Oct. 29, 1957 H. L. MUSCHAMP ET AL 2,811,318

BUNCH BUILDER FOR WINDING MACHINES

Filed June 15, 1954 7 Sheets-Sheet 1

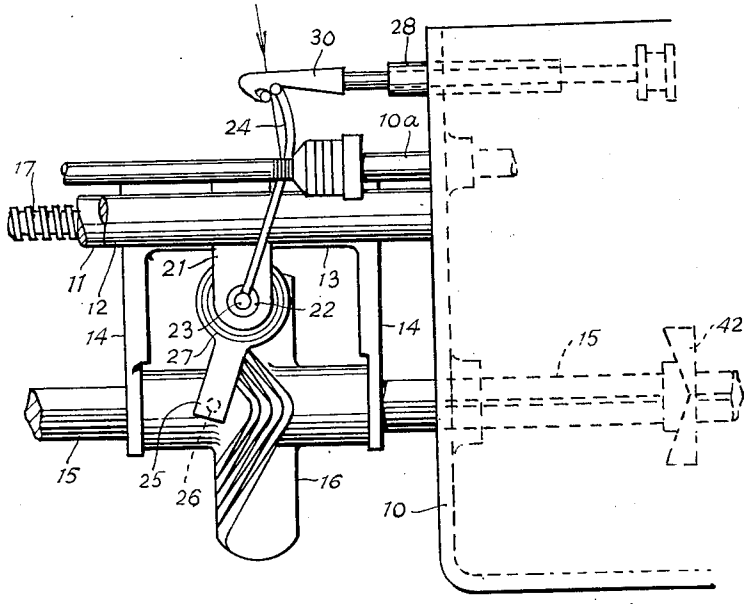


FIG. 1

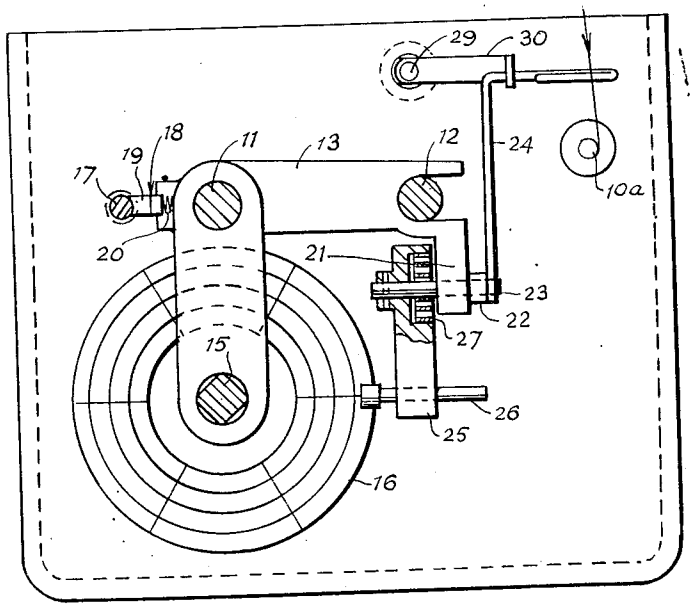


FIG. 2

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BUNCH BUILDER FOR WINDING MACHINES

