

A. E. RHOADES.
TRAVERSE MOTION FOR YARN SPINNING APPARATUS.
APPLICATION FILED MAY 8, 1909.

941,650.

Patented Nov. 30, 1909.

4 SHEETS—SHEET 1.

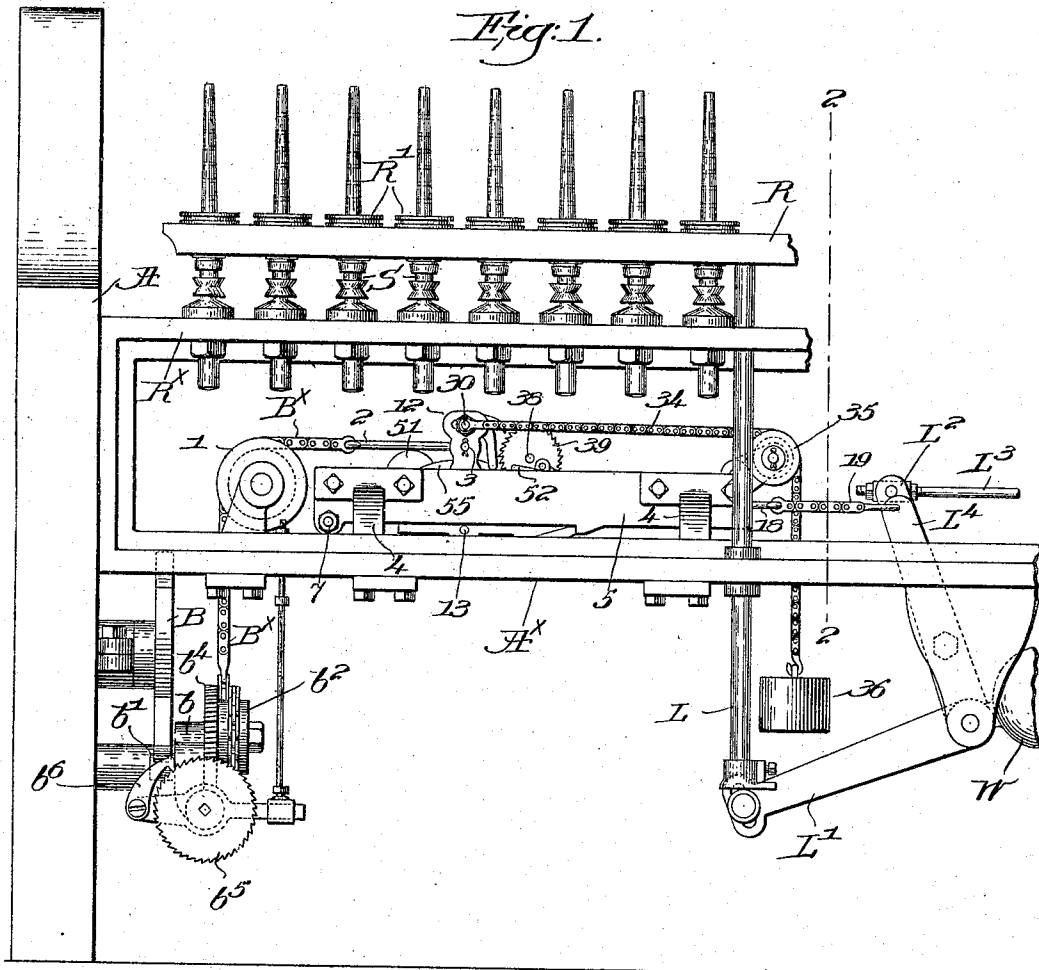
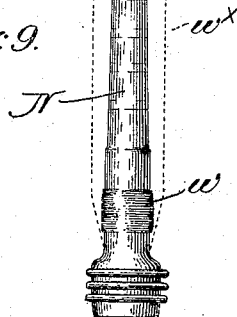


Fig. 9.



