Nov. 23, 1954 W. L. PERRY ET AL 2,695,138

WINDING MACHINE

Filed July 6, 1949 3 Sheets-Sheet 1

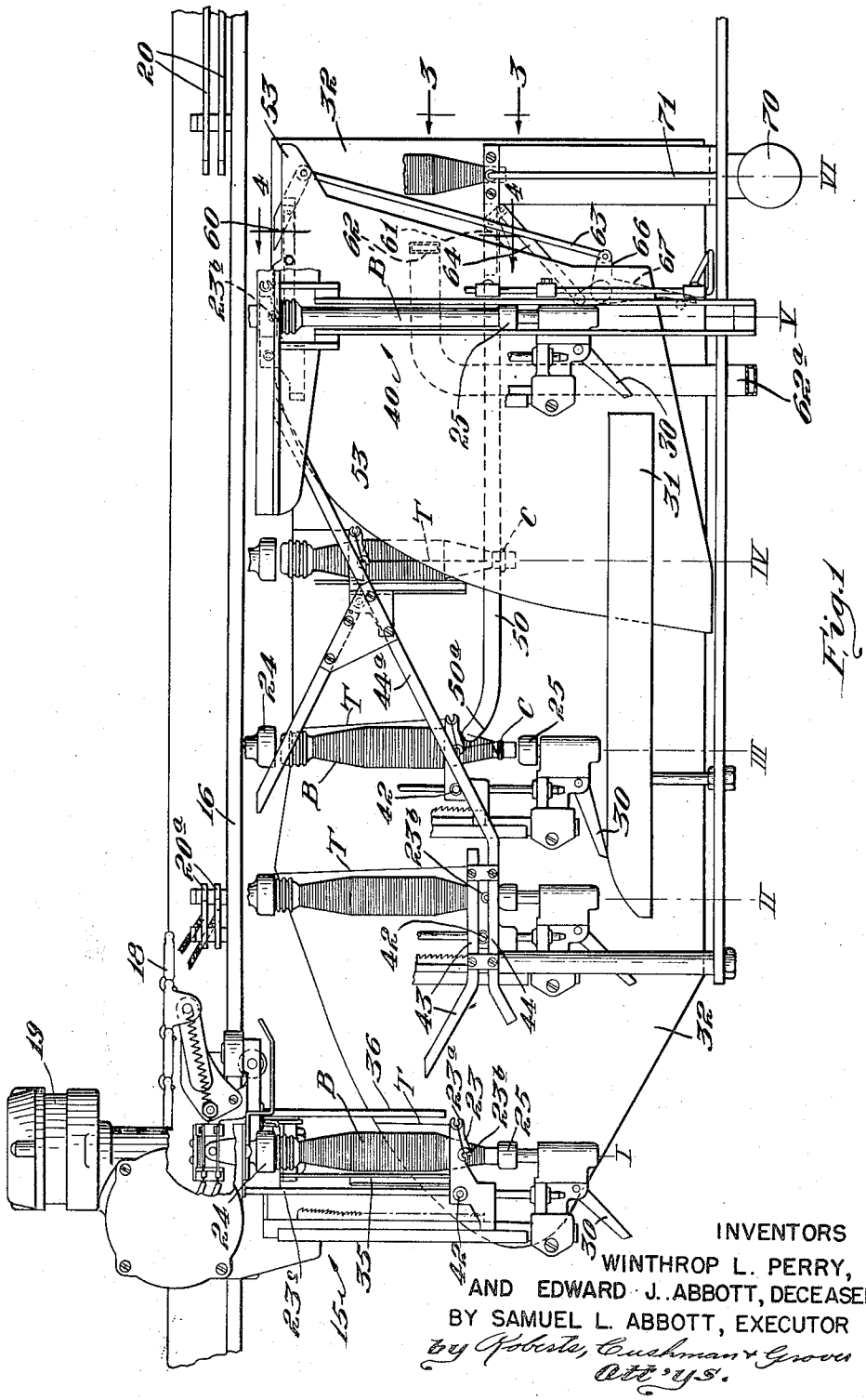


Fig. 1

