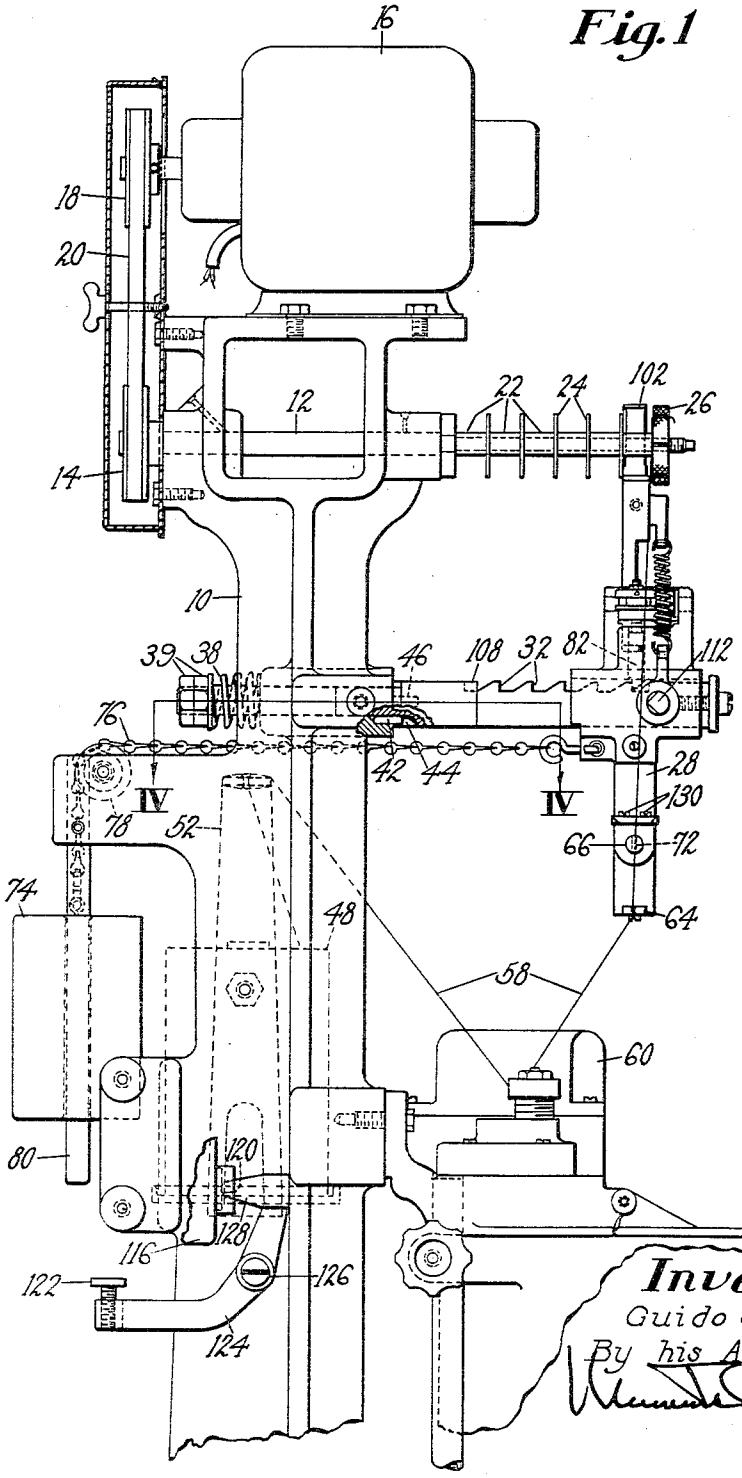
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AUTOMATIC BOBBIN WINDING MACHINES

