Dec. 4, 1956 W. V. GOODHUE ET AL 2,772,840

TENSION-DEVICE

Filed Aug. 6, 1953 3 Sheets-Sheet 1

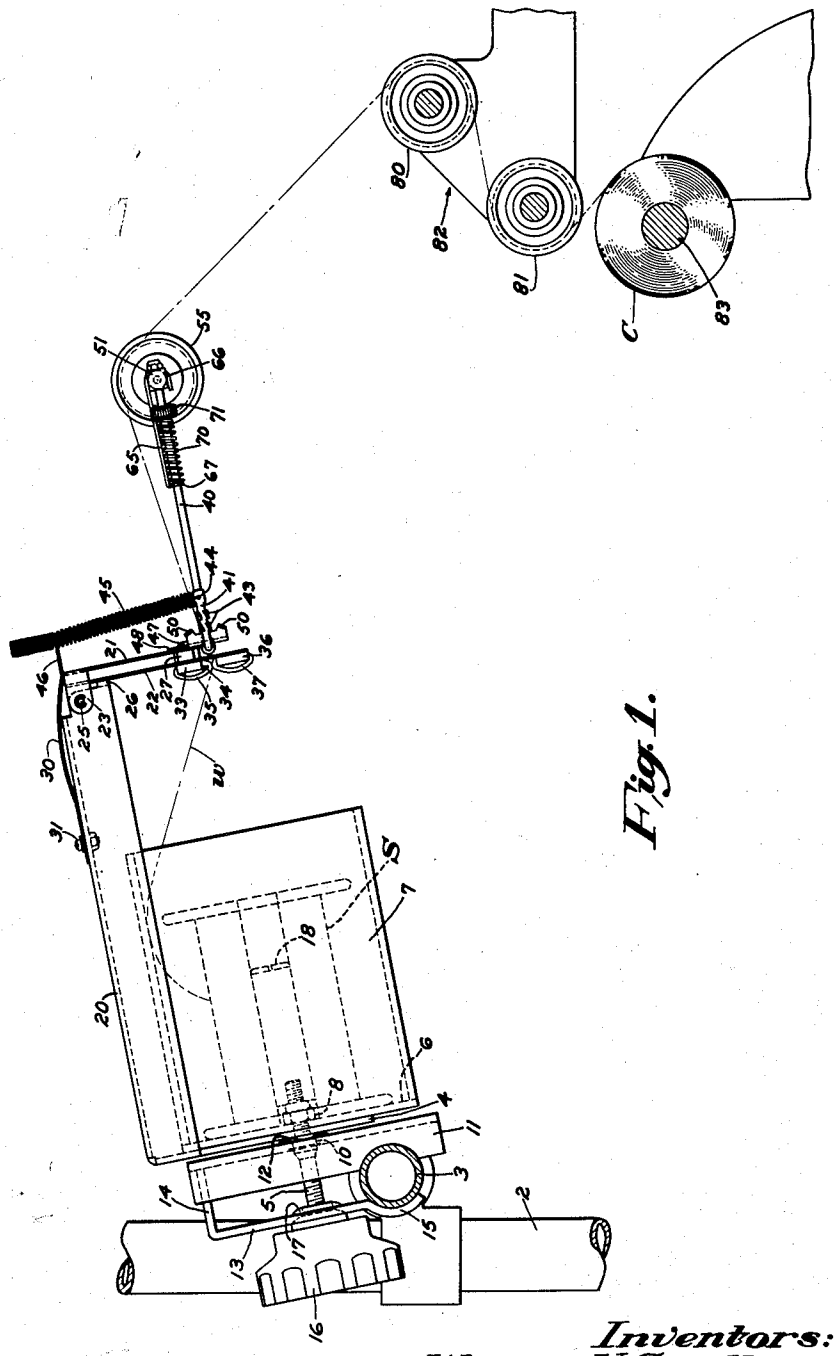


Fig. 1.

