H. E. VERRAN AND M. O. CLAUSS.

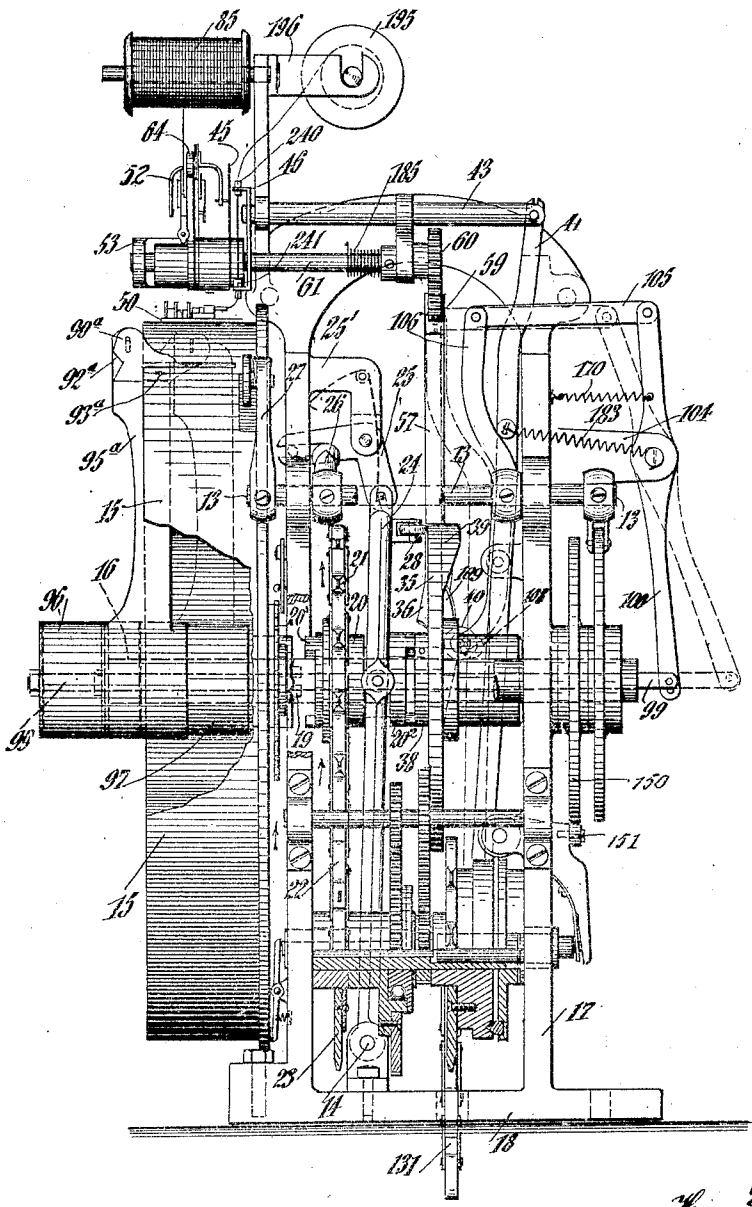
BINDING DEVICE FOR SKEINING MACHINES.

APPLICATION FILED JUNE 14, 1918.

1,381,679. Patented June 14, 1921.

3 SHEETS—SHEET 1.

Fig. 1.