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Fig. 1



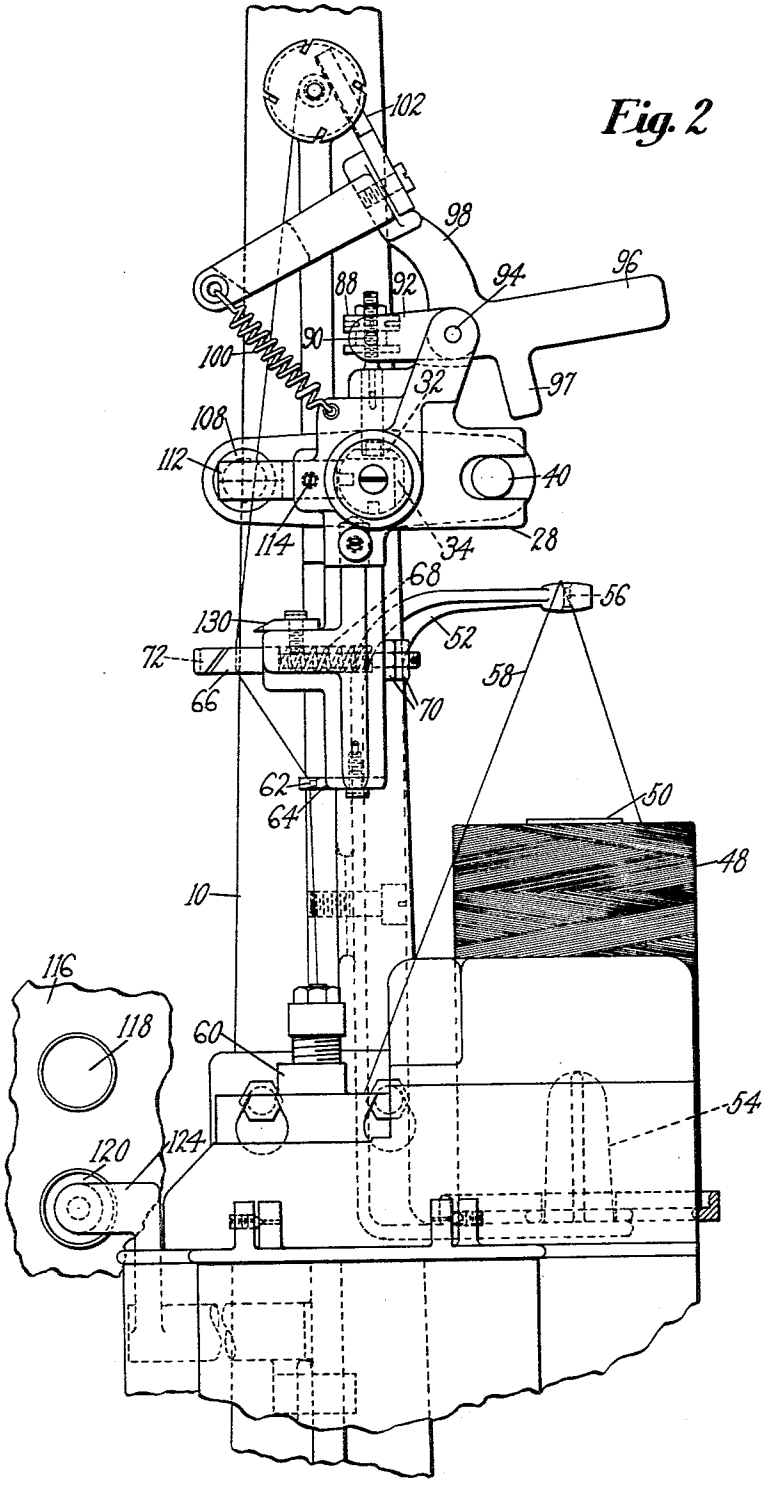
Inventor
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By his Attorney