Filed June 15, 1954 7 Sheets-Sheet 2

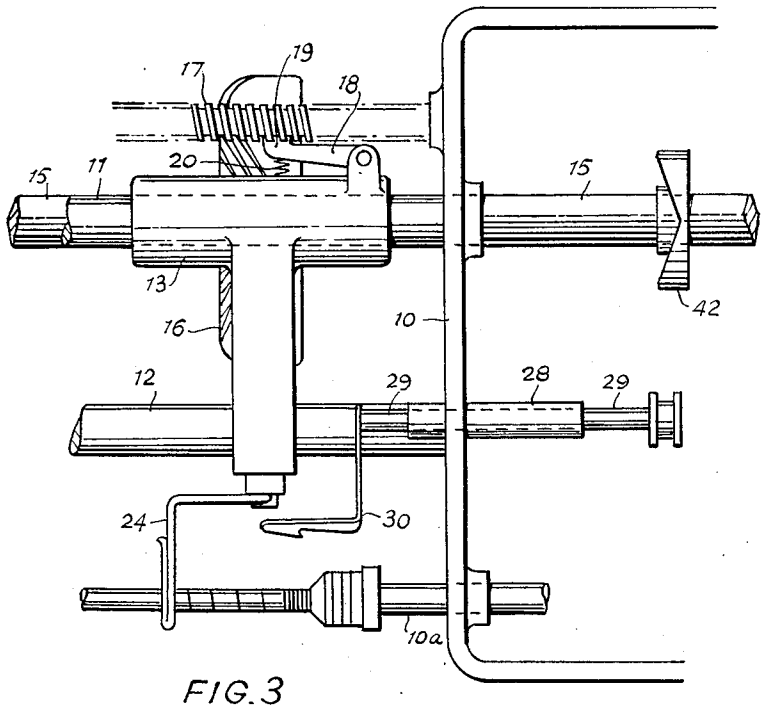


FIG. 3

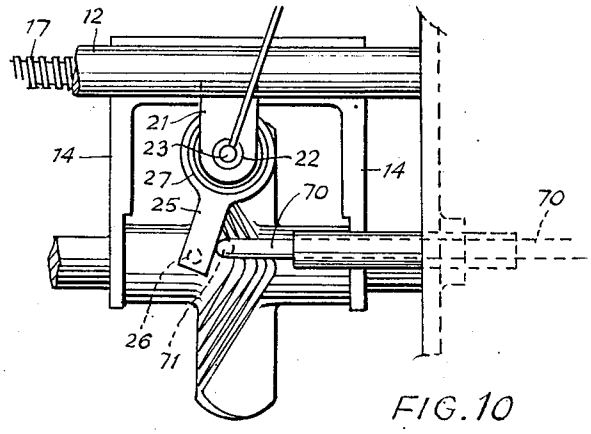


FIG. 10

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BUNCH BUILDER FOR WINDING MACHINES

Filed June 15, 1954 7 Sheets-Sheet 3

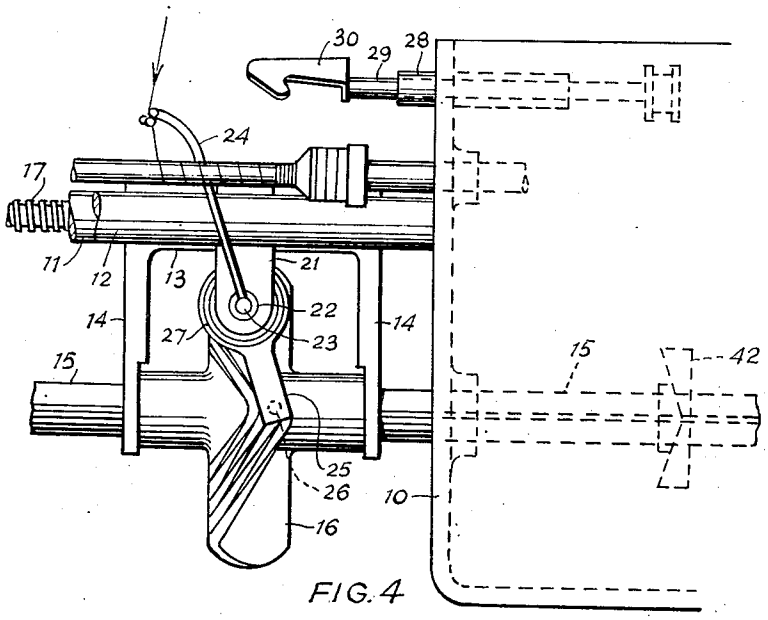


FIG. 4

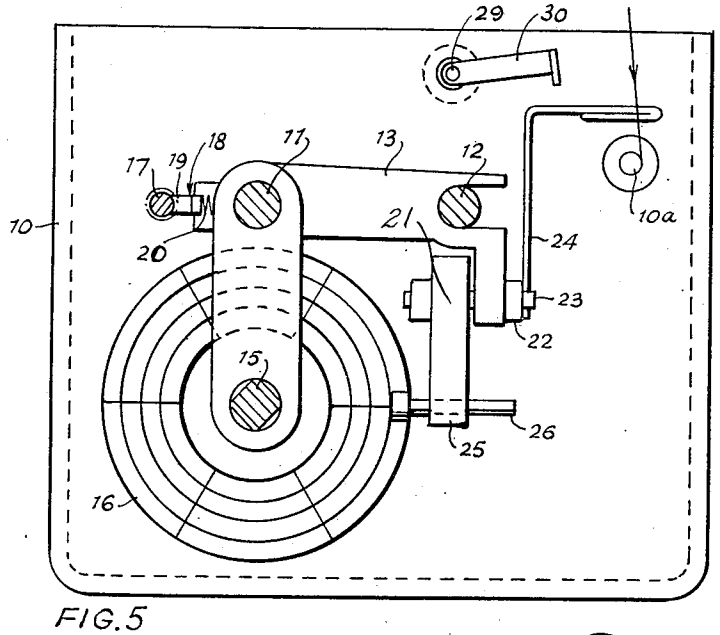


FIG. 5

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BUNCH BUILDER FOR WINDING MACHINES

