July 18, 1933. J. K. BRYANT 1,918,587

TRAVERSE MOTION FOR WINDING MACHINES AND THE LIKE

Filed Dec. 3, 1930 3 Sheets-Sheet 1

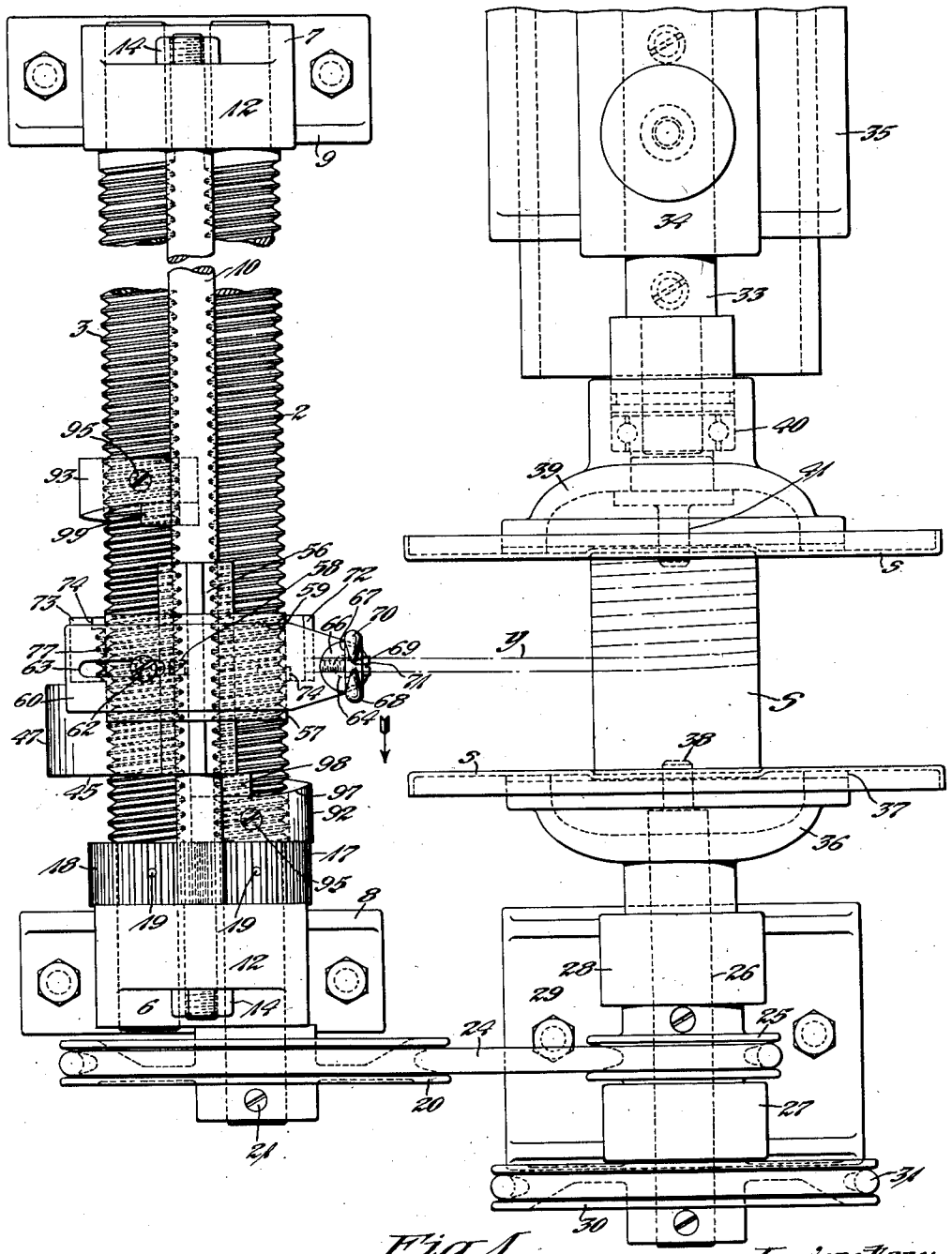


Fig. 1.

