July 13, 1937. R. A. WITTMANN 2,086,655

BUNCH BUILDER FOR WINDING AND LIKE MACHINES

Filed Aug. 21, 1935 3 Sheets-Sheet 1

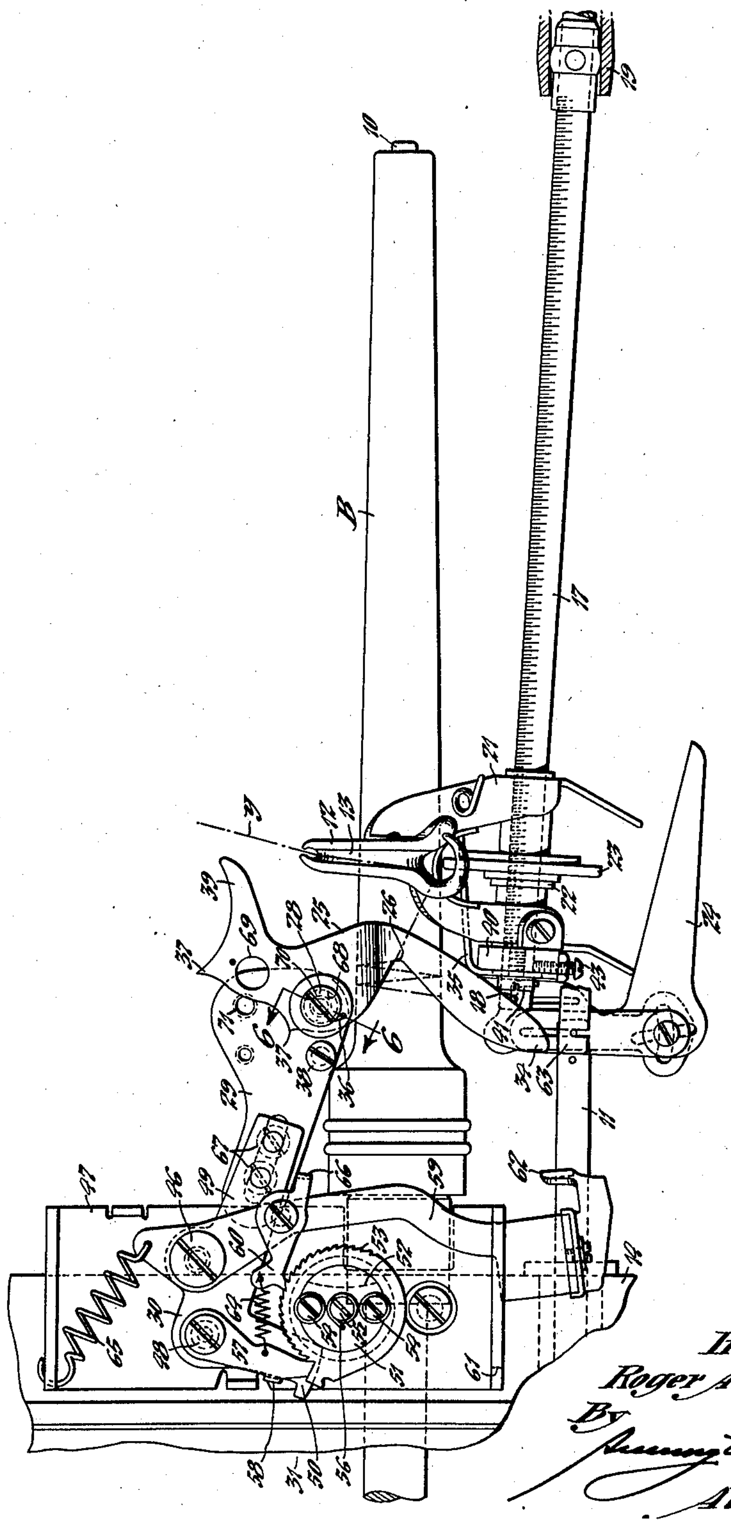

Fig. 1.

