Aug. 7, 1951 G. PEEBLES 2,562,990

DEREELING TENSION CONTROL

Filed June 16, 1947 3 Sheets-Sheet 1

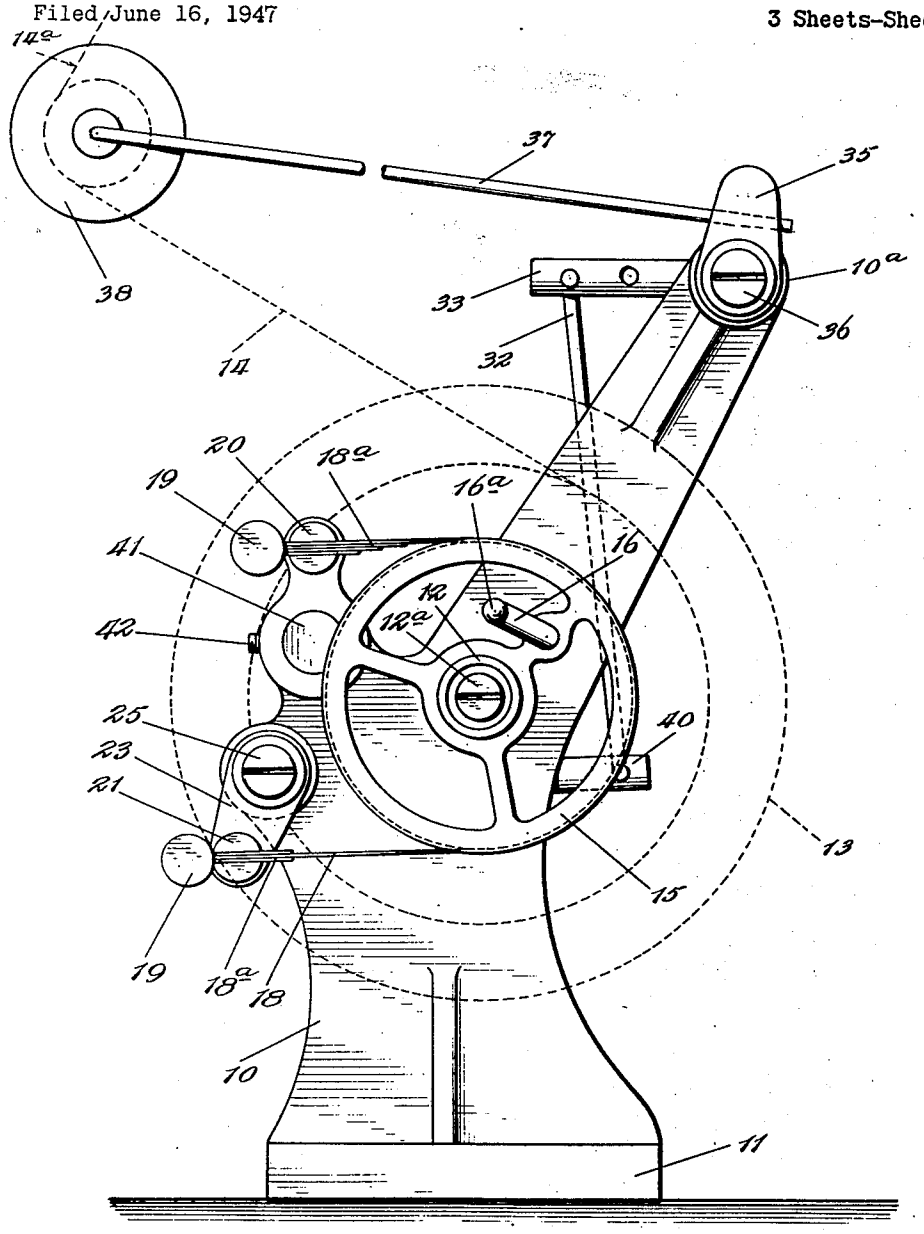


Fig. 1.