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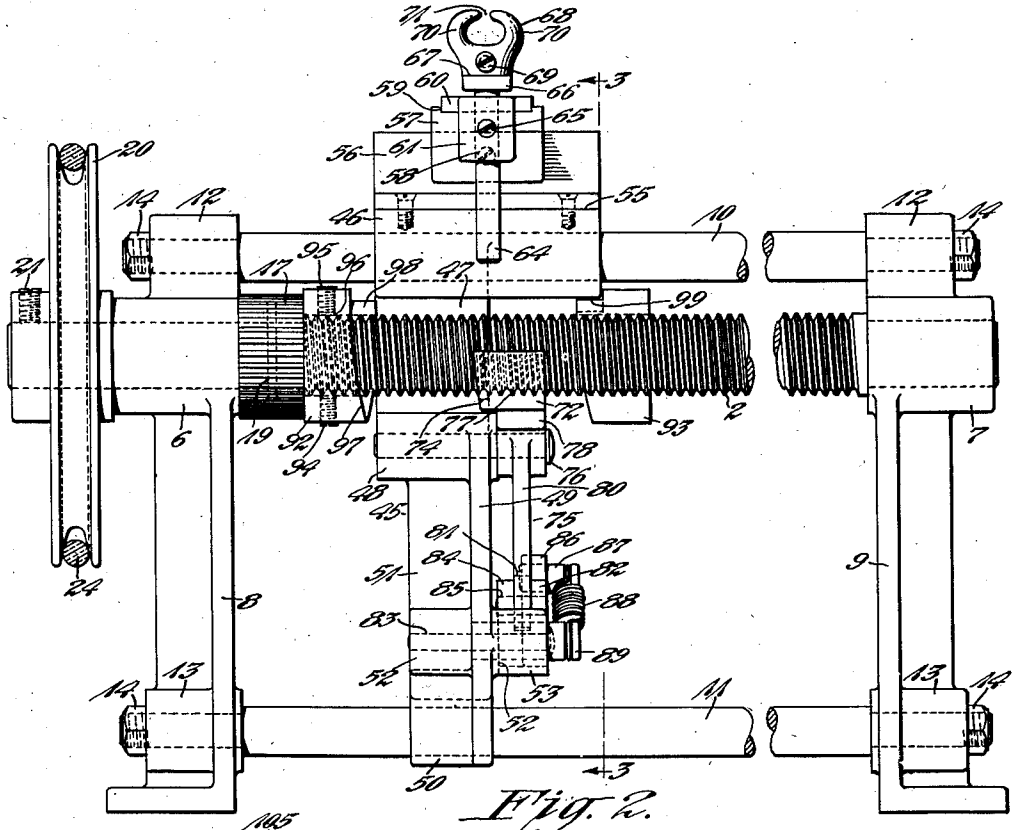


Fig. 2.

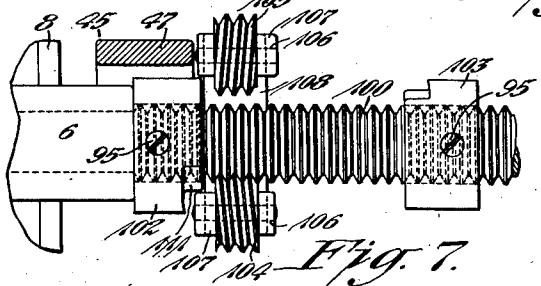


Fig. 7.

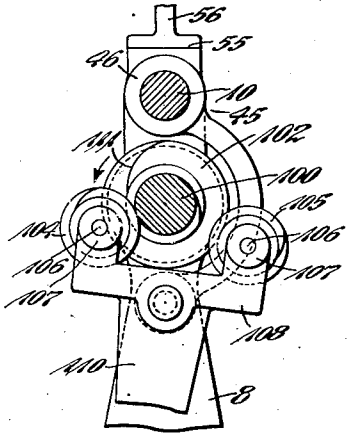


Fig. 8.

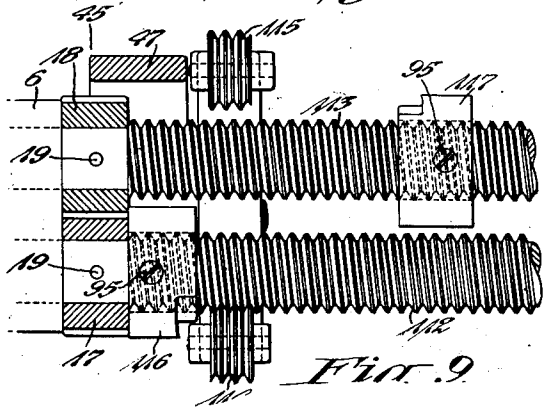


Fig. 9

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TRAVERSE MOTION FOR WINDING MACHINES AND THE LIKE

Filed Dec. 3, 1930 3 Sheets-Sheet 3

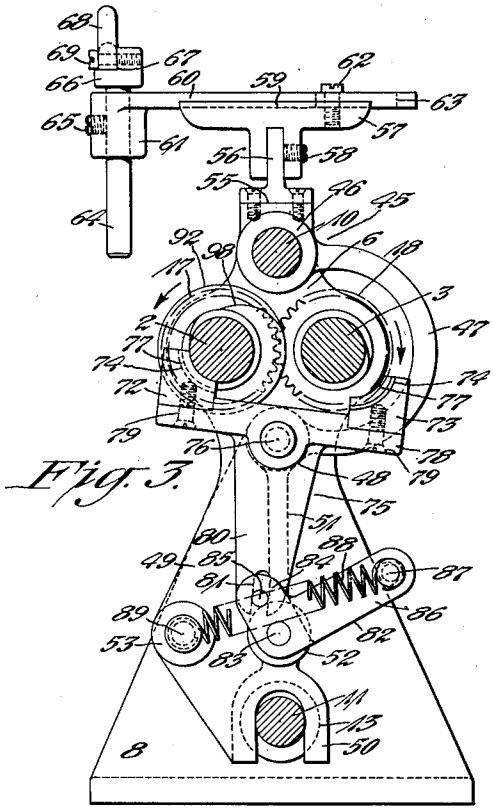


Fig. 3.

