Dec. 16, 1941. O. G. NELSON 2,266,437

TENSIONING DEVICE

Filed June 28, 1940

FIG. 1

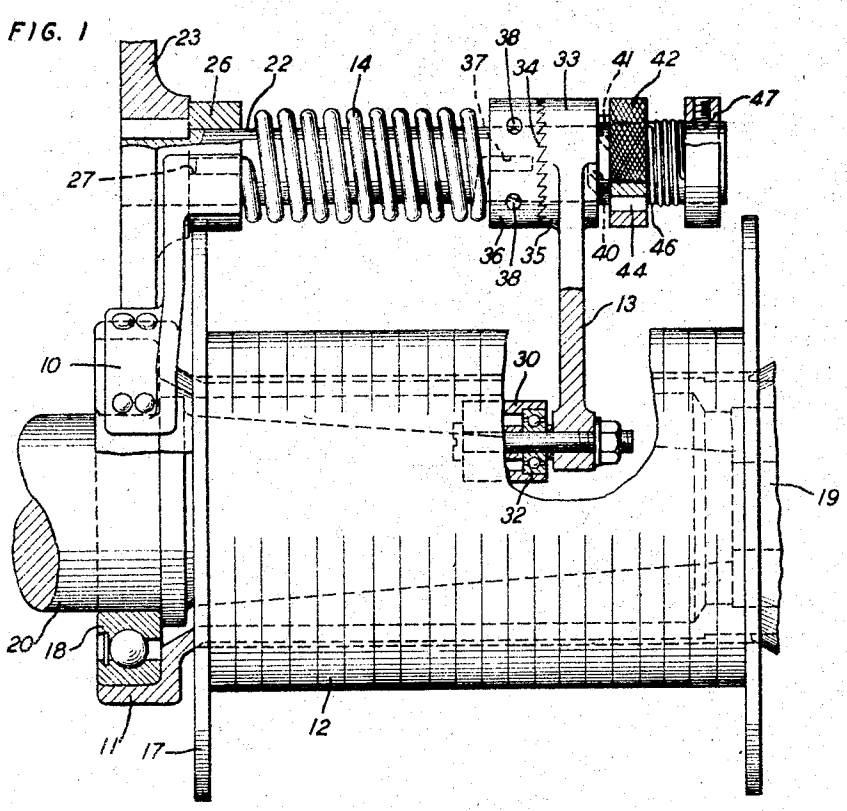
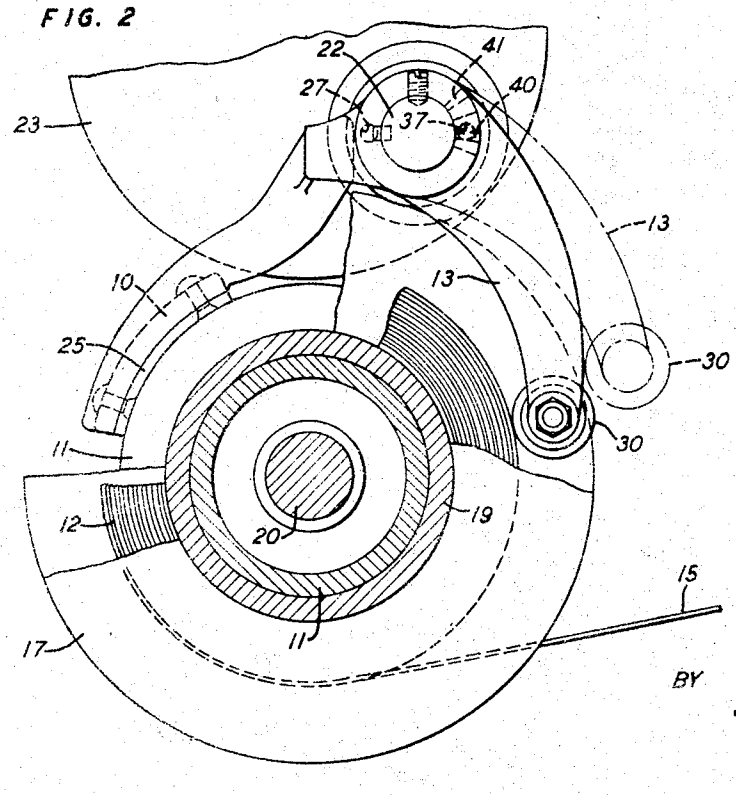


FIG. 2



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Patented Dec. 16, 1941 2,266,437

UNITED STATES PATENT OFFICE

2,266,437

TENSIONING DEVICE

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Application June 28, 1940, Serial No. 342,873

10 Claims. (Cl. 242—75)

This invention relates to a tensioning device, and more particularly to a tensioning device for material drawn from a supply.

The drawing of material from a rotatable supply, for example, from a supply reel mounted for rotation by the material being removed therefrom, creates a certain amount of tension on the material which in many instances is not sufficient and in all instances is not constant. This existing tension varies with variations in the thickness of the material on the reel, the tension increasing as the lever arm, that is, the radius of the material, decreases, requiring an increasing force to rotate the reel. Therefore, to create a constant tension on a material drawn from a rotatable supply, the force required for the additional tension must vary with the variations in the existing tension, but in reverse order.