Filed June 15, 1954 7 Sheets-Sheet 4

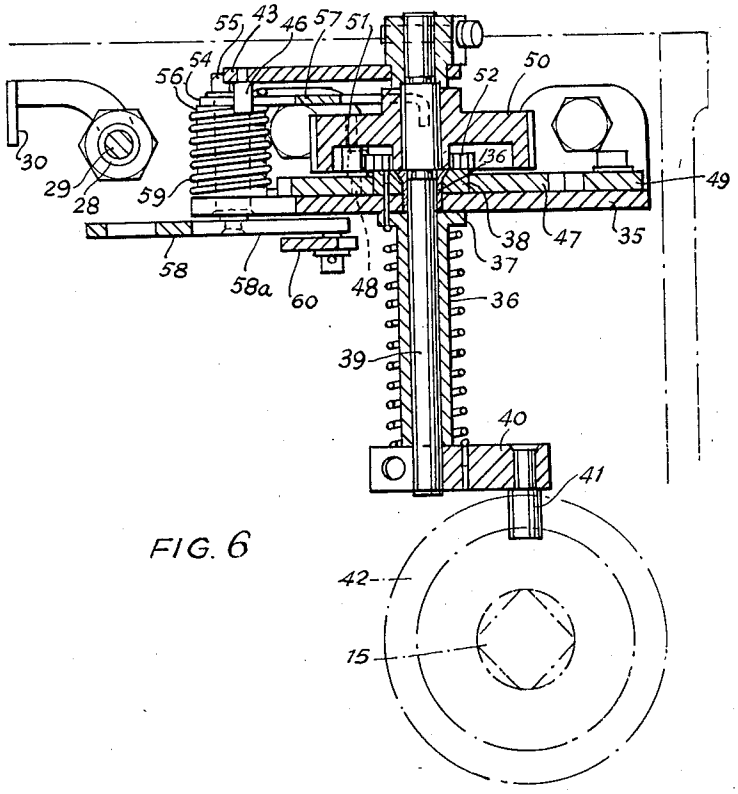


FIG. 6

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Oct. 29, 1957 H. L. MUSCHAMP ET AL 2,811,318

BUNCH BUILDER FOR WINDING MACHINES

Filed June 15, 1954 7 Sheets-Sheet 5

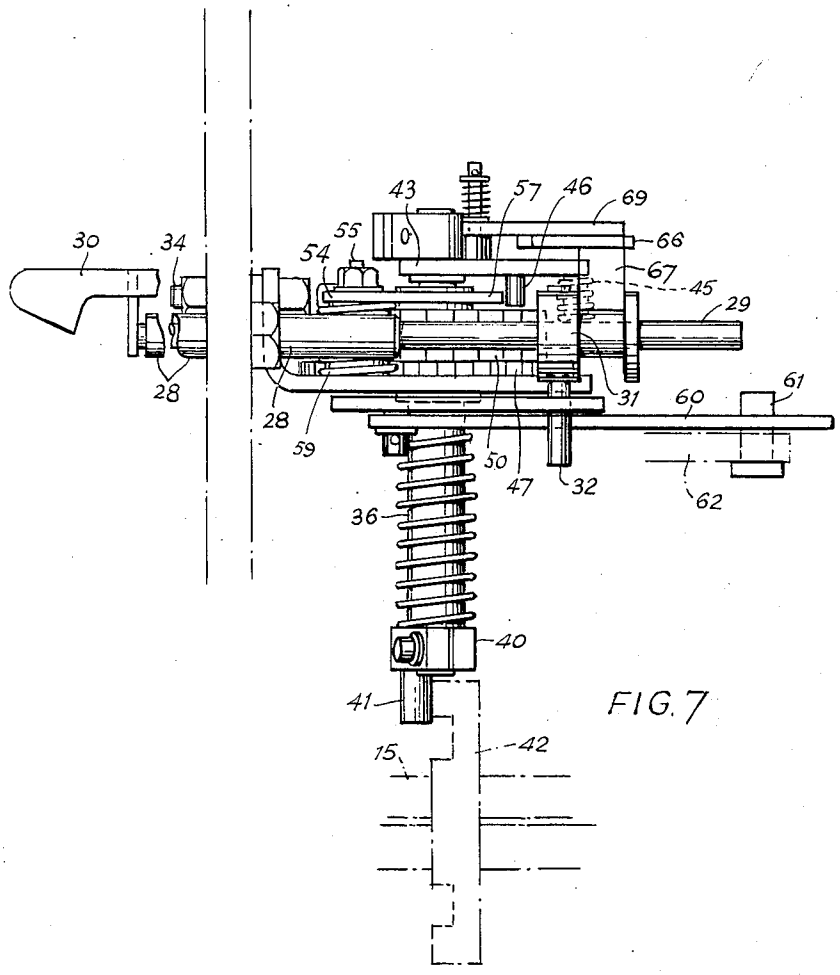


FIG. 7

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BUNCH BUILDER FOR WINDING MACHINES