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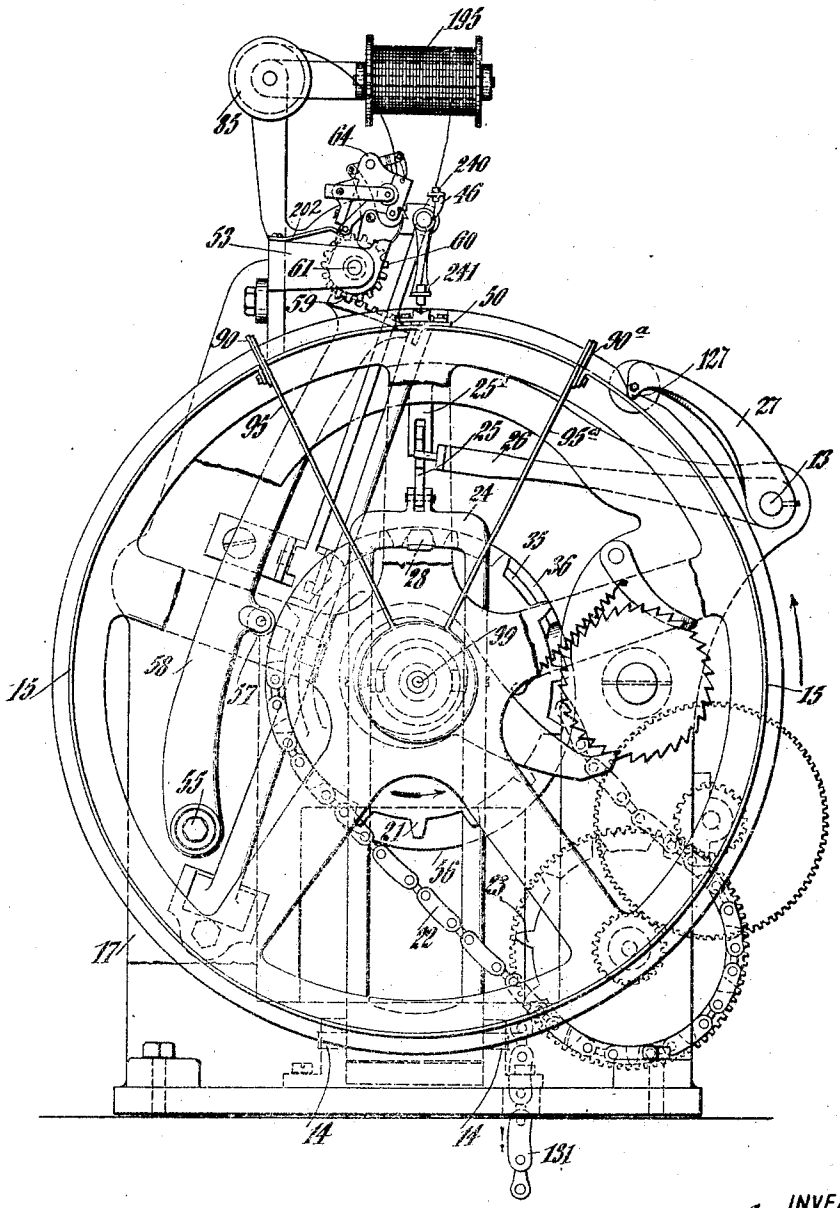
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3 SHEETS—SHEET 2.

Fig. 2.



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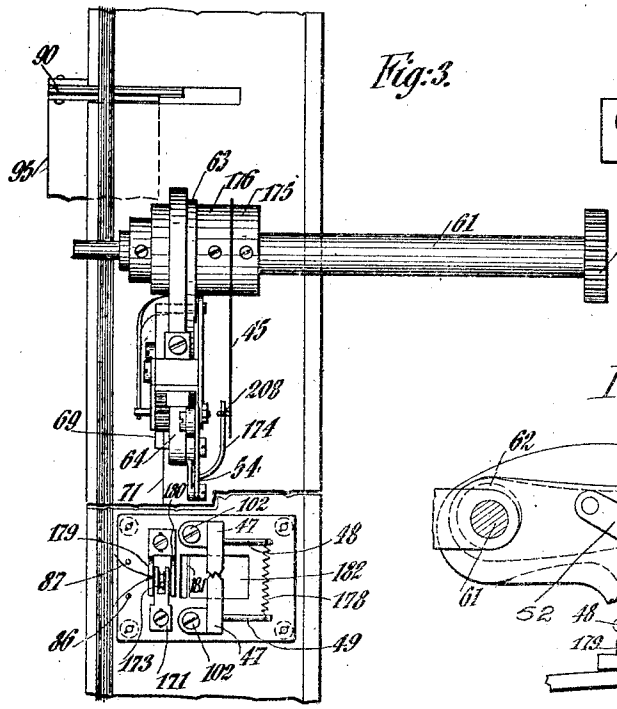
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3 SHEETS—SHEET 3.

