

937,666.

Fig. 1.

Fig.1.

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S. W. WARDWELL.
WINDING MACHINE.
APPLICATION FILED SEPT. 28, 1908.

937,666.

Patented Oct. 19, 1909.

3 SHEETS--SHEET 2.

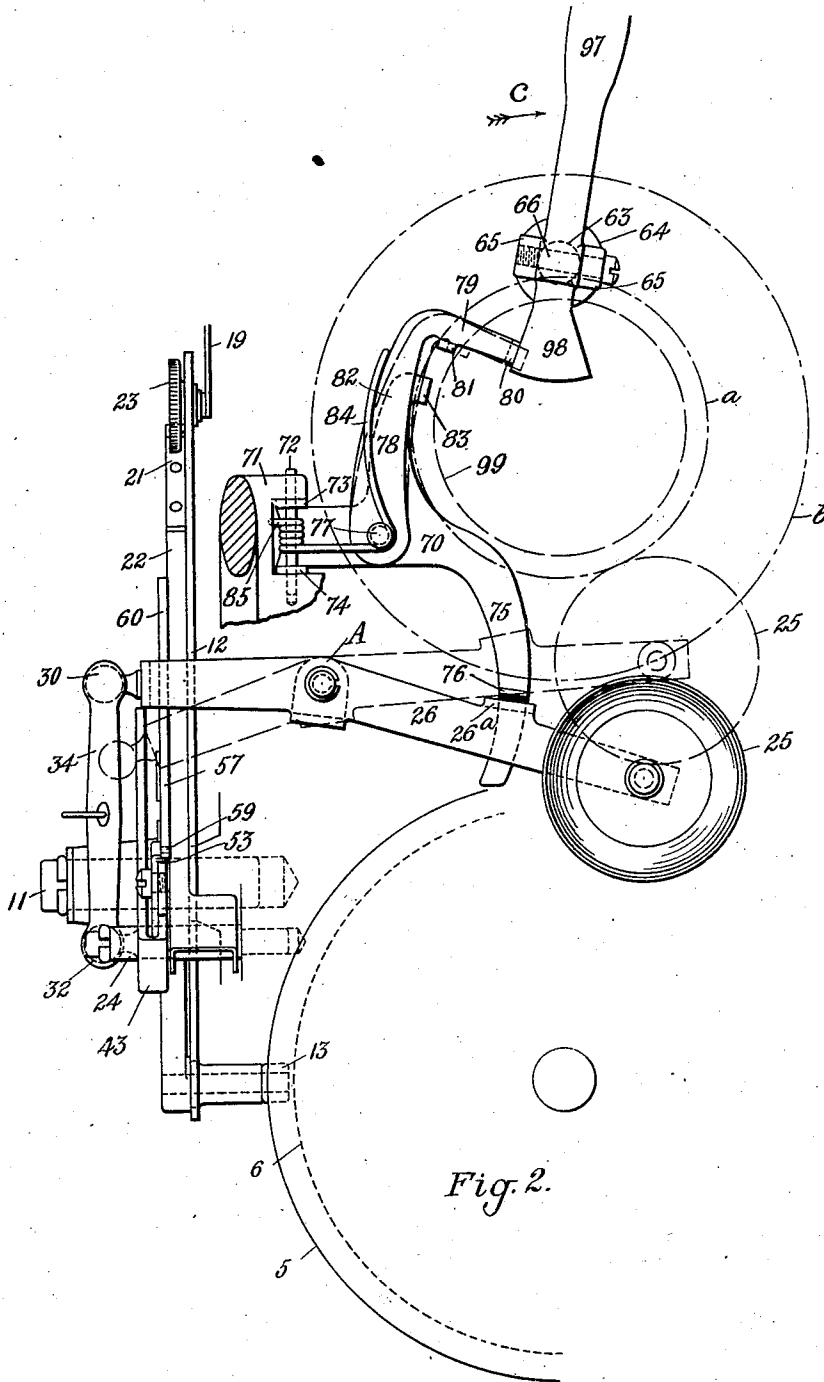


Fig. 2.