INVENTOR.
GEORGE PEEBLES

BY Dunn, Hopea Faithfull
ATTORNEYS

Aug. 7, 1951 G. PEEBLES 2,562,990

DEREELING TENSION CONTROL

Filed June 16, 1947 3 Sheets-Sheet 2

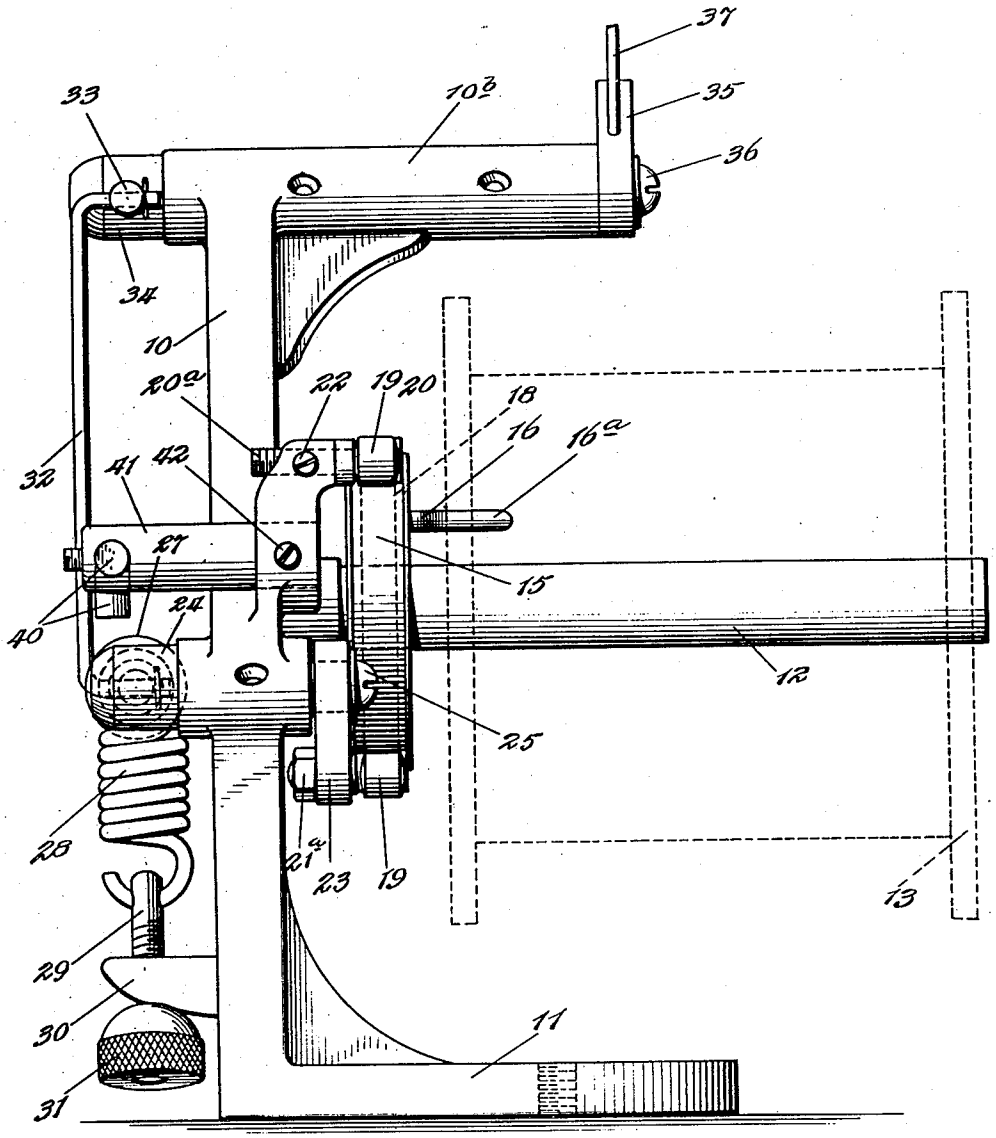


Fig. 2.

INVENTOR.

GEORGE PEEBLES

BY Dunn, Hope & Faithfull

ATTORNEY.