Filed June 15, 1954 7 Sheets-Sheet 6

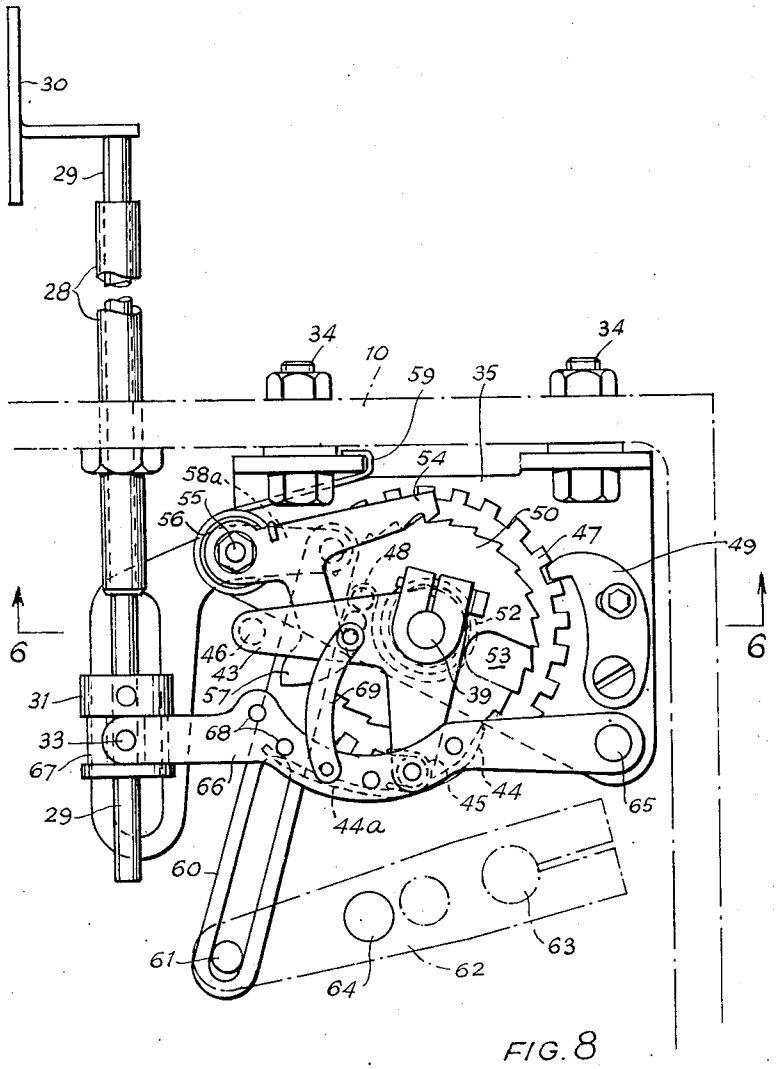


FIG. 8

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Oct. 29, 1957 H. L. MUSCHAMP ET AL 2,811,318

