Sept. 15, 1942. S. E. EDFORS 2,295,724

BUILDER MOTION FOR SPINNING AND TWISTER FRAMES

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Fig. 1

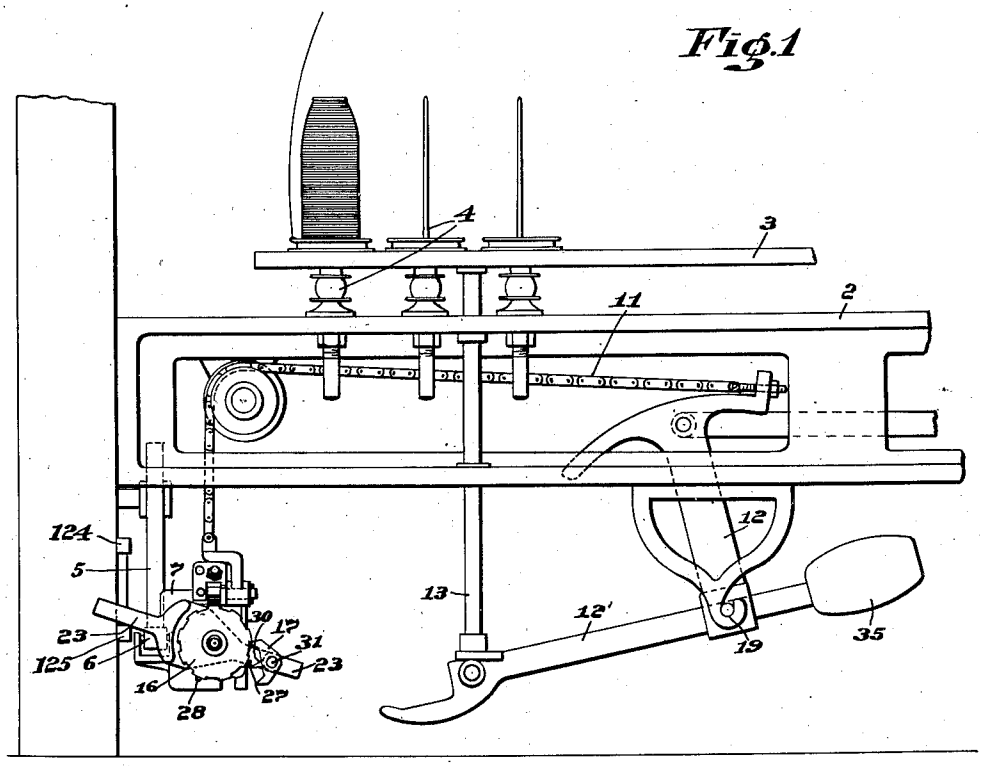
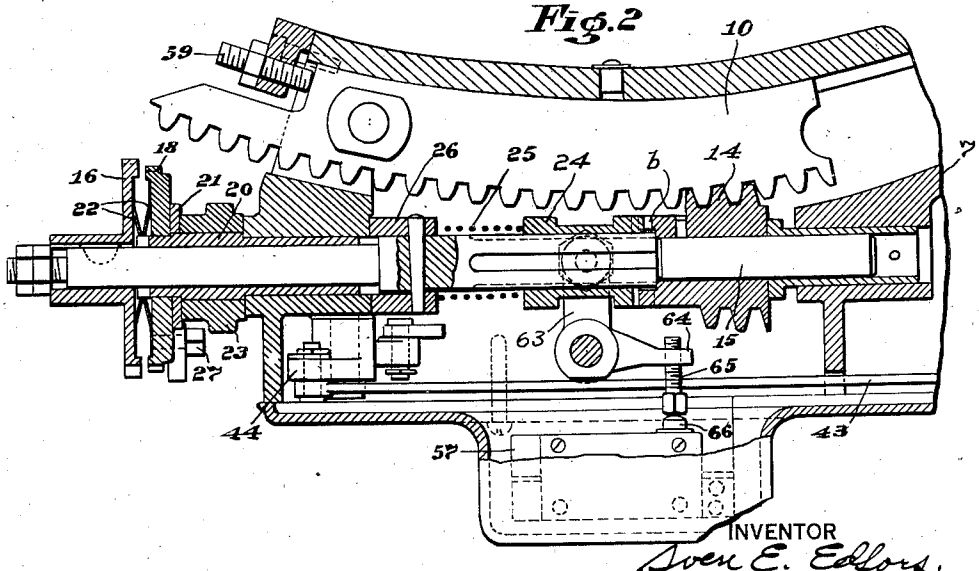