Fig:3.



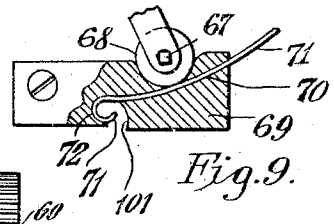


Fig:9.

Fig:6.

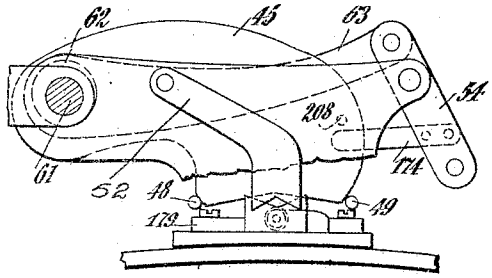


Fig:4.

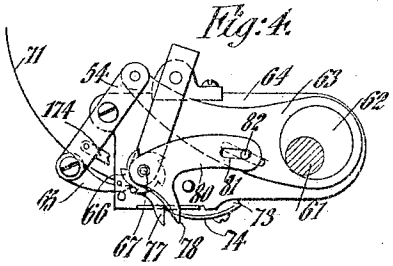


Fig:5.

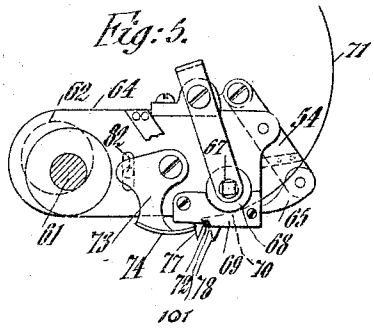


Fig:7.

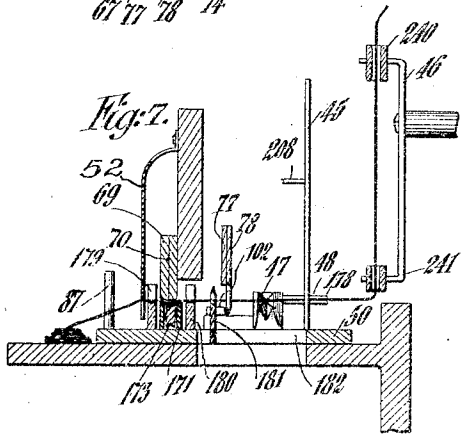
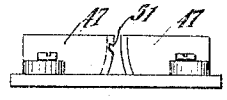


Fig:8.



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UNITED STATES PATENT OFFICE.

HARRY E. VERRAN AND MAX O. CLAUSS, OF NEW YORK, N. Y., ASSIGNORS TO H. E. VERRAN COMPANY, A CORPORATION OF NEW YORK.

BINDING DEVICE FOR SKEINING-MACHINES.

1,381,679. Specification of Letters Patent. Patented June 14, 1921.

Original application filed March 27, 1911, Serial No. 617,039. Renewed December 15, 1917, Serial No. 207,357. Divided and this application filed June 14, 1918. Serial No. 239,971.

To all whom it may concern:

Be it known that we, HARRY E. VERRAN, a citizen of the United States, and MAX O. CLAUSS, a citizen of the German Empire, residing in New York, in the State of New York, have invented a certain new and useful Improvement in Binding Devices for Skeining-Machines, of which the following is a specification.

The present invention relates to improvements in binding devices for skeining machines, and particularly to binding means therefor, being a divisional application of our original application, Serial Number 617,039, filed March 27, 1911.

An object of the invention is to provide a machine which will perform the operations necessary to wind and bind silk or other threads in the form of skeins. For this purpose we provide a machine which winds the thread until the necessary turns result, then binds the leading end or head of the thread at the beginning of the skeins, with the thread at the end of the last turn by means of a wire, and then cuts the completed skein from the supply of unskeined thread.

