device for wire drawing units comprising: a stationary shaft mounted relative to first and second units,

a driven capstan rotatably mounted on the shaft and having a variable pulling force on a wire created by a variable number of partial turns of the wire thereon to pull the wire through said first unit,

means to drive said capstan at a predetermined speed, a shive rotatably mounted on the shaft and having a number of partial turns of the wire thereon and disposed in advance of said second unit,

means to pull the wire through said second unit, and a control rotatably mounted on said shaft between said capstan and said shive to maintain a predetermined tension in the wire between said units by transferring partial turns back and forth between said capstan and said shive to vary the pulling force of said capstan on the wire.

4. In a wire tensioning device,

a positively driven capstan,

a shive axially aligned with the capstan and mounted for free rotation,

a pair of guide pulleys interposed between said capstan and shive and mounted for free rotation,

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means for rotatably supporting said guide pulleys with their axis of rotation transverse to the axes of rotation of said capstan and shive, and their peripheries overlying the capstan and shive,

means for advancing wire around the capstan, over one section of the first guide pulley, over an opposed section of the second guide pulley, and around the shive, and

means responsive to variations in tension in the wire for urging the support means to move the pulleys to wind and unwind the wire from the associated capstan and shive.

5. In a wire tensioning device,

a positively driven capstan,

a rotatable shive mounted in axial alignment with said capstan,

a pair of rotatable guide pulleys interposed between said capstan and said shive,

means for rotatably supporting said guide pulleys with their axes of rotation transverse to the axes of rotation of said capstan and shive, and the peripheries of said guide pulleys overlying the peripheries of said capstan and shive,

means for resiliently biasing said rotatable supporting means in a direction opposite to the direction of movement of said capstan, and

means for advancing wire around said capstan, over a section of the periphery of a first of said pulleys, over an opposed section of the periphery of the second of said pulleys and around said shive to hold said rotatable supporting means against movement under the urging of said biasing means.

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