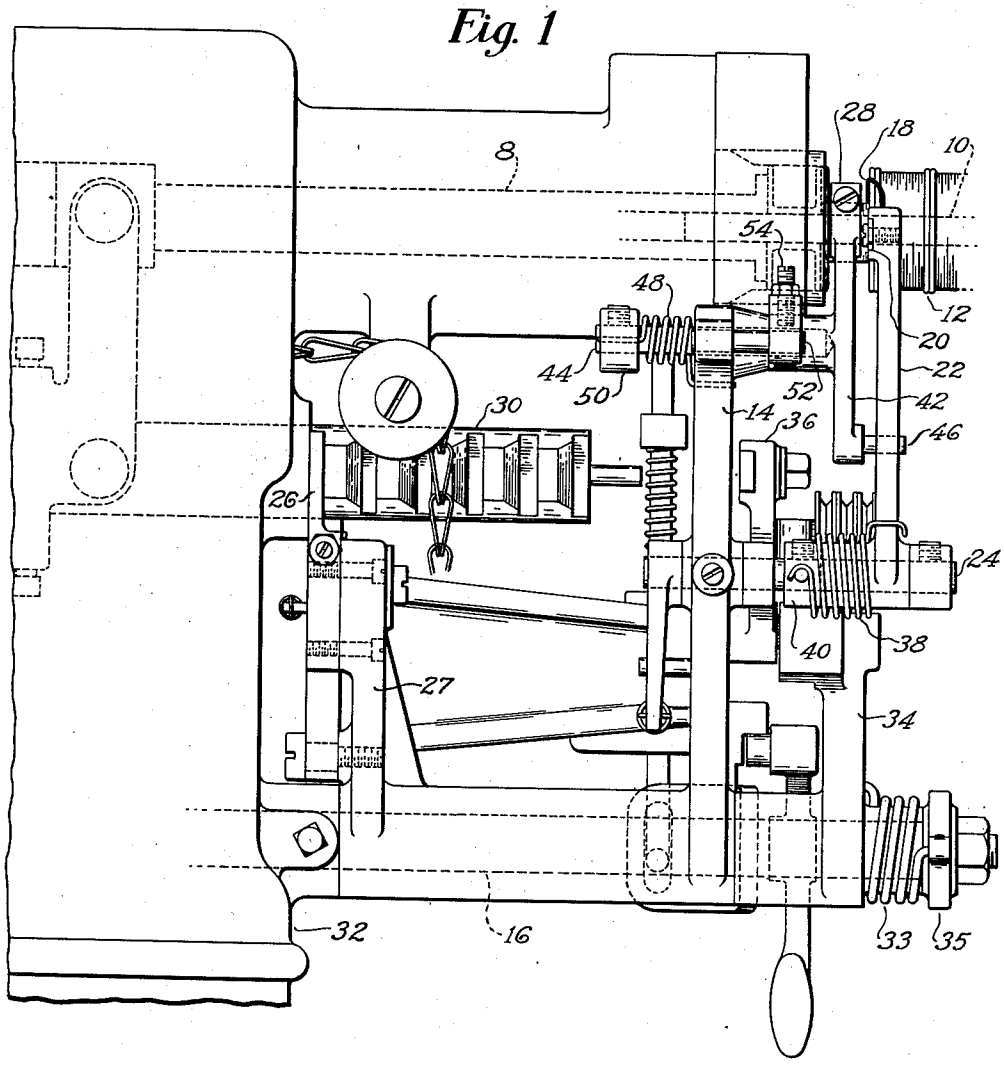
Dec. 18, 1951 R. O. SMITHSON ET AL 2,578,755