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3 SHEETS—SHEET 3.

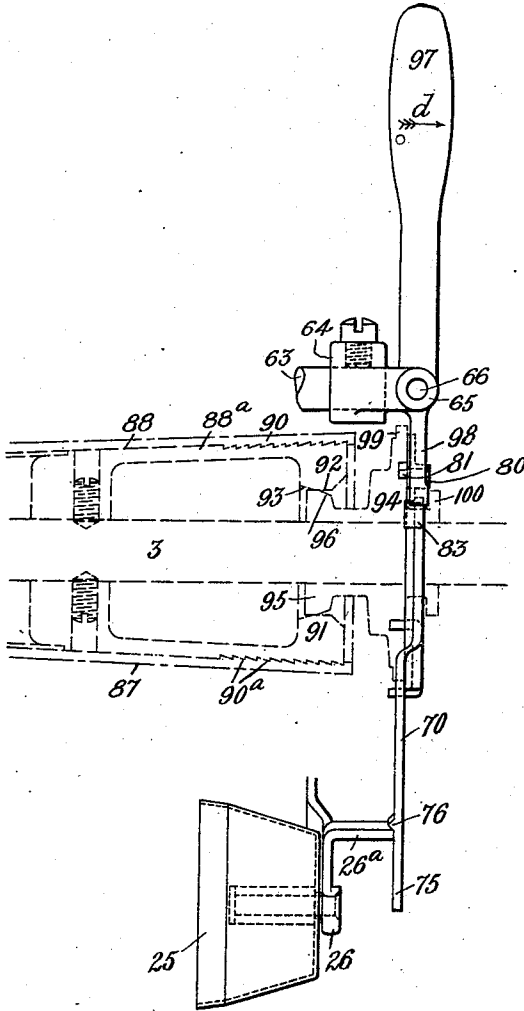


Fig. 3.

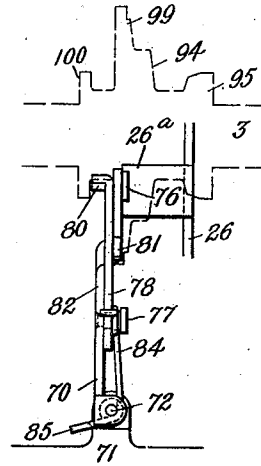


Fig. 4.

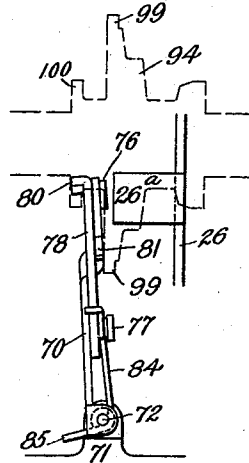


Fig. 5.

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UNITED STATES PATENT OFFICE.

SIMON W. WARDWELL, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO SUPREME KNITTING BOBBIN COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

WINDING-MACHINE.

937,666.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed September 28, 1908. Serial No. 454,974.

To all whom it may concern:

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

My invention relates to winding machines for winding bobbins or yarn packages in which the yarn is built up with a foundation, conical heel consisting of superimposed layers having gradually increasing lengths of traverse.

My invention consists particularly of devices for use with the traverse-regulating mechanism of a winding machine similar to that disclosed in my pending application, Serial No. 451,700, filed September 4th, 1908.

The accompanying drawings illustrate, respectively:—Figure 1, a front elevation of the traverse-regulating mechanism of the machine; Fig. 2, an end elevation of the same, showing the relation of the new device thereto; Figs. 3, 4 and 5, details of the arrangement and mode of operation of the parts.