When this binding and cutting operation has taken place, and thus an individual skein has been formed, the entire skein is automatically thrown off the machine. Thereupon the machine automatically repeats its action, winding the thread, binding it, cutting it, and throwing it off.

By the use of this invention an entire skein is made without the assistance of any operator except for starting the machine when commencing to work, after which the operation is continuous, requiring little or no attention. The use of such machines saves time and labor, thereby materially decreasing the cost of manufacture, and likewise enhancing the salability of the skeins produced.

In the accompanying drawings, which show one embodiment of our invention,

Figure 1 is a side elevation of our improved machine, parts of which are broken away and parts of which are shown in dotted lines in order to indicate the operation of the parts,

Fig. 2 is a front view of the machine shown in Fig. 1,

Fig. 3 is a plan view showing a portion of the winding-drum and the binder and cutter in relation thereto, also showing on the drum holding means for the thread preparatory to its binding and cutting,

Fig. 4 is a rear view of the binding and cutting means,

Fig. 5 is a front view of the binding and cutting means,

Fig. 6 is an elevation of the binding devices on a larger scale than in Figs. 4 and 5,

Fig. 7 is a vertical cross-section through the drum-flange and the binding and cutting devices, on an enlarged scale, and

Fig. 8 is an elevation of the thread-holding jaws,

Fig. 9 is a detail vertical section through the wire feeding and guiding device.

Similar letters of reference indicate corresponding parts throughout the several figures of the drawing.

Our improved machine is composed of winding apparatus, and binding, cutting, and throwing or discharging apparatus. These respective apparatus are so arranged as to be operated from one central governing source. This governing is so arranged that at the termination of the winding, the binding and cutting and then the throwing apparatus is set in motion on the conclusion of which the winding apparatus is again set in motion.

The winding apparatus is operated at different times at high speed and at low speed, and the binding, cutting, and throwing apparatus is operated during low speed, and when the high speed movement of the winding apparatus is stopped.

Referring to the drawings, the winding drum 15 is provided at its hub with a clutch 19 operated by a clutch 20^1 on the sleeve or clutch-member 20 of a gear 21 operated by a sprocket-chain 22, from a gear 23 which in turn is rotated by mechanism hereinafter described at high or low speed.

A main-cam-wheel 35 is centrally located in the machine, and one side of it is adapted to be engaged by a clutch and thereby rotated. This side controls the winding mechanism. The periphery and opposite side of the main-cam-wheel 35, govern the operations of the thread-guiding means, the binding means, the cutting means, and the throwing-off means, the supply-reel 85 for the binding wire being shown at the top of the machine and the supply reel 195 for the thread being shown in proximity thereto.

The winding-drum 15 is loosely mounted

on a shaft 16, which is screw-threaded at its farther end in the main frame 17, which forms part of the bed-plate 18.

The clutch-member 20 is embraced by a yoke 24, pivoted at its lower end to the bed-plate at 14 and at its upper end to an elbow-lever 25 pivotally supported by a bracket 25^1 of the frame 17. The other end of the elbow-lever 25 engages the free end of an arm 26 which is keyed to a rock-shaft 13, suitably supported in the frame.

The yoke 24 near its upper end where it engages the elbow-lever 25 carries a roller follower 28, which coöperates with a cam 36 at the front of the main-cam-wheel 35, which cam 36 is shown in end view in Fig. 1.

The other end of the clutch-member 20 is also provided with a clutch 20^2, which is adapted to engage its corresponding member 38 of the main-cam-wheel 35.

The main-cam-wheel 35 is provided at its rear face with a cam 39, which is engaged by a follower 40 of a lever 41 pivoted near its lower end to the frame 17, the free upper end of which lever 41 is conected by pin and slot with a transverse slide-bar 43, which carries at its forward end the thread-guide 46, which serves to control the movement of the thread supplied from the supply-wheel 195, which is suitably supported on the frame of the machine by a bracket 196. A spring 183 connected to the frame and to lever 41 keeps the follower pressed against the main-cam-wheel 35. The thread-guide bracket 46 is provided with upper and lower sockets, 240, 241, through which the thread passes.