Inventors:
William V. Goodhue
and Curt J. Rohland
By Pennington & Lutz
Attorneys.

Dec. 4, 1956 W. V. GOODHUE ET AL 2,772,840

TENSION-DEVICE

Filed Aug. 6, 1953 3 Sheets-Sheet 2

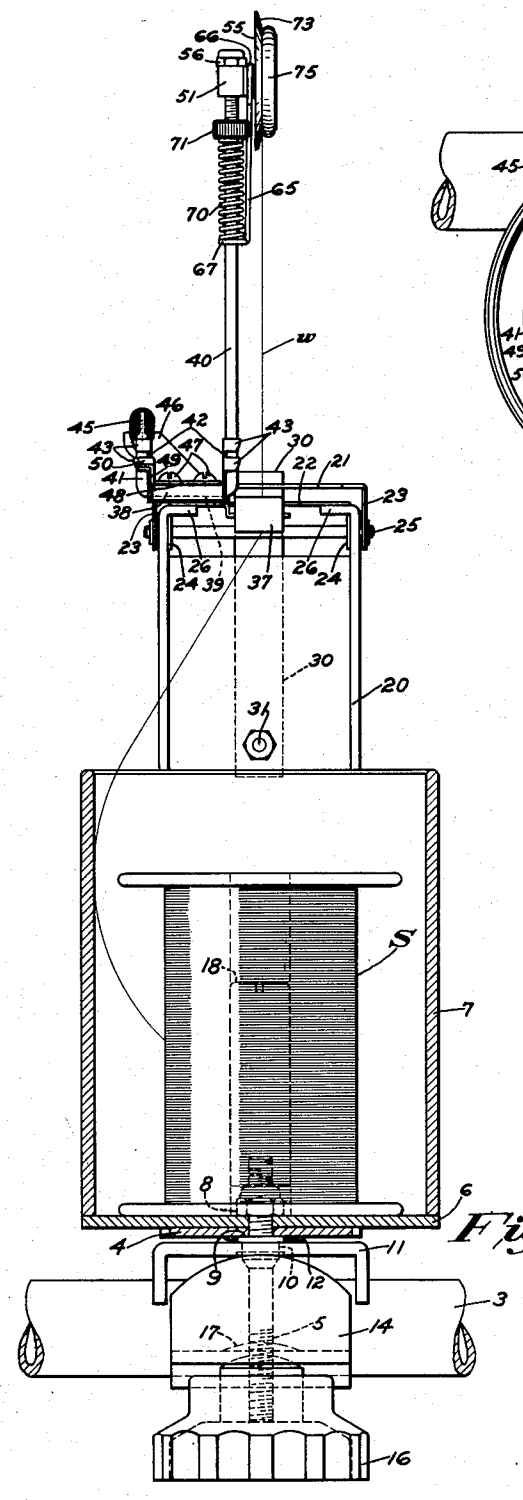


Fig. 2.

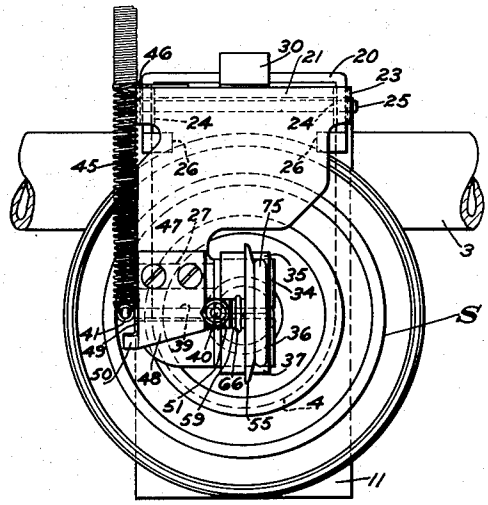


Fig. 3.