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WINDING MACHINE

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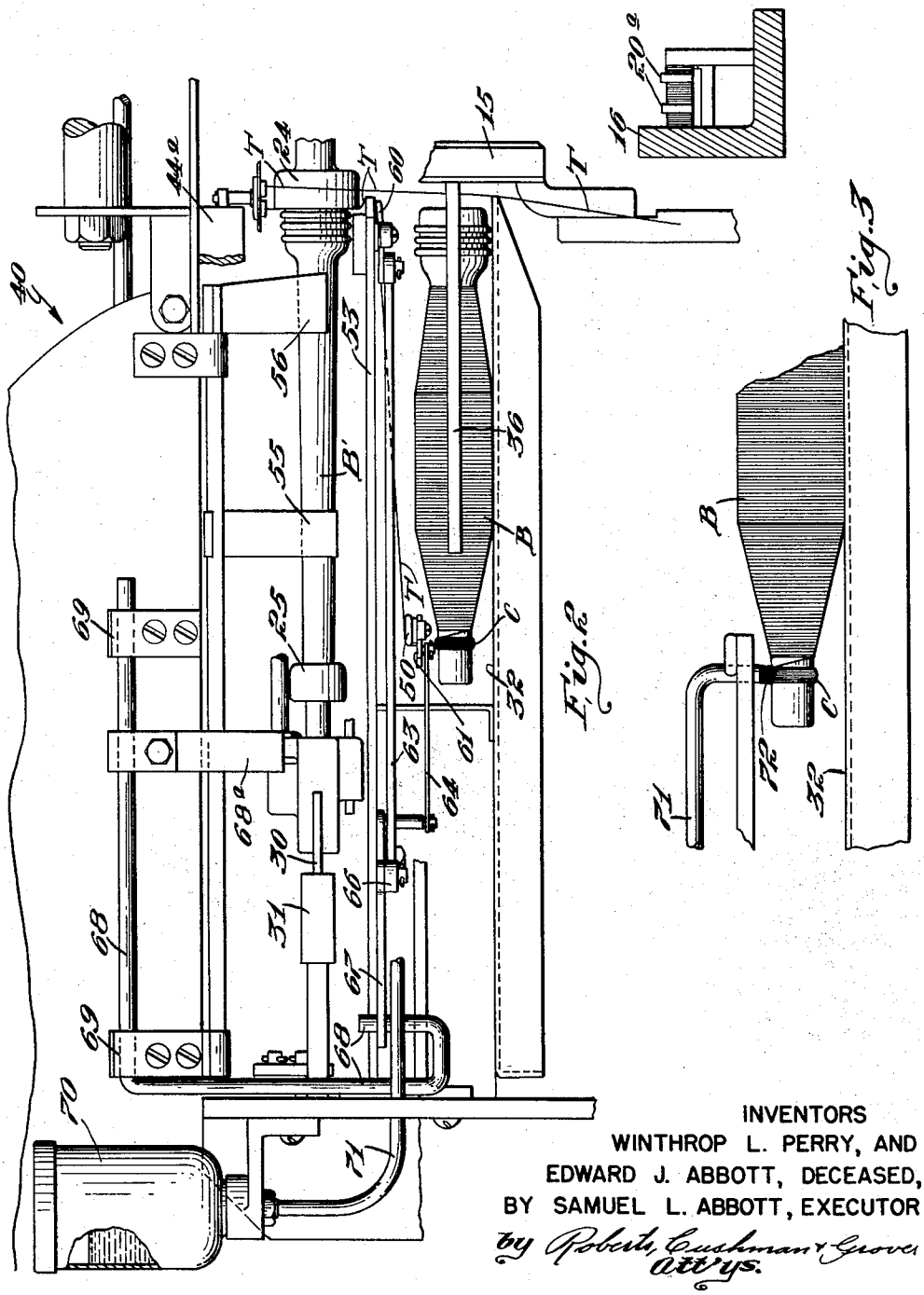


