No. 724,975. PATENTED APR. 7, 1903.

S. W. WARDWELL.

THREAD UNROLLER.

APPLICATION FILED OCT. 13, 1902.

NO MODEL.

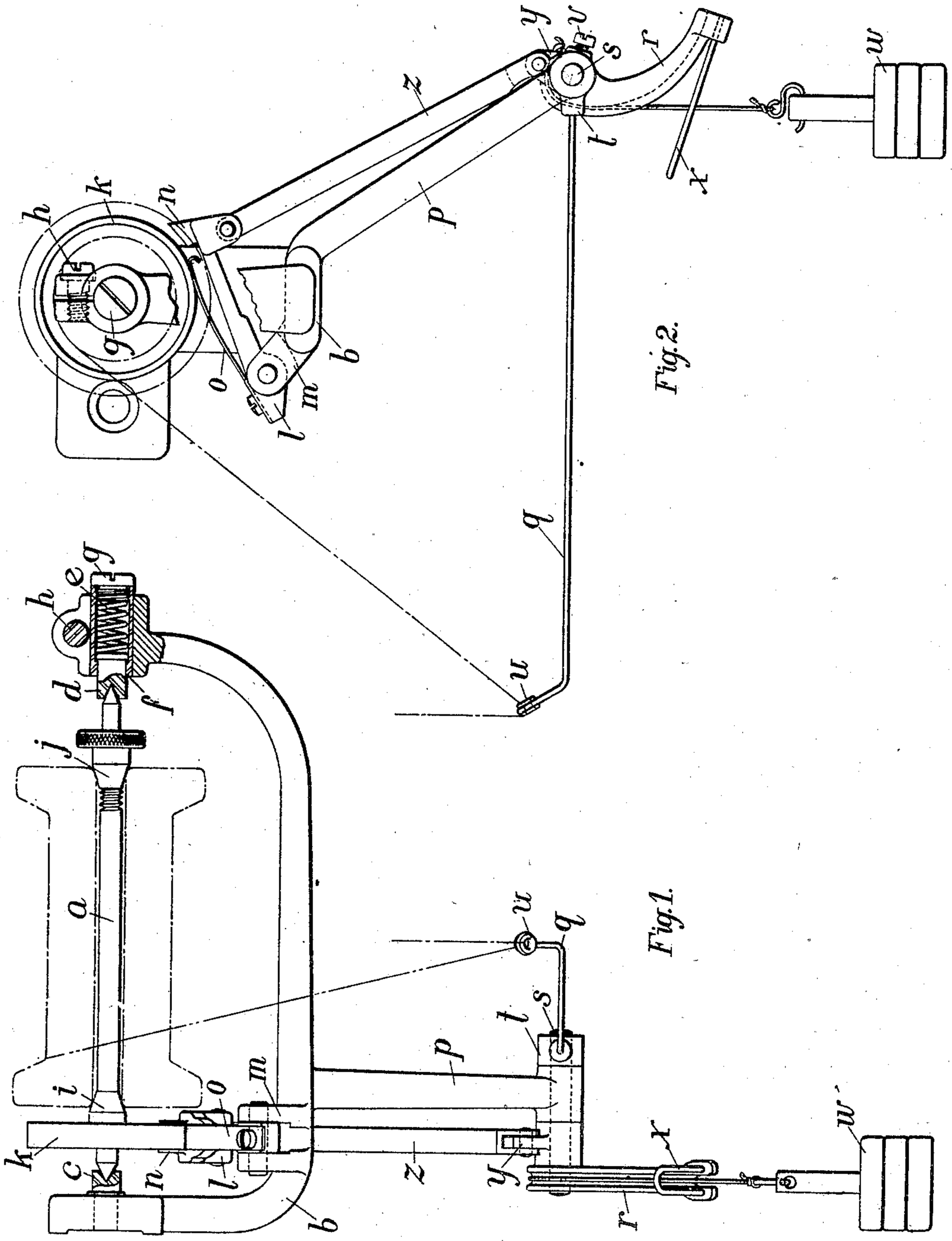

Fig. 1.

Fig. 2.

WITNESSES

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SIMON W. WARDWELL, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO UNIVERSAL WINDING COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

THREAD-UNROLLER.

SPECIFICATION forming part of Letters Patent No. 724,975, dated April 7, 1903.

Application filed October 13, 1902. Serial No. 127,168. (No model.)

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, a citizen of the United States, residing at Providence, county of Providence, and State of Rhode Island, have invented new and useful Improvements in Thread-Unrollers, of which the following is a specification.

My invention relates to improvements in unrolling devices for thread, yarn, and other textile materials supplied to winding or like machines.