Aug. 7, 1951 G. PEEBLES 2,562,990

DEREELING TENSION CONTROL

Filed June 16, 1947 3 Sheets-Sheet 3

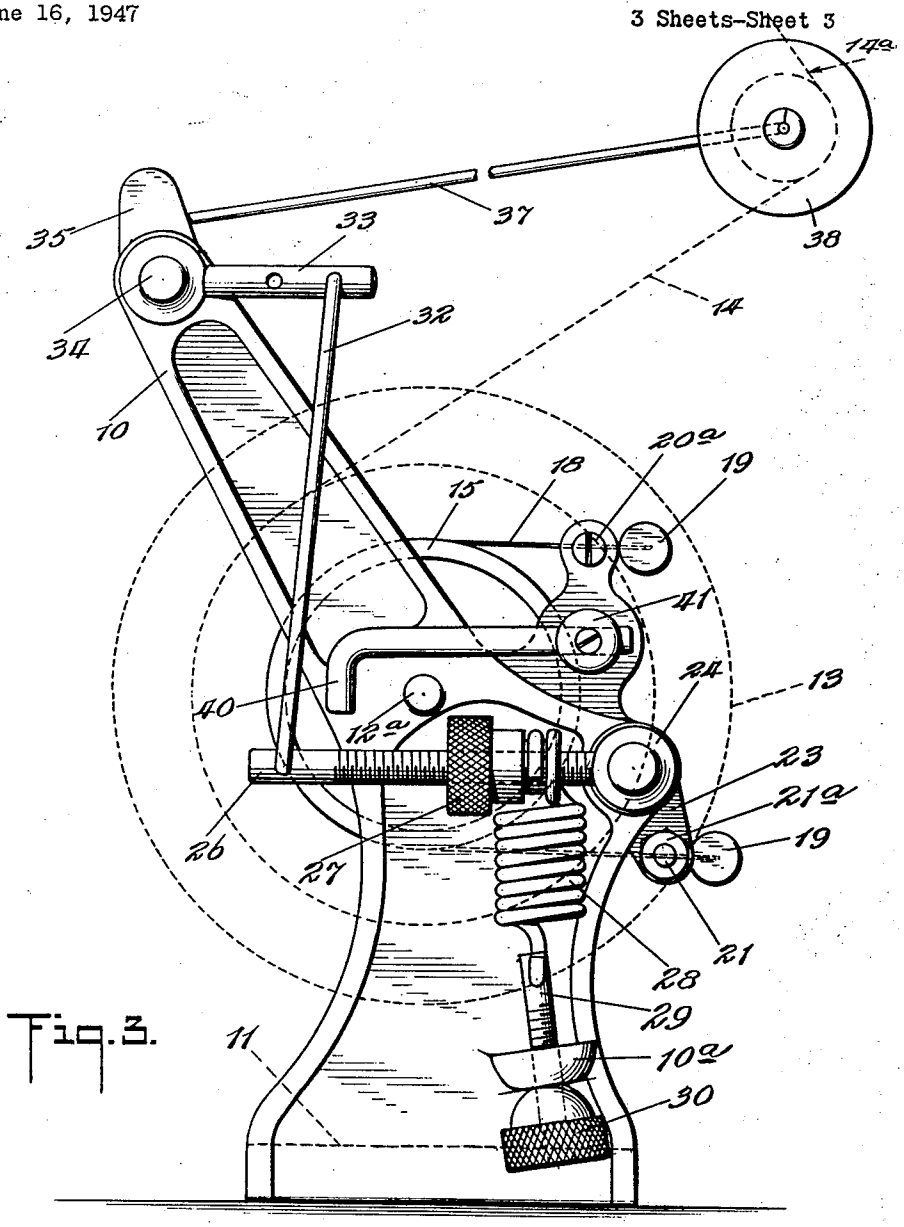


Fig. 3.

INVENTOR.
GEORGE PEEBLES

BY Davis, Hoxie & Faithfull
ATTORNEYS

Patented Aug. 7, 1951

2,562,990

UNITED STATES PATENT OFFICE

2,562,990

DEREELING TENSION CONTROL

George Peebles, Hopatcong, N. J.; Ann R. Peebles
executrix of said George Peebles, deceased

Application June 16, 1947, Serial No. 754,893

4 Claims. (Cl. 242—45)

1

This invention relates to devices for controlling the de-reeling or unwinding tension of filaments, such as wire, textile threads, and the like, and more particularly to an improved tension control which functions automatically to maintain the filament tension substantially constant during the de-reeling operation.

In supplying wire and other filaments to machinery, it is necessary in many instances to maintain the tension of the filament practically uniform while it is being de-reeled and fed to the machine. The tension control is generally effected by imposing a resistance to rotation of the spool or reel from which the filament is unwound, and varying the resistance to compensate for changes in the tension of the filament passing from the reel. Tension control devices for this purpose, as proposed heretofore, are objectionable for various reasons, among which are their bulk and complexity and their inability to maintain the tension sufficiently constant under different operating conditions without considerable attention from the operator.

The principal object of the present invention, therefore, is to provide a tension control for de-reeling operations which is compact and rugged in construction, responds automatically and accurately to counteract changes in the filament tension, and is readily adjustable for different operating conditions.