Fig. 2

Fig. 3

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WINDING MACHINE

Filed July 6, 1949 3 Sheets-Sheet 3

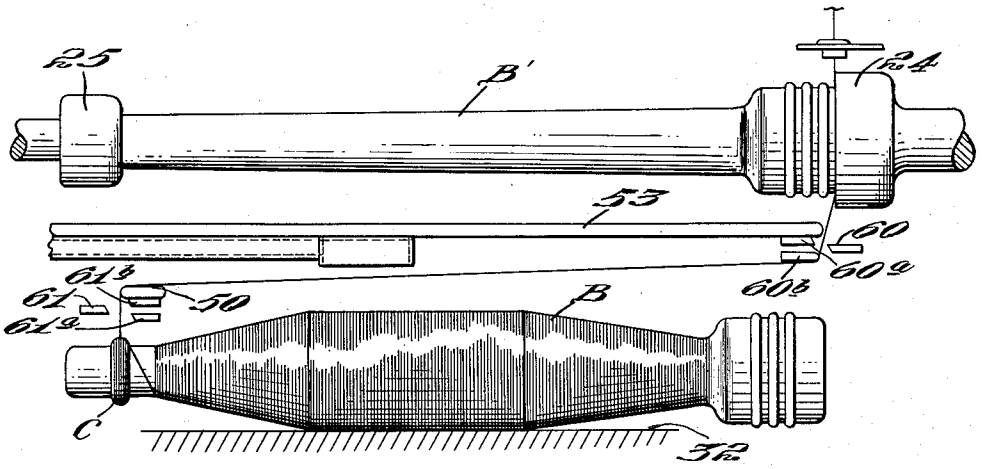


Fig. 4a

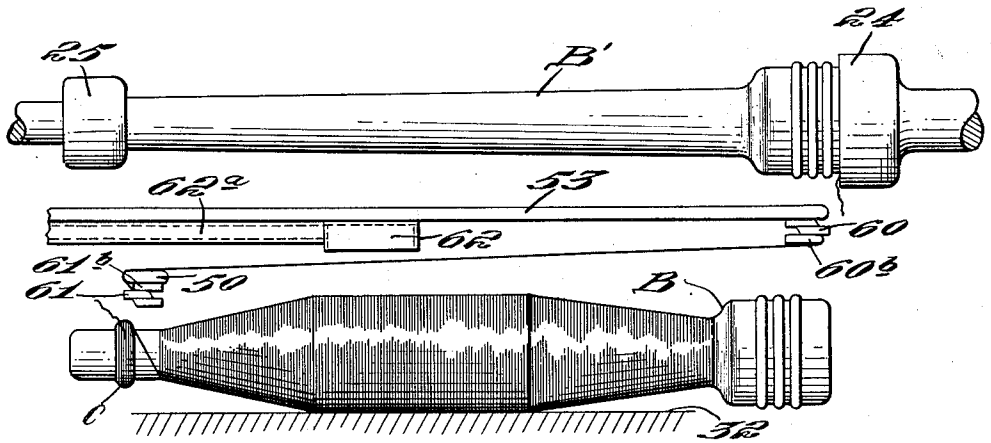


Fig. 4b

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2,695,138

WINDING MACHINE

Winthrop L. Perry, Wilton, N. H., and Edward J. Abbott, deceased, late of Wilton, N. H., by Samuel L. Abbott, executor, Wilton, N. H., assignors, by mesne assignments, to Abbott Worsted Mills, Incorporated, a corporation of New Hampshire

Application July 6, 1949, Serial No. 103,242

6 Claims. (Cl. 242—19)

This invention relates to winding machines and is of special applicability to automatic winding machines of the type disclosed in United States Reissue Patent No. 22,492 and United States Patents Nos. 2,362,455, 2,377,367, 2,395,028, 2,426,167 and 2,426,168 and United States patent application Serial No. 44,754, filed August 17, 1948, in which the thread is automatically associated with the base portion of a new empty bobbin, which is then automatically wound with the thread, the winding of bobbins proceeding in sequence.