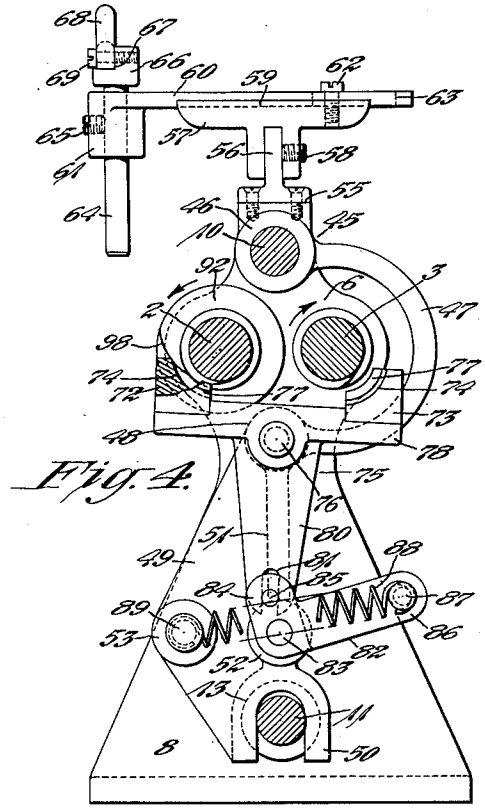


Fig. 4.

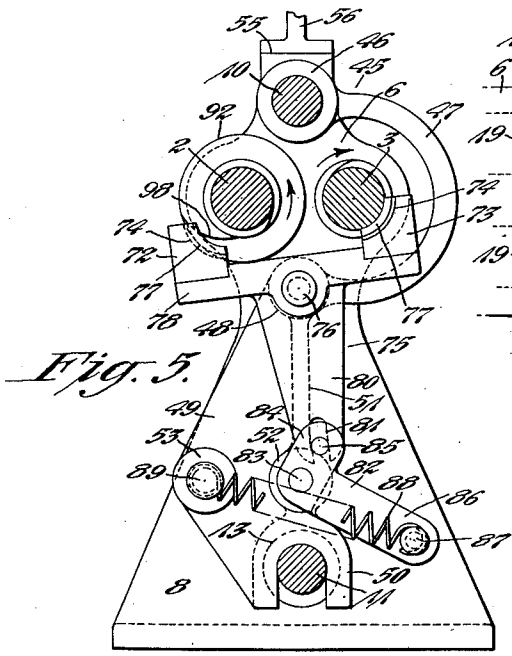


Fig. 5.

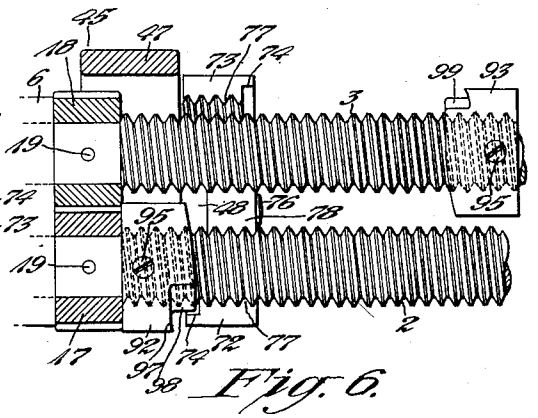


Fig. 6.

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Patented July 18, 1933 1,918,587

# UNITED STATES PATENT OFFICE

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## TRAVERSE-MOTION FOR WINDING MACHINES AND THE LIKE

Application filed December 3, 1930. Serial No. 499,776.

This invention relates to winding, reeling, spooling, beaming and like machines and consists in an improved traverse-motion for traversing yarn or other materials longitudinally of the spool-barrel or other support on which it is coiled or wound.

In the present specification and claims the term "yarn" is used generically to indicate any kind of attenuated material, either textile or otherwise, and the term "spool" is employed in a general sense to designate any form of holder or container on which the material is wound.

One object of the present invention is to provide an adjustable traverse-motion which may be set to regulate the length of traverse of the yarn within definite limits in accordance with the length of the spool or other holder or container for the material.

Another object of the invention is to provide a device of the type specified wherein the length of traverse of the yarn may be adjusted accurately and precisely to give a uniform distribution thereof without overruns at the ends of traverse.