BUNCH BUILDER FOR WINDING MACHINES

Filed June 15, 1954 7 Sheets-Sheet 7

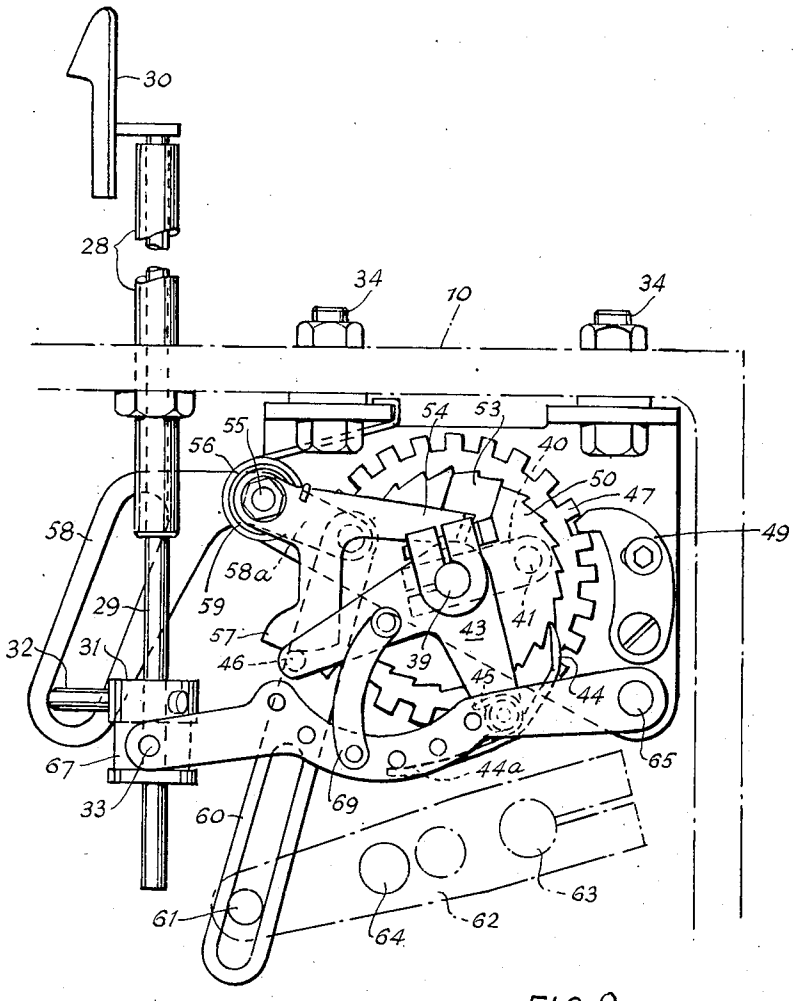


FIG. 9

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2,811,318

BUNCH BUILDER FOR WINDING MACHINES

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Application June 15, 1954, Serial No. 436,918

6 Claims. (Cl. 242—27.1)

This application is a continuation-in-part of the parent application Serial No. 199,411, filed December 6, 1950, now Patent No. 2,701,108, issued February 1, 1955.

This invention relates to yarn guides for pirn winders and is particularly, though not exculsively, applicable to automatic pirn winders in which a so-called "automaton" is set going on the completion of each pirn and takes control of the sequence of operations including principally to stop the winding, to doff the full pirn from the winding station, to don an empty bobbin thereat, to restart the winding and to stop until it is again set going or "triggered off" when the winding of the new pirn has reached completion.

As is well known, the yarn guide of a pirn winder has an oscillating motion or traverse superimposed on a progressive advance, so that the pirn winding is built up of a plurality of superimposed conical layers. In addition to this there is usually superimposed on the progressive advance mechanism an initial control which increases the rate of advance so as to give the base of the pirn winding a suitable conical shape.

It is also well known in the winding of a pirn to build a small bunch, or short group of turns of yarn, at the start of the wind, the guide being given a few traverses of short amplitude before the normal winding traverse is commenced. Where the advance and oscillation movements of the yarn guide are obtained from within the windinghead, e. g. by means of a feed screw which is rotated by gearing to provide the advance as well as oscillated by cam means to provide the traverse, both gearing and cam means being within the headstock, it is practical under the control of the automaton, to start with a short oscillation of the feed screw as is required for "bunch" building and then to change to the normal winding traverse.

However, in another known type of pirn winding the yarn guide is pivotally mounted on a carriage and oscillated by means, such as a cam, mounted on the carriage and driven by a rotating shaft from the headstock the carriage being advanced by feed screw and nut or rack and worm with or without feeler control arranged to control the advance by contact of a feeler with the pirn winding. One major advantage of such arrangement is that the mass of the oscillating or reciprocating parts can be much less than where such motion is obtained from the headstock, but hitherto it has not been possible to impart "bunch building" movement to the yarn guide at the commencement of winding of each pirn.

One object of the present invention is to provide in combination yarn guide traverse motion in which the yarn guide is oscillatably mounted on a carriage and the oscillating movement for the traverse of the wind is derived from oscillating mechanism mounted on the carriage, and means for imparting to said yarn guide a bunch building motion.

Another object of the present invention is a yarn guide traverse mechanism, applicable to a fully automatic pirn winder and having a simple and practical construction and arrangement of parts.

Other objects of the invention will be readily appreciable from the following description of a practical embodiment of the invention.

According to the invention, yarn guide mechanism for a pirn winder comprises a carriage, a yarn guide pivotally mounted on the carriage, reciprocation-imparting means mounted on the carriage for reciprocating the yarn guide to provide a normal traverse therefor and further reciprocation-imparting means operably associable with the yarn guide adapted to over-ride the normal traverse reciprocation and to impart a "bunch building" reciprocation for the commencement of winding of a iprn.