The invention relates to the production of so-called "end-finding" coils on each bobbin, that is, a plurality of coils of thread wound on the tip portion of the bobbin, beyond the completed main wound body of thread and connected to such main wound body. Such end-finding coils form a ready means for automatically "finding" or getting hold of the leading end of thread of the bobbin. Thus when the bobbin is presented to a loom, to supply the filling thread in weaving, the thread constituting the end-finding coils can readily be seized and pulled over the end of the bobbin by automatically acting hooks or grippers or the like and the thread thus held in readiness for withdrawal of the main body of thread from the bobbin. This avoids any necessity for searching over the surface of the main wound body of thread to find its extreme end.

The invention accordingly involves provisions for winding a plurality of end-finding coils on the bobbin following completion of the main wound body and for severing the thread adjacent to such end-finding coils while leaving the end-finding coils connected to the main wound body of thread.

The invention further involves coordinating the operations of winding the end-finding coils on a wound bobbin with operations of changing the bobbin, associating the thread with the next new bobbin and preparing the winding unit for winding the thread on such next new bobbin, as will hereinafter appear. Thus the invention provides for carrying the thread from adjacent the tip of the wound bobbin to adjacent the base of the new bobbin without disturbing end-finding coils wound adjacent to the tip of the wound bobbin. The invention further provides for cutting out of the thread a portion that extends between the end-finding coils of the wound bobbin and the base portion of the next new bobbin at which the thread is engaged with such new bobbin for the beginning of winding thereon.

The invention also provides improved and advantageous mechanism for causing the bobbin to rotate for a few revolutions to receive its end-finding coils and for directing the thread onto the bobbin in the form of such end-finding coils, using portions of the machine that are also useful in the sequential automatic winding of filling wound bobbins.

The invention also provides for effectively securing coils of thread in place on the bobbin by means of adhesive so that these coils do not become accidentally misplaced in latter handling of the bobbin.

Other objects and advantages of the invention will be apparent from this specification and its drawings in which the invention is explained by the explanation of a preferred embodiment thereof.

In the drawings:

Fig. 1 is a diagrammatic view mainly in plan showing a portion of a traveling unit automatic filling bobbin winder including the main portions of the automatic winding-unit tending mechanism through which the units

travel in a procession, this figure showing one of such units at the left of the figure and indicating diagrammatically further momentary positions of such unit as it travels from left to right through the tending mechanism;

Fig. 2 is a right elevation of the apparatus of Fig. 1, with some parts broken away, and also shows a portion of the track of the winding machine in vertical section;

Fig. 3 is a fragmentary diagrammatic view taken on the line 3—3 of Fig. 1; and

Figs. 4^a and 4^b are fragmentary views taken on the line 4—4 of Fig. 1 and respectively show the thread cutters open and closed.

The winding machine to which the invention is shown as applied includes a plurality of winding units such as indicated at **15** in Fig. 1, movable by means of a chain **18** in a closed path around the machine upon tracks consisting of upper and lower rails, the upper rail **16** being shown in Figs. 1 and 2.

Each winding unit may be individually driven by its own electric motor **19**, such motor deriving its current through the frame of the machine and through suitable brushes contacting with stationary conductor bars **20**, so as to wind a thread package on an individual bobbin B as the winding unit travels around the machine. As shown in Fig. 1, the conductor bars **20** are interrupted in the region where winding is suspended, following completion of winding a bobbin and before and during the changing of the bobbin by the winding unit tending mechanism.

Thread T from a supply package carried by the lower portion of the winding unit is drawn upwardly to a traversing thread guide assembly indicated at **23**, through an outer thread guide eye 23^a and thence over and down through an inner thread guide eye 23^b onto the winding bobbin.

The bobbin B is held between inner and outer chucks or rotatable hollow centers **24** and **25**, the inner center **24** being rotated by the motor **19** to rotate the bobbin.