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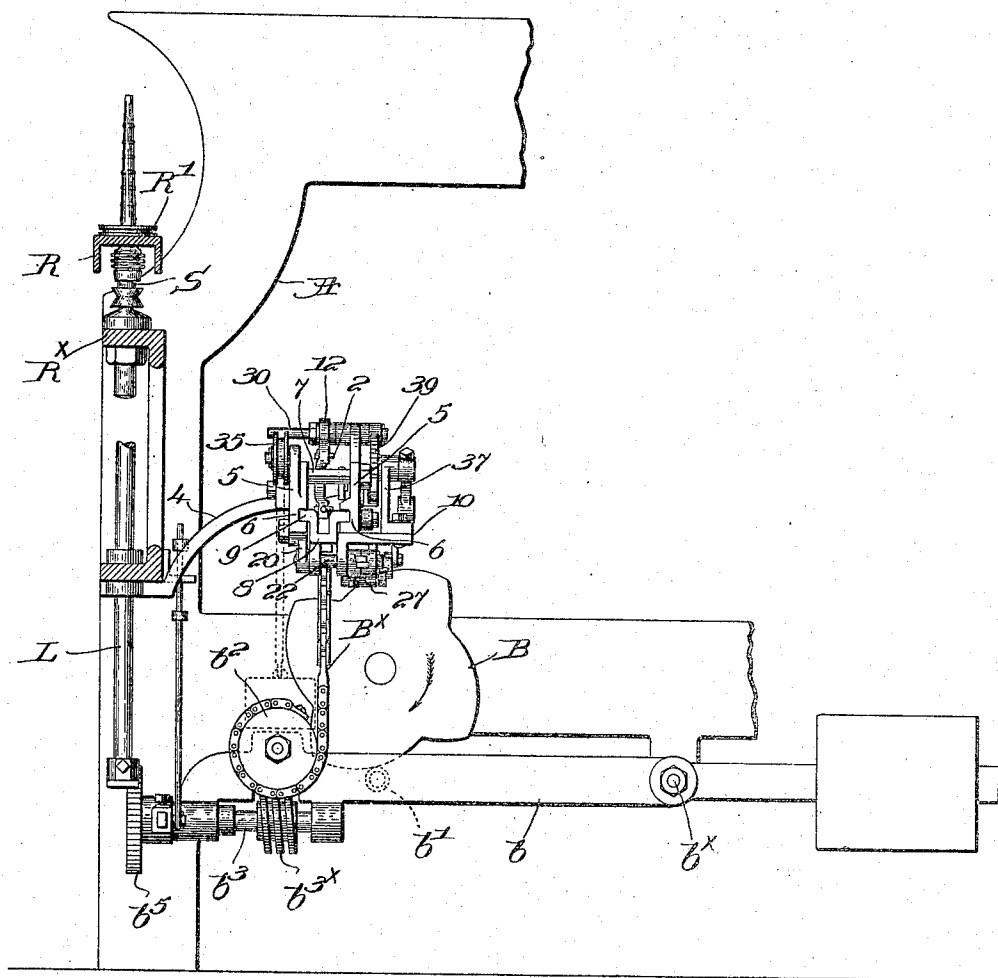
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4 SHEETS—SHEET 2.

Fig. 2.



