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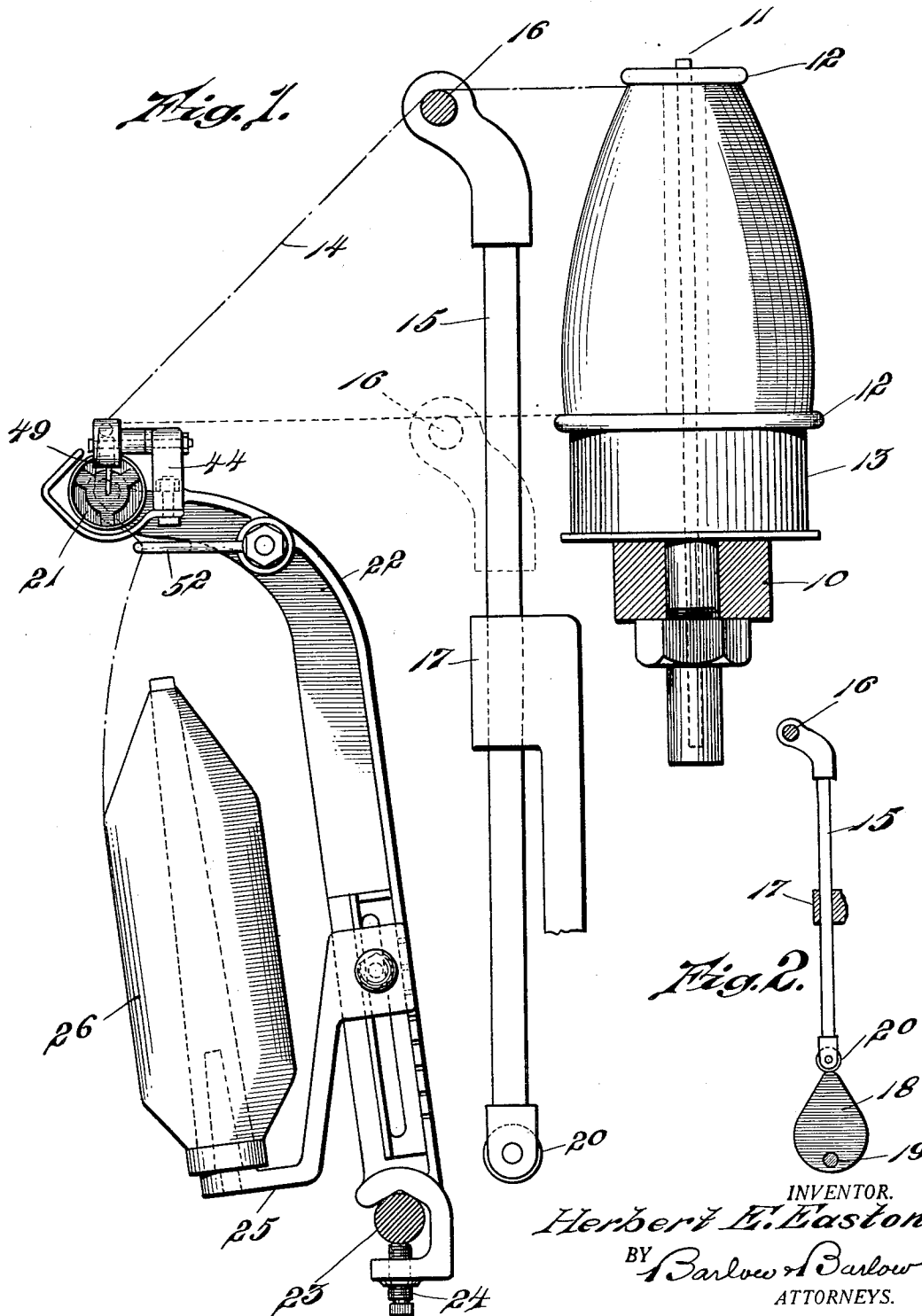
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AUTOMATIC YARN TENSIONING DEVICE