Another object of the invention is to provide a device of the type specified wherein the means for reversing the direction of traverse is actuated by the traversing-element itself to insure a quick reversal of its movement whereby to avoid a dwell at the ends of the traverse of the yarn or other material being wound.

Another object of the invention is to provide a device of the type specified wherein the reversing-means for the traverse is of compact arrangement and self-contained to economize in space and insure efficient operation of the device.

Another object of the invention is to provide a device of the type specified of greater simplicity and comprising a minimum number of parts whereby to render it more economical to manufacture and less liable to derangement and getting out of order.

Further objects of the improvement are set forth in the following specification which describes a preferred form of construction of the device with several modifications in the arrangement of the parts thereof. In the drawings, wherein like reference characters designate like parts:

Fig. 1 is a plan view showing the improved traverse-motion in connection with means for rotating a beam or spool on which the yarn is wound;

Fig. 2 is a front elevation of the traverse-motion showing the traverse-guide which is reciprocated therefrom;

Fig. 3 is an end view of the transverse-motion, part sectional on line 3—3 of Fig. 2, with the parts shown in position during one direction of movement of the traverse-guide;

Fig. 4 is a view showing the parts as they are shifted to reverse the direction of traverse of the guide;

Fig. 5 is a view showing the parts shifted to effect a direction of traverse opposite to that accomplished with the parts in position as shown in Fig. 3;

Fig. 6 is a plan view of a portion of the traverse-screws showing the reversing-means in detail;

Fig. 7 is a view illustrating a modification in the construction of the traverse-motion wherein a single grooved shaft is employed in place of the pair of screws;

Fig. 8 is an end view of this form of construction of the device; and

Fig. 9 is a view showing the double screw arrangement with a modified form of follower for engaging the same.

The present improved traverse-motion may be employed in machines for winding yarn, thread and other textile materials, on coil-winding machines in which a strand or strands of conductor are laid in helical turns, and also with various other types of machines and apparatus having parts to be reciprocated with an adjustable length of traverse or throw.

In the present drawings I have preferred to illustrate the device as applied to use with a machine for winding yarn or thread in multiple on a spool or beam, it being desirable to lay the strands close to the heads of the spool in order that the latter may contain a maximum amount of material, and also important that the traverse be reversed at definite points with a quick return of the feed so

that the yarn will not be caused to draw down in between the spool-head and the end of the mass already wound.

In general, the present improved traverse-motion consists of one or more grooved shafts or spindles, in one form of construction having external helical threads with a nut or follower for engaging the threads of each screw, and means adjustable longitudinally of the screws and arranged to shift the followers to alter the direction of feed of the element traversed thereby. In another form of construction the traverse-motion embodies a single grooved shaft with right- and left-hand helically-threaded followers alternately engageable therewith and shiftable to reverse the direction of feed of the traversing-element.

In its preferred form of construction the traverse-motion comprises two parallel, externally-threaded shafts or screws 2 and 3 which may have threads of the same hand, conveniently, right-hand threads, and are connected for rotation in opposite directions. The two screws 2 and 3 are spaced a slight distance apart with their opposite ends journaled in bearings 6 and 7 supported from brackets 8 and 9. The brackets 8 and 9 may be bolted to a suitable base-plate or fastened to the top of a table or bench. Referring particularly to Fig. 2, the two brackets 8 and 9 are connected at top and bottom by tie-rods 10 and 11 which have reduced end-portions extending through bosses 12 and 13 on the brackets and clamped in place by nuts 14. The tie-rods 10 and 11 have a further office as tracks or ways for a reciprocating element such as a slide or cross-head to be later described.

At one end of the screws 2 and 3 are intermeshing gears 17 and 18 secured fast thereon by pins 19 or other suitable keying means. The gears 17 and 18 abut the end of the bearing 6 and through the interengagement of their teeth effect rotation of the screws in opposite directions. A belt-pulley 20, secured fast to the projecting end of the screw or shaft 2 by means of a set-screw 21, is employed for driving the shafts, or any other suitable means such as gearing may be substituted therefor.

In the present form of construction of the device the pulley 20 is driven from a round belt 24 passing over a smaller pulley 25 on a stud-shaft or spindle 26. The spindle 26 may constitute the means for rotating the spool, beam or other support on which the winding is performed, being journaled in bearings 27 and 28 at the top of a bracket 29. A third driving-pulley 30 is secured fast on the outer projecting end of the spindle 26 and may be connected by a belt 31 to be driven from an electric motor or other source of power.