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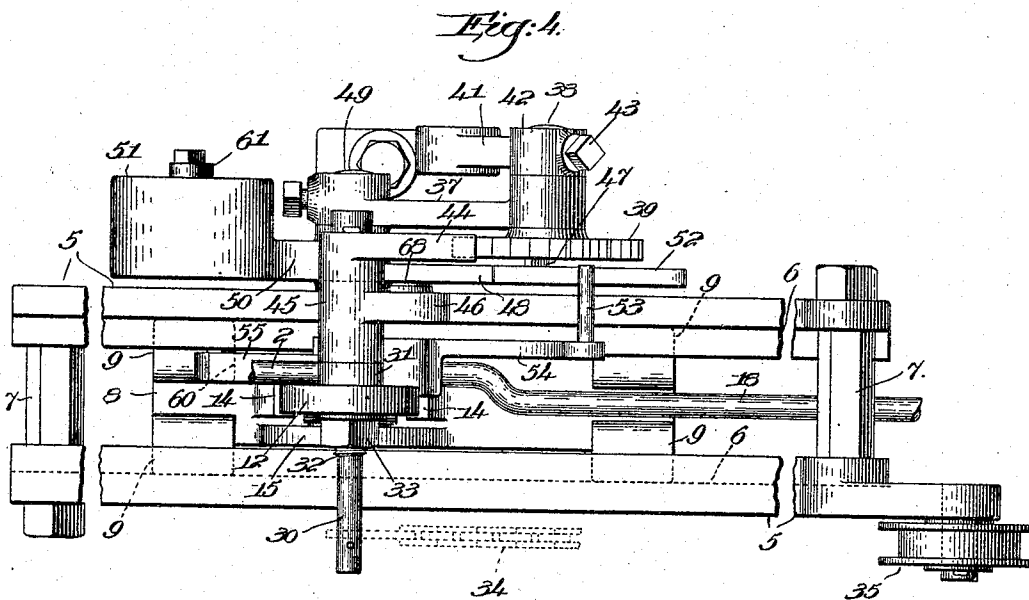
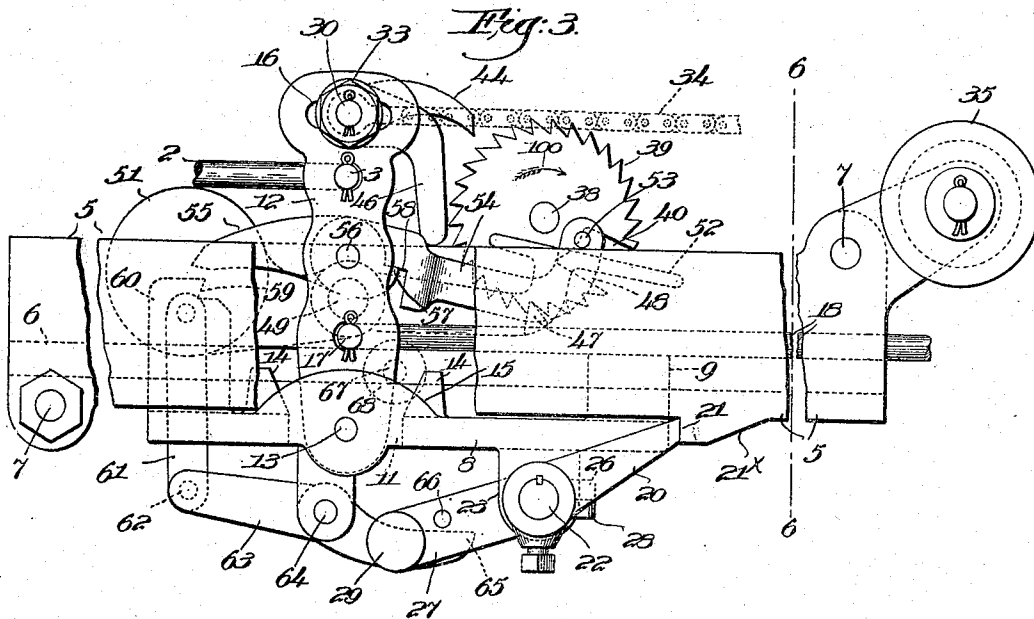
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4 SHEETS—SHEET 3.