Fig. 2



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BUILDER MOTION FOR SPINNING AND TWISTER FRAMES

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Fig. 4

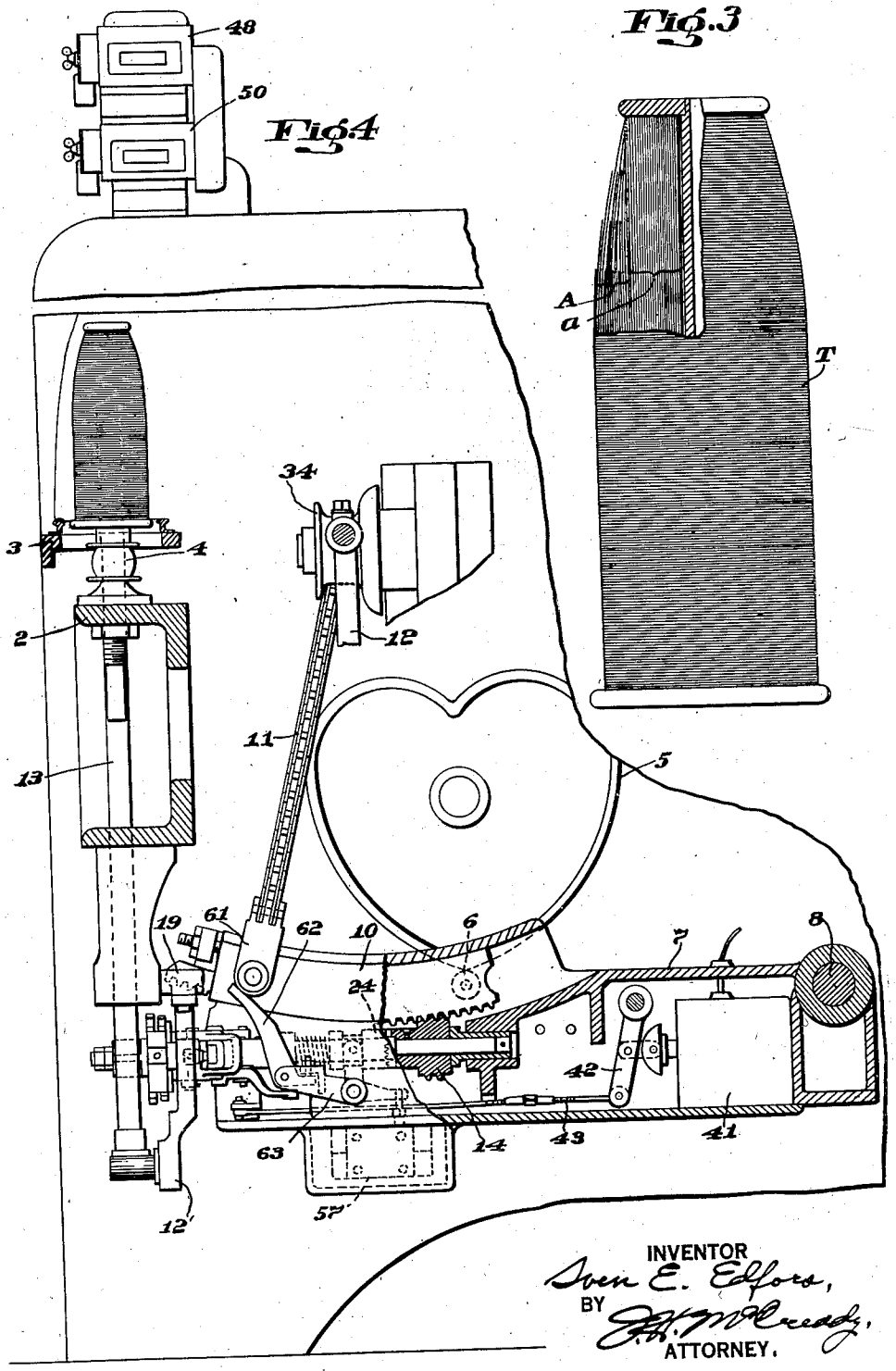


Fig. 3

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BUILDER MOTION FOR SPINNING AND TWISTER FRAMES

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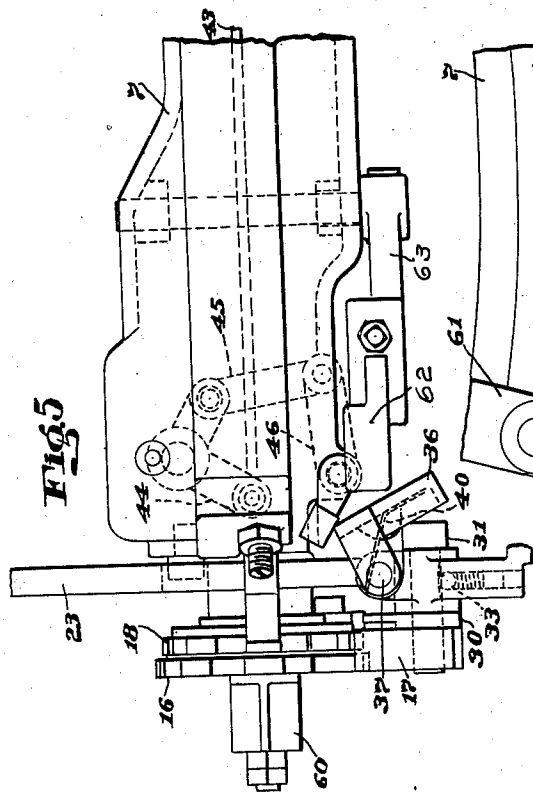