Referring to Figs. 1 and 2, 5 is the traverse cam of the winding machine, which, through suitable connections, imparts reciprocation to the yarn-depositing guide, not here shown, that lays the yarn on its holder. The means for connecting the cam 5 with the traverse-rod which carries the yarn-guide are identical with those described in my pending application above referred to and consist, in brief, of the following elements:

A lever 12, pivoted on the stud 11, carries at the extremity of its lower arm a roll 13 which engages the groove 6 of the cam 5. The upper arm of the lever 12 is curved and formed with an arcal slot 14 with rack-teeth 15 on one side. Fitted to the slot 14 and adapted to engage the teeth 15 is a pinion 20, rotatively secured to the end of a connecting-rod 19 which is fastened at its opposite end to the traverse-rod, not here shown. The pinion 20 carries a ratchet wheel 23, which, through suitable instrumentalities, is caused to turn to travel the pinion 20 on the teeth 15 and vary the connecting-rod's point of connection with the lever 12. The instrumentalities for turning the wheel 23 consist of a pawl 22 carrying a finger 21 which engages the teeth of the wheel intermittently,

each time the lever 12 is oscillated by the cam 5 to carry its upper arm to the right, as shown in Fig. 1. As the pinion 20 travels up on the lever 12, Fig. 1, showing it in its upper position on the arm of the lever, the pawl 22 is swung upward on its pivot 24 to cause the finger 21 to follow the wheel 23 to keep it in position to engage the teeth of the ratchet at each oscillation of the lever 12.

The movement of the pawl 22 is effected through means controlled by the growing diameter of the yarn mass as the layers are built up on the tube or holder which serves as a central support or core for the bobbin. These means consist of a lever A which carries at one end the contact wheel 25, constituting an antifriction part of the lever itself and adapted to initially bear on the surface of the tube or holder which is represented by the dot-and-dash circle *a*, Fig. 2, and to be moved outward by the growing diameter of the winding. The broken lines show the wheel and lever A at the start of the winding and the full lines represent their position when the base of the bobbin has attained its full diameter, represented by the dot-and-dash circle *b*.

Fulcrumed on the stud 24, the pivot of the pawl 22, is a lever 43 formed with a quadrant 48 on which is an adjustable stop or detent 53, see Fig. 1. Pivoted on the pawl 22 is a latch 57 with its end 58 formed with a shoulder 59 adapted to engage the detent 53. The latch 57 when engaged with the detent 59 connects the pawl 22 with the lever 43 so that when the latter is swung upward on its pivot it raises the pawl 22 to cause the finger 21 to follow the wheel 23 as the latter travels upward on the lever 12. When the pawl 22 has been moved to its predetermined upward limit, a suitably adjusted pin 61 supported in the frame of the apparatus engages a trigger-arm 60 of the latch 57 to free the detent 59 from the detent 53, as shown in Fig. 1, and the pawl 22 is then returned by gravity to its lowermost position. This action takes place when the base of the bobbin has been built up to the required diameter and relieves the wheel 23 from further engagement by the finger 21, so that the action of the lever 12 thereafter remains constant and further traverse of the yarn guide is effected with a uniform extent.

The lever 43 is moved by the lever A

through a connection or link 34 which has its ends formed to receive the balls 30 and 32 carried on said levers. The lever 43 is formed with a counterweight 44, the gravity of which tends to resist the downward movement of the wheel 25, and further serves to return the wheel 25 to its initial position at the completion of the winding as hereinafter more fully described.

It will be evident from the above description, and from reference to my pending application before referred to, that the operation of these devices is to cause the traverse guide to reciprocate with a gradually increasing extent of traverse as the layers of yarn are deposited on the holder, so that a foundation cone is formed, upon which, subsequent layers of uniform traverse are deposited with the guide advancing along the length of the bobbin. It will also be understood that after the foundation cone is formed, the bobbin increases by longitudinal extension only, with the winding being done on the tapered surface of the cone so that the resultant package has a substantially flat base, a cylindrical body, and a tapered nose from which the yarn is delivered in unwinding.