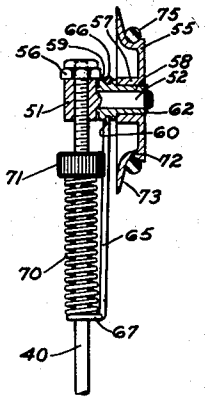


Fig. 4.

Inventors:
William V. Goodhue
and Curt J. Rohland
By Fleming, Emerson & Rohlfs
Attorneys.

Dec. 4, 1956 W. V. GOODHUE ET AL 2,772,840

TENSION-DEVICE

Filed Aug. 6, 1953 3 Sheets-Sheet 3

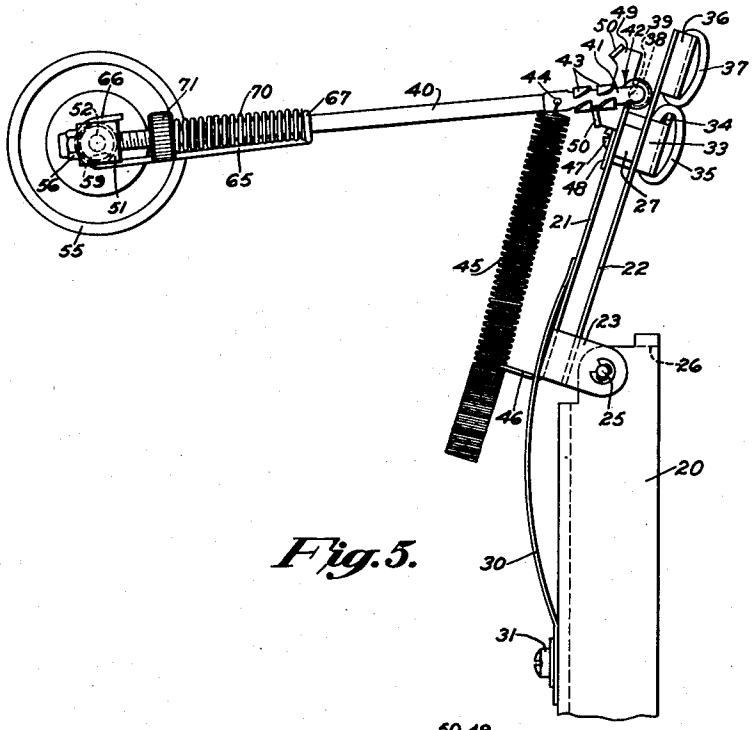


Fig. 5.