The purpose of my invention is to provide means whereby the shock due to the inertia of the spool or bobbin shall be neutralized and the rotation of the spool controlled, so that fine and delicate materials may be successfully and efficiently delivered from rotating spools or bobbins at high speed.

A spool because of its relatively large mass offers so great an inertial resistance to sudden rotation that to suddenly or quickly start unwinding a fine or delicate material is impossible, or if the material is sufficiently strong to sustain a sudden stress without breaking the effect thereof will be injurious to the final product. If the spool be successfully started without breaking the yarn, it will, unless its rotation be properly controlled, acquire considerable momentum, and in case the winding of the yarn be suddenly arrested the rotation of the spool will continue due to the said momentum, delivering a length of yarn which, not taken up by the winding, is liable to entanglement or at least must be wound back upon the spool by hand before the unwinding can again be started. Further, the yarn mass on a spool or bobbin is rarely concentric with the axis of the bobbin and is never of the same diameter throughout. Hence whenever the yarn in unwinding, traveling from end to end of the bobbin, reaches a portion of the yarn mass the surface of which is nearer the axis of rotation than other portions of the coil being unwound the spool or bobbin receives an impetus to accelerated rotation. If the diameter of the yarn mass or the distance of its surface from the axis of rotation then suddenly increases, more yarn is delivered than can be taken up immediately by the winding, and while this slack is being taken up the rotative speed of the supply-spool diminishes and may fall below the normal, so that when the slack is taken up the inertia of the spool must again be overcome to so increase its rotative speed that it may again resume its normal rate. The shock and impulse when the slack has been taken up are frequently so great, especially if taken up just as the yarn has again reached a portion of the mass of lesser diameter, that the yarn is either broken or the spool receives a new impulse to excessive speed and overdelivery of yarn. All of the above conditions result in extreme variations of tension that cause irregularities and defects in the ultimate product, strain and breakage of the yarn, and waste both of material and of the operator's time.

The nature of my invention and the manner in which I embody the same are fully disclosed in the following specification and in the accompanying drawings, which latter represent, respectively—

Figure 1, a view longitudinally of the spindle, with the retaining devices for the latter shown partly in section; Fig. 2, an end view with the outer spindle-support broken away to show the braking mechanism.

The supply-spool (indicated by dot-and-dash lines) is secured to a spindle *a*, which is removably mounted to turn in pivot-bearings on the frame *b*. The ends of the spindle are conically tapered, one end having a bearing in a conical recess in the hardened stud *c*, driven into the bracket *b*, and the other end having a similar bearing in the spring-plunger *d*. The latter is forced against the spindle by a spring *e*, held in the sleeve *f* by a screw *g*. The sleeve *f* is secured in the split end of the arm of the bracket *b*, formed to surround it, by a binder-screw *h*, allowing longitudinal adjustment to vary the tension of the spring *e* in its action on the spindle *a* and the distance between the stud *c* and the plunger *d*. The plunger *d*, adapted to slide in its sleeve, is prevented from excessive movement by a head which contacts with a shoulder formed in the bore of the sleeve. Two conical bearings for the ends of the spool are provided on the spindle, one, *i*, prefer-

ably integral therewith at its inner end, the other, *j*, adapted to screw onto the threaded outer end. The bearing *j* is formed with an enlarged disk or head, with knurled periphery to facilitate turning it on the spindle. At the inner end of the spindle is also provided a wheel or brake-disk *k*, having a substantially flat peripheral surface of a suitable width to be frictionally engaged by the brake.

A brake-lever *l* is fulcrumed at one end in a bearing *m*, formed integral with the lower arm of the bracket *b*, and at its opposite end is provided a projection *n*, adjacent the periphery of the disk *k*. A flat spring *o* is fastened at one end to the lever *l*, adjacent the bearing of the latter, with its extending end adapted to normally contact with the brake-disk *k*.

Extending downward from the bracket *b* is an arm *p*, at the lower extremity of which are supported the regulating devices for the braking mechanism. These comprise a slack and tension controlling arm *q*, acted on by the thread as it comes from the spool, and an arm *r*, operated by suspended weights to actuate the brake-lever. These arms *q* and *r* are mounted on a rock-shaft *s*, which has a bearing in the end of the arm *p*. The arm *q*, preferably of spring-wire, is secured to a hub *t*, forced onto the rock-shaft *s*, and at its outer end carries an eye *u*, preferably of porcelain or other vitreous material, to resist the wear of the thread. At the opposite end of the shaft the arm *r* is fastened by means of the set-screw *v*. (Shown in Fig. 2.) The arm *r* is provided with a groove or channel for the cord, on which are suspended the weights *w*. The bottom of the groove extends in substantially spiral form relative to the axis of the rock-shaft throughout the length of the arm *r* and is so related to the said axis that as the arm is raised the weights act with increased leverage to resist the raising of the arm *q*. A U-shaped guard-wire *x*, with its ends driven into suitable bores in the end of the arm *r*, extends either side of the weight-cord to prevent its displacement from the groove. A lug *y* is formed on the hub of the arm *r*, and to this is pivoted one end of a link *z*, similarly connected at its opposite extremity to the free end of the brake-lever *l*.