The novel features of the present invention consist of means for controlling the position of the wheel 25 so that after the base of the bobbin reaches its predetermined diameter the wheel is automatically removed from further contact with the yarn mass. The present invention also includes devices for automatically returning the wheel to its initial position to wind a new bobbin after the finished bobbin is removed from the holder on the winding spindle and a new tube applied thereto.

The automatic control of the wheel 25 is effected through means connected with and operated by the starting handle 97 of the machine. The handle 97 is mounted on a rod 63 which serves as a rocker-shaft to operate the clutch devices of the machine, not here shown as they may be of any suitable arrangement as usually provided in winding machines. The handle 97 normally stands in a vertical position when the machine is inoperative and is rocked in the direction indicated by the arrow *c* in Fig. 2, to the position here illustrated, to start the machine. Suitable detents are provided to retain the handle in this position during the winding and upon the release of the detents a spring or equivalent device returns the handle to its vertical position and rocks the rod 63 to stop the machine. These parts are not shown as they are well known in connection with their use on this class of machines and do not form essential elements of the present invention.

The handle 97 is mounted on the rod 63 by means of a collar 64 secured to the rod

and formed with two lugs 65—65 between which the handle is held by a pin 66. The pin 66 serves as a pivot, allowing the handle to be rocked independently of the rod 63 in a plane at right angles to its movement when rocking the rod. For convenience in describing the operation of the starting handle the movement of the latter in the direction of the arrow *c*, Fig. 2, will hereafter be referred to, as to the right; movement in the opposite direction, as to the left; in Fig. 3, movement in the direction of the arrow *d*, as backward; and in the opposite direction, as forward. The two last named movements are designed to operate the holder or mandrel 88 which secures the bobbin tube 87 on the spindle 3, Fig. 3.

As described in my pending application, Serial No. 451,700, filed September 4th, 1908, the holder 88 is of slightly tapered form with its larger end hollow and split longitudinally to form expansible segments 88^a grooved at 90 to form teeth 90^a on the outer surface. The end of the holder is formed with a head 91 having a cylindrical bore 92 with a bevel 93 at the inner end thereof. A sleeve 94, slidable on the spindle 3, has a circular flange 95 with a beveled edge 96 to engage the bevel 93 and open the bore of the head to admit the flange 95. The sleeve 94 is shiftable on the spindle 3 by means of the handle 97 which has a toe 98 extending between the two flanges 99 and 100, see Figs. 3 and 4. Movement of the handle 97 backward in the direction indicated by arrow *d*, Fig. 3, slides the sleeve 94 outward on the spindle to release the segments 88^a and allow them to contract so that the tube 87 may be forced snugly on to the holder. After the tube is in position, the handle 97 is pulled forward to slide the sleeve 94 backward on the spindle to expand the segments and engage the teeth 90^a with the inner surface of the tube to hold it firmly in position for the winding.

Operated from the toe 98 of the handle 97 is the controlling device for the contact wheel 25. This consists of a member 70 hinged to a portion of the frame 71 of the machine by the pin 72 which extends through two ears 73 and 74 on the member 70, see Fig. 2. Dependent from the main portion of the member 70 is a curved arm 75 which is located adjacent the arm 26 of the lever A and adapted to bear against the right angled projection 26^a on said lever, see Fig. 3. Near the end of the arm 75 is a beveled projection 76, so located that when the projection 26^a rides over it, it will carry the wheel 25 away from contact with the base of the bobbin as hereafter more fully explained.

Pivoted at 77 on the member 70 is a lever 78 which is formed at its end with a hooked arm 79 bent at right angles at 80 to adapt it to be engaged by the toe 98 of the lever 97.