Filed Dec. 2, 1929

2 Sheets-Sheet 1



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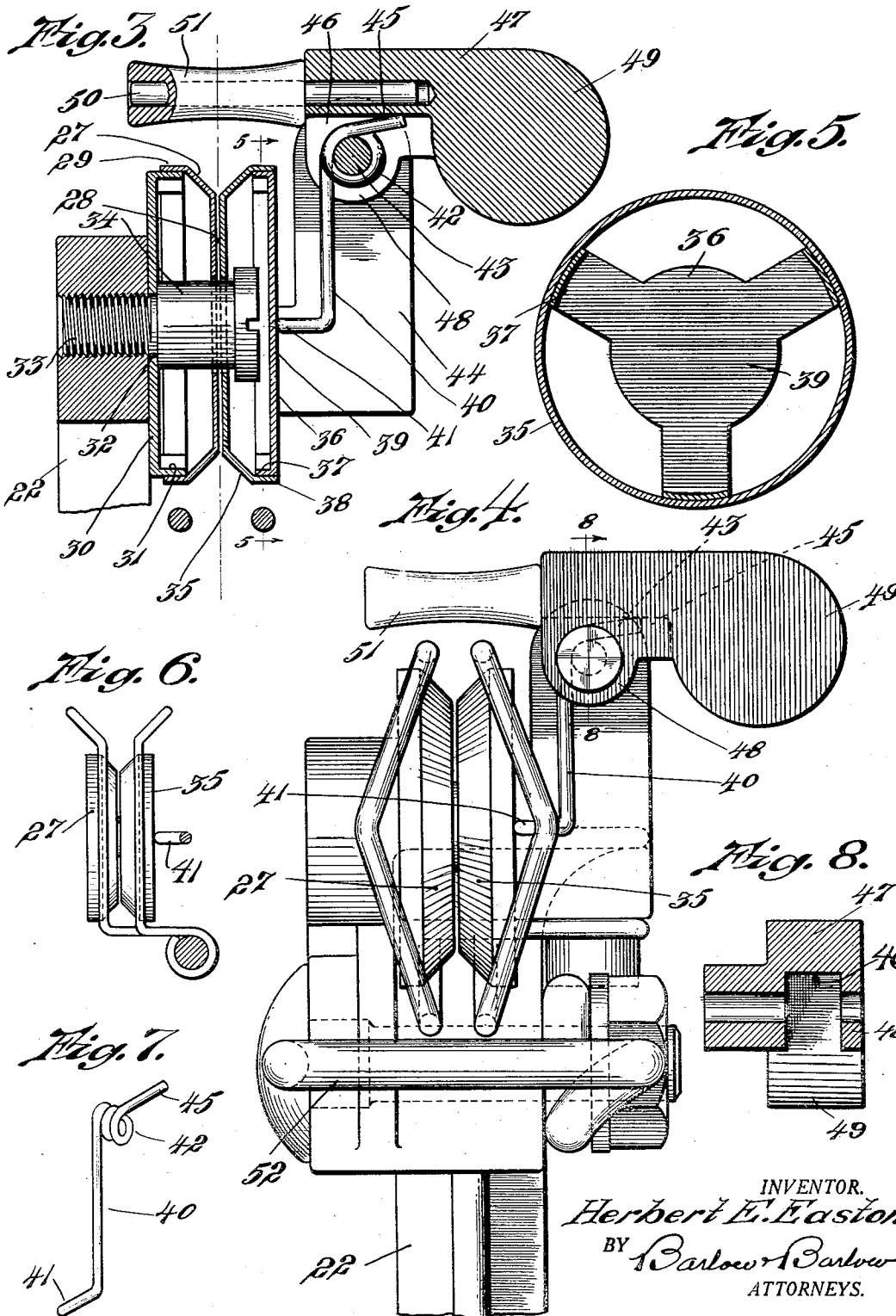
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UNITED STATES PATENT OFFICE

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AUTOMATIC YARN TENSIONING DEVICE

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7 Claims. (Cl. 242—150)

This invention relates to an improvement in yarn tensioning devices for spooling machines and the like; and the object of this invention is to provide a yarn tensioning device which will maintain a substantially constant tension on the yarn while being wound upon the spool under varying winding conditions.

A further object of the invention is to provide automatically operable means for unifying the tension on the travelling yarn while being wound at varying speeds upon the spool.

A still further object of the invention is to provide automatically operable means for causing uniform tension on the yarn while being led at constantly changing angles from the tensioning device to the spool.

The invention still further consists in the provision of a tensioning device which is located intermediate the supply package and the winding spool for frictionally engaging the yarn in its passage to maintain constant tension under varying feeding conditions.

The invention further consists in providing a friction device for the travelling yarn, which includes a fixed friction disk and a cooperating movable friction disk controlled in its movement relative to the fixed disk by pull of the yarn over a movable guide member.