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Fig. 2



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Fig. 3

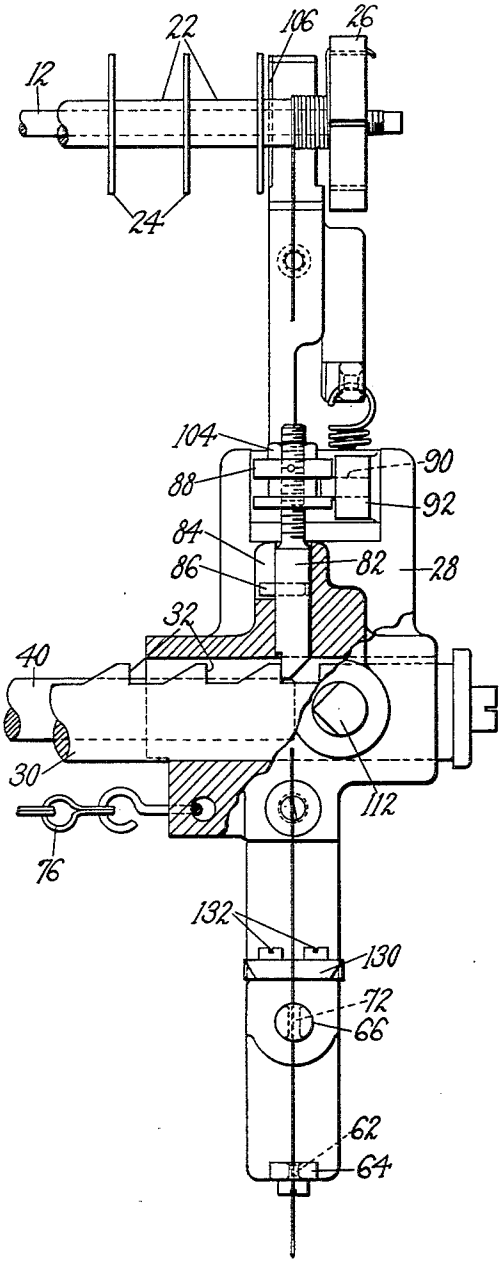


Fig. 4

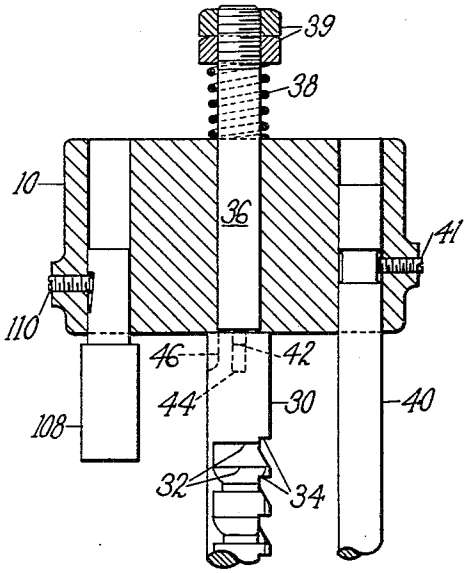
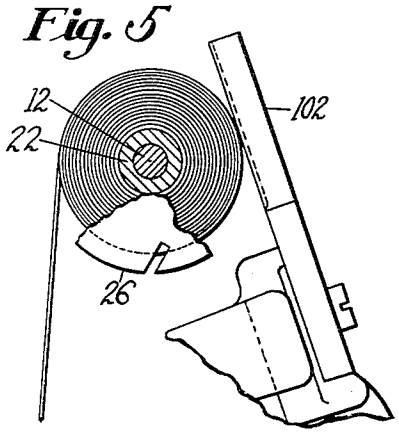


Fig. 5



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AUTOMATIC BOBBIN WINDING MACHINES

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5 Claims. (Cl. 242—21)

This invention relates generally to automatic bobbin winding machines and more particularly to such machines in which a series of bobbins is supported on a winding spindle and successively filled with a quantity of thread. In a more limited aspect, however, the invention is directed to a novel combination of thread controlling and severing elements especially applicable to winding machines in which the thread, during the winding operation, is impregnated with hot wax or a similar substance.