Arranged opposite to and in axial alinement with the spindle 26 is another spindle 33 journaled in a bearing 34 at the top of a bracket 35. On the end of the spindle 26 is a flange or head 36 adapted to engage against the head *s* of the spool S and having an axial stud 38 projecting into the bore of the spool. The driving-head 36 may be provided with a friction washer 37 for effecting driving engagement with the end of the spool S. The opposite spindle 33 is preferably a "dead spindle" mounted to slide in the bearing 34 and having resilient means, not shown, for forcing it toward the spindle 26 to clamp the spool S against the head thereof. The end of the dead spindle 33 carries a head 39 freely rotatable thereon through the means of a ball-bearing indicated generally at 40. The head 39 has an axial stud 41 adapted to enter the bore of the spool S and coöperating with the opposite stud 38 to hold the spool concentrically of the axis of the heads.

The reciprocating element which carries the traverse-guide for the yarn is constituted by a slide or crosshead 45 slidable on the tie-rods 10 and 11 previously described. As herein shown it takes the form of an elongated hub or bearing 46 bored to receive the upper rod 10 and having a curved arm 47 extending laterally therefrom to the underside of the screws 2 and 3. The lower end of the curved arm 47 is formed with a boss or hub 48 and an angularly-shaped arm 49, see Fig. 3, reaches downwardly therefrom with a fork 50 at its lower end arranged to straddle the lower tie-rod 11.

The arm 49 is braced by a rib 51, see Fig. 2, and above the forked bearing 50 is a hub 52, see Fig. 3, arranged in line with the upper hub 48. Offset to one side of the hub 52 is a boss 53 projecting from the front of the arm 49, see Fig. 2.

Fastened to a finished face 55 on top of the upper elongated bearing or hub 46 of the crosshead 45 is an angle-iron 56 of inverted T-shape for mounting the traverse- or yarn-guide. As shown more particularly in Figs. 1 and 2, the yarn-guide comprises a clamp-member 57 which is slotted on its underside to receive the upright portion of the angle-iron 56 and provided with a set-screw 58 in its side for clamping it in place thereon. By loosening the set-screw 58 the clamp-member 57 may be adjusted longitudinally of the hub 46 of the crosshead 45 to regulate the position of the yarn-guide thereon. The top of the clamp 57 is slotted at 59 to receive a slide 60 formed with a hub 61 at its forward end. A screw 62 passes down through a slot 63 in the slide 60 and is screwed into the top of the clamp 57 to secure the slide in adjusted position thereon. The hub 61 at the forward end of the slide 60 is bored to receive a rod or pin 64 which is held therein by means of a set-screw 65, see Fig. 3. The upper end of the rod 64 is formed with a head 66 which is slotted or recessed at 67 to adapt it to receive

the forked yarn-guide 68. This latter element may be constructed of porcelain or other vitreous material with a screw 69 inserted therethrough for clamping it in place on the head 66 of the rod 64. As shown more particularly in Fig. 2, the guide 68 is formed with two upwardly-extending curved arms 70 providing an opening therebetween for the passage of a band or tape of strands which are inserted thereinto through an opening 71 at the top.

The traverse-slide or crosshead 45 is reciprocated from the screws 2 and 3 through the means of nuts or followers 72 and 73 carried on a rockable lever 75. The lever 75 is pivoted on a headed stud 76 held in the hub 48 arranged centrally of and below the two screws 2 and 3. The followers 72 and 73 are constructed in the form of quarter-nuts having screw-threads 77 on their concaved faces corresponding to the threads of the screws 2 and 3, see Fig. 6. Preferably, the nuts 72 and 73 are constructed of hardened steel and attached to the ends of the cross-arm 78 of the lever 75 by means of screws 79 as illustrated in Fig. 3. At one side of each nut the threads are cut away to form a concave groove or recess 74 shown in section in Fig. 4 and also illustrated in Fig. 6. This concave face 74 on each of the followers is adapted to be engaged by a cam, to be later described, which cooperates therewith to shift the follower out of engagement with its respective screw. Extending downwardly from the cross-arm 78 of the lever 75 is a vertical arm 80 which is slotted at 81 to form a fork for connecting it with a shift-lever 82. The shift-lever 82 is of bell-crank form pivoted on a pin 83 held in the hub 52 on the arm 49 of the traverse-slide 45. Its short arm 84 is forked to straddle the sides of the arm 80 of the lever 75 and extending through the sides of the fork is a pin 85 engaging the slot 81 in the arm. The long arm 86 of the lever 80 carries a pin 87 at its outer end, to which is secured a helical spring 88. The opposite end of the spring 88 is anchored to a pin 89 held in the boss 53 on the arm 49 of the traverse-slide; the end loops of the spring being engaged with grooves in the pins as shown in Fig. 2. The spring 88 is so located as to cause it to be shifted across the pivotal axis of the bell-crank lever 82 when the latter is rocked between the positions shown in Figs. 3 and 5. The lever 82 is thereby caused to operate with a toggle action to rock the lever 75 and to hold it in one or the other of its extremes of position with either the follower 72 or the follower 73 engaged with its respective screw 2 or 3.