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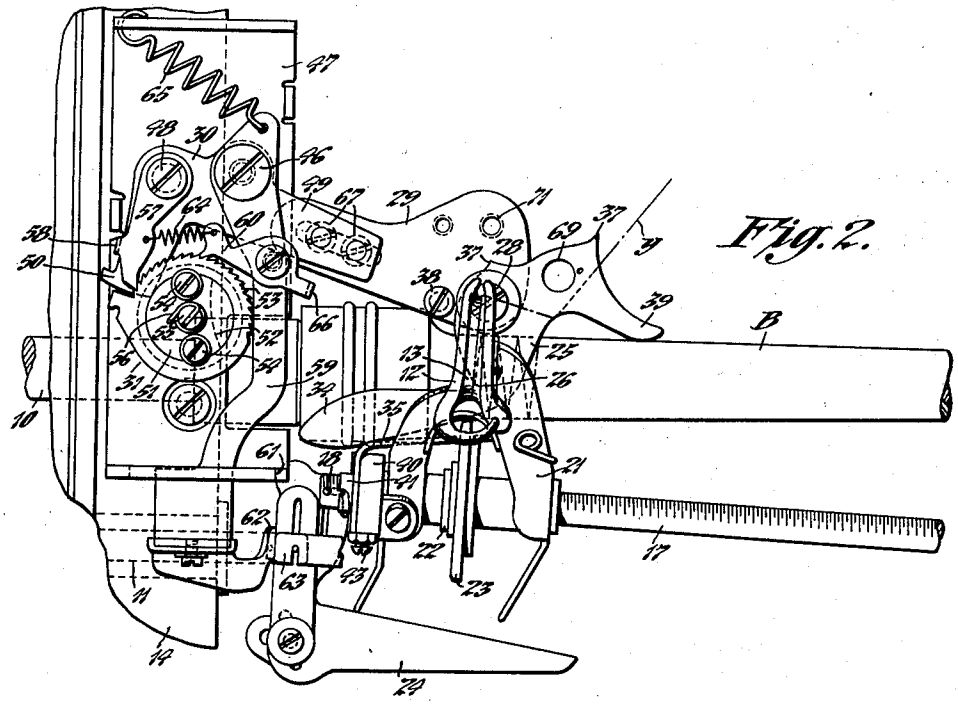

Fig. 2.

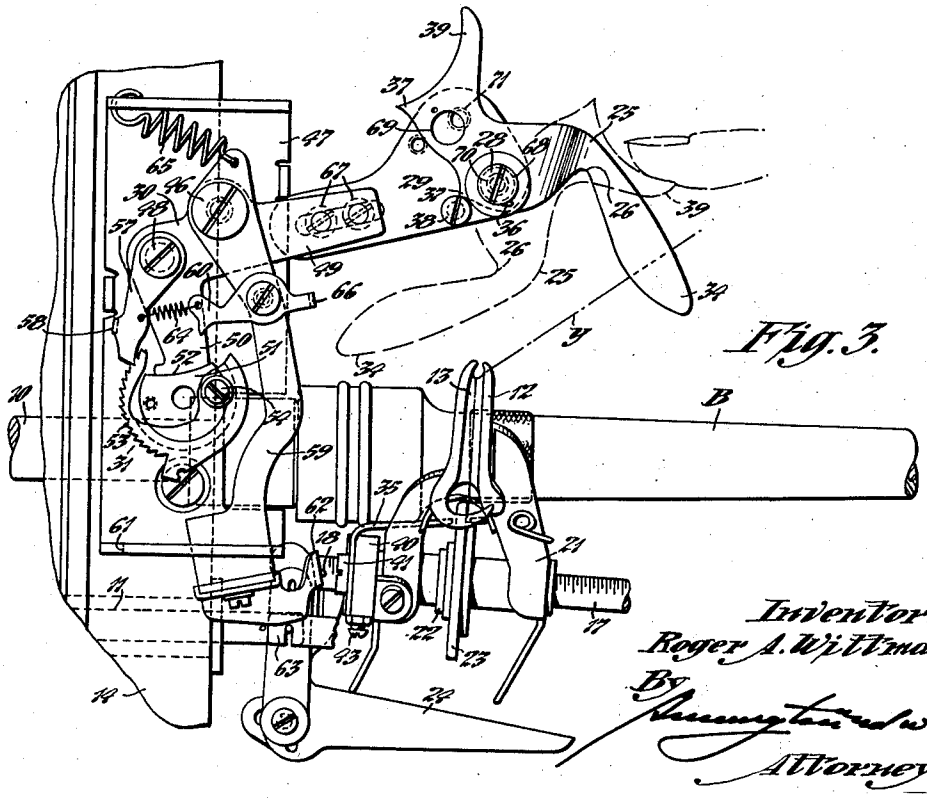

Fig. 3.