Fig. 5

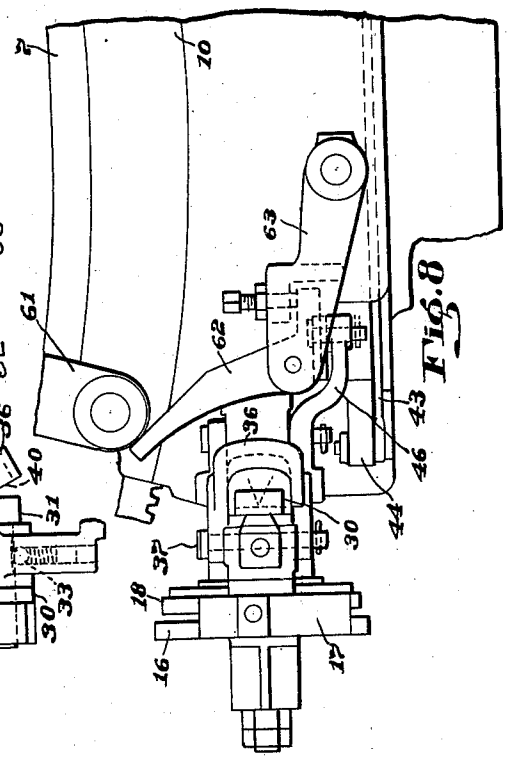


Fig. 8

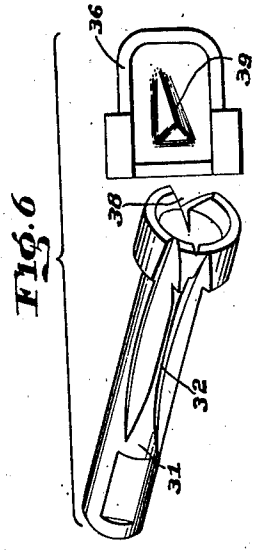


Fig. 6

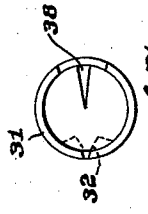


Fig. 7

Fig. 9

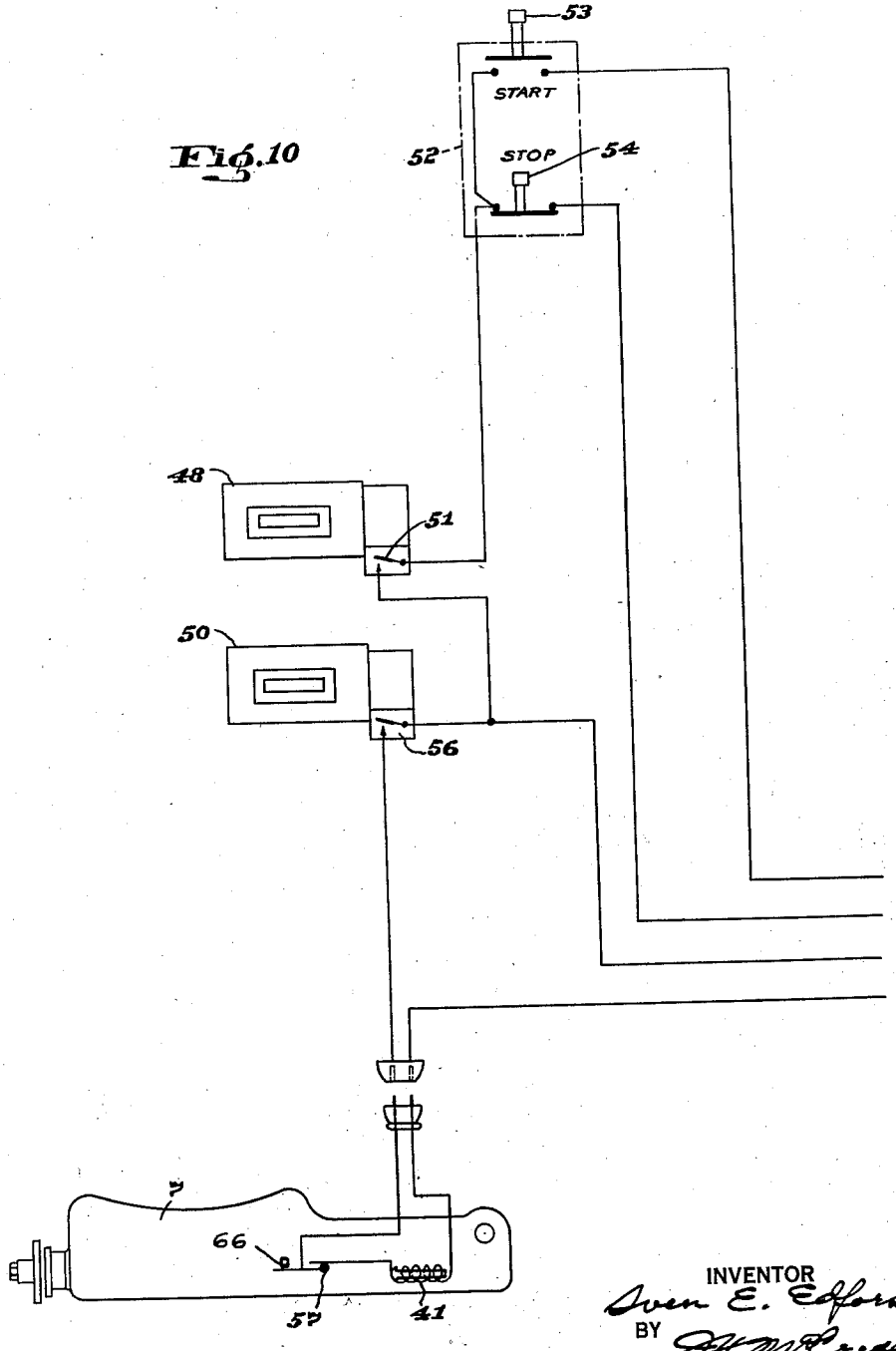
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BUILDER MOTION FOR SPINNING AND TWISTER FRAMES