The object of the cam 39 is to move the slide-bar 43 and the thread-guide 46 transversely across the width of the drum, so that the thread is engaged by jaws 47 pivoted by screws 102, 102, on a plate 50 screwed or otherwise secured to the drum 15, said slide-bar and thread-guide being retained in outermost or front position by the cam 39 until the winding operation is concluded.

When the winding operation is concluded, the follower 40 reaches the end of the cam 39 and by the spring 183 the sliding rod 43 and thread-guide 46 is moved rearwardly from its front position to its rear position, and by this movement carries the thread over the jaws 47, so that it falls upon the same.

An opener 45 frictionally secured between collars 175, 176 on a shaft 61 engages pins 48, 49 of the jaws 47 and presses them apart against the tension of their connecting spring 178, thereby simultaneously opening the jaws, and presses the thread down between them. When so pressed down the feed-thread is thus held by the jaws in position together with the leading or free end of the thread at the beginning of the skein. One of the jaws 47 is provided with a down-turned hook 51 (Fig. 8), to assist in retaining the thread.

The operation of the binding mechanism is brought about by a cam 56 provided on the periphery of the main-cam-wheel 35, which is engaged by a follower 57 shown in Fig. 2, supported by an arm 58 pivoted at 55 to the frame 17. The upper or free end of the arm 58 is provided with a rack 59 which engages a pinion 60, on a shaft 61 in a bracket 53 of the frame.

By the movement of the follower, caused by the cam 56, the arm 58 is moved and thereby the rack 59 rotates the pinion 60.

By movement of the pinion 60 the binding and cutting mechanism is brought downwardly against the tension of its spring 185 from its upper initial position to its operative position contiguous to the upper part of the drum 15. When brought into this position it cannot move any farther, because it is impeded by a die 171 on the plate 50 of the drum, but when the binding mechanism reaches this position and is thus impeded, the rack has not yet had its full play or movement and in continuing its movement and transferring the same to the pinion 60 the shaft 61 is continued to be rotated, whereby the eccentric 62 which is secured to the shaft 61 moves the eccentric rod 63 and thereby moves a pivot link 54 which is pivotally supported on the frame 64 of the binding mechanism. This pivot-link 54 is secured at one end to the rod 63 and at the other end carries a pawl 65 which engages a ratchet-wheel 66 secured to a shaft 67, to which is also secured a knurled feed-roller 68 which has its periphery seated in a feed-plate 69 in which is a groove or path 70 of substantially the same diameter as the binding-wire, part of which wire is shown by 71 in Figs. 4 and 5.

The movement of the ratchet and the corresponding movement of the knurled feed-wheel 68 moves the wire a certain amount corresponding to that necessary to embrace the threads to be bound. Said movement also causes a finger 174 of the pivot link 54 to lift the opener 45 by pin 208, sufficiently for the jaws 47, 47 to be closed by their spring 178 upon the threads. The groove 70 of the feed-plate 69 has at its lower portion a curved part 72 of small curvature, so as to nearly close the wire upon itself for embracing the threads.

At either side of the die 171, guide-plates 179, 180 guide the threads, so as to hold the same across the die during the binding operation, so that when the wire 71 is curved outwardly in the form given to it by the curved portion 72 it reliably embraces the thread. The die, also the guide-plates, are adjustable at their fastening screws so as to be brought in register with the curved portion 72. Continued movement of the rack 59 and pinion 60 brings about through the eccentric 62, a downward movement of the

member 63, whereby two simultaneous actions are performed. First, the operation of the cutting-device of the binding-wire, which consists of a knife-holder 73 pivoted to frame 64, and which has a knife 74 at its lower end, which knife engages the bottom of the feed-plate 69 close to its lower opening. The wire protrudes from said opening and movement of the knife 74 causes the wire to be cut and to be so squeezed between the feed-plate, knife, and the roller 173 of the die 171 as to tightly clamp the threads, which are thus bound for closing the skein.