The lever 78 also has an ear 81 bent at right angles to the main portion and adapted to rest on the rim of the flange 99. Extending upward from the main portion, the member 70 has an arm 82 which is bent at right angles at its end to form a stop 83 to limit the inward movement of the lever 78. The lever 78 is normally forced against the stop 83 by a spring 84 which bears against the edge of the lever and is coiled around the pivot 77. The spring 84 then extends to the hinge of the member 70, being coiled around the pin 72 with its end 85 bearing against the frame 71 so that it tends to swing the member 70 against the lever A to provide a yielding friction on the latter. The friction of the member 70 on the lever A has a steadying effect upon the latter so that the wheel 25, in riding on the yarn mass, should the surface of the winding become slightly uneven, will be prevented from vibrating or chattering. A smooth, even movement of the wheel outward from the tube is thus provided for. Further, the action of the spring 84 on the member 70 tends to force the projection 26^a on the lever A down the incline of the beveled projection 76, after it has been carried over the rise of the projection by the effect of the winding bearing on the wheel 25, so that the wheel is moved away from further contact with the bobbin after the base of the latter has reached the predetermined diameter. By releasing the member 70 from engagement with the lever A, the latter is allowed to swing upward to its initial position to bring the wheel 25 against the tube to start the winding of a new bobbin. This release is effected by the movement of the sleeve 94 when the latter is slid back on the spindle to expand the tube holder to engage the tube.

The operation of the whole mechanism will now be fully explained:—Assuming that a bobbin has been completed on the machine, then the parts will be in the position illustrated by Figs. 1, 2 and 3, excepting the pawl 22 which will be returned to its initial, lowermost position through gravity, upon the release of the latch 57, as before described. The lever A will be in the position shown by full lines in Fig. 2, held by the engagement of the beveled projection 76 with the arm 26 of the lever, as shown particularly in the plan view, Fig. 4. The sleeve 94 is in its rearward position with the flange 95 engaging the bore 92 to hold the segments of the tube 88 expanded and gripping the tube 87. The handle 97 is in the position shown in Fig. 2 while the machine is winding, with the toe 98 engaging the end 80 of the lever 78 to keep the ear 81 just clear from contact with the rim of the flange 99. This prevents frictional wear between the ear and the flange while the latter is rotating with the winding spindle; but when the

machine stops, the handle 97 is returned to its vertical position and the toe 98 releases the lever 78 and allows the ear 81 to bear on the rim of the flange. The flange 99 is represented by a broken line in Fig. 2, as it would obscure the other parts to show it in full.

To release the teeth of the holder from the tube 87, to allow the doffing of the completed bobbin, the handle 97 is pressed back in the direction indicated by the arrow *d*, Fig. 3. This movement of the handle slides the sleeve 94 outward on the spindle 3, carrying the flange 99 out from under the ear 81 and allowing the lever 78 to be moved inward under influence of the spring 84. The lever 78 moves inward against the stop 83 with the ear 81 back of the flange 99, as shown by broken lines, Fig. 2. After the full bobbin is removed and a new tube placed on the holder, the handle 97 is pulled forward to slide the sleeve 94 backward to expand the segments of the holder. As the sleeve 94 slides backward, the rear face of the flange 99 engages the ear 81, see plan view, Fig. 5, and moves the lever 78 bodily to swing the member 70 and carry the arm 75 away from the lever A. This frees the beveled projection 76 from the projection 26^a and the lever A is moved upward, under the influence of the counterweight 44 on the connected lever 43, until the wheel 25 bears on the surface of the tube 87, as represented by dash lines, Fig. 2. It is now necessary to move the lever 78 to remove its ear 81 from behind the flange 99 so that the member 70 may again be swung outward on its pivot 72 with the arm 75 bearing against the lever A. This is accomplished by the movement of the handle 97 to the right, Fig. 2, to start the machine, the toe 98 engaging the end 80 of the lever 78 and moving the latter outward until the ear 81 is free to spring back over the rim of the flange 99. As before explained, the toe 98 remains in contact with the lever 78 to keep the ear 81 free from the flange 99 during the winding.