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Fig. 10



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BUILDER MOTION FOR SPINNING AND TWISTER FRAMES

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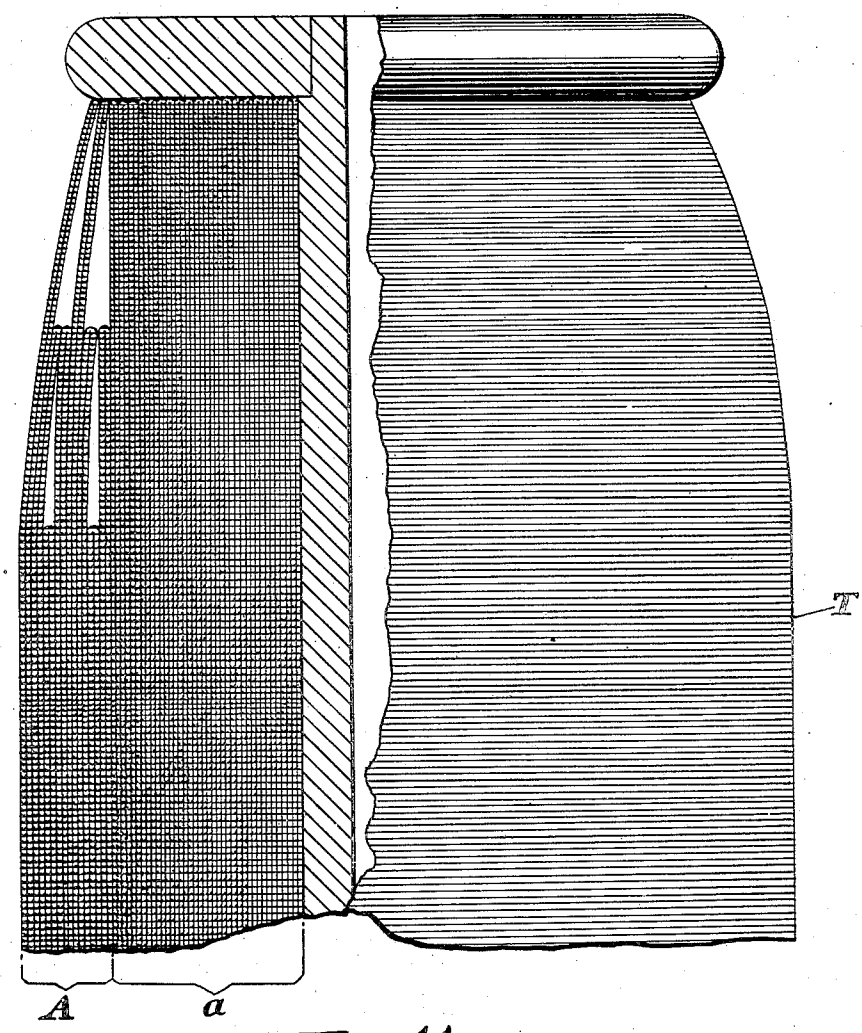


Fig. 11

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Patented Sept. 15, 1942 2,295,724

UNITED STATES PATENT OFFICE

2,295,724

BUILDER MOTION FOR SPINNING AND TWISTER FRAMES

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Application September 12, 1939, Serial No. 294,474

15 Claims. (Cl. 242—43.7)

This invention relates to spinning and twister frames and other machines designed to produce yarn or thread packages. For convenience such machines will be hereinafter included in the term "twister frames." The invention is more especially concerned with the builder motions of machines of this type. As is well understood by those skilled in this art, this term designates the mechanism which controls the winding of the thread or yarn on the bobbon, spool, tube, or other core for supporting the thread body, and it determines the distribution of the thread and, consequently, the shape of the completed package.

In producing fine count yarns, especially those composed of viscose, cellulose acetate, or other synthetic fibers, and winding them on a core to produce a yarn package suitable for subsequent use in fabricating machines of the various types employed in the textile industry, it has been found that those mechanisms which operate satisfactorily with cotton yarn give a great deal of trouble in handling these smooth, slippery, synthetic yarns. This is particularly true in attempting to build the large yarn packages or thread bodies which are now generally required by the textile industry.

A common form of yarn package much demanded by the trade has a tapered top to facilitate the withdrawal of the yarn over the end. In using packages of this kind a serious difficulty has been the tendency for the layers, turns, or coils of yarn to sluff off during withdrawal of the yarn, thus producing a snarl which may necessitate a shut-down.

It has been proposed heretofore to overcome these difficulties by building a yarn package including a core or bobbin having upper and lower heads, the latter being considerably larger in diameter than the former. Yarn is wound on this body in a straight wind until a cylindrical yarn body has been built up approximately equal to the diameter of the upper bobbin head. Thereafter the wind is changed throughout approximately the upper third of the yarn body, the traverse being progressively decreased in height and then correspondingly increased, and these progressions or cycles are repeated until the yarn body has attained the desired diameter. During this operation the rail speed preferably is maintained constant, but the effect of the varying heights of the layers is to produce a package having such a taper that the thread body will be self-sustaining and free from sluffing during the operation of unwinding.

It is the chief object of this invention to devise a builder motion and a controlling apparatus therefor of such a nature that yarn bodies of similar character can be built automatically and at a high rate of production. Some features of the invention also will be found useful in making yarn bodies of other forms.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a side view, somewhat diagrammatic in character, of a portion of a twister frame adjacent to the head end thereof, the machine being equipped with a builder motion embodying this invention;

Fig. 2 is a vertical, sectional view longitudinally of the builder arm;

Fig. 3 is a side view, partly in section, showing diagrammatically the general nature of the yarn packages produced by this machine;

Fig. 4 is a vertical, transverse, sectional view through the frame shown in Fig. 1, illustrating parts of the builder motion;

Fig. 5 is a plan view of those parts mounted at the left-hand end, Fig. 2, of the builder arm;

Fig. 6 is a perspective view of certain parts of this mechanism;

Fig. 7 is an end view of one of the parts shown in Fig. 6;

Fig. 8 is a side view of the mechanism shown in Fig. 5;

Fig. 9 is an end view of said mechanism;

Fig. 10 is a wiring diagram; and

Fig. 11 is a diagrammatic view on a large scale showing details of the package wind above referred to.