Secondly and on the other side of the frame 64 of the binding mechanism, but by the simultaneous movement of eccentric rod 63, the scissors are operated. These consist of a stationary blade 77 secured to the frame 64, and a movable blade 78 pivoted at 67 to the frame and having an arm 80 with a slot 81 which is engaged by a pin 82 secured to the knife-holder 73, so that a practically simultaneous movement of the wire-cutting knife 74 and the thread-cutting scissors is brought about. During the cutting the thread is retained in the scissors by its tension, assisted by the cross-bar 181, which supports the thread across the opening 182 of the plate 50. Said opening extends also through the drum flange, and thereby the loose ends or waste cut from the leading end of the thread is permitted to fall and be discharged from the machine.

When the thread forming the skein is cut off from the main supply or feed, the feed-thread is still engaged by the jaws 47. The thread is held in this position by the guide 46, while the guide is in its inward or rearward position.

After the skein is discharged, the machine is then ready for another operation, and thereupon the thread-guide 46 is moved from its rearward to its forward position and when it attains this position the drum is again rotated and the winding operation commenced.

The thread-guide 46 moves outwardly in such position that the thread is engaged by an upright pin 86 of the plate 50 at the outside of which pin and a corresponding pin 87 the winding is carried on. This winding continues until the necessary rotations have been made and the skein has been wound to the desired number of turns, after which the drum is again brought to a standstill and the binding-mechanism and cutting-mechanism again brought into operation.

Immediately after the thread is properly bound and cut off, and before the winding operation for the next skein is commenced, the skein that has just been bound is thrown off from the winding-drum. During the winding the thread is held upon retainers 90 and 90^a which have each a V-shaped recess 92^a of which one is shown, and which are pivoted by slot and pin 93^a to the drum, and project radially through the same so as to receive the thread in their recesses. The other end of each retainer is pivoted by slot and pin to a radial arm 95, 95^a, secured to a sleeve 96 loosely fitting the hub 97 of the winding-drum. The sleeve 96 is connected to a rod 99 which passes through the shaft 16 and at its rear end is connected by pin and slot to a lever 100, which is pivoted to a bracket 104 of the frame 17. The other end of the lever 100 is pivoted to a link 105 pivotally connected with a cam-lever 106 pivoted at the lower part of the frame of the machine. At its central portion the lever 106 is provided with a follower 108 adapted to engage a cam 109 of the main-cam-wheel 35. A spring 170 keeps the follower 108 pressed against the cam-wheel 35. The cam 109 is so placed and the lever 106 so operated that after the thread has been wound into the skein and bound and cut the sleeve 96 is moved outwardly and thereby the radial arms 95, 95^a move the retainers 90, 90^a outwardly into the position indicated in full lines in Fig. 1, thereby throwing out away from the machine the completed skein. The skeins drop into some container on the floor of the room, and are there gathered.

The machine is also provided with means for controlling the number of turns in the skein, and also with a speed control mechanism for causing the drum to rotate at high speed during the winding of the thread, and at low speed during the binding, these mechanisms being fully described in our original application above referred to.

The operation of my machine is as follows: With the machine at rest and the thread-holder in front position for commencing the operation, the free end of the thread supported by the thread-holder 46 is taken by the operator and held in a position in front of the drum, in such manner as not to be engaged by the pins 86, 87, during the rotation of the drum. The machine is then set in operation by applying power through the chain-drive 131, and thereby the drum is rotated at high speed. When the drum reaches the end of this set of rotations the low speed goes into action and thereby the speed of the drum is changed from high to low, until the drum is gradually brought to rest by engagement of the pawl 27 in the recess 127. The thread-holder 46 then passes transversely from its front to its rear position, thereby carrying the thread over the jaws 47. The binding mechanism descends, whereby a gatherer 52 on the binder-frame 64 coöperates with the gatherers 179 and 180 to place the thread in proper position for binding and cutting, and the opener 45 engages the jaw-pins and opens the jaws, and at the same time presses