It has been noted that the followers 72 and 73 are thrown out of engagement with their respective screws by means on the screws engaging directly with the followers. The construction and arrangement of these means form a novel feature of improvement of the present invention, consisting in cam-collars 92 and 93 which are rotatable with the screws 2 and 3 and adjustable longitudinally thereof. As both of the cam-collars 92 and 93 are of the same construction, one being arranged in opposite relation with respect to the other, it will be sufficient to describe one of them. Referring to Fig. 2 of the drawings, the cam-collar 92 is bored to receive the screw 2 and provided with two diametrically-opposed set-screws 94 and 95 for securing it in place thereon. Preferably, one set-screw 94 is formed with a pointed end adapted to engage in the thread grooves of the screw 2; while the end of the opposite screw 95 engages against a disk or washer 96 to clamp the latter against the points of the threads. The disk or washer 96 is preferably constructed of brass or some other relatively soft material to adapt it to engage frictionally with the threads without marking or mutilating them.

The side of the collar 92 is cut away helically at 97 in the general direction of the lead of the threads on the screw 2, but at a sharper angle, to form a convex cam-face 98 extending eccentrically outward from the exterior of the screw 2 to the periphery of the collar, see Fig. 4. This eccentric cam-face 98 is adapted to ride down against the curved interior face 74 on the follower 72, see Figs. 4 and 6, as the screw 2 turns in the direction indicated by the arrow in Fig. 4 to force the follower out of engagement with the threads on the screw. The collar 93 on the screw 3 is of the same construction as the collar 92, except that its cam-face 99 is reversed in position so that as the screw 3 is turned in the direction indicated by the arrow in Fig. 4 the cam-face 99 engages against the curved face 74 on the follower 73 to press the latter downwardly to disengage it from the threads of the screw. It will be understood that as one follower 72 is disengaged from the threads on the screw 2 the lever 75 will be rocked to move the opposite follower 73 toward the screw 3 and during this rocking action of the lever 75 the shift-lever 82 is swung across center to modify the direction of force of the spring 88 to complete the movement of the lever 75 to carry the follower 73 into engagement with the screw 3 in the manner as later more fully explained.

The method of operation of the complete traverse-motion in the form of construction as above described is as next explained.

When the device is used in connection with a spooling or reeling machine such, as shown in Fig. 1, the spool or beam S is placed between the heads 36 and 39 on the spindles 26 and 33 and the latter spindle carried into position to grip the spool to cause it to be rotated from the live spindle 26. The traverse-screws 2 and 3 are arranged in opposite

parallel relation with respect to the axis of the spool and in a plane somewhat therebelow to bring the yarn-guide 68 into proper relation to the spool S on which the material is to be wound. Various types and sizes of spools or beams may be employed in the machine in accordance with the character of the process to which the wound material is to be delivered and the length of throw or traverse of the yarn-guide 68 may be adjusted to the exact distance between the spool flanges or heads *s* by setting the cam-collars 92 and 93 in proper position on the screws 2 and 3. The cam-collars 92 and 93 are slid along the screws 2 and 3 and adjusted in such position that as one or the other of the followers 72 and 73 reaches a point opposite the side of the spool-head where the traverse is to be reversed the respective follower under operation will be immediately engaged by the cam-face on the collar. In Figs. 1 and 2 of the present drawings the cam-collar 92 is shown in position against the side face of the gear 17 and it may remain in this fixed position with the other collar 93 adjusted as required when spools of different dimensions are used. That is to say, one end of the spool will always be in definite relation with respect to the left-hand collar 92, as viewed in Fig. 1, because the head 36 on the spindle 26 remains in fixed position. After the collars 92 and 93 have been adjusted in position they are clamped to the screws by tightening the set-screws 94 and 95 in the manner as before explained. The yarn-guide 68 may be adjusted toward or away from the spool S by sliding its slide 60 on the clamp-member 57 and then tightening the screw 62. Likewise, the yarn-guide may be adjusted laterally on the crosshead 45 to insure that the end of its traverse will coincide with the inner face of the spool-head, this adjustment being effected by loosening the screw 58 and sliding the clamp 57 along the angle-iron 56. Through this provision a very fine accurate adjustment is secured to insure that the strand or strands of yarn may be deposited in place closely adjacent the inner faces of the spool-heads or flanges *s*.

With the parts in position as above described the winding or beaming machine is started to operate by applying power through the belt 31 to rotate the pulley 30 and thereby the spindle 26. The spool S held between the heads 36 and 39 on the spindles 26 and 33 is started to rotate to wind on the material, indicated at *y* in Fig. 1, it being noted that the yarn is fed to the guide from the rear, being usually taken off from a creel or other supply-holder, not herein shown, with the strands passing through a reed or the like. As the spool S is rotated the pulley 25 on the shaft 26 transmits motion through the belt 24 to turn the pulley 20 and thereby the screw-shaft 2. The screw 2 is connected to drive the screw 3 by means of the gears 17 and 18, with the two screws turning in opposite directions as indicated by the arrows in Figs. 3 to 5.