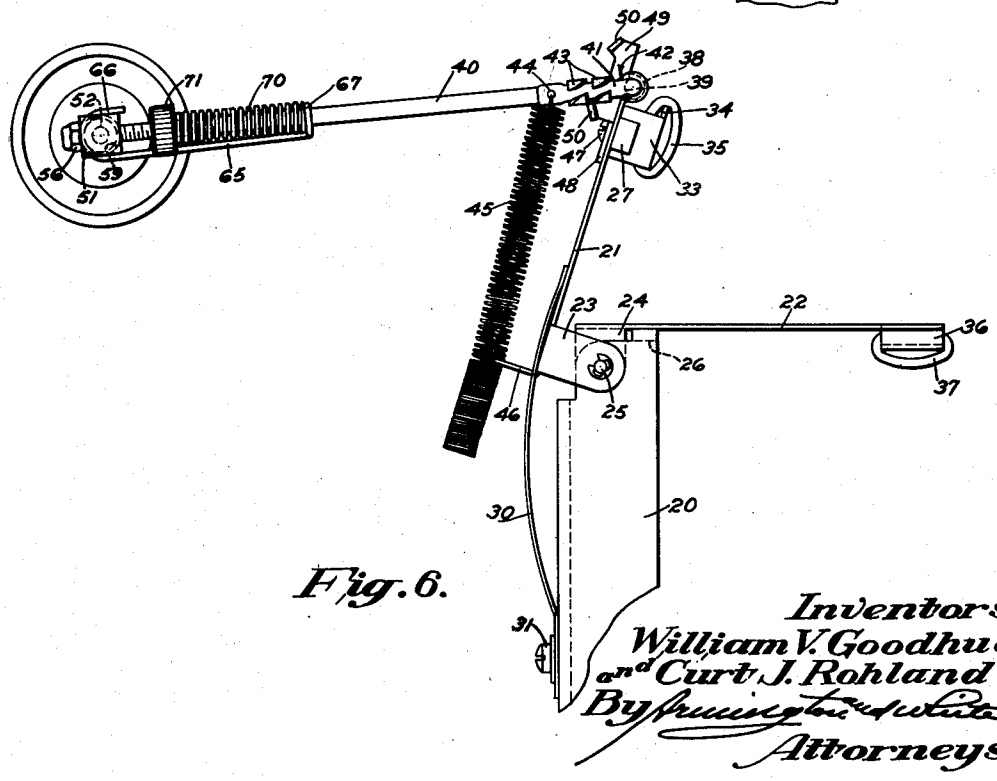


Fig. 6.

Inventors:
William V. Goodhue
and Curt J. Rohland
By Pennington & Pennington
Attorneys.

United States Patent Office 2,772,840 Patented Dec. 4, 1956

2,772,840

TENSION-DEVICE

William V. Goodhue, North Kingstown, R. I., and Curt J. Rohland, Seekonk, Mass., assignors to Universal Winding Company, Cranston, R. I., a corporation of Massachusetts

Application August 6, 1953, Serial No. 372,656

5 Claims. (Cl. 242—128)

This invention relates to tension-devices for controlling the unwinding of wire or other attenuated materials from a spool or like container.

More particularly, the invention consists in a spool-holder including a guard for restricting the ballooning of the material in unwinding it over the end of the spool, a spring-controlled arm carrying a tension-disk for applying resistance to the draft on the wire and felt pads between which the wire feeds to the tension-disk.

One object of the invention is to provide a device of the type indicated to which the spool or other container for the wound strand may be conveniently applied, with adjustable tensioning means for applying resistance to the draft on the material being unwound.

Another object is to provide a holder for a spool or other strand-container comprising a cylindrical enclosure of transparent material surrounding the spool in spaced relation thereto so that the condition of the unwinding material may be observed during the operation of the device.

Another object is to provide adjustable tensioning means spaced from the spool and its cylindrical enclosure and adapted to be shifted or swung out of the way for permitting convenient application of the spool to its holder or its removal therefrom.

Another object is to provide a rotatable disk or pulley around which the wire or other material feeds as it is withdrawn from the spool with means for frictionally resisting the rotation of said pulley to apply tension to the delivering strand.

Another object is to provide a disk or pulley having a resilient annulus surrounding its periphery and bearing against the strand as it feeds around the pulley to apply resistance to its draft for tensioning the strand.

Another object is to provide a device of the type indicated that is convenient to operate and efficient in action for delivering attenuated strand materials as a supply for winding machines and like apparatus.

Further objects of the invention are set forth in the following specification which discloses a preferred form of construction of the device as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a side elevational view of the complete device shown as mounted on the framework of a creel or supply-holder with the strand of wire arranged to deliver from the tensioning means to the traversing guide of a machine for winding electrical coils;

Fig. 2 is an enlarged front view of the device illustrated in vertical position with the enclosing balloon-guard shown in section;

Fig. 3 is a plan view of the same;

Fig. 4 is a detailed view of the adjustable frictional braking means for controlling the rotation of the tension-disk or pulley with the latter shown in section;

Fig. 5 is an enlarged view of the tensioning means shown as swung back from operative position to provide for placing the spool on its holder or removing it therefrom; and

Fig. 6 is a similar view showing the tensioning means swung back out of the way and the felt pads separated for cleaning, and for threading the wire therebetween.