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BUNCH BUILDER FOR WINDING AND LIKE MACHINES

Filed Aug. 21, 1935 3 Sheets-Sheet 3

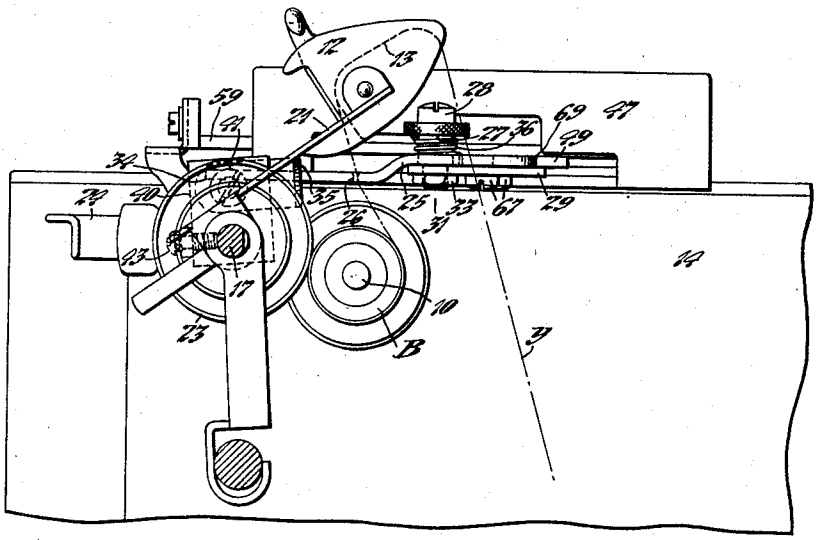

Fig. 4.

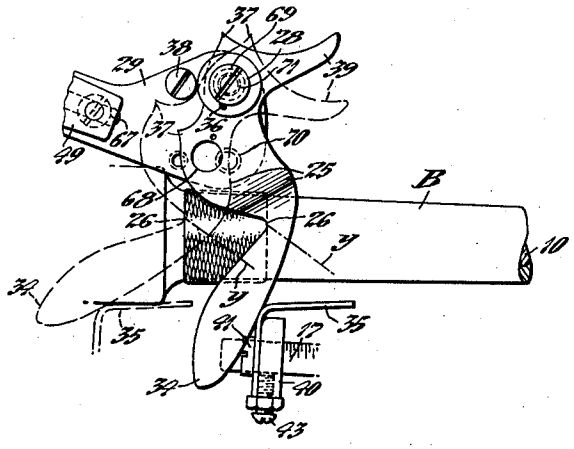

Fig. 5.

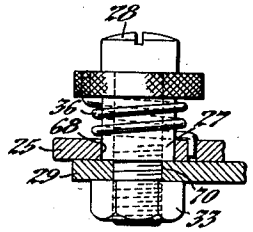

Fig. 6.

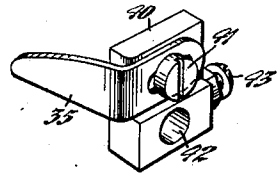

Fig. 7.

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Patented July 13, 1937

2,086,655

UNITED STATES PATENT OFFICE

2,086,655

BUNCH-BUILDER FOR WINDING AND LIKE MACHINES

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Application August 21, 1935, Serial No. 37,179

16 Claims. (Cl. 242—27)

This invention relates to improvements in winding machines and more particularly to a bunch-builder for initially forming a flat layer or bunch of yarn on a bobbin or other yarn-receiver.

One object of the present invention is to provide a bunch-builder for winding machines having means for positively controlling the disposition of the first coils of yarn wound on the receiver to form an extended flat bunch.

Another object of the present invention is to provide a bunch-builder of the type indicated which may be mounted independently of the usual traversing mechanism of the machine to be actuated thereby to initially traverse the yarn through a portion only of the full traverse.

Another object of the invention is to provide a bunch-builder of the type indicated which is automatically operable to traverse the yarn through a portion of the stroke of the thread-guide until the bunch is formed and then to release the yarn so that the thread-guide may traverse it to build the service winding.

Still another object of the invention is to provide a bunch-builder of the type indicated which is of simple construction; efficient for performing its intended function; and adjustable to vary the position of the bunch on the yarn-receiver, the amount of yarn in the bunch and the extent of the traverse of the yarn in the bunch.