According to the invention as applied to a fully automatic pirn winder having operation sequence control mechanism comprises in combination a yarn guide carriage having means for advancing the same progressively, a reciprocable yarn guide mounted on the carriage, reciprocation-imparting mechanism on the carriage operably associated with the yarn guide for imparting reciprocation thereto to provide a normal traverse for the wind and means for imparting bunch building traverse to the yarn guide over-riding the normal traverse aforesaid comprising further reciprocation-imparting mechanism operably associable with the yarn guide and means operably associated with the said operation sequence control mechanism of the pirn winder for engaging and disengaging said further reciprocation-imparting mechanism for bunch building at the commencement of winding of each pirn.

In the mechanism aforesaid, the means for imparting bunch building reciprocation to the yarn guide may comprise a hook engageable with the yarn guide, mechanism for moving the hook in one dimension to bring the same into or out of engagement with the yarn guide, further mechanism for reciprocating the hook to impart a bunch building traverse to the yarn guide and means operably associating the operation sequence control mechanism with the mechanism for engaging and disengaging the hook; or said means may comprise a hook-ended lever the hook of which is adapted to be engaged with the yarn guide, a pivot rod mounted in a guide in the machine and fixed to the lever, cam means for reciprocating the said pivot rod in such manner as to impart bunch building reciprocation to the yarn guide and means operably associated with the sequence control mechanism and connected to the other end of the lever for tilting the lever to bring the hook into or out of engagement with the yarn guide.

In the accompanying drawings:

Figure 1 is a side elevation;

Figure 2 is a front elevation, and

Figure 3 is a plan showing one example of a yarn guide advance feed and traverse mechanism of a conventional type but with a bunch builder device in the form of a hook which in Figs. 1 and 2 is depicted engaged with the wire guide;

Figures 4 and 5 are views similar to Figs. 1 and 2 showing the bunch-building hook in its normal or inoperative position disengaged from the yarn guide;

Figure 6 is a fragmentary rear elevation from within the headstock showing the essential mechanism controlling the movements of the bunch building hook;

Figure 7 is a side elevation of Fig. 9;

Figures 8 and 9 are complementary plans of the mechanism shown in Figs. 6 and 7 with the bunch builder in its working and non-working positions respectively;

Figure 10 is a modification.

As shown in Figs. 1 to 5, extending from the headstock casing **10** for the winding spindle **10***a* are guide rods **11** and **12** on which is slidably mounted a carriage **13**. De-

pending from the carriage below the rod 11 are a pair of lugs 14 through which passes a cam shaft 15 driven from within the headstock casing in known manner. The shaft 15 is of square section and carries a wing cam 16 positioned between the arms 14 so as to be slidable on the shaft with the carriage while constrained to rotate with the shaft. Level with the guide 11 is a feed screw 17 arranged to be driven in known manner from within the headstock casing while pivotally mounted on the carriage 13 is an arm 18 having a half-nut head portion 19 adapted normally to be engaged with the feed screw under the action of a spring 20. At the other side of the carriage is a further depending lug 21 carrying a bushing 22 in which is pivotally mounted a spindle 23. At one end of the spindle is fixed a wire guide 24 while to the other end is pinned a depending arm 25 carrying a slidably adjustable cam follower 26. Within a housing in the arm 25 is a return spring 27, one end of which is attached to the arm and the other to the bushing 22. Above the guide rod 12 and projecting through a bushing 28 in the casing 10 is a rod 29 to which is attached a hook 30 adapted to be engaged with the yarn guide 24 as shown in Figs. 1 and 2, or by turning the rod 29 to be disengaged from the yarn guide as shown in Figs. 3 and 4. The hook 30 is arranged to impart bunch building motion to the yarn guide and is known as the bunch building hook. It is given an oscillating motion by mechanism within the casing arranged to impart an oscillating motion to the rod 29 and is positioned for engagement or disengagement by mechanism arranged to turn the rod 29 about its own axis.

As shown in Figs. 6 to 9 the shaft 29 extends within the casing 10 and on its inner end is a grooved collar 31 having a radially depending peg 32 fixed in one flange, the collar being adjustably secured to the shaft by a grub screw 33. Fixed by bolts 34 to the front wall of the casing 10 on its inner face is a plate-like bracket 35 to which is fixed a depending bearing bushing 36 having an upper flange 37 located against the underside of the bracket. The upper end of another bushing 136 passes through the bracket and through a collar 38 into which it is riveted over. Journalled in such bushing is a vertical rocker shaft 39 to the lower end of which is clamped a rocker arm 40 carrying a depending cam-follower stud 41 engaged with a cam 42 which is shown in chain line in Figs. 6 and 7 and Figs. 1 and 4, such cam being secured to the inner end of the wing cam driving shaft 15. The cam 42 has three ridges and three valleys synchronised with those of the wing cam 16 but of shallower form. The arm 40 and cam 42 are omitted from Figs. 8 and 9 to avoid confusion with the other parts shown therein.