Considering that the nut or follower 72 is engaged with the threads on the screw 2 as illustrated in Fig. 3, the turning of the screw will cause the crosshead or slide 45 to be moved to the left as viewed in Fig. 2. Assuming that the guide starts its traverse in this direction from its right-hand extreme of throw, the band or tape of strands *y* will be laid on the barrel of the spool S as indicated by the dot-and-dash lines in Fig. 1. As the crosshead continues its movement toward the lefthand end of the spool the nut or follower 92 will eventually come into position opposite the cam-face 98 on the collar 92, the spirally recessed side 97 of the collar providing for this overlapping relationship between the follower and the cam-face. Now, as the cam-collar 92 turns in the direction indicated by the arrow in Fig. 3, the cam-face 98 rides down into engagement with the recessed curved edge 74 on the follower 72 in the manner illustrated in Fig. 4 of the drawings. The continued movement of the collar 92 will thereby cause the follower 92 to be forced radially outward from the axis of the screw 2 to disengage it from the threads thereof. As the follower 72 is forced outwardly and downwardly in this manner it rocks the lever 75 to carry the opposite follower 73 toward the screw 3. The motion imparted to the lever 75 under the camming action of the collar 92 on the follower 72 is sufficient to carry the vertical arm 80 of the lever 75 across center whereby the shift-lever 82 is rocked to carry its arm 86 downwardly until the spring 88 is stretched on the opposite side of the axis of said lever 82. Under this action the direction of force of the spring 88 is altered to rock the shift-lever 82 to continue the movement of the lever 75 to carry the follower or nut 73 into engagement with the threads of the screw 3.

The follower 73 is so related to the follower 72 on the lever 75 that the former will engage the threads of the screw 3 practically at the instant that the follower 72 is released from the screw 2 without any considerable lost motion between the parts. This provides for a quick reversal of movement of the crosshead or slide 45 carrying the yarn-guide 68 to start it back in the opposite direction under the impulse of the screw 3. Moreover, the crosshead is given an added impulse of movement to quicken its reversal of direction due to the manner of engagement of the threads on the follower 73 with those on the screw 3. The toggle action between the lever 82 and the lever 75 under the force of the spring 88 serves to carry the threads of the follower 73 into engagement with the threads of the screw 3 with a quick, sharp action, and

since the threads are tapered or beveled in the usual manner the follower has a wedging effect on the screw tending to jump the crosshead ahead as it starts its reversal of movement or, in other words causing a rebound of the crosshead at the end of its traverse. This quick reversal of the direction of movement of the slide or crosshead is most important as preventing any tendency of the yarn-guide to dwell at the ends of its traverse. It is desirable in winding yarn on a spool, beam or other holder or container to reverse the coils at each end of the spool with a sharp bend; that is, to prevent the yarn from being deposited alongside the head of the spool for any considerable distance in order that the strands may not draw in between the wound mass and the face of the spool-head. Otherwise, if the yarn is permitted to lead around the spool in substantial parallelism with the side or face of the spool-head it will pull in towards the axis of the spool and cause imperfections in the winding which prevent free delivery of the material when it is unwound from the spool.

With the nut or follower 73 engaged with the threads of the screw 3 the rotation of the latter in a reverse direction to that of the screw 2 causes the slide or cross-head 45 to be traversed to the right as viewed in Fig. 2, whereby the yarn-guide 68 will guide the material *y* back in the same direction to deposit a series of helical coils or turns upon those already laid on the barrel of the spool. As the yarn-guide 68 reaches a point opposite the inside face of the right-hand spool-head *s* the nut or follower 73 comes into position in alinement with the cam-face 99 on the collar 93 which thereupon engages with the curved face 74 of the follower in the manner as described in connection with the first collar 92. The cam-collar 93 will thus act to force the follower 73 out of engagement with the screw 3 and, practically simultaneously therewith, the opposite follower 72 is again carried into engagement with the threads on the screw 2 to again reverse the direction of traverse of the yarn-guide 68. This action of the traverse-motion continues until the material has been wound onto the spool S to the required extent when the operation of the winding machine is arrested and an empty spool supplied in place of the filled one.