the thread which was brought transversely across the drum by the thread-holder 46 between the opened jaws, the outer end of the thread still being held by the operator. The binding wire 71, before commencing the operation of the machine, has been by hand inserted in the groove 70 and by means of a suitable key (not shown) applied to the shaft 67 of the knurled feed-roller 68 moves forward to the end of the groove, is now caused by operation of the pawl 65 to protrude and to pass under the thread, which is now held by the gatherers in proper position across the die. The wire passes against the die roller 173, and by the combined operation of the parts is curved upwardly so as to surround the thread. Practically simultaneously, or immediately before this operation, the opener is lifted against its friction between the collars 175, 176, by the finger 174 and thereby disengaged from the jaws which are then closed by their spring 178. A laterally-projecting down-turned hook 51 on a tooth of one of the jaws 47 assists in retaining the thread in the jaws. Immediately thereafter the wire-cutting mechanism and the thread-cutting mechanism are operated practically simultaneously. The cutting-knife 73 cuts off the wire and forces the same against a projection 101 of the wire-guide 69, and the die, and thereby clamps the wire which envelops the thread, tightly around the same. The scissors 77, 78 are operated by the downward movement of pin 82, so as to cut off the thread. When this is done the binding-mechanism is moved upwardly by spring 185. An abutment 202, of the frame, is so located that the opener 45 strikes the same on the upward movement of the binding mechanism, thereby moving the opener forward to original position, so that it will again open the jaws on descending. The throwing mechanism is operated forwardly and backwardly, but does not throw anything off, since no turns of the thread were, during the starting operation described, made on the drum. The piece of thread which the operator holds in his hand is cut off with the piece of wire bound around it, and the thread of the supply-reel remains at its end clamped tightly in the jaws 47. The jaws now perform the function of holding the end of the thread, the operator not holding any part of the same.

The thread-holder is now moved from its innermost position transversely across the drum to its outermost position and thereby the thread passes over the jaws, but not into the same, and pulls thereon, whereby, by reason of the jaw pivots 102 being at the strain side, namely the outer side, of the jaw-faces, the end of the thread that is held in the jaws is clamped tighter.

By the outward movement of the thread-holder the thread is brought outwardly into the line of winding on the drum.

The pawl 27 is released from the rim of the drum and the drum is set in motion, in the direction indicated by the arrow in Fig. 3, whereby the thread is caught by the pin 86 and takes the course indicated to the line of winding on the drum. The drum is rotated at high speed the number of times corresponding to the number of turns to be made in the skein. When the rotations are completed, the drum is rotated for a portion of a rotation at low speed until it is brought to standstill.

The high speed is changed into low speed by reason of the follower 151 engaging the recess in the high and low speed wheel 150, and the drum goes on at low speed until the pawl 27 engages the recess 127. Simultaneously the yoke 24 is pressed toward the main-cam-wheel 35 whereby the clutch-member 20 is disengaged from the clutch 19 on the drum and brought into engagement with the clutch on the cam-wheel. By further rotation of the cam-wheel 35, the spring 183 is permitted to move the thread-holder from forward to rearward position, whereby the thread is carried across the drum, being guided by the pin 87, and is placed in the gatherers.

Shortly thereafter the cam 56 will operate the lever 58 and bring the binding and cutting mechanism downwardly toward the face of the drum. The gatherer 52 gathers the two threads held between the pins 86, 87, so as to bring the same into the apex of the recess of the gatherers on the drum. At the same time the opener engages the pins 48, 49 of the jaws and opens the same and presses the thread held by the thread-holder into the jaws. When the binder is in its lowered position the eccentric 62 is brought into operation and by means of the link 54 and ratchet 65 turns the knurled feed-wheel 68 and thrusts a part of the wire 71 outwardly under both threads, the free end of the wire being guided by the die on the drum and thereby turned upwardly so as to envelop both threads.

Immediately thereafter the wire-cutting mechanism and thread-cutting mechanism are operated practically simultaneously. The cutting-knife 74 cuts off the wire and forces the cut-off portion against the projection 101 of the guide 69 and the die-roll 173, and thereby clamps the wire tightly around the threads. The scissors are also operated so as to cut off the threads, the two threads being cut at a place between the wire-binding devices and the jaws. Then the binding-mechanism is returned upwardly by operation of the spring 185, and the skein is free to be thrown off.