An object of the invention is to provide a tensioning device particularly for material drawn from a rotatable supply and which is simple in structure and highly efficient in creating a constant tension on the material.

With this and other objects in view, the invention comprises a tensioning device for material drawn from a rotatable supply which device includes a brake member urged into engagement with a support for the supply and a follower urged into engagement with the supply by a common force variable by relative positioning of the member and follower to create, on the material, a desired tension which, when added to an existing varying tension created by the drawing of the material from the supply, will equal a constant tension.

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

Fig. 1 is a side elevational view of the apparatus, portions thereof being shown in section, and

Fig. 2 is an end elevational view of the structure shown in Fig. 1, portions thereof being broken away.

Referring now to the drawing, the present embodiment of the invention includes in general a brake member 10 urged into engagement with a support 11 for a supply 12 of material and a follower 13 urged into engagement with the supply by a common force, such as a spring 14, which is variable by relative positioning of the brake member 10 and follower 13 to create on material 15 drawn from the supply 12, a desired tension which when added to the existing varying tension created by the drawing of the material from the supply, will equal a constant tension. The support 11 in the present instance is in the form of a spindle to support a reel 17, the latter carrying the supply 12 of material 15, and removably fixed to the support or spindle by suitable means 19. The support 11 is rotatably mounted by the aid of one or more bearings 18, only one of which is shown in the present instance, upon a shaft 20. The shaft 20 may be of a machine used in the handling of materials, for example, a taping machine in which a reel or supply of material is moved in a circuitous path around a forwardly moving strand to spirally wrap the material on the strand.

The spring 14 is disposed upon a shaft 22, one end of which extends into a supporting bracket 23, and is fixed thereto. The brake member 10, having an outer portion curved to conform to the annular engaging portion of the support 11 and provided with a brake shoe 25, extends upwardly and is provided with an integral collar portion 26 which is disposed concentric with the shaft and is free to rotate thereon. An aperture 27 in the collar portion 26 receives one end of the spring 14, so that a portion of the force of the spring may urge the brake shoe 25 of the brake member 10 into intimate engagement with the support 11.

The follower 13 is in the form of an arm, supporting a roller 30 at its lower end, which roller engages the surface of the supply 12 and follows the decreasing lever arm or radius of the supply during the removal of the material 15 therefrom. The roller 30 is supported by roller bearings or other suitable antifriction means 32, so that the tensioning means will lie in, and be determined by the force of, the spring 14. The upper end of the follower 13 is in the form of a bearing portion 33, disposed concentric with the shaft 22, free to rotate thereon and controlled by the spring 14. One face of the bearing portion 33 is provided with teeth 34 which are formed to mesh with teeth 35 of a tension varying collar 36, the latter being disposed concentric with the shaft 22 for rotation thereon and having an aperture 37 therein for receiving the other end of the spring. Apertures 38 are formed at spaced positions in the collar 36 and extend radially through the outer surface thereof to receive a suitable tool (not shown) to cause relative movement of the collar and the follower 13 to vary the force of the spring 14.

The other face of the bearing portion 33 of the follower 13 has a notch 40 positioned to receive

a lug 41 of a holding member 42, the latter being mounted upon the shaft 22 and provided with a key 43 projecting into an elongate recess 44 in the shaft to allow axial movement of the holding member yet prevent rotation thereof. A helical spring 46 disposed concentric with the shaft 22 between the holding member 42 and a collar 47, the latter fixed to the shaft 22, urges the holding member 42 to the left (Fig. 1) to cause the lug 41 to press against the surface of the bearing portion 33 and enter the notch 40 when the follower is moved a sufficient distance to present the notch to the lug.

During the operation of the apparatus, it will be understood that, without the added force of the brake member 10 on the support 11 to cause tension on the material 15, a certain amount of tension on the material will exist. This tension, without the aid of the brake, may be determined by the force necessary to rotate the supply, namely the material on the reel, and the support 11. Naturally, the force required to rotate the reel and its support increases as the lever arm decreases during the removal of the material from the supply, and as the required force increases the tension on the material increases, assuming that the material is withdrawn at a constant speed. In order that the material may be handled satisfactorily, for example, in order that the material may be wrapped uniformly on a strand, it is important that the tension on the material be constant and in most instances this tension required is greater than that created merely by the drawing of the material from the supply. In the present embodiment the force for the added tension lies in the spring 14 and its effect on the brake member 10. This force may be determined by suitable means (not shown) and the force may be varied by varying the relative positions of the follower and brake member, considering, for example, that the tension varying collar 36 is a variable portion of the follower. The teeth 34 and 35 are equally spaced and may represent indications of the force of the spring 14. If desired, pointers, such as arrows, may be disposed on or formed in the bearing portion 33 and the collar 36 to indicate, through the aid of the teeth, the variations from a definite force.