In Fig. 7 I have shown a modified form of construction of the traverse-motion which is somewhat simpler in arrangement. In this embodiment of the invention a single grooved shaft 100 is employed in place of the two screws 2 and 3 and cam-collars 102 and 103 of the same formation as previously described are adjustable in position on the shaft. It will be noted that the shaft 100 is not screw-threaded, but simply grooved at right-angles to its axis, whereas the two followers 104 and 105 are formed with threads of opposite pitch adapted to engage the grooves of the shaft. The followers 104 and 105 are journaled on cross-pins 106 held in forked bearing-hubs 107 at the ends of the cross-arm 108 of a lever 110 corresponding to the lever 75 of the first described construction. Fig. 7 shows the follower 104 having threads of right-hand pitch in engagement with the grooved periphery of the shaft 100. With the parts in this relationship the turning of the shaft 100 causes the follower 104 to rotate to travel it thereabout. The travel of the follower 104 along the shaft 100 imparts movement to the crosshead 45 on which the lever 110 is mounted in the manner as previously explained in connection with the first described form of construction; it being understood that the follower travels along the shaft due to the helical form of the threads of the former. The engagement of the follower 104 with the grooves of the shaft 100 causes a traverse movement of the crosshead toward the left, as viewed in Fig. 7, and as the yarn-guide reaches the end of its traverse in this direction the cam-face 111 on the collar 102, see Fig. 8, comes into engagement with the bearing-hub 107 to shift the follower out from engagement with the serrations on the shaft. As the follower 104 is released from engagement with the shaft 100 the lever 110 is rocked to carry the opposite or left-hand threaded follower 105 into engagement with the grooves in the shaft and the direction of traverse of the crosshead and the yarn-guide carried thereby is reversed in the same manner as previously explained. When the crosshead reaches its opposite extreme of traverse the collar 103 comes into action to release the follower 105 and the follower 104 is reengaged with the shaft to again reverse the direction of traverse.

Fig. 9 illustrates a further modification in the construction of the traverse motion wherein two threaded screw-shafts 112 and 113 are employed, as in the embodiment first above described, with rotary followers 114 and 115 arranged to engage therewith. The followers 114 and 115 are grooved peripherally in accordance with the grooving of the threaded shafts, but without pitch or lead, and their engagement with the threads on the oppositely turning shafts causes them to be rotated therefrom as they travel thereabout. The purpose of this arrangement is to reduce the friction by providing for a rolling action of the followers along the screw shafts and the method of reversing the traverse is precisely the same as first described; cam-collars 116 and 117 being adjustable along the shafts 112 and 113 and adapted to be set in position to cam a follower out of engagement with its respective shaft at the point where it is desired to reverse the motion of the traverse-slide or crosshead.

It will be observed from the foregoing

that the present invention provides a particularly ingenious yet simple traverse-motion having means for adjusting the length of the traverse of the guide or other reciprocating element in accordance with requirements. A particular feature of improvement is the provision for effecting a quick reversal of the traverse of the yarn-guide without dwell at the ends of its throw whereby the yarn or other material being wound is laid uniformly on the spool-barrel or other holder without overruns or misplaced coils at the ends of the mass.

It is to be particularly noted that the means for reversing the traverse of the reciprocating element or crosshead is prompt in action, positive in operation and so constructed as to accelerate the return movement of the yarn-guide or other part under reciprocation at the ends of traverse.

The present traverse-motion may be embodied in a unitary device adapted for use with various types of winding machines and other apparatus and in any of the forms of construction as herein illustrated it is economical to manufacture, durable in use and not liable to derangement or getting out of order.

While the improved device is herein shown as embodied in a preferred form of construction with several modifications in the details thereof it is to be understood that other changes may be made in the form and arrangement of the parts thereof without departing from the spirit or scope of the appended claims. Therefore, without limiting myself in this respect, I claim:

1. A traverse-motion comprising a rotatable grooved shaft, followers having threads of opposite hand engageable alternately with the grooves in the shaft to traverse them in opposite directions longitudinally thereof, means engageable with each of the followers at the end of its traverse to disengage it from the grooves in the shaft, and means operative upon the disengagement of one follower from the shaft to engage the opposite follower therewith to reverse the direction of traverse.

2. A traverse-motion comprising a rotatable grooved shaft, a slide reciprocable longitudinally thereof, a pair of followers having threads of opposite hand arranged to engage alternately with the shaft to traverse the slide in opposite directions, and means adjustable longitudinally of the shaft and engageable with the followers to shift one of the latter out of engagement with the grooves in the shaft while causing the engagement of the opposite follower therewith to reverse the direction of traverse of the slide.

3. In a traverse-motion, the combination of a pair of opposite parallel screws, means to rotate said screws, a crosshead reciprocable longitudinally of the screws, a T-shaped lever rockably mounted on the crosshead, followers carried on the cross-arm of said lever to adapt them to be alternately engaged with the threads of the screws, a bell-crank lever pivoted on the crosshead and connected to be rocked by the first lever, a spring connected to said bell-crank lever and anchored to the crosshead to adapt it to be shifted across the axis of the bell-crank under the swinging action of the first lever whereby to hold one or the other of the followers in engagement with its respective screw, and means engageable with the followers to shift them out of engagement with their screws at a predetermined point in the traverse of the crosshead.

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