The thread guide assembly **23** is preferably frictionally mounted for sliding movement upon a traverse rod 23^c which is reciprocated with a short stroke of traverse by suitable traverse cam and linkage connections from the motor **19**. During the winding of the bobbin the thread guide assembly **23** is progressively advanced along the rod 23^c, from the base of the bobbin toward the tip, for instance by feeler mechanism such as disclosed in United States Patent No. 2,377,367 or by stationary guide mechanism which reacts on the thread guide assembly of the traveling winding unit as disclosed in United States Patent No. 2,362,455. In either case the progressive shifting of the zone of traverse of the thread guide assembly **23** from near the base of the bobbin to near the tip of the bobbin provides the filling type of winding on the bobbin, that is, nested conical layers.

Upon completion of a wound bobbin by the winding unit, or in any event upon the winding unit reaching a predetermined place in advance of the tending mechanism of Fig. 1, winding is stopped and the individual motor of the unit is deenergized by breaking the circuit to the motor, for instance by lifting of the unit's brushes from the conductor bars **20** through use of control mechanism such as employed in connection with the machine of Figs. 13 to 23 of said Patent No. 2,377,367. Thus each winding unit enters from the left of Fig. 1 in an inactive condition but still holding the wound bobbin in winding position between the centers **24** and **25**.

The outer chuck or center **25** of each unit is retractable to discharge the wound package from winding position by means of a crank arm **30** on the winding unit and a stationary abutment **31** shown in Fig. 1. Upon the crank arm **30** encountering the abutment **31**, the wound bobbin will drop from the chucks or centers a short distance onto a lower horizontal stationary plate **32** which extends along the path of travel of the winding units **15**, underneath their head portions. The wound bobbin is rolled along on this plate **32** by being held between a generally vertical plate **35** (Fig. 1) and a rod **36** (Figs. 1 and 2) both of which extend from and move along with the winding unit, and upon reaching the right end of plate **32** the wound bobbin may roll off into a

receptacle or into any desired bobbin-arranging mechanism.

When the crank **30** leaves the right end of abutment **31**, the outer center **25** is allowed to close upon a new empty bobbin appropriately held by suitable bobbin-feeding mechanism which may be that of Fig. 21 of said Patent No. 2,377,367, indicated generally by the reference character **40** and located to hold the new bobbin for reception at the position indicated at V in Fig. 1. Fig. 2 shows such new empty bobbin B as having been received between the centers **24** and **25**, in winding position, and above the discharge full bobbin which is still being rolled along on the plate **32**.

The first form of means for winding end-finding coils on the bobbin includes provision for guiding the thread onto the tip portion of the bobbin and simultaneously rotating the bobbin for a few turns while it is still held in the chucks **24** and **25** of the winding unit.

It will be observed from the left-hand position of a winding unit in Fig. 1 that the thread guide assembly **23** will have stopped with its inner eye **23^b** located somewhere in the zone of the last conical layer of thread nearest to the tip of the bobbin. An upstanding roller **42** on the thread guide assembly is engaged by an inclined portion of an overhead plow and guide member **43** which guides the roller **42** in between the guide member **43** and a straight portion **44** of the further overhead guide member, displacing the thread guide assembly along its traverse rod **23^c** so that the inner eye **23^b** enters the region of the bare portion of the bobbin core between the last conical layer of thread and the tip of the bobbin, as at position II of Fig. 1. At this stage the brushes of the winding unit encounter short sections of conductor bars **20^a**, briefly energizing the motor **19** and rotating the bobbin a few turns during which time the thread T is wound in coils C near the tip of the bobbin, these coils being spaced from the main wound body of thread on the bobbin, but connected thereto as shown at position III of Fig. 1.

The brushes of the winding unit may be lowered into contact with the short sections of conductor bars **20^a** by suitable brush controlling mechanism such as employed in connection with the machine of Figs. 13 to 23 of said Patent No. 2,377,367, although in this use it is unnecessary that the brushes be held down in contact with conductor bars **20^a** long enough for the brush controlling mechanism to become latched since the short sections of conductor bars **20^a** are intended to cause only a few rotations of the individual motor of the winding unit. Instead of causing brushes of the winding unit to be lowered into contact with the short sections of conductor bars **20^a**, these bars may merely be positioned a little higher than the main conductor bars **20**, so as to make momentary contact with the brushes in the elevated position of the brushes.