A further object of the invention is to so mount one of the friction disks that it will be caused by the travelling yarn to rotate relative to the other disk while being moved automatically towards and from the opposite disk to vary its frictional pressure upon the travelling yarn.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a side elevation showing fragmental portions of the spooling machine and my improved tensioning device as applied to the yarn in being wound upon the spool;

Fig. 2 shows one means of providing an irregular movement to the traversing yarn guide whereby the desired shape of winding on the spool may be obtained;

Fig. 3 is an enlarged sectional view showing the pivot lever and the two cooperating friction disks in my improved yarn tensioning device;

Fig. 4 is a front view of the device in elevation;

Fig. 5 is a section through one of the disk members, on line 5—5 of Figure 3 looking in the direction of the arrows;

Fig. 6 shows the friction disk and the yarn guide as applied thereto;

Fig. 7 is a perspective view of the presser arm which is operated by the friction control lever; and

Fig. 8 is a section on line 8—8 of Figure 4 through the friction control lever, showing the pocket in which the end of the presser arm is located.

It is found in the practical operation of spooling machines of this character desirable to wind the yarn on the spools in somewhat of a conical or so-called bottle shape, or larger on one end than on the other, so that the yarn may be rapidly drawn axially from the end of the spool in warping or for other purposes and to also wind the yarn on the spool under a constant tension to have the density of the winding uniform throughout the length of the spool; and to produce this particular form of wind in which the diameter of the winding is progressively varied, I provide a yarn guiding traverse motion which moves with a predetermined varying speed to guide and lay the yarn so that more will be wound on one end portion of the spool than at the other; and as a result, the large diameter of the winding is naturally caused to take up the yarn faster than that of the smaller diameter, by which construction two variations in the winding operation must be taken into consideration in the producing of a uniform winding tension on the yarn; first, the travelling speed of the yarn varies as wound upon different portions of the spool; and secondly, the angle of the running yarn as led over the tension device is constantly varying, both of which change in speed and change in angularity must be compensated for by the action of the yarn tensioning device, and I have therefore devised a yarn tensioning device which is controlled by the pull of the yarn to automatically effect a friction pressure on the running yarn, the same being so balanced that it will maintain a substantially uniform tension on the yarn at the point where it is laid upon the spool, the degree of pressure upon the yarn being varied to compensate for the change in speed and change in angularity at which it is drawn over the balanced friction control lever; and the following is a detailed description of the present embodiment of my invention and showing one means by which these advantageous results may be accomplished:

With reference to the drawings, 10 designates a portion of the frame of the machine which supports the spool spindle 11 and on which spin-

die is mounted a winding spool 12 which is caused to rotate by the driven whirl 13.

In order to lay the yarn 14 on this spool to build up the winding into the desired shape which is that of forming the same somewhat conical or bottle shape in which the diameter at the upper end of the spool is smaller than at the bottom of the spool, I have provided suitable means for reciprocating the guide rod 15. In the upper end of this guide rod, I have positioned a guide pin 16 over which the yarn 14 is led to the spool, and this rod is guided in a suitable bearing 17 and may be reciprocated by any suitable means that herein shown being illustrated in Figure 2, in which a cam 18 is mounted on a shaft 19 to be rotated, the rod 15 being provided at its lower end with a roll 20 to follow the contour of the cam and so produce a varying traverse speed of the guide pin 16 to lay the yarn upon the spool so that its winding will be of a shape desired. In this machine, I have also provided a yarn tensioning device 21 which I mount in the frame arm 22, which frame arm is supported on the rod 23 that extends along the front of the machine, and is secured thereon at the desired angle by a set screw 24 or other suitable means; also on this frame arm 22, I have mounted a bracket 25 for supporting the yarn supply package 26.

One of the frame arms is positioned adjacent each of a plurality of winding spools 12 which are spaced along the length of each spooling machine.

The detailed construction of my improved tensioning device is as follows:

The friction disk 27 which has a friction surface 28, is provided with a cup-shaped flange 29, into which the outturned ends 31 of a spider-shaped member 30 are forced. This spider-shaped member 30 is provided with an opening 32 through which the threaded end 33 of the trunnion screw 34 is passed, the shoulder of this screw serving to bind the spider and so retain the friction disk in fixed position on the frame arm 22.

A cooperating disk 35 formed similarly to the fixed disk 27 is rotatably mounted upon this trunnion screw 34 and is free to be moved axially thereon relative to the fixed disk. A spider member 36 having inturned end portions 37 is forced into the outturned flange 38 of this rotatable disk and provides a central bearing plate 39 against which an end 41 of the yieldable presser arm 40 engages, this presser arm being provided with a bearing coil 42 mounted on the pivot pin 43 in the bracket 44 and having an extending end 45 to engage the under surface 46 of the friction control lever 47.