The skein, consisting of the number of turns intended, is wound on the drum and

in the recesses of the retainers 90, 90ª. These retainers are operated by the follower 108 being acted on by the cam 109, thereby actuating the rod 99 passing through the shaft 16, moving the sleeve 96 outwardly on the hub of the drum, whereby the arms 95, 95ª move the retainers 90, 90ª at the pivoted upper end outwardly in slots 204, 205 of the drum, upsetting them over their pivot pins on the drum, slots in the retainers allowing the necessary play of the pin on the end of the arms to permit swinging the retainers. The retainers throw the skein with the ends bound by the wire, outwardly away from the machine. After the skein has been discharged the retainers are returned to their normal position by the action of spring 170.

At this time the jaws hold two pieces of thread, the small piece of thread cut from the leading end or free end of the skein which was first held by the jaws, and the other thread which is part of the thread passing through the thread-holder. The small piece remains in the jaws during the operation of winding the following skein, and when this is wound and the jaws are again opened to receive the thread this small piece of cut-off thread from the first skein falls from the jaws through the opening in the plate 50 and flange of the drum. The end of the thread being thus held between the jaws the thread-holder is again moved from innermost position outwardly, and the thread is engaged by the pin 86 and the drum is rotated and the operation carried on as hereinbefore described.

We are aware that it has been heretofore proposed to make a skein having all its loops tied together. The skein produced by the present machine, however, has the advantage over such a skein of saving that length of material which was hitherto consumed in passing the same around the tang of the skein and forming a knot for binding, such material being ordinarily cut off and thrown away in the operation of opening up the skein for use. Such saving amounts to a large quantity of material when a large number of skeins are made, and represents a valuable saving in the cost of the skeins.

The skeins formed by the present machine have also the advantage of saving the time of the user. The ends of the skeins may be instantly separated by manually pulling them apart, the binding wire yielding readily to the pull and remaining on one end of the thread, from which it is readily removed by the thumb and finger. Where large quantities of skeins are used, as in manufacturing establishments, this saving of time is a highly valuable factor.

The practical embodiment of our invention herein described is especially adapted for the winding of cotton floss, but it is clear that threads of other materials may be used, as silk, and all other materials which it is desirable to form into skeins.

We have also shown a practical embodiment of means to bring about the coöperation of the different parts, but it is clear that some of these means may be substituted by others performing the same functions in substantially the same way.

Also, other embodiments of our invention may be made without departing from the spirit of the same, which consists in the cooperative winding, binding, cutting and throwing off of silk or other threads by a machine entirely automatic from the beginning of the operation to the end, and throughout the continued operations of winding and skeining, without the attendance of any person other than in a supervisory capacity, and which consists also in the novel individual members which compose the machine, as also in the coöperation of these with each other.

We claim:

1. In a machine for binding the ends of a skein, means for feeding a binding wire, a guide for receiving the end of said wire and acting to bend the same about the skein, and means for binding the bent portion of the wire about the skein and for severing said bent portion.

2. In a machine for binding the ends of a skein, means for feeding a binding wire, a guide adapted to receive the wire when fed and provided with a curved portion for directing the end of the wire about the skein during the feeding of the wire, and means for binding the said end of the wire upon the skein.

3. In a skeining machine, skein binding means consisting of a frame, an eccentric engaging the frame, adapted to move the same downwardly from an initial upward position, means actuated by the eccentric for advancing the binding wire on the continued rotation of the eccentric after the frame has arrived at its lowermost position, means for binding the wire, and means for cutting off the advanced wire.

4. In a skeining machine, means for feeding a binding wire, a guide for receiving the end of said wire and acting to bind the same, and means for severing the bound portion of the wire.

5. In a skeining machine, means for feeding a binding wire, and a guide adapted to receive the wire when fed and provided with a curved portion for binding the wire during the feeding of the same.

In testimony that we claim the foregoing as our invention, we have signed our names.

HARRY E. VERRAN.
MAX O. CLAUSS.