THREAD CUTTER FOR BOBBIN WINDERS

Filed Jan. 12, 1948 2 SHEETS—SHEET 1

Fig. 1



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Fig. 2

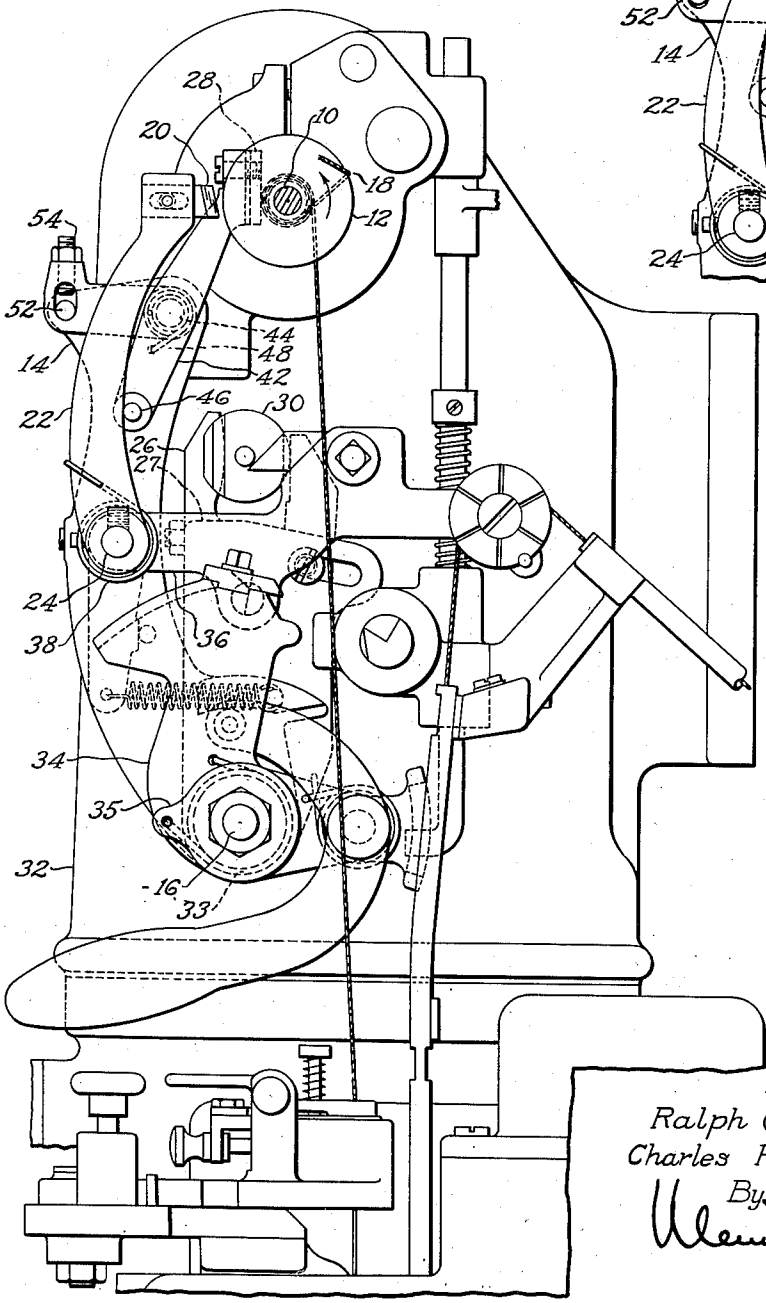
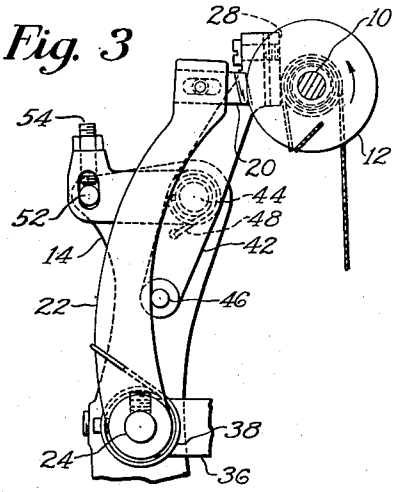


Fig. 3



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THREAD CUTTER FOR BOBBIN WINDERS

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9 Claims. (Cl. 242—21)

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The present invention relates to machines for winding sewing machine bobbins or other thread packages and primarily to improvements in the apparatus for severing the thread between successively wound bobbins in such machines disclosed in an application for United States Letters Patent, Serial No. 787,410, filed November 21, 1947 in the names of Raymond L. Slinkard and Arthur B. Miller, now Patent No. 2,514,423 dated July 11, 1950. As hereinafter described the invention is embodied in an automatic bobbin winding machine of the type identified in United States Letters Patent No. 2,343,935, granted March 14, 1944 on application of Paul W. Senfleben.