Shortly after the winding unit leaves position II, the crank arm **30** encounters the stationary abutment **31**, the outer center of the chuck **25** is retracted as shown at position III of the winding unit of Fig. 1, and the bobbin drops out of the chucks **24** and **25** onto the plate **32**.

Following such discharge of the bobbin, the thread guide assembly **23** is shifted to a position above the inner or base chuck **24** by engagement of the upstanding roller **42** with an inclined extension **44^a** of the guide element **44**, the wound bobbin B meanwhile being rolled along the plate **32** between the elements **35** and **36** of the winding unit.

Advantage is taken of the time during which the thread guide assembly is thus being shifted and the bobbin being rolled, to wind further coils on the bobbin. A stationary horizontal bar **50** having a cam shaped end **50^a** intervenes between the thread guide assembly and the tip portion of the bobbin, a portion of the thread extending from the thread guide to the bobbin thus being intercepted and bent around the bar **50** near the coils C previously wound, and the bar **50** guiding the thread onto the bobbin in further coils C as the bobbin rolls along and accordingly rotates beneath the bar **50**, as indicated in position IV of the winding unit in Fig. 1 and in Fig. 2.

As the thread guide assembly moves toward the base chuck **24**, the thread extending between the inner eye **23^b** and the bar **50** is engaged by the edge of an upper cam plate **53** which forces the thread, below the level of the chuck **24**, over toward the plane of the chuck **24**. Just before the winding unit has reached position V of the winding unit of Fig. 1, to receive a new empty bobbin B', the thread is thus held across the open end of the chuck **24**, above the chuck by means of the inner eye **23^b**, and below the chuck by the edge of the upper cam plate **53**. At this bobbin receiving position the crank arm **30** leaves the stationary abutment **31** and springs outwardly, allowing the outer chuck **25** to close upon the empty bobbin B' as the latter is held by swingable fingers **55** and **56** of the bobbin-feeding mechanism **40**.

Fig. 2 shows the thread extending upwardly from the supply at the lower portion of the winding unit, past the inner edge of the lower plate **32**, through the eyes of the thread guide assembly, down between the new bobbin and chuck **24**, thence over the inner edge of the upper guide plate **53**, underneath this guide plate and over to the bar **50** and around this bar down onto the wound coils C on the bobbin.

With the thread thus wound in end-finding coils C on the tip portion of the fully wound bobbin and also connected to the new empty bobbin B' by being clamped between the latter and the inner chuck **24**, the thread is then automatically severed twice, once adjacent to the end-finding coils and once adjacent to the chuck, to cut out this portion of the thread.

One remaining end of the thread, that is, the end attached to the supply, is left clamped between the new empty bobbin B' and its chuck. The other remaining end of thread comprises the end-finding coils C of the wound bobbin B, and these coils C are left attached to the main body of thread of that bobbin.

Thus the thread extending down from the chuck **24** to the edge of the guide plate **53** enters in between the blades of a cutter located adjacent to the base chuck **24**, the pivoted blade of which cutter is indicated at **60** in Fig. 1. At approximately the same time, the thread which extends down from the guide bar **50** to the end-finding coils C enters in between the blades of another cutter located adjacent to the tip portion of the discharged bobbin, the pivoted blade of such other cutter being indicated at **61**. The two pivoted blades **60** and **61** of the two cutters are operated by links **63** and **64** respectively from a three armed crank **66** which may normally be held as by a spring in position to hold the two cutters open. One arm **67** of the crank **66** is adapted to be engaged by a bent rod **68** (Fig. 2) which is pivoted on a horizontal axis in brackets **69**, **69** and has fast thereon a depending arm **68^a** located in position to be swung by contact with the outer portion of a passing winding unit. Thus as a winding unit passes a little beyond position V of the winding unit in Fig. 1 and the thread has entered into the two cutters, the bent rod **68**, three armed crank **66** and links **63** and **64** are actuated to close the cutters, and sever the thread twice, near the base chuck and near the tip portion of the discharged bobbin.