Referring first to Figs. 1 and 4, the machine shown comprises a spindle rail 2 and a ring rail 3, the former carrying a series of spindles 4 adapted to support bobbins or other cores on which the yarn is wound. The vertical traversing movement of the ring rail required for this purpose is produced by a builder motion including the usual cam 5 cooperating with a pitman roll 6 on the builder arm 7 which is pivotally connected at 8 to the machine frame. Mounted in a curved guideway in the arm 7 is a rack 10 slidably adjustable along said guideway. A chain 11 connects this rack with an arm 12 secured to a rock shaft at 19 to which is fastened another arm 12' for operating the lifter rod 13. Similar arms are provided at various points along the

frame to operate other lifter rods which unitedly support the ring rail 3.

So far as the mechanism above described is concerned, it is essentially like those commonly used in twister frames.

As above stated, the thread body T, Figs. 3 and 11, includes a central cylindrical portion *a* produced by a straight or "spool" wind. During the building of this part of the yarn body, the rack 10 remains in the position shown in Fig. 2, and the builder motion operates in the well known manner, successive layers being wound one upon the other and the ring rail traversing the entire length of the yarn body. The present invention provides a pick mechanism which is brought into action automatically at the conclusion of this stage of the building operation and which so changes the wind as to produce the part A, Figs. 3 and 11, of the yarn package. The first effect of this change is to gradually shorten successive traverses. Next the traverses are gradually increased in height, and this cycle is repeated until the building of the thread body has been completed.

Such gradual shortening of the traverse is accomplished by moving the rack 10 step by step toward the right, Fig. 2, until a predetermined minimum length of traverse has been produced. Then the rack is similarly moved step by step toward the left until it has returned to its initial position. And these functions are performed by a novel pick mechanism which forms an important feature of this invention.

Referring more particularly to Fig. 2, it will be seen that a worm 14 meshes with the rack 10 and is mounted loosely on a worm shaft 15 supported in suitable bearings in the builder arm 7. At the left-hand end of this shaft a ratchet wheel 16, Figs. 2, 5, 8 and 9, is keyed thereto and is adapted to be operated by a double acting pawl 17. Mounted immediately beside the ratchet wheel 16 is another ratchet wheel 18 of smaller diameter, turning loosely on the stationary bearing bushing 20, Fig. 2, and backed up by a friction washer 21. A divided spring 22 is interposed between the two ratchet wheels and applies sufficient friction to both wheels to prevent them from rotating except when operated by the pawl 17. The spring is held stationary on the sleeve or bushing 20. The pawl 17 is pivotally mounted on a lever 23, supported on the bushing 20, and the left-hand end, Figs. 1 and 9, of this lever is arranged to engage upper and lower stops 124 and 125 secured on the frame of the machine, as the builder arm approaches, respectively, the upper and lower limits of its swing. The stops are vertically adjustable. Assuming that the pawl is tipped, as shown in Fig. 9, engagement of the swing lever 23 with the upper stop 124 on the upward swing of the builder arm will cause the pawl to move the ratchet wheel 16 one tooth in a counter-clockwise direction, while the corresponding engagement of the lever with the lower stop on the downward swing of the builder arm will move the pawl downwardly over the next tooth where it will drop in behind it. When the position of the pawl is reversed, as will presently be described, the operations also are reversed and the pawl then rotates the ratchet wheel 16 in a clockwise direction. In other words, this is a reversible pawl and ratchet mechanism. The term "reversible pawl and ratchet mechanism" or other "reversible mechanism" is used hereinafter in the claims to designate a mechanism in which the direction of rotation can be reversed while the mechanism remains in its operative position in the machine.

Each rotative movement of the wheel 16 is transmitted to the worm 14, Fig. 2, through a clutch comprising teeth *b* on the left-hand end of the worm, and cooperating teeth on the opposing end of a clutch sleeve 24, mounted to slide on the shaft 15, these two sets of teeth normally being pressed together by means of a spring 25 encircling said shaft and backed up by a collar 26 pinned to the shaft. The sleeve 24 is splined to the shaft so that it transmits the rotary motion of the latter to the worm 14, but can be moved to release the clutch. Since the successive movements of the ratchet wheel 16 in one direction operate through these connections with the rack 10 to move it toward the pivot 8 of the builder arm, they progressively lower the upper limit of the ring rail traverse, while a reversal of these adjusting movements has the opposite effect.