As the machine continues to operate, the yarn is built up on the base of the holder and as each layer is added the wheel 25 moves outward to regulate the traverse of the yarn guide, all as previously explained. As the lever A moves downward on the arm 75 the projection 26^a finally encounters the bevel 76, rides up over the latter, and the pressure of the spring 84 causes the bevel to act as a wedge to force the lever A still farther downward and remove the wheel 25 from contact with the winding. The pin 61, Fig. 1, is so adjusted that at this point the latch 57 is released from engagement with the lever 43 and the pawl 22 drops back to its lowermost position. This prevents further engagement of the wheel 23 so that the traverse of the guide thereafter remains con-

stant and the bobbin grows by longitudinal extension, without any further increase in diameter. It will be understood that the longitudinal growth of the bobbin is effected through the means of a progression wheel, not here shown, but described in my pending application before referred to, which contacts with the surface of the winding and feeds the guide along its traverse rod.

After the bobbin is completed by the addition of layers wound on the conical surface of the heel or base, it is removed by manipulation of the handle 97, as first explained. The wheel 23 is next turned back to its lowermost position on the lever 12. The handle 97 is then pressed backward to secure the new tube on the holder and after the yarn is led through the guide with its end secured to the holder the machine is started by rocking the handle to the right, Fig. 2. It will now be understood that the simple manipulation of the starting handle serves to return the wheel 25 to its initial position and upon the return of the wheel the latch 57 engages the lever 43 so that when the wheel 25 moves outward again, under influence of the winding, it regulates the position of the pawl 22 which, in turn, acts on the wheel 23 to control the traverse of the yarn guide.

The parts are automatically controlled by the shifting of the starting handle so that the operator is relieved of all care in setting them to secure their proper adjustment and coaction.

I do not herein claim the mechanisms previously shown and described in my pending applications, Serial Nos. 541,700 and 541,701, filed September 4th, 1908, by themselves, but only in combination with the new and improved devices now disclosed. It will be evident, also, that modifications in the structure and arrangement of the parts might be made without departing from the scope of my invention, therefore, without limiting myself to the precise construction shown,

What I claim is:—

1. In a traverse-regulating device for winding machines, the combination with a contact member adapted to be shifted by the pressure of the growing bobbin, means to automatically move said member away from the bobbin after the latter reaches a predetermined diameter, and a handle to release said means and allow the member to return to its initial position.

2. In a traverse-regulating device for winding machines, the combination with a contact member adapted to bear on the surface of the winding and shifted by the increase in diameter of the bobbin, of means to engage said member to hold it from contact with the bobbin when the latter reaches a predetermined diameter, devices to actuate

said means to release the member and a handle to operate said devices.

3. In a winding machine, the combination with the starting handle therefor, of a traverse-regulating device, including a contact member adapted to bear on the surface of the winding and shifted by the increase in diameter of the bobbin, automatic means to move said member away from the bobbin when the latter reaches a predetermined diameter, and devices connected with said means and operated by the starting handle to release the contact member and allow it to return to its initial position.

4. In a winding machine, the combination with a traverse-regulating device, of a contact lever adapted to control said device through contact with the winding, a member arranged to yieldingly press against the contact lever, and means on said member to engage the contact lever to move it away from contact with the bobbin after the latter has reached its full diameter.

5. In a winding machine, the combination with a traverse-regulating device, of a contact lever adapted to be moved by the growth of the bobbin to control said device, a member 70 arranged to yieldingly engage the contact lever to regulate its movement, means on said member 70 engageable by the contact lever to move the latter away from the winding, when a predetermined diameter has been attained, and means to release said member 70 from the contact lever.

6. In a winding machine, the combination with a traverse-regulating device, of a lever A adapted to be moved by pressure of the growing bobbin to control the traverse device, a spring pressed member 70 adapted to bear against the lever A to frictionize the latter's movement, and a beveled projection on said member 70 adapted to be engaged by the lever A to move the latter away from the winding when a predetermined diameter is attained.