Clamped to the upper end of the rocker shaft 39 is a bell crank lever 43 one arm of which carries a ratchet pawl 44 having a long tail 44*a* and return spring 45, while the other arm carries a depending stud 46. Lying on the upper face of the bracket and located over the collar 38 is a notched wheel 47 carrying an upstanding stop peg 48, the position of which stud may be adjusted and determined by a holding catch 49. Rotatably journaled on the upper end of the rocker shaft 39 is a ratchet wheel 50 complementary to the pawl 44, having a depending stud 51 adapted to engage the stud 48 as shown in Fig. 8. The ratchet wheel is urged by a spring 52 to rotate in a clockwise direction as seen in Fig. 8, such rotation being limited by the engagement of the said stud 51 with the stud 48. The ratchet wheel is formed with a facial notch 53 of half the thickness of the wheel, complementary to a holding pawl 54 secured to the upper end of a spindle 55 journaled in a bushing 56 fixed in the bracket 35. The pawl 54 has a cam shaped extension 57 complementary to the stud 46 while fixed to the lower end of the spindle 55 is a slotted arm 58, the slot of which is engaged by the depending peg 32. A coil spring 59 is located on the bushing 56 and is arranged to urge the arms 54 and 58 in a clockwise direction about the axis of the spindle 55. The arm 58 has an extension 58*a* to which is pivoted one end of a slotted link 60, in the slot of which is located a peg 61 of a resetting arm 62 which is clamped to a shaft 63, such shaft and arm forming a resetting lever for the bunch builder mechanism above described and being in fact part of the automaton which is not described or illustrated. Such lever also carries a trip stud 64 complementary to the cam tail 44*a*. Pivoted at 65 to the bracket 35 is a lever 66 which carries at its end a block 67 engaged with the groove of the collar 31 and in such lever are alternative holes 68 for the pivoted connection of one end of a link 69, the other end of which is connected to the bell crank lever 43.

In operation, during the winding operation proper, the carriage 13 is slowly advanced by the feed screw 17 away from the headstock casing 10, due to the engagement of the half-nut head 19 of the arm 18 with such feedscrew. At the same time, the yarn guide 24 is continuously reciprocated by the wing cam 16 through contact of the cam follower 26 with one of the annular cam-face steps. In this connection it is to be noted that at the ridges of the cam, all the ridges as seen on the left hand side of the cam in Figs. 1 or 4 are at the same level but are of progressively varying depth at the valleys and consequently the follower 26 may be set to engage one or other of the faces of the stepped cam to give different lengths of traverse to the yarn guide each position giving the same base and location for the guide. The wing cam 16 moves along the camshaft 15 with the carriage to maintain the traverse motion while the camshaft and feed screw are driven in known manner through suitable gearing within the headstock casing, such gearing not being described or illustrated as it forms no part of the invention and would only confuse the drawings. The drive for the winding spindle 10*a* is also not included for the same reason.

When the winding of the pirn has been completed, as may be determined in any known manner, the automaton, also in known manner, disengages the half nut from the feed screw for quick return of the carriage 13 to its starting position, declutches the drive to the winding spindle, camshaft and feed screw and moves the reset lever 62 clockwise as seen in Fig. 8 to reset the bunch builder, such lever being moved until the stud 61, by engaging the end of the slot in the link 60 lifts the holding pawl 54 out of the notch 53 and clear of the teeth of the ratchet wheel 50. This movement also swings the arm 58 anti-clockwise in Fig. 8 so that the depending peg 32 by engagement with the slot in such arm turns the shaft 29 causing the hook 30 to be lowered to its working position as shown in Figs. 1 and 2. At the same time, the trip stud 64 on the arm 62 engages the tail 44*a* of the pawl 44 to disengage the same from the teeth of the ratchet wheel and the ratchet wheel is then returned by its spring 52 until its depending stud 57 engages the upstanding stud 48 on the notched wheel 47. The automaton then proceeds through its normal cycle to remove the full pirn from the winding spindle 10*a* and replace it with a new empty pirn, trapping the yarn ready for starting the winding and severing the yarn below the new pirn finally to release the full one. The reset lever 62 is ultimately returned by the automaton to the normal position shown in Figs. 8 and 9 and when the automaton restarts the winding, the yarn guide 24 is held back by the hook 30 so that it receives the short reciprocating movement of such hook obtained from the cam 42 through the stud 41, vertical shaft 39, bell crank 43, link 69, lever 66 and collar 31, and not from the wing cam 16. The shaft 39 also oscillates the bell crank lever 43 which through the pawl 44 proceeds to turn the ratchet wheel 50 in a counter-clockwise direction, tooth by tooth, the holding pawl 54 as seen in Fig. 8 engaging the ratchet teeth and preventing return movement of the ratchet wheel 50 under the action of its spring 52. When the notch 53 is finally brought into register with the holding

pawl **54** such pawl drops into the notch to the position shown in Fig. 9, permitting the arm **58** also to move to the position shown in Fig. 9, turning the shaft **29** to lift the hook **30** into the disengaged position shown in Figs. 4 and 5. Simultaneously, reciprocation of the hook **30** is stopped by the cam **57** engaging below the stud **46** which holds the bell crank lever **43** in a position such that the cam follower stud **41** is just clear of the ridges of the cam **42**.