A tension control device made in accordance with the invention comprises a frame for rotatably mounting the filament spool or reel, and a brake drum or other rotatable part on the frame adapted to be driven by the reel in the de-reeling operation. Adjacent the drum periphery is a brake band secured at one end to the frame and at the other end to the arm of a crank rotatable on the frame by means of a pivoted tension arm which is engaged by the filament passing from the reel. The tension arm and the brake band are spring loaded, as by means of an adjustable tension spring coniected to the brake band, whereby the latter is urged against the drum to exert a braking effect upon the reel. The spring also acts to urge the tension arm against the filament passing from the reel, so that when the tension increases, the tension arm moves the crank against the spring action to relieve the braking effect, and when the tension decreases, the spring moves the crank and the tension arm in the opposite direction to increase the braking effect, thereby immediately counteracting any changes in the filament tension.

In a present form of the device, the connection

2

between the tension arm and the crank for the brake band includes a lever on which an adjustment nut is threaded, the tension spring being connected at one end to the adjustment nut and at the other end to the frame through a second adjustment nut. Thus, by adjusting the nut on the lever, the moment arm of the spring force on the lever may be varied to provide a wide range of adjustment of the braking effect and therefore the filament tension; and the second nut serves as a means for compensating or modifying the effect of the first adjustment and extending still further the range of adjustment. Preferably, the brake band is provided with another adjustment by means of a pin rotatable on the frame and having a slot for receiving one end of the band. By rotating the pin, the angular position of the adjacent end of the band is adjusted to vary the effective braking area of the band upon the drum, whereby "jumping" of the filament reel at high tensions may be prevented and suitable adjustments may be made for backlash. To prevent sharp bends in the brake band, I prefer to superimpose a plurality of leaf springs on the end portions of the band where it is held, and braze or otherwise secure the band and the leaves to enlargements at the ends of the band. In this way, the band and the reinforcing leaves may be held in and easily removed from slots in supporting pins at the ends of the band, the enlargements preventing the band from being drawn through the slots during operation of the device.

The brake drum may be provided with an adjustable driving pin for coupling it to filament reels of different sizes. For this purpose, the drum has a crank offset from the drum axis, the driving pin projecting from the crank and being adapted to fit into an opening in the reel. The pin is eccentric to the crank axis, so that angular adjustment of the crank will vary the radial distance of the pin from the drum axis, to accommodate the different reel sizes.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which

Fig. 1 is a side elevational view of a preferred form of the new device;

Fig. 2 is a front elevational view of the device shown in Fig. 1, and

Fig. 3 is a side elevational view of the device, but showing the side opposite to that illustrated in Fig. 1.

The tension control device as illustrated comprises a frame 10 having a base 11 by which the frame may be secured to a machine to be supplied

with the filament. An axle 12 is rotatably mounted on the upright portion of the frame, as by means of an elongated screw 12a. The axle 12 is adapted to support a reel 13, shown in dotted lines, on which the wire or other filament 14 is wound, the reel being rotatable with the axle 12 on the frame.

A rotatable member 15 in the form of a brake drum is mounted on the inner part of the axle adjacent the frame, where it is secured against axial movement on the shaft. The drum 15 is adapted to be driven by the reel through a coupling 16 during the unwinding or de-reeling of the filament 14. As shown, the coupling 16 is in the form of a crank mounted in an opening in one of the spokes of the drum, the crank having an eccentric driving pin 16a adapted to fit into an opening in the adjacent end of the reel. Since the crank 16 is offset from the axle 12, and the driving pin 16a is eccentric to the axis of the crank, the radial distance of the driving pin from the drum axis may be adjusted by changing the angular position of the crank on the drum. In this way, the driving pin may be adjusted to accommodate reels of different sizes.

A brake band 18, which may be made of tempered spring steel, extends around part of the periphery of drum 15. Leaf springs 18a are superimposed on the end portions of the brake band where they are braced or otherwise secured, together with the band itself, to enlargements 19. The brake band is held in position around the drum by pins 20 and 21 at the respective end portions of the band. Each pin 20, 21 is transversely slotted to receive the corresponding end portion of the brake band and the superimposed leaves 18a. The enlargements 19, by engaging the sides of the pins, prevent the brake band from being drawn lengthwise through the slots when the band is tightened against the drum. However, the band may be easily removed from the drum by displacing it axially from the slots in the pins.