This friction control lever is preferably formed of a casting having a pair of pivot ears 48 pierced to receive the pivot pin 43 on which this lever may freely rock. One end of this lever is provided with an enlargement or gravity actuated weight 49, while the other end of the lever on the opposite side of the pivot pin is provided with an extending pin 50 on which is fixed a porcelain guide member 51 over which the yarn is drawn. It will therefore be seen that when the yarn is led from the package 26 through the guide eye 52 and between the friction washers 27 and 35 then over the yarn guide 51 it must be led at an angle therefrom to be wound upon the spool 12, the degree of the angle varying from substantially a right angle where the yarn is wound upon the bottom portion of the spool, to substantially an

angle of 45° where it is conducted to the top of the spool. Therefore the pull on the friction control lever is greater when the yarn is being led to the bottom portion of the spool than when it is being led to the top portion of the spool, also when led to that portion adjacent the bottom of the spool the yarn travels at a greater speed owing to the larger diameter of the winding at that point. These two elements of variation in angularity and variation in travelling speed are compensated for by movement of the balancing lever 47 which is so weighted that as the angle of pull and the speed of travel increases the weighted end of the lever is naturally tipped up to permit the pressure arm to swing back and permit the two disks to separate sufficiently to reduce the friction on the yarn travelling therebetween, and as this angle of pull is decreased, the weighted end of the lever is permitted to swing back and through the pressure arm exert a greater friction upon the yarn as it travels between the disks.

My improved tension device is very simple, practical in construction, and is effective in its operation and by its use the tension of the yarn on the spool is maintained substantially uniform irrespective of the constantly changing winding conditions.

The foregoing description is directed solely towards the construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. In a spooling machine, a device for applying friction to the traveling yarn including a fixed friction disk, a movable friction disk, resilient means engaging said movable friction disk at the center thereof, whereby the rubbing friction thereon is minimized and means for operating said resilient means to apply a uniform tension on the yarn.

2. In a spooling machine, a device for applying friction to the traveling yarn including a fixed friction member, a rotatable friction member movable axially relatively to said fixed friction member, and resilient means engaging said rotatable friction member at the axis thereof to move it toward said other friction member, and means for operating said friction means to apply a uniform tension to the yarn.

3. In a spooling machine, a device for applying friction to the traveling yarn comprising a trunnion, a fixed friction disk secured on said trunnion, a movable friction disk slidable on said trunnion, a lever pivoted adjacent said friction disks, said lever having a guide portion for the yarn extending over the juxtaposed faces of the friction disks and a weighted portion at the opposite side thereof, and resilient means contacting the weighted portion of the lever and engaging the friction disk at the center thereof, whereby the rubbing friction thereon is minimized.

4. In a spooling machine, a device for applying friction to the traveling yarn comprising a trunnion, a fixed friction disk on said trunnion, a movable friction disk slidable on said trunnion, means on said trunnion to limit the movement of the slidable disk, a lever pivoted adjacent said friction disks, said lever having a guide portion for the yarn, at one side of its pivot, extending over the juxtaposed faces of the friction disks, and a weighted portion extending on the opposite side of its pivot, a spring coiled about the

lever pivot, said spring having one end in constant engagement with the weighted portion of the lever and its opposite end in constant engagement with the center of the friction disk.

5 5. A device for applying friction to a traveling yarn, comprising a fixed friction disk and a rotatably mounted friction disk between which the yarn travels, a support, a weighted lever pivoted on said support, a yarn guide secured to said lever, a resilient means engaging said lever and rotatable disk and movable about the pivot of said lever, whereby a tension is applied on the yarn.

10 6. A device for applying friction to a traveling yarn, comprising a fixed friction disk and a trunnion extending therefrom, a friction disk rotatably and axially movably mounted on said trunnion, a support, a weighted lever pivoted to said support, a yarn guide secured to said weight, a spring comprising a wire coiled around the pivot

of the lever with radially extending end portions and with one end in engagement with the lever and the other end engaging the rotatable disk, whereby said disk is moved towards the fixed disk to tension the yarn traveling therebetween. 80

7. A device for applying friction to a traveling yarn, comprising a fixed friction disk and a rotatably mounted friction disk between which the yarn travels, a support at right angles to the axis of the disk, a weighted lever pivoted on said support and provided with a recess therein, a spring coiled around the pivot of the lever with radially extending end portions and with one end extending into said recess and in contact with said lever and the other end in engagement with the rotatable disk, whereby said rotatable disk is moved towards the fixed disk thru said spring to tension the yarn traveling therebetween. 85 90

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