The machine constructed according to the teaching of the patent and application above referred to is provided with a rotary winding spindle to which a series of bobbins are clamped by a removable mandrel in adjacent flange-to-flange relation. The machine is provided with a thread controller arranged automatically to engage the thread on each successive bobbin at one side of the mandrel and to be forced outwardly of the bobbin by the thread during each winding operation. Outward movement of the controller from a bobbin causes the winding operation on each bobbin to be terminated and the winding operation on the next bobbin to be started, the spindle and mandrel being advanced in a lengthwise direction relatively to the thread controller at the end of each winding operation the distance between bobbins. The machine of the patent is provided with a thread severing knife or cutter arranged at the same side of the winding mandrel with the controller and mounted in fixed position upon the controller. The knife acts to sever the thread crossing the flanges of adjacent bobbins as soon as the controller enters between the flanges of a bobbin. With such arrangement there is a possibility that the knife will act before sufficient number of turns have been wound on a bobbin so that the thread will slip and will not turn with the bobbin, the winding operation, thereby, being discontinued.

To insure winding a sufficient number of turns upon a bobbin to prevent slippage before the thread is severed between bobbins, in the machine of the application, the knife is mounted on the thread controller and so located that it acts only after the thread controller has been engaged by the thread on the bobbin and has been moved outwardly by the thread a definite distance from its innermost position. For this purpose the knife of the application is mounted on the con-

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troller and is actuated by connections including an arm carried by the thread controller and stationary means on the machine frame to engage and sever the thread at a position beneath the winding mandrel, whereas the knife of the patented machine is located at the same side of the mandrel with the thread controller. Thus, while the thread controller of the machine illustrated in the application moves outwardly from a bobbin the knife moves through a path tangent to the bobbin flanges, never reaching a position greatly removed from the flanges and remaining in close proximity to the flanges at all times. A disadvantage of this arrangement sometimes arises from the presence of the knife in close proximity to the flanges of the bobbins during advancing movement of the bobbin supporting mandrel or while the mandrel loaded with empty bobbins is being substituted for a mandrel loaded with filled bobbins, the bobbin flanges occasionally coming into accidental contact with the cutting edge of the knife in such a way as to injure the knife or to interfere with the proper advancing movement of the mandrel. Also, a further disadvantage is in the proper adjustment of the controller in regulating the winding operation, which adjustment may interfere with the time of knife actuation, the knife actuating connections being mounted in part on the controller and in part on the stationary machine frame.

It is an object of the present invention to provide a bobbin winding machine with a thread severing knife or cutter arranged to act in severing the thread only after a sufficient number of turns have been wound on a bobbin as in the machine of the Slinkard and Miller application without the disadvantage of possible interference between the knife and the bobbin flanges during lengthwise advancing movement of the mandrel or of improper adjustment of the time of knife actuation when an adjustment is made in the machine to regulate the winding operations. A further object of the invention is to improve the mode of operation of the thread severing knife actuating mechanism in a machine similar to that disclosed in the Slinkard and Miller application.

Accordingly, the machine of the present invention is provided with a bobbin supporting mandrel, a thread controller arranged for inward movement toward the mandrel and for outward movement by the thread on a bobbin being wound to cause the bobbin supporting mandrel to be advanced as in the machine of the patent and application, in which a thread severing knife

has its actuating connections mounted entirely on the controller without the use of any stationary means on the machine frame, to cause the knife to act on the thread crossing the flange of a bobbin being wound after the thread controller has reached the limit of its inward movement toward the bobbin supporting mandrel and before the outward movement is started. Preferably the knife is located at the same side of the mandrel with the thread controller so that when the controller is moved outwardly from the mandrel at the end of a winding operation the knife also will be moved radially away from the flanges on the bobbins by a corresponding distance. In this way the possibility of interference between the flanges on the bobbins and the cutting edge of the knife is avoided.

As hereinafter illustrated the knife is mounted for movement relatively to an arm comprising the thread controller and is actuated by the controller carried connections into thread severing position before outward movement of the arm is started. More specifically the knife is actuated through an operative connection with a thread engaging member also on the controller arm and, in the illustrated embodiment of this feature, the thread engaging member is movable on the controller arm.