7. In a winding machine, the combination with a traverse-regulating device, of a lever A adapted to be moved by the pressure of the growing bobbin to control the traverse device, a member 70 pivoted to swing against the lever A and formed with a beveled projection over which the lever A rides, a spring to swing the member 70 to cause the bevel to move the lever away from the winding, when the bobbin reaches a predetermined diameter, and a handle to release the member 70 from the lever A to allow the latter to return to its initial position.

8. In a winding machine, the combination of a traverse cam, a lever 12 oscillated by the cam, means on the lever to be shifted to vary its operating length, a lever A controlled by the diameter of the bobbin to shift said means, and devices engaged by the lever A to move the latter away from the winding

when the bobbin reaches a predetermined diameter.

9. In a winding machine, the combination of a traverse cam, a lever 12 oscillated by the cam, means shiftable on the lever to vary its operating length, a pawl 22 to shift said means, a contact member operated by the growth of the bobbin and connected with the pawl 22 to move the latter, and means to move said contact member away from the bobbin when the latter reaches a predetermined diameter.

10. In a winding machine, the combination of a traverse cam, a lever 12 oscillated by the cam and formed with rack teeth, a pinion travelable on said teeth, a wheel to travel the pinion, a pawl to turn the wheel, means to move the pawl to follow the wheel, comprising a contact member shifted by the growth of the bobbin, and means to hold the contact member away from the bobbin when the latter reaches a predetermined diameter.

11. In a winding machine, the combination of a winding spindle, an expansible tube-holder carried on the spindle, a handle to operate the holder, traverse-regulating devices, a contact member controlled by the growth of the bobbin to operate the traverse-regulating devices, and means to move the contact member away from the bobbin when the latter reaches its full diameter, said means operated by the handle to release the contact member when the tube holder is expanded.

12. In a winding machine, the combination with the winding spindle, of an expansible tube holder rotated therewith, a sleeve slidable on the spindle to expand said holder, a handle to slide the sleeve, traverse-regulating devices, a contact member controlled by the growth of the bobbin to operate the traverse-regulating devices, means to move the contact member away from the bobbin when the latter reaches a predetermined diameter, and devices to release the contact member to allow it to return to its initial position, said devices operated by the sliding sleeve.

13. In a winding machine, the combination with the winding spindle, of an expansible tube holder mounted thereon, a slidable sleeve to expand the holder, a handle to operate the sleeve, traverse-regulating devices, a contact member moved by the growth of the bobbin to control the traverse-regulating devices, a member 70 adapted to move the contact member out of contact with the bobbin at a predetermined point in the winding, and means actuated by the sliding sleeve to operate said member 70 to release the contact member when the sleeve is moved to expand the holder.

14. In a winding machine, the combination with a winding spindle of an expansible tube holder mounted thereon, a sleeve to ex-

pand the holder, a starting handle rockable in one plane to control the operation of the machine and in another plane to operate the sleeve, traverse-regulating means, a contact member shifted by the increase in diameter of the bobbin to control the traverse-regulating means, means to hold the contact member away from the bobbin when the latter reaches a predetermined diameter, and means operated by the starting handle to return the contact member to its initial position when the holder is expanded.

15. The combination in a winding machine, with an expansible tube holder, of a handle rockable in one plane to operate said holder and in another plane to control the operation of the machine, traverse-regulating means, a contact lever A adapted to be moved by the growth of the bobbin to control said means, a member 70 engaging the lever A to frictionize its movement, means on said member 70 to hold the lever A out of operative position when the bobbin reaches its full diameter, and means actuated from the starting handle to release the member 70 from the lever A when the handle is rocked to expand the holder and to return the member into engagement with the lever when the handle is rocked to start the machine.