The wheel 16 is sufficiently large in diameter to hold the pawl normally out of contact with the teeth of the ratchet wheel 18. However, the former is provided with one notch *d*, Fig. 9, of sufficient depth to permit the end of the pawl to drop in behind one of the teeth of the wheel 18 and thus to actuate it. This occurs only once in each revolution of the wheel 16, and this arrangement is utilized both to predetermine the maximum adjustment of the rack made by the pick mechanism in a given cycle, and also to effect the reversal of that movement. For this purpose the wheel 18 has reversing lugs 27 and 28, Fig. 9, secured to it, these lugs being adjustable circumferentially of the wheel into any desired position so that when a predetermined number of picks of the wheel 16 have been made in a counter-clockwise direction, the lug 27 will strike the trip lever 30 upon the next pick and reverse the position of the pawl 17. This is accomplished by mounting the trip lever securely on the pawl pivot 31, Figs. 5, 6, 7 and 9, and grooving the latter, as shown in Fig. 6, to provide a rib 32 of inverted V-shape in cross-section. A spring pressed ball 33, Fig. 5, is positioned to engage said rib. As the reversing lever 30 is moved by either lug 27 or 28 through an intermediate central position, the ball is forced from the bottom of one groove up the inclined surface of the rib 30 and slightly to the other side thereof, whereupon its pressure on the latter side completes the shifting movement of the pivot and consequently of the pawl 17 fastened to it. This reverses the adjusting movement of the worm 14 and consequently of the rack 10. Rotative movement of the wheel 16 in the new direction continues until one of the reversing lugs on the wheel 18 again strikes the lever 30 and shifts the pawl 17 into its opposite position. Considering this adjustment of the rack in one direction and then back to its initial position as one cycle, these cycles will be repeated automatically until the machine is stopped.

It should be noted that the adjusting movements just described affect only the upper portion of the traverse of the ring rail. As indicated in Fig. 4, this rail is at the lower limit of its traverse when the point of the cam 5 is in engagement with the pitman roll 6. The guideway in the builder arm in which the slide 10 operates is curved in an arc having a center located at the upper edge of the guide roll 34, Fig. 4, over which the chain 11 runs. Consequently, any

adjustment of this slide has no effect on the lower limit of traverse of the ring rail, but any such adjustment does affect the upper limit of the traversing movement because the builder arm 7 at that time has swung upwardly out of the horizontal position in which it is shown in Fig. 4 and any change in the distance between the anchoring point of the chain 11 to the slide and the pivot point 8 affects the height to which the ring rail is allowed to rise. In this machine the cam 5 acting on the pitman roll 6 positively produces the downward movement of the ring rail, and its upward movement is produced primarily by weights one of which is shown at 35, Fig. 1, but under the control of the cam 5.

As above stated, the pick mechanism is held out of action during the building of the central cylindrical portion of the yarn body. For this purpose a pawl shield 36, Figs. 5, 6 and 8, is pivoted at 37 on the lever 23, and is equipped with a V-shaped cam 39, best shown in Fig. 6, adapted to enter a notch 38 formed in the end of the pawl pivot 31. A leaf spring 40, Fig. 5, acts on this shield in a direction tending to hold it out of contact with the pivot, but an electro-magnetically controlled mechanism is provided to hold this shield in its operative or pawl locking position. As best shown in Figs. 4, 5 and 8, this mechanism comprises a solenoid or electro-magnet 41 mounted in the builder arm 7, a lever 42 pivoted to the plunger of said electro-magnet, a link 43 connecting said lever with one arm of a bell crank lever 44, Fig. 5, and a link 45 connecting the other arm of the bell crank lever to a shield operating lever 46. When the solenoid is energized it operates through these connections to swing the shield 36 in a clockwise direction, Fig. 5, at which time the cam 39 enters the notch 38 and locks the shield in its operative position. Upon deenergization of the magnet its plunger is ejected by a spring and the parts are returned to the positions in which they appear in Fig. 5.

The cam 39, Fig. 6, is so related to the walls of of the V-shaped notch 38 that as the shield swings into its operative position the cam acts on said walls to rock the pivot 31 into a central position where it holds the pawl 17 in an idle or neutral condition, both of its ends being out of contact with the teeth of the wheel 16. Consequently, so long as the parts are held in this relationship the pick mechanism remains idle, even though the lever 23 continues to be operated by its engagement with the stops 124 and 125.

A general control of the builder mechanism is provided by an electrical apparatus comprising two yardage counters or so-called "clocks" indicated, respectively, at 48 and 50, Figs. 4 and 10. The former controls a relay switch which, in turn, controls the motor for driving the spinning frame, and such control is exercised through a switch 51 with which the counter 48 is equipped. Normally, or when the twister frame is in operation, this switch is closed and holds the motor controlling switch (not shown) in its closed position. This circuit, however, is also controlled by a manually operated switch 52 equipped with the usual starting button 53 and stop button 54. Such controlling circuits are well known in the art so that a detailed illustration of them is not necessary.

The yardage counter 50, or so-called "builder clock," includes a switch 56 which remains closed during the building of the cylindrical portion *a*, Fig. 3, of the thread body T, and during this period it cooperates with another switch 57, Fig. 10, in the builder arm 7 to hold the circuit of the solenoid 41 closed and thus to maintain the pawl shield 36 in its operative position where it holds the pawl 17 out of action.