In winding fine wire into electrical coils and for delivering other strand material from a spool or like container it is essential to apply tension thereto as the strand uncoils over the end of the spool; and means must be provided for tensioning the multiple strands unwinding from a plurality of spools mounted on a creel to supply them to a coil-winder comprising a plurality of winding heads. The present improved device is adapted particularly for this purpose and is herein shown as embodied in a single unit mounted on a bracket clamped to one of the crossarms of a creel or similar framework. The creel may consist of a plurality of uprights 2 constructed of rods or pipes and crossarms 3, also of pipe (Figs. 1 and 2), with suitable clamping means for mounting the spool-holders and tension-devices thereon. As illustrated in Fig. 2, the holder for the spool S may consist in a rectangular base-plate or platform 4 mounted on a spindle 5 projecting through a central hole therein. The spindle 5 also projects through a hole in a circular disk 6 which forms the bottom of a cylinder 7 constituting an enclosure for the spool S. The cylinder 7 serves as a guard for controlling the ballooning of the wire as it uncoils from the spool S. Preferably, the cylindrical enclosure or balloon-guard 7 is constructed of transparent material such as plastic or glass so that the spool is visible therethrough from the outside for observing the condition of the strand-material as it unwinds from the spool.

A nut 8 screwed onto the threaded upper end of the spindle 5 binds the plate 4 against the shoulder 9 of an enlarged boss 10 on the spindle. A clamping member 11 of inverted channel-shape is staked to the boss 10 on the spindle 5 to provide means for fastening the device to a creel or other support. A sheet-metal washer 12 of undulating contour in edge-view surrounds the boss 10 between the plate 4 and the top of the clamping member 11 for frictional engagement therewith to resist turning movement of the bracket-assembly about the spindle 5, while permitting its rotation for adjusting it to face in different directions.

As shown in Fig. 1, the channel-shaped clamping member 11 has the ends of its downturned flanges arcuately recessed to fit around one side of the creel-member or pipe 3 and a second L-shaped clamping member 13 has one leg 14 arcuately shaped at its end (Fig. 2) to bear against the inner web of the member 11 with the end of its longer leg 15 shaped to engage around the opposite side of the pipe 3. A hand-nut 16 screwed onto the threaded end of the spindle 5 is employed to draw the parts of the clamp together to grip the pipe 3, the end of the nut having a convex portion engaging in a similarly shaped depression 17 in the clamping member 13. By tightening the nut 16 the member 15 is bound against one side of the pipe 3 and the cooperating channel-shaped clamp 11 engaged forcibly against the opposite side of the pipe with the plate 4 fixedly held against the shoulder 9 at the end of the boss 10. Screwed onto the upper end of the spindle 5 is a cylindrical spool-holder 18 on which the spool S may be fixedly mounted within the cylindrical balloon-guard 7.

Projecting from the end of the rectangular platform or plate 4, and preferably formed integral therewith, is an arm or bracket 20 which may be constructed of channel shape in cross-section as shown most clearly in Fig. 3. The channel-shaped bracket 20 forms the support for the parts of the tension-device which are mounted at its outer end as viewed in Fig. 1.

Referring more particularly to Figs. 5 and 6, the tension-device comprises a pair of sheet-metal arms 21 and 22 formed at their rearward ends with spaced ears 23