Further objects of the improvement are set forth in the following specification which describes a preferred embodiment of the invention, by way of example, as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a plan view of the essential elements of a well-known type of winding machine illustrating the present improved bunch-builder as applied to use therewith with the auxiliary thread-guide shown in one extreme position;

Fig. 2 is a view similar to Fig. 1 showing the auxiliary thread-guide in its opposite extreme position;

Fig. 3 is a view similar to Figs. 1 and 2 showing the auxiliary thread-guide moved to its inoperative position to release the yarn after a bunch has been formed on the yarn-receiver;

Fig. 4 is an end view of the winding mechanism showing the relationship of the operating elements of the bunch-builder with respect thereto;

Fig. 5 is a detailed view of the auxiliary thread-guide showing its pivot adjusted to a different setting for forming a longer bunch than that shown in Fig. 3;

Fig. 6 is a detailed sectional view on line 6—6 of Fig. 1 showing the resilient means for urging the auxiliary thread-guide into position for engagement by the traversing mechanism; and

Fig. 7 is a detailed perspective view of the actuator for the auxiliary thread-guide shown in Fig. 5.

The present invention relates to improvements in the bunch-building mechanism disclosed in U. S. Letters Patent No. 1,915,194 issued June 20, 1933. With such mechanisms as heretofore used the yarn is not positively guided during the bunch-winding and as a result the coils are wound in more or less haphazard manner so that the yarn will not draw off freely from the bobbin when delivering from the shuttle. In the present improved device the yarn is controlled during the bunch-winding by an oscillating arm constituting an auxiliary thread-guide for engaging and traversing the yarn, the arm being pivotally mounted at one end on the bell-crank lever of the follow-up mechanism disclosed in the patent referred to above. The arm extends across the winding-spindle and is oscillated about its pivot by the engagement of its free end with the usual reciprocating mechanism provided for traversing the yarn to build the service winding. Due to the position of the thread-guiding means between the pivoted end and the actuated end of the arm, the yarn is traversed through a portion only of the stroke of the traversing means to form a flat bunch in which the coils are laid in regular order in overlying relationship.

Fig. 1 of the drawings illustrates the general organization of mechanism disclosed in the prior patent above referred to, including a rotating winding-spindle 10 and a reciprocating traverse-bar 11. The traverse-bar 11 is arranged opposite the spindle 10 and carries the usual service winding thread-guide 12 which is provided with a strand-guiding groove 13. Besides its reciprocating movement with the bar 11 the guide 12 is also fed progressively outward therealong to cause it to lay the yarn in superimposed conical layers advancing progressively along the spindle to build the cop or bobbin in the usual manner by longitudinal extension of the yarn mass. The winding-spindle 10 is journaled in bearings in the main frame 14 of the machine and is driven through suitable instrumentalities not herein shown or described.

A portion of the spindle 10 overhangs the front of the frame 14 and may be adapted to mount a wooden bobbin B or any other form of yarn-receiver. The traverse-bar 11 is mounted to slide in bearings in the frame 14, being reciprocated

from a rocker-arm or other suitable mechanism not herein shown or described. The traverse-bar 11 is preferably constructed in two parts, a main section and a theaded section 17 connected at their adjacent ends by a pin-and-slot coupling shown at 18. The outer end of the threaded section 17 of the traverse-bar 11 is mounted in a swiveled outboard bearing 19 which allows the inner end of the bar to swing inwardly toward the winding-spindle 10.

The thread-guide 12 is carried at the end of an arm or guide-holder 21 which is hinged to the threaded section 17 of the bar 11 and adapted to slide thereon. Mounted between the legs of the thread-guide holder 21 is a nut 22 engaging the threads of the section 17 of the bar 11 to feed the guide 12 along the bar as the nut is turned thereon. A contact-wheel 23 on the nut 22 is adapted to engage the surface of the winding to turn the nut to advance the guide 12 with respect to the bobbin B. The swiveled arrangement of the threaded section 17 of the bar 11 allows the wheel 23 to be pressed toward the winding-spindle 10 to adapt it to engage the first layers of yarn wound on the bare bobbin B and these elements operate in connection with a former 24 to build up a conical mass of yarn on the bobbin at the start of the winding in a manner common to machines of the present type.

The present improved bunch-building device comprises an auxiliary thread-guide in the form of an elbow-shaped arm 25 provided with a yarn-guiding notch 26 on one side intermediate its ends. As shown in detail in Fig. 6, the arm 25 is pivotally mounted at one end on a flanged sleeve 27 embracing a screw 28 secured in a member 29. The member 29 is attached to and constitutes an extension of one leg of a bell-crank lever 30 forming a part of the follow-up mechanism 31 of the bunch-builder of the prior patent before referred to. The sleeve 27 is rigidly fixed to the member 29 by the screw 28 which is secured in place by a nut 33 set up against the under side of the member. The pivot for the arm 25 is thus located on the opposite side of the spindle 10 from the traverse-bar 11 and the arm extends across the spindle and has its free end rounded to form a toe 34 positioned in the path of the reciprocating traverse-bar 11.