When a predetermined yardage has been wound on each spool, as indicated by the counter 50, the builder clock switch 56 opens, thus deenergizing the magnet or solenoid 41, whereupon the shield 36 is swung into its inoperative position by the spring 40, Fig. 5. The parts are so biased that whenever the pawl pivot 31 is freed from the restraint of its shield 36, the spring pressed ball 33 acts on the pivot to tip the pawl 17 in a counter-clockwise direction and into the position shown in Fig. 9. In this relationship the pawl moves the ratchet wheel 16 step by step in a counter-clockwise direction and therefore rotates the sleeve 24 in a direction tending to move the rack toward the left, Figs. 2 and 4. However, throughout the building of the straight wound portion *a* of the thread body, the rack 10 is held in its extreme left-hand position against the stop 59. In this position the chain hook 61 bears against the lever 62 and holds the clutch sleeve 24 so far toward the left that its teeth slip over the cooperating teeth on the worm hub with the result that the worm 14 and rack 10 remain stationary. The pawl continues to move the ratchet wheel 16 in a counter-clockwise direction, without imparting motion to the worm or the rack, until its action is reversed by the lug 27 striking the lever 30, as above explained. The purpose of this idle operation of the pawl and ratchet mechanism is to correlate the position of the reversing lug 27 with the position of the rack 10. As soon as the operation of the ratchet mechanism is reversed, it operates through the worm 14 to move the rack 10 step by step toward the fulcrum 8 of the builder arm, thus shortening successive traversing movements of the latter, and the pick mechanism thereafter continues to operate normally throughout the building of the variable traverse volume A of the thread body. When this operation has been completed the main yardage counter or motor control clock 48 opens its switch 51 and shuts down the operation of the machine.

In this connection it may be pointed out that during the building of the vari-pick portion A of the thread body T shown in Figs. 3 and 11, successive traverses may be initially stepped down or shortened by relatively short distances say, for example, a quarter of an inch, until a certain minimum length of traverse is reached. Thereafter they are increased or lengthened in steps of approximately the same height until the traverse extends the entire height of the thread body. And these cycles are repeated throughout the building of the portion A. Figs. 3 and 11 show a typical form of thread package made in accordance with the invention, but the stepping of successive layers of yarn is shown merely diagrammatically, it being understood that in a commercial package of typical dimensions and sizes of yarn there will be hundreds of these stepped courses or layers of threads.

Because the machine may be stopped with the rack 10 in some intermediate position, and it is necessary for the building of these thread bodies that the rack shall be at the extreme left-hand end, Fig. 2, and against the stop 59 throughout the winding of the first part *a* of the yarn package, the end portion 60 of the shaft 15 is squared, as shown in Fig. 5, to receive a hand crank by means of which this readjustment or winding

back of the rack can be performed. Means, however, is also provided to perform this operation automatically.

As above pointed out, the solenoid 41 is de-energized at the time the main yardage clock 48 opens the switch 51 and thus shuts down the motor. This occurs at the completion of the wind and at a time when the switches 56 and 57 are open and the pick mechanism, accordingly, is in operation. After the operator has completed the doff in the usual manner and is ready to start up the machine again, he resets both clocks and then pushes the starting button 53. Consequently, when the frame starts up, the pick mechanism immediately begins to operate. In completing its own cycle of operations in which it was working when the machine was shut down, it moves the rack 10 back toward the left, Figs. 4 and 8, until the chain hook 61 strikes the clutch throwout lever 62 and operates through the clutch fork lever 63 to move the clutch sleeve 24 toward the left far enough to partially disengage its teeth from the clutch teeth on the worm 14. An extension 64, Fig. 2, on the lever 63 has a screw 65 threaded through it in position to bear normally on the push button 66 of the switch 57 due to the action of the spring 25. This switch normally is held open by said spring and the parts 64 and 65 but is closed by the slight lifting movement of the screw 65 and the consequent release of the button 66 when the lever 63 is operated as just described. Thus at this time the switch closes the circuit of the solenoid 41, the clock controlled switch 56 having already been closed by the resetting operation. Hence the solenoid is again energized, and the pawl shield 36 is brought into its operative position, thus throwing the pick mechanism into neutral. It is held in this condition until again brought into action by the opening of the builder clock switch 56 at the completion of the winding of the cylindrical portions of the thread bodies on the cores placed on the spindles at the previous doff.

With this invention, therefore, the machine automatically goes through its cycle of operations after it has once been started up, making thread packages of the character above described, and then shutting down automatically when the packages have been completed. Since the building of such packages occupies several hours when a thread of fine gauge is used, the invention effects an important reduction in the time and attention which such machines require.

It will also be evident to those skilled in this art that while I have shown and described a preferred embodiment of my invention, the invention is, nevertheless, capable of embodiment in other forms without departing from the spirit or scope thereof. Also, that while the invention is herein disclosed as embodied in a twister frame of a common form, it is applicable to other machines in which it is desirable to operate a traversing rail in a similar manner.

Having thus described my invention, what I desire to claim as new is:

1. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a member adjustable lengthwise of said arm to change the length of traverse of said rail, a rotary element for producing adjusting movements of said member along said arm in opposite directions, and mechanism for rotating said element step by step to move said member along said arm, said mechanism including a rotary driving device and means for automatically reversing the direction of rotation of said driving device at predetermined intervals and thereby producing adjusting movements of said member in opposite directions.

2. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a member adjustable lengthwise of said arm to change the length of traverse of said rail, a rotary element for producing adjusting movements of said member along said arm in opposite directions, and mechanism arranged to be reversely operated by the motion of said arm for rotating said element step by step first in one direction and then in the opposite direction.

3. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a member adjustable lengthwise of said arm to change the length of traverse of said rail, a rotary element for producing adjusting movements of said member along said arm in opposite directions, mechanism for rotating said element step by step to move said member along said arm, said mechanism including a rotary driving device and means cooperating with said mechanism to reverse the direction of rotation of said driving device at predetermined intervals and thereby reversing the movement of said member along said arm.

4. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a slide adjustable lengthwise of said arm, a reversible pawl and ratchet mechanism mounted on said arm, said mechanism being adapted to be driven in opposite directions at will while it remains in its operative position in the machine and means arranged to be operated by said pawl and ratchet mechanism and connected with said slide for adjusting the slide first in one direction and then in the opposite direction on said arm.

5. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a slide adjustable lengthwise of said arm, a reversible pawl and ratchet mechanism mounted on said arm, means arranged to be operated by said pawl and ratchet mechanism and connected with said slide for adjusting the slide first in one direction and then in the opposite direction on said arm, and means mounted on said arm operable to throw said pawl and ratchet mechanism into and out of action.

6. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a slide adjustable lengthwise of said arm, a reversible pawl and ratchet mechanism mounted on said arm, means arranged to be operated by said pawl and ratchet mechanism and connected with said slide for adjusting the slide first in one direction and then in the opposite direction on said arm, and electro-magnetically actuated means mounted on said arm and operable to control the operation of said pawl and ratchet mechanism.

7. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting

said arm with said rail including a slide adjustable lengthwise of said arm, a worm rotatably mounted in said arm, said slide having teeth engageable with said worm whereby the rotation of the worm moves the slide longitudinally of the arm, and a reversible pawl and ratchet mechanism mounted on said arm and connected with said worm to revolve it in opposite directions, said mechanism being adapted to be driven in opposite directions at will while it remains in its operative positions in the machine.

8. In a twister frame, the combination with a traversing rail and a builder motion comprising a pivoted builder arm, a cam for operating said arm and means for operatively connecting said arm with said rail including a slide adjustable lengthwise of the arm toward and from the pivot for said arm, of a rotary element operatively connected with said slide to adjust it in opposite directions lengthwise of said arm, mechanism for driving said element in opposite directions, and automatic means for throwing said mechanism into and out of operation at predetermined points in the cycle of operations of the machine and while the machine is running.

9. In a twister frame, the combination with a traversing rail and a builder motion comprising a pivoted builder arm, a cam for operating said arm and means for operatively connecting said arm with said rail including a slide adjustable lengthwise of the arm toward and from the pivot for said arm of a rotary element operatively connected with said slide to adjust it in opposite directions lengthwise of said arm, mechanism for driving said element in opposite directions, and automatic means for holding said mechanism out of operation during a portion of the cycle of operations of the machine and throwing it into operation at a predetermined point in said cycle.

10. In a twister frame, the combination with a traversing rail and a builder motion comprising a pivoted builder arm, a cam for operating said arm and means for operatively connecting said arm with said rail including a slide adjustable lengthwise of the arm toward and from the pivot for said arm, of mechanism for adjusting said slide automatically in opposite directions along said arm to shorten and subsequently lengthen the traverse of said rail, and controlling apparatus for automatically bringing said mechanism into operation at a predetermined point in the cycle of operations of the machine while it is running and subsequently throwing said mechanism out of action again at another predetermined point in said cycle.

11. In a twister frame, the combination with a traversing rail and a builder motion comprising a pivoted builder arm, a cam for operating said arm and means for operatively connecting said arm with said rail including a slide adjustable lengthwise of the arm toward and from the pivot for said arm, of a rotary element operatively connected with said slide to adjust it in opposite directions lengthwise of said arm, mechanism for driving said element in opposite directions, and automatic means governing the general operation of the machine including a yardage clock and a builder clock, and apparatus controlled by said clocks for enabling the former to shut down the machine automatically when the desired yardage has been wound and the latter to bring said slide adjusting mechanism into action at a predetermined point in the cycle of operations of the machine.

12. In a twister frame, the combination with a traversing rail and a builder motion comprising a pivoted builder arm, a cam for operating said arm and means for operatively connecting said arm with said rail including a slide adjustable lengthwise of the arm toward and from the pivot for said arm, of a rotary element operatively connected with said slide to adjust it in opposite directions lengthwise of said arm, mechanism for driving said element in opposite directions, automatic means for throwing said mechanism into and out of operation at predetermined points in the cycle of operations of the machine, and parts cooperating with said means and said mechanism to restore said slide to the outer limit of its range of adjustment at the commencement of one portion of the cycle of operations of the machine.

13. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a member adjustable lengthwise of said arm to change the length of traverse of said rail, a rotary element for producing adjusting movements of said member along said arm in opposite directions, and mechanism operated by the motion of said arm for rotating said element step by step first in one direction and then in the oppostie direction, said mechanism including means adjustable to vary the extent of the rotative movements so imparted to said element.

14. In a twister frame, the combination with a traversing rail and a builder motion comprising a pivoted builder arm, a cam for operating said arm and means for operatively connecting said arm with said rail including a slide adjustable lengthwise of the arm toward and from the pivot for said arm, of a rotary worm mounted on said arm and operatively connected with said slide to adjust it in opposite directions lengthwise of said arm, a pawl and ratchet mechanism mounted on said arm and connected with said worm to revolve it, said mechanism being arranged to be operated by the swinging movement of said arm and including parts operable automatically to reverse the direction of rotation so transmitted to said worm.

15. A builder motion for operating the traversing rail of a twister frame comprising a pivoted builder arm, means for operatively connecting said arm with said rail including a slide adjustable lengthwise of said arm, a worm rotatably mounted in said arm, said slide having teeth engageable with said worm whereby the rotation of the worm moves the slide longitudinally of the arm, a reversible pawl and ratchet mechanism mounted on said arm and connected with said worm to revolve it in opposite directions, and a clutch through which said pawl and ratchet mechanism drives said worm, said builder motion including means for operating said clutch automatically in response to predetermined conditions.

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