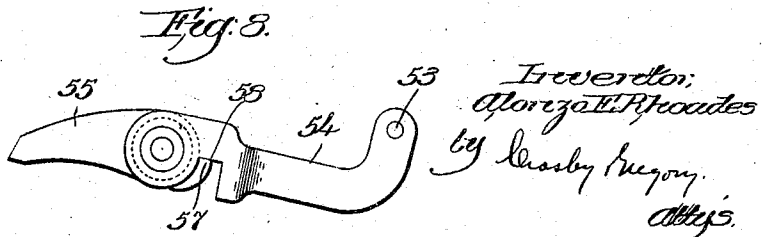
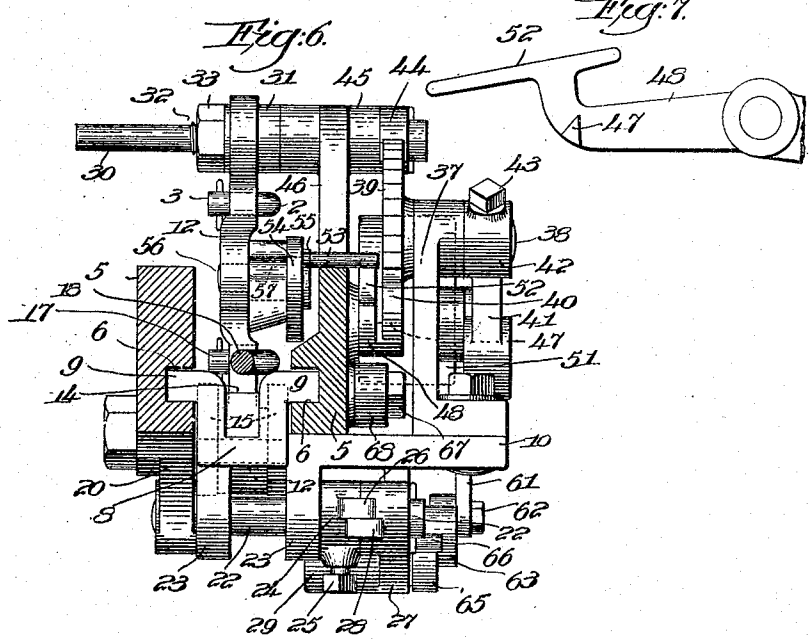
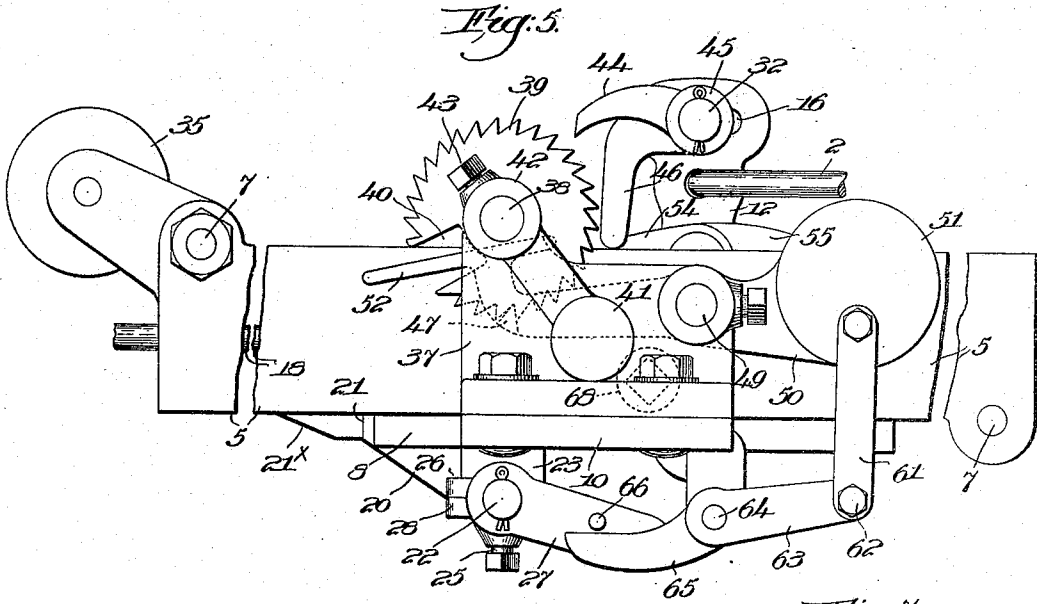
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 4 SHEETS—SHEET 4.



Witnesses,
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UNITED STATES PATENT OFFICE.

ALONZO E. RHOADES, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

TRAVERSE-MOTION FOR YARN-SPINNING APPARATUS.

941,650.

Specification of Letters Patent.

Patented Nov. 30, 1909.

Application filed May 8, 1909. Serial No. 494,783.

To all whom it may concern:

Be it known that I, ALONZO E. RHOADES, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Traverse-Motions for Yarn-Spinning Apparatus, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to apparatus wherein the winding of yarn upon a yarn-receiver or bobbin is effected in such manner that a preliminary winding or bunch is first laid and thereafter a main or service winding of the yarn is laid, the bobbins so wound being subsequently used in automatic filling replenishing looms of the so-called "feeler" type. In such looms the preliminary winding affords sufficient yarn to maintain continuity of the filling when a change of filling in the running shuttle is effected, through the agency of the feeler, after the main or service winding of the yarn has been woven into the cloth.

A number of patents have been granted to me for apparatus of the general class to which this invention pertains, and in Patent No. 913,164 granted to me February 23, 1909 I have shown means for increasing the "gain" of the traverse during the preliminary winding in order to impart a gradual taper to the bunch, so that the yarn will not catch on the inner end thereof during the weaving operation.

With some kinds of yarn it is quite necessary to use every effort to enable it to weave off freely when approaching or down to the bunch, while with other yarns it is not necessary to take the same precautions, and the ends of the bunch need not be so gradually tapered as provided for in my above-mentioned patent. My present invention is applicable to spinning yarn of the latter character, and as an increase in the "gain" of the traverse does not have to be augmented over and above that due to the usual winding mechanism I am enabled herein to dispense with special means for augmenting the gain, and I thus simplify the traverse motion.