and 24, respectively, which straddle the sides of the bracket 20 and are perforated to receive the ends of a pivot-pin 25 extending laterally through the side flanges of the bracket. In normal position the two arms 21 and 22 extend in spaced parallel relationship at right-angles to the bracket 20 with the end of the lower arm 22 resting on lugs 26 bent laterally across the end of the side flanges of the bracket 20. A rectangular metal strip or block 27 fastened to the under side of the upper arm 21 engages the top of the lower arm 22 to maintain the two arms in parallel, spaced relationship as shown in Fig. 1. A bowed leaf-spring 30 fastened by a bolt 31 to the bracket 20 extends outwardly therealong with its end adapted to engage across the rearward edge of the arm 21 when the two arms are in operative relationship as shown in Fig. 1. The spring 30 thus acts to yieldingly hold the two arms in operative relationship while permitting one or both of the arms to be swung upwardly about the pivot-pin 25 as shown in Figs. 5 and 6, the purpose of this pivotal movement of the arms being to swing them away from the open end of the cylindrical balloon-guard 7 so that the spool S may readily be placed therein or removed therefrom.

Referring to Fig. 6, the outer end of the arm 21 is formed with a portion 33 extending at right-angles thereto and bent again to form a laterally-projecting extension 34 for mounting a tubular felt pad 35 thereon. The arm 22 also has an offset right-angular projection 36 for mounting a similar tubular felt pad 37. With the arms 21 and 22 in operative position as shown in Fig. 1 the two pads 35 and 37 are held in alinement with their adjacent peripheries abutting in substantial contact to adapt the strand of wire *w* to feed therebetween in the manner and for the purpose as later explained.

At its outer end the arm 21 is narrowed laterally (Fig. 3) and curled around to form a cylindrical bearing 38 (Fig. 2) for pivotally mounting the right-angular bent end 39 of a rod 40 constituting an arm for mounting the tensioning means for the wire strand *w*. Referring to Figs. 2 and 5, the bearing portion 39 of the arm 40 is bent upwardly at its outer end to form a shorter arm 41 for attachment of a spring to control the pivotal movement of the arm 40. Abutting each end of the bearing 38 is a relatively thin sheet-metal strip 42 of circular shape provided with a hole for receiving the end of the bearing portion 39 of the rod or arm 40 to serve as a washer therefor. A narrow length of each strip 42 extends outwardly along the arm 40 and the arm 41, being formed with projecting lugs 43 bent therearound to connect the strips thereto. The shorter arm 41 is perforated with a hole 44 at its end for receiving the hooked end of a spring 45 anchored at its opposite end to a bent projection 46 at the rearward end of the arm 21. The spring 45 may be connected to the projection 46 by inserting the latter between its coils, thus providing for adjustment of the operative length of the spring to alter its tension for swinging the arm 41. Fastened to the top of the arm 21 by screws 47 is a plate 48 having a right-angular portion 49 at one end formed with bent detent-lugs 50, against one or the other of which the arm 41 is adapted to strike to limit the swinging motion of the main arm 40.

The outer end of the tension-arm 40 is screw-threaded to receive a metal block 51 provided with a laterally-extending bearing spindle 52 on which is journaled the tension-disk or pulley 55. A nut 56 screwed onto the end of the arm 40 is set up against the end of the block 51 to secure it against turning on the arm. The pulley 55 is formed with a hub 57 bored to receive a bushing 58, fast therein and preferably constructed of suitable oilless bearing material. The bushing 58 has an enlarged hub-portion 59 formed with a circumferential groove 60. The end of the spindle 52 is scored with a peripheral groove for receiving a spring-washer 62 which abuts the end of the bushing 58 to hold the tension-disk 55 in place on the spindle.

Means are provided for applying frictional resistance to the rotation of the tension-disk 55 consisting in a wire brake-element 65 bent into a loop 66 hooked around the hub 59 of the bushing 58 in engagement with the peripheral groove 60 therein. The opposite end of the wire brake-element 65 is bent around in a ring 67 encircling the rod or arm 40 and a helical spring 70 surrounding the arm bears against the ring 67 on the element to cause the loop 66 on the latter to frictionally engage the hub 59. The tension of the spring 70 may be adjusted by means of a knurled nut 71 engaging the threaded end of the arm 40. By screwing the nut 71 inwardly from the end of the arm 40 the spring may be shortened to increase its pressure on the brake-element 65 whereby to exert increased frictional drag of its hooked end 66 on the bushing 58 of the disk 55 and provide greater resistance to the turning of the disk. By turning the nut 71 in the opposite direction the pressure of the spring may be reduced to relieve the frictional drag of the wire brake-element 65 on the bushing 58 and thereby the resistance to the rotation of the disk 55.