The upper pin 20 is in the form of a screw threaded through part of the frame 10. The pin 20 has a slotted head 20a by which it may be rotated to different angular positions, for a purpose to be described presently, the pin being clamped in its adjusted position by a set screw 22 (Fig. 2). The lower pin 21 extends through a crank arm 23 and is secured thereto by nut 21a. The arm 23 is connected to one end of a crank shaft 24, as by means of a screw 25, the shaft 24 projecting through an opening in the upright portion of the frame and having at its opposite end a radially extending lever 26 rigidly secured thereto. An adjustment nut 27 is threaded on the lever 26 and is connected to one end of a biasing element 28 in the form of a tension spring. The other end of spring 28 is connected to a threaded stem 29 extending through a projection 10a of the frame and having an adjustment screw 30.

A link 32 is pivotally connected at one end to the free end of lever 26, and at the opposite end to a projection 33 extending radially from a shaft 34. The shaft 34 is rotatable in a hollow boss 10b integral with the frame. A crank arm 35 is connected to shaft 34 at the end of the shaft remote from link 32. The arm 35 is splined to shaft 34 and is secured to the spline by a screw 36 which may be loosened to adjust the angular position of the crank arm relative to the shaft. A tension arm in the form of a rod 37 projects laterally from crank arm 35, to which it may be secured by a set screw (not shown). At its free end, the rod 37 carries a pulley 38 engaged by the wire or other filament 14. That is, the filament from reel 13 extends to and partly around the pulley 38, and from the pulley it extends at about right angles to its initial direction, to the machine which is to be supplied with the filament, as indicated at 14a.

The operation of the device is as follows: The tension spring 28 acts through lever 26, link 32, shaft 34 and crank 35 to urge the pulley 38 of the tension arm against the filament 14. The spring 28 also acts through lever 26 and shaft 24 to urge the crank arm 23 clockwise, as shown in Fig. 1, whereby the brake band 18 is tightened around drum 15. The filament 14, as it is drawn at a substantially uniform rate from the reel around pulley 38, causes the reel to rotate on axle 12, and this rotation of the reel is transmitted to the brake drum 15 through the coupling 16. When the tension in the filament 14 decreases, due, for example, to the action of the machine to which it is supplied, the spring 28 causes the free end of tension arm 37 to move downwardly against the filament and at the same time operates through crank arm 23 to tighten the brake band around drum 15. The brake band thus imposes a greater resistance to rotation of reel 13, which increases the tension in the filament and thereby counteracts the initial decrease in the tension. Conversely, when the filament tension increases, due to the action of the machine which it supplies, the free end of tension arm 37 will be forced upwardly by the filament against the action of spring 28, causing the crank arm 23 to move counterclockwise (Fig. 1) and relieve the pressure of the brake band upon drum 15. This in turn decreases the resistance to rotation of reel 13 so as to counteract the increase in the filament tension.

By means of the lever nut 27, the device may be adjusted to maintain any desired filament tension within a wide range. That is, when nut 27 is rotated on the lever, the position of the upper end of spring 28 is adjusted relative to the lever pivot or shaft 24. Accordingly, when the nut 27 is moved away from shaft 24, the moment arm of the spring action on the lever is increased so that with the same pull exerted by the spring the brake band will be urged against the drum with a greater force, whereby the filament will be maintained under a higher tension. When the moment arm of the spring is increased, as described, the spring will expand or contract a greater distance and thus cause a greater change in its tension upon rotation of shaft 24 through a given angle, thereby varying the operating characteristic of the device. The nut 30 serves as a means for modifying the effect of the adjustments by nut 27 and for extending still further the range of adjustment.

Angular adjustment of the pin 20 will, of course, vary the angular position of the corresponding end of the brake band. The result of this adjustment is to change the effective braking area of the band upon the brake drum. In other words, when pin 20 is rotated clockwise (Fig. 1), it increases the effective braking area, and when it is turned in the opposite direction it decreases the braking area. Thus, by means of the pin 20, the device may be adjusted for backlash, a greater backlash being obtained by turning the pin counterclockwise (Fig. 1). Also, such rotation of the pin 20 will prevent "jumping" of the reel at the heavy end of the tension range. It will be understood that the reenforcing

leaves 18a serve to retard bending of the brake band at the end portions where it is held by the pins 20 and 21, and to prevent sharp bends which would result in damage to the band.

If desired, the upward movement of tension arm 37 in response to an increase in the filament tension may be limited by a stop 60. As shown, the stop projects laterally from a shaft 61 rotatable on the frame, and a set screw 62 is provided to clamp the shaft and the stop in any desired position.