The arm 25 is oscillated about its pivot by the engagement of its toe 34 with a reciprocating bunter-element 35 carried on the threaded section 17 of the traverse-bar 11. A helical spring 36 surrounds the pivot-sleeve 27 with one end fastened to the arm 25 and its opposite end held in a hole in the flange on the sleeve 27. The spring 36 functions to resiliently retain the arm 25 bearing against the upper face of the member 29 while tending to swing the arm on its pivot in a counterclockwise direction as viewed in Figs. 1, 2, 3 and 5. The arm 25 is provided with a pair of detent projections 37 for engagement with a stop-pin 38 extending upwardly from the member 29 on the lever 30 to limit the swinging movement of the arm under the force of the spring 36. A curved finger-piece 39 on the arm 25 provides for manually resetting the auxiliary guide in the manner as later explained.

As shown in detail in Figs. 5 and 7, the bunter-element 35 is constituted as an elbow-shaped strip of sheet-metal fastened to a block 40 by a screw 41 and having a tapered finger-portion extending at a slight angle to the side of the block. The block 40 has an aperture 42 for mounting it on the threaded section 17 of the traverse-bar 11, to which it is fixedly attached adjacent the inward end thereof by a set-screw 43. As the traverse-bar 11 reciprocates from the position shown in Fig. 1 to that shown in Fig. 2 the rounded elbow portion of the bunter-element 35 engages the side edge of the toe 34 of the arm 25 to rock the latter about its pivot 28.

Besides serving as a bunter for actuating the arm 25 the element 35 also functions for another purpose, that is, to elevate the thread-guide 12 to a position where it will clear the arm 25 at each rearward stroke during the early stages of the winding operation. To provide this clearance for the arm 25 between the thread-guide 12 and the bobbin or yarn-receiver B the extended end of the bunter-element 35 is tapered to cause it to engage the under side of the guide-holder 21 to rock it upwardly on the threaded section 17 of the traverse-bar when the guide is moved back into the position shown in Figs. 1 to 3 at the start of the winding operation. In this manner the arm 25, which constitutes the auxiliary thread-guide, is free to swing between the service winding thread-guide 12 and the bobbin B to positively engage and control the yarn to lay the coils in regular order. After the bunch has been formed the arm 25 is automatically shifted to an inoperative position as shown in Fig. 3 by the follow-up mechanism illustrated in the patent above referred to.

The follow-up mechanism 31 is enclosed in a casing 47 having a stud 48 fixed in its base. The lever 30 is pivotally mounted on the stud 48 with its longer leg 49 extending outwardly through an opening in the side of the casing. The opposite leg 50 of the bell-crank lever 30 extends at an angle to the leg 49 with its end normally engaging the periphery of a cylindrical cam 51 having a recessed portion or slot 52 through which the end of the leg 50 may pass to permit the lever to swing on its pivot 48. A ratchet 53 is adjustably fixed to the cam 51 by screws 54 and the cam-and-ratchet assembly are rotatably mounted on a stud 55 fixed in the casing 47. The assembly is resiliently urged to rotate in a clockwise direction, as viewed in Figs. 1 to 3 and 5, by means of a helical spring 56 which surrounds the stud 55 with one end secured thereto and the other end attached to the cam 51. A check-pawl 57, pivotally mounted on the pivot-stud 48 for the bell-crank lever 30, engages the teeth of the ratchet 53 to prevent retrogressive movement thereof; the pawl being provided with a stop-finger 58 for engagement by the lever 30 upon pivotal movement of the latter in a clockwise direction whereby to disengage the pawl from the ratchet.