Referring to Fig. 4, is the annular portion of the tension-disk or pulley 55 is provided with a peripheral groove 72 from the side of which a tapered radial flange 73 projects. Seated in the groove 72 is an elastic ring or annulus 75 constructed of rubber or similar resilient material and adapted to engage against the strand of wire as it feeds around the disk. The construction and arrangement of the several parts of the complete device having now been described in detail its method of operation is explained as follows:

To prepare the device for operation the two arms 21 and 22 are first swung upwardly to the position shown in Fig. 5 to clear the open end of the cylindrical balloon-guard 7 for placing the spool therein. A spool S of wire or other strand material then may be inserted through the open end of the balloon-guard 7 and seated on the mandrel 18 as shown in Fig. 1. After the spool S has been placed on the mandrel 18 the end of the wire *w* is drawn off therefrom and inserted between the felt pads 35 and 37 to adapt it to feed therebetween. It will be observed that with the arms 21 and 22 swung back into inoperative position, as shown in Fig. 5, they are retained in this relationship by the spring 30 bearing against the flat face of the upper arm 21. For convenience in threading the strand *w* between the pads 35 and 37, the arm 22 is first swung downwardly into the position shown in Fig. 6 so that the wire can be laid across the inner end of the pad 37. Then the arm 21 is rocked downwardly into the position shown in Fig. 1, thereby carrying the tension-arm 40 and the tension-disk or pulley 55 into operative position. As the pad 35 is brought into juxtaposition with the pad 37 the wire *w* will be held between the pads 35 and 37 and may then be drawn out and carried around the pulley 55 to position it between the resilient annulus 75 and the flange 73 on the pulley. From the disk 55 the wire *w* is drawn downwardly and passed around the pulleys 80, 81 of the traversing strand-guide 82 to feed it to the rotary spindle 83.

For winding an electrical coil C or other product, the end of the wire *w* is fastened to the winding spindle 83 and as the latter starts to rotate it will wind the strand thereon. The sudden draft on the wire at the start of winding draws the arm 40 down until it strikes the lower stop or detent-lug 50, in which position the arm is held by the tension of the wire as the winding continues; it being understood that this operative relationship of the parts is secured by adjustment of the spring 45 to regulate its tension in accordance with the requirements of the wire. By this arrangement, when the winding is arrested for any cause the arm 40 will swing upward to take up any slack in the wire so that in starting to wind again no sudden strain will be imposed on fine wire liable to break it. This feature provides that some rearward rotation of the winding arbor 83 is permitted

as sometimes required in the production of the electrical coils. As the wire *w* unwinds from the spool S it will balloon outwardly in a loop revolving around the interior of the enclosing cylinder or guard 7. The balloon-guard thus controls the extent of ballooning of the wire to prevent the strand from flying out to catch on, or tangle with, other parts of the device.

During the unwinding of the wire *w* from the spool S it is guided between the pads 35 and 37 to feed around the pulley 55 as the pulley is rotated with its rotation resisted by the action of the friction brake 65 to apply the proper degree of tension to the strand in accordance with the adjustment of the spring 70. Meanwhile, as the strand feeds between the felt pads 35 and 37 any foreign particles adhering thereto will be wiped off to clean the wire before it delivers to the winding coil C. The pads 35 and 37 apply a slight pre-tension to the strand as it is guided into alinement with the pulley 55, while preventing it from flying out and catching on other parts of the device. It will be understood that the purpose of swingably mounting the tension-arm 40 is to provide for taking up the slack in the strand feeding around the pulley 55, this action having no effect to materially increase the tension on the strand.