One of the objects of the present invention is to provide a simple and yet efficient bobbin winding machine which may be operated with less attention from the operator than that required by more complex prior art machines, such as those described in Letters Patent of the United States No. 2,343,935, granted March 14, 1944 and No. 2,396,754, granted March 19, 1946, both upon applications filed in the name of Paul W. Senfleben.

Another object is to provide a bobbin winding machine which, because of its simplicity, may be inexpensively manufactured and operated for extended periods without the need of adjustments or repairs.

Still another object is to provide an automatic bobbin winding machine incorporating thread severing devices which are not rendered inherently dangerous either through wear of component parts or through carelessness of the operator. Machines disclosed in the Senfleben patents which comprise sharp blades mounted on cocked spring actuated arms do present a danger of injury to the operator if he is careless or if the machine has not been maintained in adequate repair.

Yet other and more particular objects are to provide, in automatic bobbin winding machines, thread severing devices which, because of the nature of their construction, are not rendered inoperative by an accumulation of lint and wax from the thread being processed and which operate with minimum impact so that the thread severing elements need not be reconditioned at frequent intervals.

The foregoing objects are achieved in a machine including a main frame, a spindle journalled in the frame for supporting a plurality of bobbins of a series in end-to-end relation and a thread control carriage movable to successive winding positions, each corresponding to one of the bobbins of the series. Thread is furnished to the machine generally in the form of a large supply cop and passes from the supply successively through a wax pot of conventional design, then through a guide mounted on the carriage to one of the bobbins on the spindle. One of the features of the invention resides in the use of said guide in directing the thread running to the spindle into cooperative relation with two thread severing devices of different characteristics and purposes.

The first of the severing devices comprises two alined knife blade and anvil members, one mounted on the thread control carriage and the other on the base which members are brought into engagement with the thread after the winding of a series of bobbins has been completed. The engagement of two members with the thread directed by the guide is effected by an additional movement of the thread control carriage to a thread severing position after the last bobbin of the series has been wound.

The other thread severing device consists of a blade fixed upon the thread control carriage in spaced relation with the path of the thread while it is being wound under normal tension. The guide by means of which the two otherwise independent thread severing devices are cooperatively associated includes an eye, through which the thread passes, formed in a yieldingly supported member. Under conditions of normal tension or even when excessive tension is applied to the thread very briefly, the yielding guide maintains the thread out of contact with the blade but out of contact with the first severing members at all times. However, when from any cause excessive tension is applied for more than a brief instant, the guide yields allowing the thread to contact the blade and to be severed thereby. Since the thread is severed by the blade beyond the wax pot, the supply may be replenished quickly by merely fastening the leading end of a new cop to the trailing end of an exhausted cop and drawing the leading end through the wax pot without the delay occasioned by rethreading the wax pot.

The yielding movement of the guide is limited in extent so that there is no possibility that the thread will break from excessive tension before contacting the blade, the thread being severed in the most convenient position for manual application to a new series of bobbins on the winding spindle. Between the extremes of its travel the yielding guide maintains the thread always between the two members of the first thread severing device so that any tension on the thread, less than that required to render the fixed blade effective, does not interfere with the severing of the thread after the last of a series of bobbins has been completely filled with thread.

The foregoing objects and features and additional advantages of the invention will be more clearly understood from a detail description of an illustrative embodiment of the invention taken in connection with the accompanying drawings in which,

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

Fig. 2 is a view in right side elevation of the machine shown in Fig. 1;

Fig. 3 is a fragmentary view showing in greater detail a thread control carriage, its mounting and means by which it is indexed to successive bobbin winding positions;

Fig. 4 is a view in cross section taken along the line IV—IV of Fig. 1 and showing supporting means for the carriage; and

Fig. 5 is a fragmentary detail view showing a thread control arm, which is mounted on the carriage and contacts the thread being wound on a bobbin.