An actuating lever 59 is pivotally mounted at 46 on the leg 49 of the bell-crank lever 30 and carries a pivoted pawl 60 for engagement with the teeth of the ratchet 53 to rotate the cam 51. The actuating lever 59 extends through a slot 61 in the end of the casing 47, the confines of which limit its movement, and the lever has a finger 62 at its end positioned in the path of a second bunter-element 63 carried by the traverse-bar 11. As the traverse-bar 11 reciprocates, the actuating lever 59 is engaged by the bunter-element 63 toward the end of its stroke whereby to oscillate the pawl 60 to rotate the cam 51 through the space of one tooth on the ratchet 53; the two pawls 57 and 60 being held in engagement with the teeth of the ratchet by a connecting spring 64. When the cam 51 has been moved to a position where its recessed or slotted portion 52 is in alinement with the end of the leg

50 of the bell-crank lever 30 the latter is swung on its pivot 48 to the position shown in Fig. 3 under the tension of a spring 65 extending between the end of the actuating lever 59 and the casing 47. The pawl 60 is also provided with a stop-finger 66 for the same purpose as the stop-finger 58 on the check-pawl 57, the two stop-fingers being so arranged as to be simultaneously engaged by the edges of the legs 49 and 50 of the bell-crank lever 30 to rock the pawls to release them from the ratchet 53.

The mechanism may be adjusted to regulate the length of the yarn wound into the bunch by varying the rotative position of the cam 51 with respect to the ratchet 53. By positioning the slot 52 on the cam 51 remotely with respect to the point at which the leg 50 of the bell-crank lever 30 initially engages the cylindrical portion of the cam, the number of strokes of the traverse-bar 11 necessary for releasing the bell-crank lever is increased to delay the release of the yarn from the auxiliary thread-guide arm 25. The member 29 on which the auxiliary thread-guide arm 25 is mounted and the leg 49 of the lever 30 have overlapping slotted portions which are held together by screws 67 to provide for adjusting the length of the leg which, in turn, regulates the position of the bunch on the bobbin or cop-tube B. The width of the flat bunch formed by the auxiliary thread-guide 25 may be varied by adjusting the pivotal mounting of the arm 25. To this end the arm 25 is provided with a plurality of differently located apertures 68 and 69 and the extension 29 of the bell-crank lever 30 also has differently located apertures 70 and 71 for receiving the pivot-stud 28 so that by varying the position of the pivot the effective length of the arm and thereby the extent of traverse of the yarn by the auxiliary thread-guide is varied. Fig. 5 illustrates the stud 28 as secured in the threaded aperture 71 in the member 29 with the stud and sleeve 27 passing through the aperture 69 in the arm 25. With this last-described adjustment of the pivot 28 the yarn *y* will be guided in the notch 26 of the arm with an increased extent of traverse to form a relatively wide bunch as indicated in Fig. 5. Having now described the bunch-building mechanism in detail its mode of operation will be next explained.

Let it be assumed that the bell-crank lever 30, arm 25, and service winding thread-guide assembly are disposed in the position shown in Fig. 3 and a bobbin B has been placed on the winding-spindle 10. In this relationship of the parts the thread-guide 12 is held elevated above the bobbin B by the engagement of the tapered arm or extension of the bunter-element 35 with the under side of the guide-holder 21 as shown most clearly in Fig. 4. The yarn *y* is led upwardly from its source of supply through the groove 13 in the thread-guide 12 and its end attached to the bobbin. The operator then presses on the finger-piece 39 of the arm 25 in the manner indicated by dot-and-dash lines in Fig. 3 to swing the arm forwardly while at the same time rocking the bell-crank lever 30 on its pivot 48. The tension of the springs 36 and 65 is so proportioned that the lever 30 and arm 25 will move in a path to cause the yarn *y* to be caught in the notch 26 of the arm whereby it will be initially guided onto the bobbin thereby. During the movement of the bell-crank lever 30 the stop-fingers 58 and 66 on the pawls 57 and 60 are engaged thereby to rock the pawls to release them from the ratchet 53. The cam 51 and ratchet 53 will then be automatically moved to the initial starting position indicated in Fig. 1 by the helical spring 56. When the finger-piece 39 is released the spring 65 rocks the bell-crank lever 30 until the end of its leg 50 engages the cylindrical portion of the cam 51, whereupon the pawls 57 and 60 are released to engage the ratchet 53. The spring 36 then acts to resiliently hold the arm 25 with its toe 34 engaging the bunter-element 35 on the traverse-bar 11.

The spindle 10 is rotated by suitable driving mechanism, not herein shown, and the yarn is drawn from its source of supply through the thread-guide 12 and notch 26 in the arm 25 to be wound onto the bobbin or cop-tube B. As the spindle 10 rotates, the traverse-bar 11 is reciprocated and due to the engagement of the bunter-element 35 with the toe 34 of the auxiliary thread-guide arm 25 the latter is oscillated on its pivot 28 in synchronism with the traverse-bar. However, due to the position of the guiding notch 26 intermediate the ends of the oscillating arm 25 the yarn will be traversed to an extent less than the stroke of the main thread-guide 12, the length of this traverse being dependent upon the setting of the pivot-stud 28 for the arm.