These and other features of the invention relating to certain constructions, combinations and arrangements of parts as hereinafter claimed will be clearly understood from the following description taken in connection with the accompanying drawings in which:

Fig. 1 is a view in front elevation of a portion of the winding head in a bobbin winding machine embodying the features of the present invention;

Fig. 2 is a view in right side elevation of the winding head of the machine illustrated partially in Fig. 1 with the thread cutter shown in inoperative position; and

Fig. 3 is a similar view of part of the winding head with the thread cutter shown in thread severing position.

The machine disclosed herein is an automatic bobbin winding machine and is provided with a rotating winding spindle **8** having a mandrel **10** on which a series of empty bobbins **12** are supported and a thread controller in the form of a lever having an arm **14** of the same construction and mode of operation as set forth in the Senfleben patent above referred to. As in the machine of the patent the thread controller arm **14** is moved inwardly toward the bobbin supporting mandrel about a stationary shaft **16**, secured to the machine frame, indicated at **32**. After a thread engaging member on the controller arm is engaged by the thread on a bobbin being wound, the controller is moved outwardly away from the mandrel and the winding operation on the bobbin is terminated when the controller reaches a predetermined position. The mandrel is then moved lengthwise to carry the filled bobbin from beneath the thread controller the distance between successive bobbins and to bring an empty bobbin into cooperative relationship with the controller. The thread engaging member on the controller then enters between the flanges of the empty bobbin, the thread running from the filled bobbin being carried across the adjacent flanges of the bobbins, as at **18**, and being led into the empty bobbin in order to start the new winding operation thereon. In the patented machine the thread engaging member is fixed to the controller lever and the controller lever also carries in fixed relation a thread severing knife acting during entry of the thread engaging member between the flanges of an empty bobbin on the thread crossing the bobbin flanges.

In the machine of the application above referred to, the thread controller comprises a lever of similar construction and carries a thread severing knife in a position to act at the underside of the bobbins being wound approximately 90° from the point of engagement of the thread engaging member on the lever in such a way that the thread is severed only after the thread engaging member is engaged by the thread on the bobbin being wound. The knife of the application is so located on the thread controller lever that it acts only when the lever is moving outwardly from between the flanges of a bobbin. To prevent the knife from acting during inward movement of the thread controller in the machine of the application, the stationary means mounted on the frame in that machine moves the knife a short distance downwardly to an inoperative position, although retaining the knife in close proximity to the flanges of a bobbin. It has been found with such an arrangement that difficulty is encountered as a result of accidental engagement of the knife with the bobbin flanges when it is found desirable to adjust the machine or to shift the winding mandrel manually. Such engagement of the knife with the bobbin flanges may dull the cutting edge of the knife, damage the bobbin flanges or interfere with the lengthwise movements of the mandrel.

In the machine of the present invention continued automatic winding operations are obtained in a bobbin winding machine when a thread severing knife and its actuating connections both are mounted for relative movement and located entirely on the arm of the controller lever at the same side of the mandrel and winding spindle with the thread engaging member while retaining the advantages of a thread severing knife mounted at the underside of the bobbins on the mandrel as in the application machine. For this purpose the knife, indicated at **20**, for severing the thread is secured to the upper end of an arm **22** rotatably mounted for movement relatively to the thread controller on a shaft **24** secured in the thread controller arm **14**. The knife **20** acts on the thread crossing the flanges of the bobbins being wound at the same side of the mandrel with the thread controller. The thread controller arm **14** is moved inwardly toward the mandrel on the winding spindle about the shaft **16** mounted in parallel relation to and below the winding spindle with a yielding force by a spring **33** coiled about the hub of a lever **34**, one end being hooked about the lever and the other end secured to a collar **35** clamped to the end of the shaft **16**. The lever **34** transmits the yielding force of the spring **33** to a latch arm **36** pivoted on the shaft **24** carried by the controller arm **14**. Inward movement of the arm **14** toward the mandrel is limited by engagement of a stop comprising a pawl **26** on a second arm **27** of the controller lever and a ratchet bar **30** forming a part of the winding spindle and mandrel advancing mechanism. When the controller arm is moved outwardly of a bobbin a predetermined distance away from the mandrel by the increasing diameter of the thread, this mechanism is set into operation to terminate the winding operation on the bobbin being wound

and to move the spindle and mandrel lengthwise, bringing an empty bobbin into winding position. This mechanism is the same as described in the Senfleben patent. The thread severing knife 20 is mounted to act at the inner surface of the right flange of a bobbin. It is yieldingly urged toward thread severing position by a spring 38 coiled about the hub of the arm 22 to which the knife is secured with one end engaging the arm and the other a pin on a collar 40 clamped to the shaft 24.

