June 16, 1953 E. J. HEIZER 2,642,236

YARN TENSIONING DEVICE

Filed May 19, 1950

Fig. 1

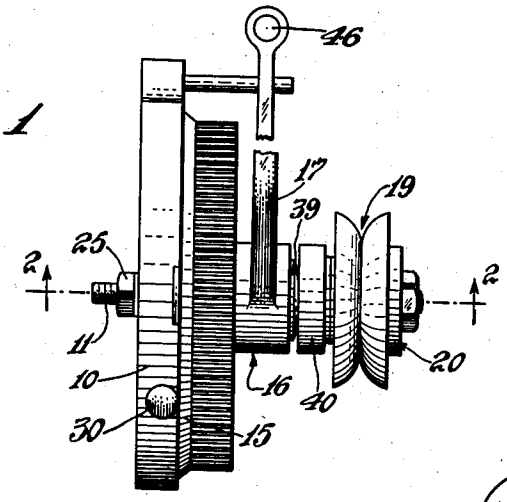


Fig. 3

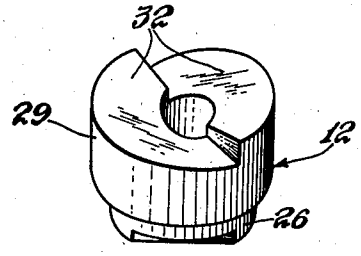


Fig. 2

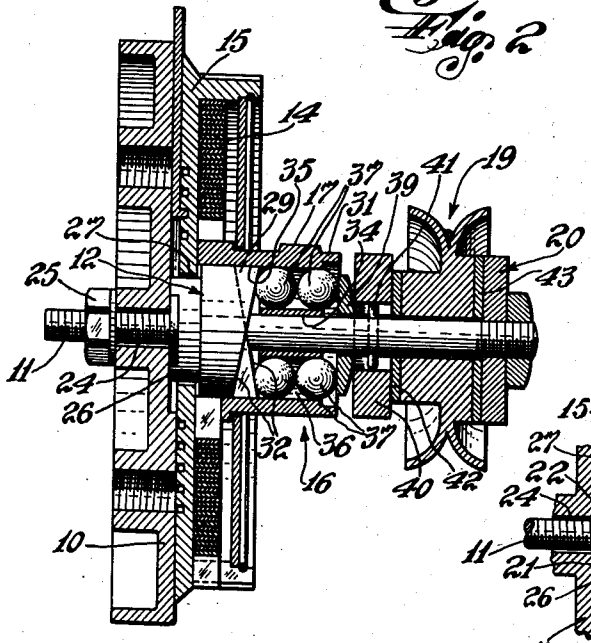
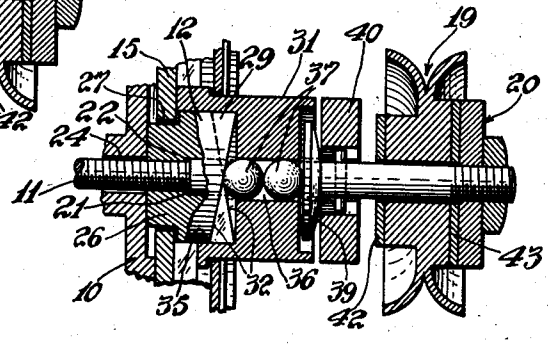


Fig. 4



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YARN TENSIONING DEVICE

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7 Claims. (Cl. 242—155)

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The present invention relates to devices for tensioning yarn wherein the input tension is compensated to attain a substantially uniform output tension, and, more particularly, relates to improvements in such devices suitable for use in connection with yarn tensioning or stretching processes of the type disclosed in United States Letters Patent 2,220,958, although the devices may have other general utility.

Accordingly, the more important objects of the present invention are to provide such devices which are relatively simple and economical in construction, are easily assembled and installed, are readily adjustable to accurately vary the tension within desired limits, and are capable of withstanding such rough usage to which they normally may be subjected.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

In accordance with the invention, these objects are accomplished by providing a yarn tensioning device comprising a stem, a stop on the stem, a pulley over which yarn is adapted to pass rotatably mounted on the stem adjacent the stop, a cam, means between the cam and the pulley arranged to be actuated by the cam to move axially with respect to the stem and retard rotation of the pulley, a member mounted for rotation about the stem for causing the aforementioned means to be actuated by the cam, a spring for urging the member into a position to cause the means to urge the pulley against the stop, and an arm on the member responsive to yarn passing over the pulley for operating the member in opposition to the spring to decrease the effectiveness of the means to retard rotation of the pulley. Preferably, the stop is adjustable on the stem, and the force of the spring may be varied to adjust the device for varying the tension put into the yarn.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawing, forming a part of the specification, wherein:

Figure 1 is a top view of a yarn tensioning device in accordance with the present invention.