At the end of each rearward stroke of the traverse-bar 11 the finger 62 on the actuating lever 59 is engaged by the bunter-element 63 on the bar to actuate the pawl 60 to rotate the ratchet 53 and thereby the cam 51. The traversing of the yarn to form the bunch continues until the cam 51 has been stepped around to a position where its slot 52 is in alinement with the end of the leg 50 of the bell-crank lever 30. At this juncture the bell-crank lever 30 is released and swung by the spring 65 to its inoperative position shown in full lines in Fig. 3. This movement of the lever 30 carries the auxiliary thread-guide arm 25 rearwardly to release the yarn *y* from its notch 26 and thereafter the yarn is controlled by the thread-guide 12 to be traversed to the full extent to build the service winding of the bobbin. The bell-crank lever 30 and the arm 25 carried thereby are held in their inoperative position by the spring 65 until the service winding has been completed, whereafter the bobbin is doffed and a new yarn-receiver placed on the spindle 10. The bell-crank lever 30 and auxiliary thread-guide arm 25 are then moved to their operative position shown in Fig. 1 in the manner as previously explained and the thread-guide 12 returned to its first position to commence another winding operation.

From the foregoing description it will be observed that the present invention provides a relatively simple construction of bunch-builder adapted for application to standard types of winding machines. It will also be apparent that the auxiliary thread-guide of the present improved device operates to positively control the yarn to traverse it with a short stroke to lay the coils in regular order in the bunch whereof to insure a free withdrawal of the yarn from the bobbin.

While the improved device is herein described and illustrated as embodied in a preferred form of construction, the structure and arrangement of its parts are susceptible of modification without departing from the spirit or scope of the invention. Therefore, without limiting myself in this respect, I claim:

1. In a winding machine, means for traversing yarn on a bobbin to build the service winding, an

auxiliary thread-guide mounted independently of the traversing means and bodily movable into and out of engagement therewith, and means on the traversing means directly engaging the auxiliary thread-guide to actuate the latter to initially traverse the yarn with a restricted traverse to form a bunch on the bobbin.

2. In a winding machine, reciprocating means including a thread-guide for traversing yarn on a bobbin to build the service winding, and an auxiliary thread-guide mounted independently of the reciprocating means and bodily movable toward and away from the reciprocating means, said auxiliary thread-guide being actuated by direct engagement with the reciprocating means and so constructed and arranged as to initially traverse the yarn to a lesser extent than by the service-winding thread guide to form a bunch on the bobbin.

3. In a winding machine, a reciprocable thread-guide, means for reciprocating said thread-guide, and an auxiliary thread-guide pivotally mounted independently of the first thread-guide and extending into the path of movement of the reciprocating means, said auxiliary thread-guide being actuated by direct-engagement with the reciprocating means for the first thread-guide to traverse the yarn through a portion only of the stroke of the first thread-guide.

4. In a winding machine, reciprocating means including a thread-guide for traversing yarn to build the service winding on a bobbin, and an oscillating auxiliary thread-guide for forming a bunch during the initial stages of the winding, said bunch-building thread-guide being mounted independently of the service winding thread-guide and extending into the path of movement of the reciprocating means to adapt it to be oscillated by direct engagement with the reciprocating means and so constructed and arranged as to traverse the yarn through a part only of the stroke of said service winding thread-guide.

5. In a winding machine, reciprocating means including a thread-guide for traversing yarn to build the service winding on a bobbin, a member pivoted at one end and adapted to be oscillated by direct engagement of its opposite end with the reciprocating means during the initial stages of the winding, and means intermediate the ends of said member for guiding the yarn to traverse it to an extent less than the full stroke of the reciprocating means to form a bunch.

6. In a winding machine, means for traversing yarn to build the service winding on a bobbin, an arm pivotally mounted at one end for oscillatory movement and actuated by direct engagement of its opposite end with the traversing means, and a notch formed on one side of the arm between its ends for guiding the yarn to traverse it to an extent less than the full stroke of the traversing means to form a bunch.

7. In a winding machine, a reciprocating means including a thread-guide for traversing yarn to build the service winding on a bobbin, said thread-guide being adapted to normally contact with the yarn mass being wound on the bobbin, means for holding the thread-guide in spaced relation to the bobbin during the initial stages of the winding, an arm pivotally mounted for oscillatory movement between the thread-guide and bobbin, said arm being actuated by direct engagement with the reciprocating means for the thread-guide, and thread-guiding means on the arm for traversing the yarn to build a bunch.