To hold the severing knife in inoperative position away from the bobbins on the spindle and to cause it to act before outward movement of the controller arm 14 is started, the knife actuating connections and the thread engaging member 28 are entirely mounted for relative movement on the controller arm 14 and for this purpose the thread engaging member is secured to the upper arm of a lever 42 fixed to a shaft 44 rotatable in the upper end of the controller arm. The lower arm of the lever 42 carries a pin 46 forming an operative connection between the lever 42 and the knife arm 22. When the thread engaging member 28 first enters between the flanges of a bobbin being wound, the pin 46 is in engagement with the arm 22 and holds the knife 20 in the position of Fig. 2 out of engagement with the thread crossing between bobbins on the winding spindle.

To actuate the thread engaging member the lever 42 is pressed by a spring 48 coiled about the shaft 44 and secured at one end in an opening in the controller arm 14 and at the other end in a collar 50 clamped to the shaft 44. This spring exerts a stronger force on the pin 46 than is exerted through the arm 22 by the spring 38. The force of the spring 48 thus produces a yielding movement in the lever 42 and to limit the yielding movement a forwardly extending arm of the lever 42 is slotted and surrounds a pin 52 projecting from one side of the controller arm 14. The forwardly extending arm of the lever 42 also carries a set screw 54 to enable adjustment of the effective length of the slot and, therefore, of the limited yielding movement.

The screw 54 is so adjusted that when the pawl 26 moves against the stop formed by the ratchet bar 30, the thread engaging member 28 will be held spaced from the hub of a bobbin being wound to provide space for thread. The space beneath the thread engaging member is made great enough to accommodate the desired number of turns of thread.

During operation of the machine as a bobbin is being wound, the thread eventually fills the said space and engages the member 28, forcing it outwardly through the limited yielding movement of the lever 42 relatively to the controller arm 14. The controller arm remains stationary during the relative movement of the lever 42. The thread severing knife 20 during the relative movement of the lever 42 moves toward the flanges of the bobbins on the winding spindle to its thread severing position, shown in Fig. 3, the thread controller arm 14 still remaining stationary. By this time the bobbin being wound has accumulated sufficient turns of thread to insure a firm frictional grip of the thread on the bobbin being wound without requiring a connection with the thread on the previously wound bobbin.

Further increase in diameter of the thread on the bobbin eventually causes the set screw 54 to engage the pin 52 and the thread controller arm 14 to move outwardly with the thread engaging member 28 until the bobbin is completely filled with thread. The winding operation on the filled bobbin is then terminated and the winding spindle is shifted in a manner similar to that described in the Senfleben patent, to bring an empty bobbin into winding position. In terminating the winding operation on a bobbin, the thread controller arm is moved outwardly further than it is moved by the thread engaging member, a distance sufficient to enable the lever 42 to resume its original relative position on the controller arm, as shown in Fig. 2. Inasmuch as the thread engaging member is now clear of the flanges on the bobbin being wound, the thread severing knife also is moved clear of the bobbin flanges and accordingly the spindle may be shifted to bring a new bobbin into winding position without danger of accidental contact between the bobbin flanges and the severing knife.

By the construction thus described, the use of a thread severing knife acting at the underside of the mandrel is avoided. Also, adjustments in the mandrel advancing mechanism including the thread controller do not interfere with the adjustments of the knife actuating connections. Consequently the thread severing knife is moved outwardly from the mandrel and the flanges of the bobbins thereon a distance approximately equal to the outward movement of the thread engaging member without changing the time of knife operation. The mandrel may then be shifted manually or adjustments made in the machine after the thread engaging member has been moved out of the path of movement of the bobbin flanges with the assurance that the knife also will be moved to a position clear of the bobbin flanges. At the same time an adequate number of turns will always be wound on a bobbin being filled with thread before the thread severing knife is allowed to engage the thread crossing from the bobbin being wound to the adjacent filled bobbin.