In certain respects there is a similarity between my present invention and that disclosed in my Patent No. 913,164, more par-

ticularly in the traverse shifting means by which change from short to long traverse is effected when the preliminary winding of yarn is completed, but there are differences in construction herein, and various other novel features which will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a front elevation of a portion of a spinning-frame, showing the builder-motion and the controlling connections between it and the ring-rail embodying my present invention, the parts being shown on the preliminary winding and with the ring-rail at mid-position for the short traverse; Fig. 2 is a transverse section on the line 2—2, Fig. 1, looking toward the left; Fig. 3 is an enlarged detail in front elevation and partly broken out of the means whereby the shorter traverse with which the preliminary winding is laid is shifted or changed automatically at the proper time to the longer traverse with which the main or service winding is laid; Fig. 4 is a top plan view of the mechanism shown in Fig. 3, the support on which the carriage travels being broken out between its ends in both figures to economize space; Fig. 5 is a rear elevation of the mechanism illustrated in Figs. 3 and 4, with the different parts in the same relative positions; Fig. 6 is a transverse section on the line 6—6, Fig. 3, looking toward the left; Fig. 7 is a detail in side elevation of the detent pawl and a portion of its carrier, to be referred to hereinafter; Fig. 8 is a separate view in side elevation of the locking latch which connects the traverse-shifter and the carriage to move together during the long traverse; Fig. 9 is an enlarged elevation of a yarn-receiver or bobbin showing thereon the completed preliminary winding, the completed service winding being shown by dotted lines.

In Figs. 1 and 2, the frame A, the spindle-rail R^x on which are mounted usual spindles S, the vertically-reciprocating ring-rail R provided with rings R', one for each spindle, the lifter-rods, as L, a rocker L' for each lifter-rod, one of said rockers having an attached weight W, Fig. 1, to elevate the ring-rail, the upturned rocker-arms, as L², and the connecting links, as L³, may be and are of usual construction and operate in a well-known manner. The builder-motion comprises the builder-arm b fulcrumed at b^x and

provided with a roller or other stud b' to co-operate with the actuating or traverse-cam B, (clearly shown in Fig. 2) and the winding mechanism mounted on the arm, including drum b^2 , pick-shaft b^3 having the usual worm b^{3*} to rotate the worm-gear b^4 attached to the drum, the pick-wheel b^5 , and the actuating pawl b^6 , operating as usual. This builder-motion as a whole is of well-known construction, the cam B giving the builder-arm a constant stroke, while the gradual rotation of the drum lets off the attached chain or other connection B^* to effect the gain of the traverse. Said chain leads up over a guide-sheave 1 supported on the girder A^* and has attached to its free end a link 2 bent at its end and pivotally connected at 3 to a traverse-shifter, to be described, rearwardly extended brackets 4 attached to the girder sustaining the parallel sides 5 of an open, elongated frame having horizontal guide-ways 6, the sides being rigidly connected by cross-bars 7. A carriage 8 is provided with lateral projections 9 which slidably enter the guide-ways, so that the carriage may be reciprocated longitudinally in the open frame, and as shown in Figs. 3 and 6 the bottom of the carriage is below the bottom of said frame, and is provided at its rear side with a horizontal foot 10 which projects beneath the frame, Figs. 2, 5 and 6. The carriage is longitudinally slotted at 11 to receive the lower end of a traverse-shifter, shown as an upright lever 12 fulcrumed near its lower end at 13 on the carriage, and adapted to rock on such fulcrum between stops 14 located at the opposite ends of the slot 11, the carriage having enlarged cheeks 15 between which the lower, hub-like end of the traverse-shifter is inserted.

As shown clearly in Fig. 3 the connection at 3 between the chain B^* and the traverse-shifter is quite near the enlarged upper end of the latter, which is provided with an elongated slot 16, for a purpose to be described, and obviously while the said chain is directly connected with the traverse-shifter it is indirectly connected through the latter with the carriage 8. The traverse-shifter 12 has a hole near its fulcrum 13 to receive the bent end 17 of a link 18 attached by a short length of chain 19, Fig. 1, to the upturned arm L^4 of the first rocker L' beyond the carriage. The preliminary winding or bunch is governed as to its traverse by oscillation of the lever 12 about its fulcrum 13, transmitted to the ring-rail through the connection 18, 19, arm L^4 , etc. the traverse being uniform throughout the preliminary winding, and at that time the carriage 8 is locked by means of a latch 20, Fig. 3, engaging a shoulder 21 on the front wall of the open frame in which the carriage is slidably supported. Said latch is keyed onto a rock-shaft 22 mounted in ears 23 de-