8. In a winding machine, a spindle, means for traversing yarn longitudinally of the spindle to build a service winding on a bobbin, an arm pivotally mounted on the opposite side of the spindle from the traversing means and extending across the spindle, said yarn-traversing means being so constructed and arranged as to oscillate the arm on its pivot, thread-guiding means on the arm for traversing the yarn through a portion only of the stroke of the traversing means during the initial stages of the winding, and means for resiliently urging the arm into position to be engaged by the traversing means.

9. In a winding machine, reciprocating means including a thread-guide for traversing yarn to build the service winding on a bobbin, an arm pivotally mounted on the opposite side of the bobbin from the reciprocating means and extending across the bobbin, said arm being oscillated by direct engagement with the reciprocating means, thread-guiding means on the arm intermediate its ends for traversing the yarn through a portion only of the stroke of the reciprocating means, and means for adjusting the position of the pivotal mounting of the arm to vary the length of the traversing stroke of its thread-guiding means.

10. In a winding machine, reciprocating means including a thread-guide for traversing yarn on a bobbin to build the service winding, an auxiliary thread-guide pivotally mounted independently of the service winding thread-guide and extending into the path of movement of the reciprocating means, said auxiliary thread-guide being actuated by direct engagement with the reciprocating means and so constructed and arranged as to traverse the yarn with a restricted traverse to wind a bunch, and means for shifting the auxiliary thread-guide to inoperative position after the bunch has been formed.

11. In a winding machine, reciprocating means including a thread-guide for traversing yarn on a bobbin to build the service winding, an auxiliary thread-guide pivoted at one end and extending into the path of movement of the reciprocating means, said auxiliary thread-guide being oscillated by direct engagement with the reciprocating means and so constructed and arranged as to traverse the yarn through a portion only of the stroke of the latter to initially build a bunch, and means actuated by the reciprocating means to move the auxiliary thread-guide to inoperative position after the bunch has been formed.

12. In a winding machine, reciprocating means including a thread-guide for traversing yarn on a bobbin to build the service winding, an auxiliary thread-guide bodily movable toward and away from the bobbin and extending into the path of movement of the reciprocating means when moved toward the bobbin, said auxiliary thread-guide being actuated by direct engagement with the reciprocating means and so constructed and arranged as to wind a bunch of less traverse than that of the service winding, and means actuated by the traversing means and responsive after a predetermined number of strokes thereof to bodily shift the auxiliary thread-guide into inoperative position.

13. In a winding machine, means for traversing yarn to build the service winding on a bobbin, a lever, an arm pivotally mounted on the lever and engageable by the traversing means, thread-guiding means on the arm between its pivot and the portion of the arm engageable by the traversing means for traversing the yarn

through a portion only of the stroke of the traversing means to form a bunch, means actuated by the traversing means to release the lever after the bunch has been formed, and means for moving the lever and arm to inoperative position upon release of the lever.

14. In a winding machine, reciprocating means including a thread-guide for building the service winding on a bobbin, a support held stationary relatively of the reciprocating means, an arm pivotally mounted on said support, said arm extending into the path of movement of the reciprocating means and adapted to be oscillated by direct engagement therewith, and means on the arm between its pivot and the portion engaged by the reciprocating means to initially traverse the yarn with a restricted traverse to form a bunch on the bobbin.

15. In a winding machine, reciprocating means including a thread-guide for building the service winding on a bobbin, a support held stationary relatively of the reciprocating means, an arm pivotally mounted on said support, said arm extending into the path of movement of the reciprocating means to adapt it to be oscillated by direct engagement therewith, a spring for yieldingly holding the arm in engagement with the reciprocating means, and means on the arm between its pivot and the portion engaged by the reciprocating means to initially traverse the yarn with a restricted traverse to form a bunch.

16. In a winding machine, reciprocating means including a thread-guide for building the service winding on a bobbin, a support movable toward and away from the reciprocating means, an arm pivotally mounted on the support, said arm extending into the path of movement of the reciprocating means to adapt it to be oscillated by direct engagement therewith when the support is adjacent thereto, means on the arm intermediate its pivot and the portion engaged by the reciprocating means to initially traverse the yarn with a restricted traverse to form a bunch on a bobbin, and means actuated by the reciprocating means after a predetermined number of strokes thereof to move the support away from the reciprocating means and to thereby bodily move the arm out of engagement with the reciprocating means.

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