As may be seen from Figs. 1 and 2 the illustrative machine includes a pedestal or base **10** near the top of which is journalled a flanged spindle **12** retained against axial motion between the flange and a V-belt pulley **14** fixedly mounted on the spindle near one of its ends. A motor **16** is supported atop the pedestal and is provided with a drive pulley **18** through which it supplies rotary motion to the spindle by means of a V-belt **20** which passes about the pulleys **14** and **18**. Although the machine may be employed for winding conventional flanged bobbins or unsupported cops, it is shown in the drawing with a plurality of tubes **22** mounted on the spindle and separated by spacer washers **24**. A series of tubes and washers or bobbins, as the case may be, is clamped on the spindle by means of a slotted and knurled nut **26** in threaded engagement with the outer end of the spindle.

For directing the winding of successive bobbins a thread control carriage **28** (see also Fig. 3) has been provided. The control carriage is movable to a succession of thread

winding positions along the length of the spindle, each position corresponding to that of one of the bobbins to be filled with thread. The carriage 28 is slidable upon an index bar 30 which may be selectively oriented to bring into operative position either of two sets of index notches 32 or 34, the notches 32 being shown in operative position in the drawings. The index bar is provided with a threaded shank 36 of reduced diameter slidable in the base and about which is coiled a compression spring 38 acting between the base and a pair of check nuts 39 threaded on the end of the shank, for urging the index bar inwardly toward the base. For retaining the carriage 28 against pivotal movement about the index bar 30 it is formed with a rearwardly extending forked portion which embraces a rod 40 arranged in parallel relation with the index bar and secured by a set screw 41 in an opening in the base 10 (Fig. 4). Orientation of the index bar is maintained by a pin 42 fixedly projecting from the base and engageable by either of two slots 44, 46 corresponding to operative positions of the sets of notches 32 and 34 respectively. The distance between adjacent notches 32 or 34 in a set determines the successive positions of the carriage 28 and is equal to the length of bobbins to be wound, the bobbins of a given series supported at one time upon the spindle being preferably though not necessarily of equal length. Although only two sets of index notches have been shown on the bar 30 it will be appreciated that, since a single set of notches is employed instead of two sets for each bobbin length as in the machines of the above identified Senfleben patents, additional sets of notches may be provided to add to the versatility of the present machine.

The thread supply for the machine is in the form of a large cop 48 wound on a tube 50 to which the trailing end of the supply is fastened. The supply cop is supported on a bracket 52 which is fixed upon the base 20 and has two outwardly extending arms upon one of which is mounted a core member 54 which resiliently engages the inner surface of the tube 50. The other arm of the bracket 52 extends above the supply cop and is perforated to provide an eye 56 through which thread from the cop is guided. From the eye 56 the thread designated by the reference numeral 58 is directed through a wax pot 60 of conventional design supported on the base 10. The thread receives an application of wax in the wax pot from which it passes to an eye 62 formed in a plate 64 fixedly supported at the lower end of the carriage 28. Also mounted on the carriage 28 is a plunger 66 slidable in a suitable perforation in the carriage and pressed outwardly by a compression spring 68. The plunger 66, which is retained by a pair of check nuts 70, is formed with an eye 72 through which the thread passes on its way from the fixed eye 62 to one of the bobbins or cops being wound. The plunger 66 serves not only to minimize tension variations in the thread being wound but also functions to bring into cooperative association two thread severing devices incorporated in the machine.

The thread carriage 28 is urged inwardly toward the base to successive bobbin winding positions by a heavy weight 74 suspended on a chain 76 which is guided over a pulley 78 supported on the base 10. The chain 76 is connected to the carriage 28 and the weight 74 is guided on a rod 80, depending from the base 10, which passes loosely through a suitable perforation in the weight.