16. In a winding machine, the combination with a starting handle to control the operation of the machine, of a traverse-regulating device adapted to control the winding to form a conical base of superimposed layers of varying lengths, a contact member operated by the growth of the base to actuate the traverse-regulating device, means engaged by the contact member when the base reaches a predetermined diameter to hold said member away from the bobbin during the winding of additional layers on the conical surface of the base, and means operated by the starting lever at the completion of the winding to prepare the machine for winding a new bobbin with the parts in their proper relation.

17. In a winding machine, the combination with a traverse-regulating device, of a pivoted lever A, a contact wheel 25 at one end of said lever, a weighted lever 43 adapted to be connected to operate the traverse device and connected with the lever A to normally hold the wheel 25 against the winding, means operating automatically to remove the wheel from the winding when the bobbin reaches a predetermined diameter, and devices to release said means to allow the wheel 25 to return to its initial position under the influence of gravity on the lever 43.

18. In a traverse-regulating device for winding machines, the combination of a pivoted lever A adapted to be moved by the increase in diameter of the winding, means to connect said lever to control the traverse-reg-

ulating device, a member 70 hinged to swing against the lever A, a spring 84 to swing said member, a sliding sleeve 94, a rockable handle 97 to slide said sleeve, and a lever 78

5 pivoted on the member 70 and adapted to be engaged by the sleeve 94 to move the member 70 away from the lever A.

19. In a traverse-regulating device for winding machines, the combination of a lever
10 A movable to control said device, a member 70 hinged to swing into contact with said lever and formed with a beveled projection over which the lever A rides, a spring to hold the member 70 in contact with the lever
15 A, a lever 78 pivoted on the member 70, a sleeve 94 slidable to engage the lever 78 to move the member 70 away from the lever A and a handle 97 to slide said sleeve.

20. In a traverse-regulating device for winding machines, the combination with a lever A adapted to be moved by the increase in diameter of the bobbin, a member 70 hinged at 72 and formed with an arm 75 with a beveled projection 76 at its lower end,
25 means to hold the arm in yielding contact with the lever A to frictionize the movement of the latter and to cause the beveled projection to act to move the lever A away from the surface of the bobbin, and a handle 97
30 rockable in one direction to release the lever A to allow the member 70 to return to its initial position and rockable in another direction to allow the member 70 to again engage the lever A.

35 21. In a traverse-regulating device for winding machines, the combination of a pivoted lever A adapted to be moved from the winding, a member 70 arranged to bear against the lever A with yielding pressure,
40 means on the member 70 to cause it to move the lever A away from the winding when the latter reaches a predetermined position, a sleeve 94 slidable to engage the lever 78 to

release the member 70 from the lever A, and a handle 97 adapted to be rocked in one 45 direction to slide the sleeve 94 and rockable in a different direction to release the lever 78 from the sleeve 94 to allow the member 70 to return into engagement with the lever A.

22. In a traverse-regulating device for 50 winding machines, the combination with a pivoted lever A adapted to be moved from the winding, a member 70 arranged to bear against the lever A with a yielding pressure, means on the member 70 to cause it to move 55 the lever A away from the winding when the latter reaches a predetermined position, a sliding sleeve 94 having a flange 99, a lever 78 with a projection 81 adapted to bear on the rim of the flange 99, a spring 84 to move 60 the lever 78 to carry the projection into position in back of the flange 99 when the sleeve 94 is slid outward, and a handle 97 rockable in one direction to slide the sleeve and in another direction to return the projection 65 to the rim of the flange 99.

23. In a traverse-regulating device for winding machines, the combination of a pivoted lever A adapted to be moved from the winding, a member 70 hinged at 72, means 70 on the member 70 to cause it to move the lever A away from the winding when the latter reaches a predetermined position, a sliding sleeve 94, a lever 78 on the member 70, movable to be normally engaged by the 75 sleeve 94, and a handle 97 movable in one direction to slide the sleeve and in another direction to disengage the lever 78 from the sleeve 94.

In testimony whereof I affix my signature 80 in presence of two witnesses.

SIMON W. WARDWELL.

Witnesses:

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ARTHUR I. HARVEY.