Figure 2 is a sectional view taken along the line 2—2 on Figure 1.

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Figure 3 is a perspective view of the cam.

Figure 4 is a fragmentary sectional view illustrating the operation of the device.

Referring to the drawing in detail, there is shown a yarn tensioning device generally comprising a base 10, a stem 11, a cam body 12, a spring 14, a spring housing 15, cam actuated means 16, an arm 17, a pulley 19 and a stop 20.

The stem 11 has a shoulder 21 adjacent one end thereof which engages a shoulder 22 in the central bore of the cam body (Figure 4), and this end of the stem extends through an aperture 24 in the base and has a nut 25 threaded thereon to fix the stem and cam body on the base.

The cam body 12 has a cylindrical section 26 adjacent the base which extends through a central aperture 27 in the spring housing 15 to mount the housing for rotation on the cam body, and has an enlarged cylindrical section 29 providing a shoulder for holding the spring housing against the base. Set screw means including a clamping plate 30 serve to hold the housing against rotation with respect to the base. The cam body section 29 further serves to provide means for rotatably mounting a cup-like member 31 constituting an element of the cam actuated means 16 and having the arm 17 mounted thereon. The end of the section 29 is formed with a pair of 180° cam surfaces 32, the function of which will become apparent hereinafter.

The cup-like member 31 has a central aperture 34 through which the stem extends, and has a cylindrical bore 35 for receiving the cam body section 29. The member 31 further has a pair of diametrically opposite apertures 36 parallel to the aperture 34, and a pair of ball bearings 37 are disposed in each of the apertures 36, one of each pair being in contact with one of the cam surfaces 32 and the other of each pair being in contact with a centrally apertured thrust ring 39 mounted for axial movement on the stem and coacting with the ball bearings to serve as cam follower means.

The stop 20 is threadedly secured to the free end of the stem to facilitate axial adjustment thereon and the pulley 19 is rotatably mounted on the stem adjacent the stop. A collar 40 is mounted between the thrust ring 39 and the pulley for axial movement on the stem and is held against rotation with respect to the stem by a pin and groove arrangement generally indicated by the reference numeral 41. Preferably, friction elements, such as felt washers 42 and 43 or the like, are positioned between the collar 40

and the pulley and between the pulley and the stop **20**, respectively.

In order to retard rotation of the pulley, a coiled spring **14** has one end secured to the spring housing and has its other end secured to the rotatably mounted member **31** in a manner whereby the member **31** normally tends to rotate in a direction to cause the cam surfaces **32** to move the ball bearings in their apertures **36** to engage the thrust ring **39** and axially move the thrust ring which in turn moves the collar towards the pulley to urge the latter towards the stop. The effective force of the spring **14** may be varied by rotation of the spring housing into desired positions in relation to the base and securing the housing in such positions by means of the set screw operated clamping plate **30**.

The foregoing described device is particularly adapted for putting tension in yarn by passing the same over or around the pulley and retarding rotation of the pulley by applying a braking force thereon by means of the spring **14** to effect tensioning of the yarn. In order to control the degree of tensioning of the yarn, the yarn passing over the pulley is led through an eye **46** or the like at the end of the arm **17** in a manner to cause the yarn upon excessive tensioning thereof to effect movement of the arm and the member **31** in opposition of the spring and movement of ball bearings **37** in relation to the cam surfaces **32** to lessen the retarding force on the pulley applied by the collar **40** and the thrust ring **39**, as shown in Figure 4.

From the foregoing description, it will be seen that the present invention provides a useful device for putting yarn under tension wherein the degree of tensioning of the yarn can be accurately predetermined by adjusting the force of the spring and the relative position of the elements cooperating to retard rotation of the yarn tensioning pulley, and such tensioning is maintained at a substantially constant value in response to the ouput tension of the yarn.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

I claim:

1. A device for tensioning yarn comprising a stem, a stop on said stem, a pulley rotatably mounted on said stem adjacent said stop having an annular surface over which yarn is adapted to pass to rotate the pulley, a cam, means between said cam and said pulley arranged to be actuated by said cam to move axially with respect to said stem and urge said pulley against said stop and to apply a braking force on said pulley to retard rotation thereof, a member mounted for rotation about the longitudinal axis of said stem for causing said means to be actuated by said cam, a spring for urging said member into a position to cause said means to urge said pulley against said stop, and an arm on said member responsive to the yarn passing over said pulley for operating said member in opposition to said spring to decrease the effectiveness of said means to retard rotation of said pulley.