As shown in Fig. 10, instead of having a hook **30** to pull back the yarn guide, a shaft **70** is provided, instead of the shaft **29** and having a bent end **71** adapted directly to engage the end of the arm **25**. The shaft **70** is adapted to be reciprocated and turned by the same mechanism as described for the shaft **29** to position it in or out of the path of the arm **25** so that it can impose a "bunch building" reciprocation on the yarn guide in lieu of the normal traverse reciprocation from the cam **16**.

We claim:

1. Yarn guide mechanism for a pirn winder comprising a carriage, a yarn guide pivotally mounted on the carriage, reciprocation-imparting means mounted on the carriage for reciprocating the yarn guide to provide a normal traverse therefor and further reciprocation-imparting means engageable and disengageable with the yarn guide adapted when so engaged to over-ride the normal traverse reciprocation and to impart a "bunch building" reciprocation for the commencement of winding of a pirn.

2. Yarn guide mechanism for an automatic pirn winder having operation sequence control mechanism and comprising in combination a yarn guide carriage having means for advancing the same progressively, a reciprocable yarn guide mounted on the carriage, reciprocation imparting mechanism on the carriage engageable and disengageable with the yarn guide for imparting reciprocation thereto when so engaged to provide a normal traverse for the wind and means for imparting a bunch building traverse to the yarn guide over-riding the normal traverse aforesaid comprising further reciprocation-imparting mechanism engageable and disengageable with the yarn guide and means engageable and disengageable with the said operation sequence control mechanism of the pirn winder for engaging and disengaging said further reciprocation-imparting mechanism for bunch building at the commencement of winding of each pirn.

3. Yarn guide mechanism according to claim 2 wherein the means for imparting bunch building reciprocation to the yarn guide comprises a hook engageable with the yarn guide, mechanism for moving the hook in one dimension to bring the same into or out of engagement with the yarn guide, further mechanism for reciprocating the hook to impart a bunch building traverse to the yarn guide and means engageable and disengageable with the operation sequence control mechanism for moving the hook to engage with and disengage from the yarn guide.

4. Yarn guide mechanism according to claim 2 wherein the means for imparting bunch building reciprocation to the yarn guide comprises a hook-ended lever, the hook of which is adapted to be engaged with the yarn guide, a pivot rod mounted in a guide in the machine and fixed to the lever, cam means for reciprocating the said pivot rod in such manner as to impart bunch building reciprocation to the yarn guide and means, engageable and disengageable with the sequence control mechanism and connected to the other end of the lever for tilting the lever to bring the hook into or out of engagement with the yarn guide.

5. Yarn guide traverse mechanism for a winding machine comprising a pivotally mounted yarn guide, a cam follower connected to and actuating said yarn guide, a face cam mounted for rotation about an axis substantially at right angles to the yarn guide pivot, a plurality of concentric wavy paths of varying amplitudes on said face cam and adjustable cam follower means to contact a selected wavy path, in combination with a bunch builder, means for engaging said bunch builder with the yarn guide so as to override the action of the cam, means for reciprocating the bunch builder so as to reciprocate said yarn guide for building an initial bunch of turns and means for disengaging the bunch builder from the yarn guide after building the said bunch for further reciprocation of said guide by the said cam.

6. In a winding machine in combination a carriage longitudinally movable parallel to the winding axis, a yarn guide pivotally mounted on said carriage, a cam shaft parallel to said winding axis, a face cam mounted to rotation on said cam shaft and longitudinally slidable thereon, the throw of said face cam varying at different radial distances from its centre, means associated with the carriage for moving said face cam longitudinally on its shaft in unison with the carriage movement on a cam follower associated with said yarn guide adjustable to contact the face cam at different radial distances, in combination with a bunch builder means for engaging said bunch builder with the yarn guide so as to override the action of the cam, means for reciprocating the bunch builder so as to reciprocate said yarn guide for building an initial bunch of turns and means for disengaging the bunch builder from the yarn guide after building the said bunch for further reciprocation of said guide by the said cam.

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