The carriage 28 is held against the force of the weight 74 at successive bobbin winding positions by means of an index pawl 82 which engages the notches 32 or 34 depending upon the position of the index bar 30. The pawl 82 is slidable in a bore formed in an integral slotted boss of the carriage 28, the slot 84 of which is engaged by a pin 86 pressed radially into the pawl 82 for maintaining it correctly oriented. The upper end of the pawl 82 has a shank of reduced diameter threaded to receive a spool 88 between the flanges of which is disposed a pin 90 pressed into a forwardly extending arm 92 of a multi-arm lever. In addition to the arm 92, the multi-arm lever, which is pivoted on a transverse pin 94 supported in upstanding ears integral with the carriage 28, is also provided with an integral handle 96 and with a thread control arm 98. The handle 96 is formed with a depending stop portion 97 for engaging the carriage 28 to limit the downward movement of the handle in lifting the pawl 82 out of engagement with the notches of the index bar in returning the carriage to the first bobbin winding position. The pawl 82 is biased into engagement with the appropriate notch of the index bar 30 by a tension spring 100 stretched between the carriage and a forwardly and downwardly extending portion of the thread control arm 98. The pawl 82 is caused to move upwardly out of engagement with a notch 32 or 34 for allowing the carriage 28 to be shifted to the left to a position in which the pawl engages the next notch of the set by a plate or finger 102 secured to the thread control arm 98 and maintained in contact with the thread on the bobbin being wound. The spool 88 is positioned axially on the shank of the pawl 82 and is locked in place by a check nut 104 so that the pawl moves out of engagement with the notch 32 or 34 when the corresponding bobbin is completely filled with thread. When the first cop 22 supported on the outward end of the spindle has been filled with thread the finger 102 is forced outwardly from the spindle by the thread to the extent necessary for causing the pawl 82 to move out of engagement with the upper edge of the notch 32 or 34. Under the force of the weight 74 the carriage begins to move leftwardly after the pawl releases the notch corresponding to the already filled bobbin. The notches are so formed that as the carriage 28 moves leftwardly and before the finger 102 is in position for the succeeding bobbin winding operation, the pawl 82 is moved under the force of the spring 100 into position to engage the next notch on the index bar. In order to facilitate passage of the finger 102 over the washers 24, its inward edge is formed with a chamfer 106. The operation of the pawl 82 is the same after the winding of each successive bobbin on the spindle. After the last bobbin of a series has been wound, however, the carriage is moved past the last bobbin winding position a short distance to a thread severing position at which the thread is cut and a switch is opened for interrupting electrical power to the motor 16.

The short movement of the carriage 28 is arrested as members of a thread severing device come together. The thread severing device comprises an anvil 108 having a cylindrical shank which enters an appropriate bore in the base and is there fixedly retained by a setscrew 110. Cooperating with the anvil is a blade 112 which is clamped in a perforation in the carriage 28 by a setscrew 114. The anvil and blade are maintained in alinement during the operation of the machine and the thread is directed between them by the eye 72 during the winding operation. Because the movement from the last bobbin winding position to the thread severing position is short, the anvil and blade come together under minimum impact but considerable force is imposed upon the carriage by the weight 74 so that the thread which is under tension is cleanly severed against the anvil by the blade which has a relatively blunt cutting edge. This permissible bluntness of the cutting edge of the blade 112 is an advantage in that the thread engaging members seldom need reconditioning or replacement. When either reconditioning or replacement is necessary, however, removal of the members is readily accomplished by loosening of a single setscrew for each and a simple adjustment of a switch actuating mechanism to be described is the only further adjustment necessary to compensate for possible changes resulting in the thread severing position of the carriage.

Power to the motor is controlled by a switch 116, shown fragmentarily in Figs. 1 and 2, and having an on-

button 118 and an off-button 120. In the thread severing position of the carriage 28 the weight 74 is effective to actuate the off-button 120 for cutting off power to the motor 16. In descending to its lowermost position the weight 74 engages the head of a screw 122 threaded into one of the arms of an offset bell crank 124 pivoted on a shoulder screw 126 threaded into the frame 10. The other arm of the bell crank 124 is L-shaped and is formed with an integral finger 128 which engages the off-button 120 when the weight contacts the head of the screw 122. When the thread severing position of the carriage 28 is changed by altering either the anvil 108 or the blade 110, the screw 122 is adjusted to be engaged by the weight 74 thereby to actuate the button 120 in the new thread severing position of the control carriage 28.