2. A device for tensioning yarn comprising a fixed stem, a stop on said stem, a pulley rotatably mounted on said stem adjacent said stop having an annular surface over which yarn is adapted to pass to rotate the pulley, a cam secured to said stem having cam surfaces facing said pulley, cam follower means positioned about said stem between said cam and said pulley and arranged to be actuated by said cam to move axially with respect to said stem and urge said pulley against said stop and to apply a braking force on said pulley to retard rotation thereof, a member mounted for rotation about the longitudinal axis of said stem for causing said means to be actuated by said cam, a spring for urging said member into a position to cause said means to urge said pulley against said stop, and an arm on said member engaged by and responsive to the yarn passing over said pulley for operating said member in opposition to said spring to decrease the effectiveness of said means to retard rotation of said pulley.

3. A device for tensioning yarn comprising a stem, a stop on said stem, a pulley rotatably mounted on said stem adjacent said stop having an annular surface over which yarn is adapted to pass to rotate the pulley, a cam, means between said cam and said pulley arranged to be actuated by said cam to move axially with respect to said stem and urge said pulley against said stop and to apply a braking force on said pulley to retard rotation thereof, a member mounted for rotation on said stem for causing said means to be actuated by said cam, a spring for urging said member into a position to cause said means to urge said pulley against said stop, an arm on said member responsive to the yarn passing over said pulley for operating said member in opposition to said spring to decrease the effectiveness of said means to retard rotation of said pulley, and means for adjusting the position of said stop on said stem.

4. A device for tensioning yarn comprising a stem, a stop on said stem, a pulley rotatably mounted on said stem adjacent said stop having an annular surface over which yarn is adapted to pass to rotate the pulley, a cam, means between said cam and said pulley arranged to be actuated by said cam to move axially with respect to said stem and urge said pulley against said stop and to apply a braking force on said pulley to retard rotation thereof, a member mounted for rotation about the longitudinal axis of said stem for causing said means to be actuated by said cam, a spring for urging said member into a position to cause said means to urge said pulley against said stop, an arm on said member responsive to the yarn passing over said pulley for operating said member in opposition to said spring to decrease the effectiveness of said means to retard rotation of said pulley, and means for varying the force of said spring.

5. A device for tensioning yarn comprising a fixed stem, a stop on said stem, a pulley rotatably mounted on said stem adjacent said stop having an annular surface over which yarn is adapted to pass to rotate the pulley, a friction element between said stop and said pulley, a cam secured to said stem, means between said cam and said pulley including a friction element for engaging said pulley arranged to be actuated by said cam to move axially with respect to said stem and urge said pulley toward said stop and to apply a braking force on said pulley to cause said friction elements to retard rotation of said pulley, a member mounted for rotation on said stem for causing said means to be actuated by said cam, a spring for urging said member into a position to

cause said means to urge said pulley toward said stop, and an arm on said member responsive to the yarn passing over said pulley for operating said member in opposition to said spring to decrease the effectiveness of said friction elements to retard rotation of said pulley.

6. A device for tensioning yarn comprising a fixed stem, a stop on said stem, a pulley rotatably mounted on said stem adjacent said stop having an annular surface over which yarn is adapted to pass to rotate the pulley, a cam secured to said stem, a member mounted for rotation about said stem adjacent said cam, cam follower means associated with said member adapted to be actuated by said cam upon rotation of said member, a member between said cam follower means and said pulley mounted for axial movement on said stem and retained against rotative movement with respect thereto, a spring for urging said rotatable member into a position to cause said cam to actuate said cam follower means and said axially movable member to urge said pulley against said stop and to apply a braking force on said pulley to retard rotation thereof and thereby tension the yarn, and an arm on said rotatable member engaged by and responsive to the yarn passing over said pulley for moving said rotatable member about said stem in opposition to said spring to decrease the effectiveness of said cam follower means and said axially movable member to retard rotation of said pulley.

7. A device for tensioning yarn comprising a fixed stem, a stop on said stem, a pulley rotatably mounted on said stem adjacent said stop having an annular surface over which yarn is adapted to pass to rotate the pulley, a friction element between said stop and said pulley, a cam secured to said stem having cam surfaces facing said pulley, a member mounted for rotation about said stem adjacent said cam, cam follower means

associated with said member adapted to be actuated by said cam upon rotation of said member, a member between said cam follower means and said pulley mounted for axial movement on said stem and retained against rotative movement with respect thereto, a second friction element between said pulley and said last mentioned member, a spring for urging said rotatable member into a position to cause said cam to actuate said cam follower means and said axially movable member to urge said pulley against said stop and to apply a braking force on said pulley through said friction elements to retard rotation of said pulley and thereby tension the yarn, an arm on said rotatable member engaged by and responsive to the yarn passing over said pulley for moving said rotatable member about said stem in opposition to said spring to decrease the effectiveness of said cam follower means, said axially movable member and said friction elements to retard rotation of said pulley, means for adjusting the position of said stop on said stem and means for varying the force of said spring.

EDWARD J. HEIZER.

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