In this manner the device operates to apply a substantially uniform tension to the wire or other strand maaterial whereby it may be rapidly unwound from a spool or other container and the winding machine operated at high speed for producing electrical coils or other products from the material.

While the invention is herein described and illustrated as embodied in a preferred form of construction, it will be obvious that variations may be made in the form and arrangement of the parts of the device within the scope of the appended claims. Therefore, without limiting ourselves in this respect, we claim:

1. In a tension-device, a holder for supporting a spool or other container for wound strand material, a pair of resilient pads spaced from said holder and arranged in contact to adapt the strand to draw therebetween, a pivoted arm, resilient means for controlling the pivoting of said arm, a flanged pulley mounted on said arm in position to adapt the strand to feed therearound as it draws between the resilient pads, and a resilient annulus of cylindrical cross-sectional form surrounding said pulley to adapt it to bear against the strand and force it laterally against the flange of said pulley to apply resistance to its draft.

2. In a tension-device, a bracket having means for supporting a spool or like strand-container, a cylindrical balloon-guard fixedly mounted on said bracket enclosing said spool for controlling the ballooning of the strand as it unwinds from the spool, a pair of pivoted arms normally extending in spaced parallel relationship at right-angles to the axis of said spool, a resilient pad carried at the end of each arm for mounting them in cooperative abutting relationship to adapt the strand to feed therebetween, resilient means for maintaining said arms with their pads in cooperative relationship in substantial alinement with the axis of the spool, and resilient means for holding both of said pad-carrying arms with their pads in cooperative relationship while adapting them to be swung out of the way as a unit for applying the spool to the holder within the balloon-guard.

3. In a tension-device, a bracket embodying a holder for mounting a spool or other strand-container, a cylindrical balloon-guard on said bracket surrounding the spool, a pair of arms pivoted to said bracket and carrying cooperating pads at their ends positioned to engage a strand drawing between said pads, means to hold said arms in operative relationship to cause the pads to apply pre-tension to the strand, said arms being adapted to be swung as a unit to displace them from the end of the balloon-guard for applying the spool to its holder, a tension-arm pivoted to one of the first-named arms, a pulley journaled at the end of said tension-arm, and resilient means for controlling the pivoting movement of said tension-arm.

4. In a tension-device, a bracket for mounting a spool or like container for strand material, a pair of arms pivoted on said bracket to swing about a common axis, means on the bracket for limiting the swinging movement of one arm, means engaging between said arms to normally maintain them in parallel spaced relationship, resilient means for holding said arms in parallel cooperative relationship while adapting one or both arms to swing about their pivot as a unit, and resilient pads carried at the ends of said arms and adapted to be supported in alined abutting relationship when said arms are held in operative position.

5. In a tension-device, a bracket, a pair of arms pivoted on a common axis on said bracket, means engageable to maintain said arms extended from said bracket in parallel spaced relationship, resilient strand-guiding means carried by said arms and adapted to be positioned in alined abutting relationship when said arms are extended from the bracket, and a leaf-spring fastened at one end to the bracket with its opposite end engaging the rearward end of one arm to hold both arms extended in operative relationship while adapting one arm to be swung away from the other arm or both arms to be swung together as a unit.

References Cited in the file of this patent

UNITED STATES PATENTS

345,468	Wilmott	July 13, 1886
1,011,450	De Laski et al.	Dec. 12, 1911
1,407,175	Smith	Feb. 21, 1922
1,873,422	Keller	Aug. 23, 1932
1,874,379	Stewart	Aug. 30, 1932
2,048,511	Newton	July 21, 1936
2,058,536	Waseen	Oct. 27, 1936
2,079,966	Reiners et al.	May 11, 1937
2,362,920	Moore	Nov. 14, 1944
2,366,101	Grothey	Dec. 26, 1944
2,643,075	Moore	June 23, 1953