The nature and scope of the invention having been indicated and a particular embodiment having been described, what is claimed is:

1. A bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins, a yieldingly actuated controller arm arranged for inward movement toward the bobbin supporting mandrel and for outward movement as each bobbin is being wound to cause the winding operation on that bobbin to be terminated and the winding operation on the next bobbin to be started and means for stopping the inward movement of the controller arm toward the mandrel, in combination with a yieldingly actuated thread engaging lever fulcrumed for relative movement on the controller arm, means on the controller arm for limiting the relative movement of the thread engaging lever to prevent engagement of the thread engaging lever with the thread until a bobbin is partially filled, a knife pivoted for relative movement on the controller arm for severing the thread crossing the flange of the bobbin, a spring for moving the knife toward thread severing position and a pin on the thread engaging lever for holding the knife out of thread severing position until the thread engaging lever is engaged by the thread on the bobbin being wound.

2. A bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a thread controller arranged for inward movement toward the bobbin supporting man-

drel and for outward movement by the thread on a bobbin being wound to cause the winding operation on that bobbin to be terminated and the winding operation on another bobbin to be started, in combination with a knife mounted on the thread controller in a position to act along the inner surface of a flange on the bobbin being wound for severing the thread crossing the flange of said bobbin.

3. A bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a thread controller arranged for inward movement toward the bobbin supporting mandrel and for outward movement by the thread on a bobbin being wound to cause the winding operation on that bobbin to be terminated and the winding operation on another bobbin to be started, in combination with a knife mounted on the thread controller at a position to act along the inner surface of a flange on the bobbin being wound and at the side of the bobbin mandrel with the thread controller before the thread controller has been moved outwardly by the thread from between the flanges of the bobbin being wound for severing the thread crossing the flange of said bobbin.

4. In a bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a controller arm arranged for outward movement as each bobbin is being wound to cause the winding operation on that bobbin to be terminated and the winding operation on the next bobbin to be started, the improvement which comprises a member pivoted on the controller arm, and a knife pivoted on the controller arm and connected operatively with said member to be moved to sever the thread upon movement of said member relative to the controller arm after the controller arm has reached the limit of its inward movement and before outward movement is started.

5. In a bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a controller arm arranged for outward movement as each bobbin is being wound to cause the winding operation on that bobbin to be terminated and the winding operation on the next bobbin to be started, the improvement which comprises a member pivoted on the controller arm, a knife pivoted on the controller arm, and means entirely on the controller arm engaging said knife and rendered operative by movement of said member relative to the controller arm for moving said knife to sever the thread after the controller arm has reached the limit of its inward movement and before outward movement is started.

6. In a bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a controller arm arranged for outward movement as each bobbin is being wound to cause the winding operation on that bobbin to be terminated and the winding operation on the next bobbin to be started, the improvement which comprises a thread engaging member pivoted on the controller arm and arranged to move with the controller arm as each bobbin is being wound, and a thread severing knife pivoted on the controller arm independently of said thread engaging member and connected operatively with said thread engaging member to be moved to sever the thread upon movement of said thread engaging member relative to the controller arm.

7. In a bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a controller arm arranged for outward movement as each bobbin is being wound to cause the winding operation on that bobbin to be terminated and the winding operation on the next bobbin to be started, the improvement which comprises a thread engaging member pivoted on the controller arm and arranged to move with the controller arm as each bobbin is being wound, a thread severing knife pivoted on the controller arm independently of said member, and means entirely on the controller arm engaging said knife and rendered operative by movement of said thread engaging member relative to the controller arm for moving said knife to sever the thread after the controller arm has reached the limit of its inward movement and before outward movement is started.

8. In a bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a controller arm arranged for outward movement as each bobbin is being wound to cause the winding operation on that bobbin to be terminated and the winding operation on the next bobbin to be started, the improvement which comprises a thread engaging member pivoted on the controller arm, a thread severing knife pivoted on the controller arm, and an element connected to said thread engaging member controlling movement of said knife to thread severing position after said member is moved relative to said controller arm by engagement with thread on the bobbin being wound.

9. In a bobbin winding machine having a mandrel for supporting a plurality of flanged bobbins and a controller arm arranged for outward movement as each bobbin is being wound to cause the winding operation on that bobbin to be terminated and the winding operation on the next bobbin to be started, the improvement which comprises a thread engaging member pivoted on the controller arm, a thread severing knife pivoted on the controller arm and normally urged toward thread severing position, and an element on said member engaging said knife to hold said knife out of thread severing position until said member is moved by the thread on the bobbin being wound.

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