The eye 72 in the plunger 66, in addition to guiding the thread between the anvil 108 and the blade 112, also cooperates with a blade 130 which is oriented with its cutting edge in right angle relation with the blade 112 and secured on the carriage 28 by a pair of screws 132 for severing the thread when it is subjected to excessive tension. Under conditions of normal tension the thread is directed in spaced relation with the cutting edge of the blade 130, as shown in Fig. 2. In addition, when the thread is subjected to slight variations in tension, the spring 68 behind the plunger 66 compresses slightly to absorb the increased tension without allowing the thread to contact the cutting edge of the blade 130. However, when the thread is under tension just short of that necessary to cause the thread to break, the spring 68 is compressed sufficiently to cause the thread to engage the blade 130 and to be severed at a point where it can be conveniently recovered. Tension sufficient to cause the thread to be severed results, for example, from a large knot in the thread which cannot pass through the eyes 56 or 62 or the wax pot 60. Also, when the supply cop 48 is exhausted, the tube 50 to which the trailing end of the thread is tied is pulled by the thread being withdrawn from the core member 54 and engages the bracket 52 at its eye 56, thus subjecting the thread to excessive tension and causing the blade 130 to be effective for severing the thread. The thread supply is then replaced merely by tying the leading end of a new supply cop to the trailing end of the exhausted cop and dawing the thead up to the spindle without the need of tediously rethreading the wax pot 60.

In general the operation performed by the present machine is similar to that obtained from prior art machines described in the above identified Senfleben patents. One significant difference in construction, however, is that the Senfleben machines are provided with an axially movable spindle by which bobbins of a series are successively moved to a winding position but in the present machine a movable carriage is indexed to successive bobbin winding positions along a spindle which is retained against axial motion. In the present machine, as well as in the prior art machines, the winding of a series of bobbins or cops once begun is normally completely automatic requiring no further attention from the operator. In the present machine the winding operation is begun with the outermost bobbin on the spindle and as each bobbin becomes filled the thread control carriage is automatically indexed into position for directing the winding of the next adjacent bobbin. If, during the thread winding operation, the thread is subjected to excessive tension it is automatically severed in a convenient location so that the winding operation may be resumed with a minimum loss of time. When the winding of a series of bobbins has become completed the thread from the last bobbin is automatically severed so that the filled bobbins may be removed from the spindle with ease and the motor circuit is automatically interrupted to stop the machine.

As a result of the construction and arrangement of parts described above, the illustrative machine, because of its simplicity and minimum number of moving parts, may be economically constructed. Although adjustments are rarely necessary, the adjustable parts of the machine are placed in accessible positions so that the necessary adjustments may be readily made. It is also an advantage of the present machine that thread severing devices included therein are positioned at a substantial distance from the spindle and do not include moving parts which would make them inherently dangerous. Consequently the present machine is one which performs essentially the same functions as prior art machines but which is more economical, simpler and safer, operates for extended periods of time without attention, is quickly adjusted when necessary and provides for greater versatility in handling different sizes of bobbins without requiring extensive modification.

The nature and scope of the invention having been indicated and a particular embodiment having been described in detail for purposes of illustration, what is claimed is:

1. A machine for winding thread from a supply through a wax pot and onto a series of bobbins including a base, a spindle rotatable in the base for supporting the series of bobbins being wound, a carriage mounted for stepwise movement lengthwise of the spindle to successive bobbin winding positions each corresponding to a bobbin of the series and further to a thread severing position, in combination with means for severing the thread after the winding of the series has been completed including an anvil fixed on the base, a first blade fixed upon the carriage for severing the thread against the anvil when the carriage moves to its thread severing position, and means for severing the thread between the wax pot and the bobbin being wound when the tension upon the thread reaches a predetermined limit including a second blade fixed upon the carriage and a spring pressed plunger also mounted upon the carriage and having an eye through which the thread is directed between the first blade and the anvil and in spaced relation with both blades when tension applied to the thread is below the predetermined limit, said plunger being movable under thread tension at the predetermined limit to cause the thread to engage the second blade only and to be severed thereby while being held out of contact with the first blade.