The operation of the device is as follows: To apply or remove a spool, the spindle *a* is removed from its bearings by forcing it longitudinally outward against the plunger *d*, compressing the spring *e* until the inner end of the spindle is free from the stud *c*. After removing the outer spool-bearing *j* the spool is slid onto the spindle and secured concentrically therewith by reapplying the outer bearing *j* and screwing it tightly against the spool, the taper of the bearings *i* and *j* centralizing the spool. The end of the yarn is then threaded through the eye *u* and thence led up to the operating mechanism of the machine with which the device coöperates. When the machine is started, the sudden and quick pull on the supply takes up the thread in the loop which extends downward from the spool through the eye *u* and the latter is drawn upward. The upward movement of the arm *q* rocks the shaft *s* and through the arm *r* and the connecting-link *z* draws the lever *l* away from the brake-disk. An extended movement of the brake-lever releases the spring *o* from the periphery of the brake-disk, leaving the spool then entirely free to rotate. After overcoming the inertial resistance of the spool the tension on the thread tends to decrease as the speed of the spool increases, and the thread delivers with greater freedom, and the arm *q* drops back to a position where the pull of the yarn on the arm is just balanced by the reaction of the weights, as indicated in Fig. 2, and where the spring *o* is caused to act with the requisite intensity. The movement of the arm *q* causes the degree of pressure of the brake-spring *o* to vary. In case the supply-spool receives an impulse to rotate too fast, the slack caused thereby is at once taken up by the downward movement of the arm *q*, which downward movement causes the spring *o* to be pressed more strongly against the brake-disk *k* to retard the rotation of the spool or if the acceleration of the spool be very great to cause the action of the brake *n*. On the contrary, should any sudden and unusual stress occur, as by the sudden tightening of slack, the arm *q* is raised, relieving or entirely removing the pressure of the spring *o* and leaving the spool free to rotate. In case the supply is exhausted or the machine stops for any other cause, the action is the same as when much slack is unwound. The brake *n* engages the disk *k* and promptly arrests the rotation of the spool.

I am aware that unrolling devices have before been used in which the resistance to the delivery of the supply is regulated by a thread-controlled arm and by an elastic braking element. I am not aware, however, that any unrolling device has been devised having the principle of operation described and capable of delivering fine textiles at high speed with uniform tension.

Therefore, without limiting myself to the precise details and relations hereinbefore described, I claim—

1. The combination in a thread-unroller with a rotating spindle having a brake-disk, of a brake-lever pivoted to contact with said disk, a spring on said lever normally bearing on the disk and means for operating said lever to vary the degree of action of the spring.

2. The combination in a thread-unroller with a removable spindle supported in pivot-bearings, a brake-disk on the spindle, a pivoted brake-lever, a spring on the brake-lever, normally contacting with the brake-disk and means for actuating and controlling said lever, comprising a member whereby the said brake-lever is pressed toward the disk, an arm acted upon by the thread to vary the position of said member and the degree with

which the brake-lever acts on said disk, and weights connected with said member to cause the action of said brake-lever and to resist, with a varying degree of intensity and leverage, the action of the thread on the arm aforesaid.

3. The combination with a rotatable spindle for thread-supplies, of braking devices for controlling its rotation comprising a brake-lever, a pivoted arm connected with the brake-lever and having a spiral groove, a cord secured to the arm and laid in the spiral groove, weights suspended by the cord, and a second arm connected with the first and controlled in position by the delivery action of the thread and reaction of the weight.

4. The combination with a rotatable spindle for spools, of braking devices for controlling the rotation of the spool, comprising a lever hinged to frictionally engage the spindle, a yielding member between the lever and the spindle, a swinging arm shifted by the varying tension of the thread, means to resist the movement of the arm and a connection between the arm and the lever, substantially as shown and described.

5. The combination in a thread-unroller with a bracket *b*, a fixed bearing *c*, a movable bearing in the bracket comprising a headed stud *d*, a sleeve *f* bored with a shoulder to contact with the head of the stud, a spring *e* in the sleeve, and a screw *g* for retaining the spring, a bearing surrounding the sleeve and clamped thereon by a screw *h*, of a supply-spindle having a fixed and an adjustable conical bearing for the spool and braking devices acting to resist the rotation of the spindle controlled by the delivery of the supply, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON W. WARDWELL. [L. S.]

Witnesses:
CHARLES A. EDDY,
ARTHUR A. ARMINGTON.