Each cutter is preferably constructed to hold temporarily the cut portion of thread that extends to the other cutter, insuring that both cuts will be made before the thread is able to leave either cutter, so that if either cutter cuts the thread sooner than the other cutter, the part of thread which should be cut by such other cutter will not become loose and miss such other cutter.

Thus the pivoted blade **60** is provided with a cooperating fixed cutting blade **60^a** and a cooperating fixed holding blade **60^b** between which the blade **60** enters, the thread being cut between blades **60** and **60^a** and being held between blades **60** and **60^b** until the blade **60** opens again. Similarly the pivoted blade **61** of the other cutter is provided with a cooperating fixed cutting blade **61^a** and a cooperating fixed holding blade **61^b**.

Fig. 4^a shows the thread in position to be engaged by the pivoted cutting blades **60** and **61** of the two cutters, and Fig. 4^b shows the cut portion held between the closed blade **60** and its cooperating holding blade **60^a** and also held between the closed blade **61** and its cooperating holding blade **61^b**.

A suction nozzle **62** is preferably located over the position of the cut and temporarily held piece of thread, and is connected by a conduit **62^a** to any suitable source of suction. Upon the blades **60** and **61** of the cutters opening again and releasing the cut off piece, the cut off piece is drawn into the suction nozzle **62** and carried away through the conduit **62^a**.

It will be observed that the preferred form of mechanism shown includes two means for guiding the thread onto the bobbin in end-finding coils, one of these employing the individual thread guide eye **23b** of the winding unit, to guide the thread directly onto the tip portion of the bobbin, and the other employing an additional supplemental thread guide in the form of the stationary bar **50**.

It will be apparent that either one of these two means may be employed in the winding of a certain number of such end-finding coils, and that, by employing both such means, as in the illustrated machine, a greater number of end-finding coils can be wound.

In employing only the bar **50** to direct the thread onto the bobbin during the winding of the end-finding coils, the provision for rotating the bobbin after completion of its main body of wound yarn and while still held in the chucks can simply be omitted, in which case the winding of the end-finding coils does not begin until the thread attached to the discharged rolling bobbin is engaged by the bar **50**. To employ only the thread guide eye **23b** of the winding unit to direct the thread onto the bobbin in end-finding coils, the bar **50**, or the rotation of the bobbin beneath the bar **50**, by rolling, may be omitted.

Even though the machine may be constructed to omit the winding of end-finding coils under the direct guidance of the thread guide eye **23b** of the winding unit, it will be apparent that this thread guide eye cooperates with the bar **50** in presenting the thread to the bar. Also, even though the machine may be constructed to omit rotation of the bobbin after discharge from winding position and to omit the winding of end-finding coils under the guidance of bar **50**, the bar **50** is useful in cooperating with the thread guide eye **23b** to prevent end-finding coils which have been wound under the direct control of the thread guide eye **23b** from being displaced as the thread guide assembly is shifted away from such coils, and also to retain the run of thread in the region of the end-finding coils in position for cutting by the cutter blade **61** in close proximity to the wound end-finding coils.

As indicated above, the invention further provides for securing coils of thread in place on the bobbin by means of adhesive. While it is contemplated that in some cases it may be desirable to apply adhesive to some at least of the exposed thread of the main wound body of thread on the bobbin, in general it will be preferable to limit the application of adhesive to surface portions of the wound thread which are of smaller diameter than the full diameter surface portions, with the resulting advantage that the adhesive may remain free from contact with other bobbins or parts of the machine at least until the adhesive has dried.

In the illustrated machine which has provision for winding end-finding coils C, of less diameter than the full diameter portion of the main wound body, it is preferable that the adhesive be applied to some at least of these end-finding coils, and this, in general, will suffice to fasten the leading end portion of thread in place on the bobbin without any application of any adhesive to any of the main wound body of thread.