2. A machine for winding thread from a supply through a wax pot and onto a series of bobbins including a base, a spindle rotatable in the base for supporting the series of bobbins being wound, a carriage mounted for stepwise movement lengthwise of the spindle to successive bobbin winding positions, each corresponding to a bobbin of the series, and further to a thread severing position, in combination with means for severing the thread after the winding of the series has been completed including an anvil fixed on the base, a first blade having a relatively blunt edge fixed upon the carriage and maintained continuously in alinement with the anvil for severing the thread against the anvil when the carriage moves to its thread severing position, and means for severing the thread between the wax pot and the bobbin being wound when the tension upon the thread reaches a predetermined limit including a second blade considerably sharper than the first and fixed upon the carriage, and a guide resiliently mounted upon the carriage and having an eye through which the thread is directed between the first blade and the anvil and in spaced relation with both blades when tension applied to the thread is below the predetermined limit, said guide being movable under thread tension at the predetermined limit to cause the thread to engage the second blade only and to be severed thereby while being held out of contact with the first blade.

3. A machine for winding thread from a supply through a wax pot and onto a series of bobbins including a base, a spindle rotatable in the base for supporting the series of bobbins being wound, a carriage

mounted for stepwise movement lengthwise of the spindle to successive bobbin winding positions, each corresponding to a bobbin of the series, and further to a thread severing position, in combination with means for severing the thread after the winding of the series has been completed including an anvil, having a thread engaging surface, fixed on the base, a first blade having a relatively blunt edge fixed upon the carriage in alinement with the anvil and with its edge in parallel relation with the thread engaging surface of the anvil for severing the thread against the thread engaging surface when the carriage moves to thread severing position, and means for severing the thread between the wax pot and the bobbin being wound when the tension upon the thread reaches a predetermined limit including a second blade, having an edge sharper than that of the first angularly oriented with respect to the thread engaging surface of the anvil and the edge of the first blade, fixed upon the carriage and a spring pressed plunger slidable in the carriage toward and away from the edge of the second blade and having an eye through which the thread is directed between the first blade and the anvil and in spaced relation with both blades when tension applied to the thread is below the predetermined limit, said plunger being movable under thread tension at the predetermined limit to cause the thread to engage the second blade only and to be severed thereby while being held out of contact with the first blade.

4. A machine for winding thread from a supply onto a series of flanged bobbins, including a base, a spindle rotatable in the base for supporting a series of bobbins in end-to-end relation, a carriage mounted for stepwise movement lengthwise of the spindle to successive bobbin

winding positions, each corresponding to a bobbin of the series, and further to a thread severing position, in combination with means for severing the thread after the winding of the series has been completed including a member fixed on the base, and a movable member mounted on the carriage for engaging the thread against the fixed member between the supply and the last-wound bobbin when the carriage moves to its thread severing position.

5. A machine for winding thread from a supply onto a series of flanged bobbins including a base, a spindle rotatable in the base for supporting a series of bobbins in end-to-end relation, a carriage mounted for step-wise movement lengthwise of the spindle to successive bobbin winding positions, each corresponding to a bobbin of the series and further to a thread severing position, in combination with an anvil fixed upon the base, a blade mounted upon the carriage in opposed relation with the anvil, and a resiliently supported thread guiding means for directing the thread between the blade and the anvil under variable conditions of thread tension whereby when the carriage is moved to its thread severing position at the completion of the winding of a series of bobbins the thread directed by the resiliently supported guiding means is in position to be severed by engagement between the anvil and the blade in spite of variations in thread tension otherwise tending to dislocate the thread.

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