Let it be assumed, for example, that the device as shown is set to create the required tension on material of a definite size. At the beginning of the withdrawal of the material from a full supply, the force of the spring, transferred to the support 11 by the brake member 10, is at its maximum, the total force of the spring being divided between the follower and the brake member. As the material is withdrawn from the supply layer by layer, the roller 30 moves inwardly toward the axis of rotation of the supply, decreasing gradually the force of the spring on the brake member to decrease the effective force on the support correspondingly to the increase in force necessary for the material to rotate the reel resulting in the combination of two forces, one decreasing while the other correspondingly increases to maintain a constant force and, therefore, a constant tension on the material.

When the reel is empty the follower may be moved counter-clockwise about the shaft 22 until the notch 40 receives the lug 41, the latter holding the follower in the dotted line position shown in Fig. 2, so that the empty reel may be removed from the support 11 and a filled reel disposed thereon. The operator may then move the holding member 42 to the right against the force of the spring 46, removing the lug 41 from the notch 40, and allow the follower 13 to be moved by the spring 14 until the roller 30 rests upon the surface of the new supply of material. In this manner the adjustment of the spring 14 is maintained and the material from the new supply may be withdrawn under the same tension without further adjustment of the device.

It is apparent that with this device the force of the spring 14 may be varied to vary the constant tension of like materials and also may be varied for various types of materials. This may be accomplished by the aid of a tool receivable in the apertures 38 by the aid of which the follower may be moved relative to the collar 36 or vice versa. The spring 46 in addition to controlling the holding member 42 adjacent the follower, assists the holding member in holding the follower into engagement with the collar 36. The follower may be moved longitudinally of the shaft 22 to disengage the teeth 34 thereof from the teeth 35 of the collar, to decrease the tension or force of the spring 14 if desired.

It will, therefore, be observed that the brake member 10 may apply a varying force to the support 11 controlled by the decreasing radius of the supply through the follower 13, to cause a decreasing tension on the material as the existing tension, caused by the added force required to rotate the supply, increases, creating a combined constant tension on the material.

The embodiment of the invention herein disclosed is merely illustrative and may be modified and departed from in many ways without departing from the spirit and scope of the invention as pointed out in and limited solely by the appended claims.

What is claimed is:

1. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, and a follower pivotally mounted on the shaft and urged about the axis thereof by the spring to follow the supply while decreasing in size to decrease the force of the spring.

2. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, a follower pivotally mounted on the shaft and urged about the axis thereof by the spring to follow the supply while decreasing in size to decrease the force of the spring, and means movable on the shaft relative to the follower to vary the force of the spring.

3. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, a follower pivotally mounted on the shaft and urged about the axis thereof by the

spring to follow the supply while decreasing in size to decrease the force of the spring, and a member interengaging the follower to vary the force of the spring.

4. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, and a follower pivotally mounted on the shaft and urged about the axis thereof by the spring to follow the supply while decreasing in size to decrease the force of the spring, one portion of the follower movable relative to another to vary the force of the spring.

5. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, a follower pivotally mounted on the shaft and urged about the axis thereof by the spring to follow the supply while decreasing in size to decrease the force of the spring, means to vary the force of the spring, and means to indicate the variation in the force of the spring.

6. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, a follower pivotally mounted on the shaft and urged about the axis thereof by the spring to follow the supply while decreasing in size to decrease the force of the spring, and means to hold the follower away from the support for the positioning of a supply of material on the support.

7. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, a follower pivotally mounted on the shaft and urged about the axis thereof by the spring to follow the supply while decreasing in size to decrease the force of the spring, and a holding member disposed on the shaft to hold the follower away from the support for the positioning of a supply of material thereon.

8. A tensioning device for material drawn from a supply comprising a rotatable support for a supply of material, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create a tension on the material drawn from the supply, a follower pivotally mounted on the shaft and urged about the axis thereof by the spring to follow the supply while decreasing in size to decrease the force of the spring, and a holding member positioned to interengage the follower to hold the follower in a position away from the supply when the follower is moved into the position.

9. A tensioning device for material drawn from a supply comprising a support, for a supply of material, rotated by the withdrawal of the material under an increasing existing tension varying with the decreasing radii of the supply, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create an added tension on the material, and a follower movable on the shaft with the decreasing radii to cause variation in the force of the spring to cause the added tension to decrease as the existing tension increases resulting in a constant tension on the material.

10. A tensioning device for material drawn from a supply comprising a support, for a supply of material, rotated by the withdrawal of the material under an increasing existing tension varying with decreasing radii of the supply, a shaft, a brake arm mounted on the shaft for pivotal movement about the axis thereof and into engagement with the support, a spring disposed on the shaft to supply a force urging the brake arm against the support to create an added tension on the material, a follower movable on the shaft with the decreasing radii to cause variation in the force of the spring to cause the added tension to decrease as the existing tension increases resulting in a constant tension on the material, and means to hold the follower out of engagement with the supply.

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