From the foregoing, it will be apparent that the new tension control is of relatively simple, compact and rugged construction. It is adapted to maintain the filament under a substantially constant tension, even under severe conditions of use, and it is readily adjustable to accommodate different requirements of the machine to which the filament is fed from the reel.

I claim:

1. In a device for controlling the de-reeling tension of filaments, and the like, which comprises a frame for rotatably mounting a reel, and a rotatable part on the frame adapted to be driven by the reel, the combination of a shaft rotatable on the frame, a tension arm projecting laterally from the shaft and adjustable angularly thereon, the tension arm being engageable with the filament in the de-reeling operation and movable to rotate the shaft in response to variations in the filament tension, a projection extending laterally from the shaft, a second shaft rotatable on the frame and having a crank, a lever projecting laterally from the second shaft, a link connecting said projection and lever, a brake band adjacent the rotatable part and connected at one end to the crank, a pin for securing the other end of the band and rotatable on the frame to adjust the angular position of said last end, a tension spring connected at one end to the frame and at the opposite end to the lever and operable through the lever, said second shaft and the crank to urge the brake band against said rotatable part, the tension arm being operable through the first shaft and said link and lever to counteract the spring in response to an increase in the filament tension, thereby relieving the braking effect of the band upon the rotatable part, and a movable member for adjusting the spring to vary the force with which the band is urged against said rotatable part.

2. In a device for controlling the de-reeling tension of filaments, and the like, which comprises a frame for rotatably mounting a reel, and a rotatable part on the frame adapted to be driven by the reel, the combination of a tension arm pivotally mounted on the frame and engageable with the filament in the de-reeling operation, the arm being movable on the frame in response to variations in the filament tension, a brake mounted on the frame adjacent the rotatable part, a tension spring connected to the brake for urging the same to exert a braking effect upon the rotatable part, a connection between the tension arm and the brake for moving the brake to relieve said braking effect upon actuation of the arm in response to an increase in the filament tension, said connection including a lever pivoted on the frame, a screw on the lever connected to one end of the spring and adjustable to vary the position of said end relative to the pivotal axis of the lever, and a second screw on the frame connected to the opposite end of the spring and adjustable to vary the tension in the spring.

3. In a device for controlling the de-reeling tension of filaments, and the like, which comprises a frame for rotatably mounting a reel, and a rotatable part on the frame adapted to be driven by the reel, the combination of a tension arm pivotally mounted on the frame and engageable with the filament in the de-reeling operation, the arm being movable on the frame in response to variations in the filament tension, a brake mounted on the frame adjacent the rotatable part, a biasing element connected to the brake for urging the same to exert a braking effect upon the rotatable part, a connection between the tension arm and the brake for moving the brake to relieve said braking effect upon actuation of the arm in response to an increase in the filament tension, the brake including a brake band secured at one end to said connection, and a pin rotatable on the frame and having a slot in which the other end of the band is held.

4. In a device for controlling the de-reeling tension of filaments, and the like, which comprises a frame for rotatably mounting a reel, and a rotatable part on the frame adapted to be driven by the reel, the combination of a tension arm pivotally mounted on the frame and engageable with the filament in the de-reeling operation, the arm being movable on the frame in response to variations in the filament tension, a brake mounted on the frame adjacent the rotatable part, a biasing element connected to the brake for urging the same to exert a braking effect upon the rotatable part, a connection between the tension arm and the brake for moving the brake to relieve said braking effect upon actuation of the arm in response to an increase in the filament tension, the brake including a brake band having at each end a plurality of superimposed spring leaves, and a pair of pins having slots for receiving the respective end portions of the band, one of the pins being secured to the frame and the other being movable by said connection.

GEORGE PEEBLES.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
680,706	Edmunds	Aug. 20, 1901
778,668	Hudson	Dec. 27, 1904
1,302,121	Anderson	Apr. 29, 1919
1,462,604	Lavalle	July 24, 1923
1,598,937	Selvig	Sept. 7, 1926
1,667,070	Jones	Apr. 24, 1928
1,882,950	Rulon	Oct. 18, 1932
1,947,826	Campbell	Feb. 20, 1934
2,070,035	Weiss	Feb. 9, 1937
2,149,718	Anderson	Mar. 7, 1939
2,160,910	Runton	June 6, 1939
2,252,247	Bjorge	Aug. 12, 1941

FOREIGN PATENTS

Number	Country	Date
582,017	Germany	Aug. 7, 1933
702,346	France	Jan. 20, 1931