As shown in the drawings, liquid adhesive may flow from a container **70** through a pipe **71** into a small brush **72** (Fig. 3) located in position to brush against the coils C of a bobbin B, following the cutting of the thread as described above, as the bobbin rolls and rotates beneath the brush. A slight amount of adhesive applied to the coils in this way will insure that these coils do not become dislodged from their intended position between the main body of yarn and the tip of the bobbin, and accordingly that all of the thread of the bobbin will remain in place thereon until the end-finding coils C are intentionally pulled off.

Application of the adhesive to the coils C without application of any adhesive to the main wound body of thread has the advantage that the adhesive after being applied need not contact with any other bobbin or any part of the machine before drying. In the illustrated machine the plate **32** on which the bobbins roll and any subsequent conveyor for the bobbin can engage the full diameter portions of the bobbins but not the small-diameter adhesively treated coils C.

We claim:

1. A winding machine including means for holding a bobbin in winding position, said holding means including a chuck for the base of the bobbin, means including a thread guide for distributing the thread on the bobbin in nested conical layers which progressively advance from the base toward the tip of the bobbin, means for discharging the wound bobbin from said chuck, means for carrying a portion of the thread extending between the thread guide and the discharged bobbin to said chuck for association with a new empty bobbin, and cutters arranged to cut the thread at two places between the chuck and the discharged bobbin to cut out a portion of such thread.

2. A winding machine including means for holding a bobbin in winding position, said holding means including a chuck for the base of the bobbin, means including a thread guide for distributing the thread on the bobbin in nested conical layers which progressively advance from the base toward the tip of the bobbin, means for discharging the wound bobbin from said chuck, means for carrying a portion of the thread extending between the thread guide and the discharged bobbin to said chuck for association with a new empty bobbin, cutters arranged to cut the thread at two places between the chuck and the discharged bobbin to cut out a portion of such thread, and means for fastening a leading end portion of thread in place on the bobbin.

3. A winding machine including means for holding a bobbin in winding position, said holding means including a chuck for the base of the bobbin, means including a thread guide for distributing the thread on the bobbin in nested conical layers which progressively advance from the base toward the tip of the bobbin, means for discharging the wound bobbin from said chuck, means for carrying a portion of the thread extending between the thread guide and the discharged bobbin to said chuck for association with a new empty bobbin, cutters arranged to cut the thread at two places between the chuck and the discharged bobbin to cut out a portion of such thread, and means for applying adhesive to a leading end portion of thread of the bobbin to hold such leading end portion in place.

4. A winding machine including means for holding a bobbin in winding position, said holding means including a chuck for the base of the bobbin, means including a thread guide for distributing the thread on the bobbin in nested conical layers which progressively advance from the base toward the tip of the bobbin, means for discharging the wound bobbin from said chuck, means for carrying a portion of the thread extending between the thread guide and the discharged bobbin to said chuck for association with a new empty bobbin, and two cutters arranged to cut the thread between the chuck and the discharged bobbin, one such cutter being located adjacent to said chuck and the other such cutter being located adjacent to the tip portion of the discharged bobbin.

5. A winding machine including means for holding a bobbin in winding position, said holding means including a chuck for the base of the bobbin, means including a thread guide for distributing the thread on the bobbin in nested conical layers which progressively advance from the base toward the tip of the bobbin, means for discharging the wound bobbin from said chuck, means for carrying a portion of the thread extending between the thread guide and the discharged bobbin to said chuck for association with a new empty bobbin, and two cutters for cutting the thread between the chuck and the discharged bobbin, each of said cutters being constructed to hold temporarily the cut portion of thread extending to the other cutter.

6. A winding machine including a bobbin holding chuck for rotatably holding the base of a winding bobbin, means for traversing thread on the rotating bobbin, means for progressively shifting the zone of traverse from adjacent to the base to adjacent to the tip of the bobbin, means for winding coils of the same thread in a restricted zone adjacent to the tip of the bobbin, means for discharging the bobbin from winding position, means for positioning the thread, which leads to said coils, at said chuck for engagement with the base of a new bobbin, and means for cutting twice a length of such thread that extends between the said coils and said chuck, to remove the portion between the two cuttings.

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