pending from the carriage, a collar 24 being held fast on the rear end of said shaft by a set-screw 25 and having a radial toe 26, Figs. 3, 5 and 6, while adjacent the collar the hub of a weighted arm 27 is loosely mounted on shaft 22 and provided with a toe 28 projecting under the toe 26. The weight of the arm 27 normally acts through the toe 28 to lift the toe 26 and elevate the latch 20 into operative position, so that when winding-back is effected and the carriage is returned to the position shown in Fig. 3 the end of the latch will wipe over the bevel 21^* and then rise into position to cooperate with the shoulder 21 and lock the carriage. Conveniently the arm 27 is weighted by making a heavy lateral enlargement 29 on its free end, as herein shown.

While a number of the parts just referred to are shown in Fig. 2 only the more noticeable ones are provided with reference characters, owing to the small scale, the larger detail views, Figs. 3, 5 and 6, showing such parts distinctly and on such a scale that their structure may be readily understood.

The latch 20 is disengaged automatically when the preliminary winding is completed, to thereby release or unlock the carriage so that it may be reciprocated to effect the longer traverse for the main or service winding, but before describing the latch-releasing means other mechanism will be referred to. An elongated rod 30 is provided with an annular enlargement 31 to bear against the back of the traverse-shifter 12 when the forward end of the rod, threaded at 32, is passed through the slot 16, a washer and nut 33 firmly clamping the rod to the traverse-shifter at any desired part of the slot, and as shown in Figs. 4 and 6 the rear end of the rod is somewhat larger in diameter than its front end. To the front end of the rod is attached one end of a chain 34, carried over a guide-sheave 35 on the carriage supporting frame 5 and having attached to its depending end a weight 36, Fig. 1, which weight acts in conjunction with the weight W to keep taut the builder connector B^* when the carriage and the traverse-shifter 12 move in unison during the main winding, and also when the shifter is rocked or oscillated during preliminary winding. It will now be understood that when the builder-arm rises the traverse-shifter 12 swings to the right, Figs. 1 and 3, on its fulcrum 13, and through the connection 18, 19 and attached parts the ring-rail is permitted to rise, but as said connection is attached to the shifter 12 so near its fulcrum the stroke or traverse of the ring-rail will be much shorter than the stroke of the builder-arm.

A layer of yarn is laid on the yarn-receivers during the rise of the ring-rail, which descends when the builder-arm is depressed, but the winding mechanism acts to give off

the builder connector B* slightly at each descent of the builder-arm, so that the rail R will not descend quite so low as on its preceding descent, and on its next up-stroke it will rise a little higher than before, thereby imparting the "gain" to the traverse. While this slight gain is somewhat diminished by the structure that shortens the traverse during preliminary winding that is not objectionable when operating with some kinds of yarn, and herein I make no provision for increasing the gain at such time.

Upon the foot 10 at the back of the carriage is bolted a bracket 37 having a bearing for the shaft 38 of a rotatable ratchet 39, said ratchet having a rather wide and deep notch 40 formed in it and interrupting the continuity of its teeth, as shown in Figs. 3 and 5. A weighted arm 41 has its hub 42 adjustably secured to the shaft 38 by a set-screw 43, the hub keeping the ratchet and its shaft properly positioned in the bearing of bracket 37 and also providing means to turn said ratchet automatically to the starting point after a set of bobbins has been wound, as will appear hereafter. An actuating pawl 44 overhangs the ratchet 39 and has its long hub 45 fulcrumed on the rod 30 carried by the traverse-shifter 12, said hub having formed upon it a depending, weighted tail 46 which rests on and also slides along the top of the rear wall or plate 5 of the carriage supporting frame. The tail holds the pawl in position to engage the ratchet as the shifter 12 swings to the right, Fig. 3, and to thereby advance the ratchet, the angular movement or amplitude of such advance depending upon the adjustment of the rod 30. If it is set nearer the right-hand end of the slot 16, Fig. 3, the greater will be each advance of the ratchet and the sooner will the preliminary winding be completed, while adjustment to the left-hand end of the slot will diminish the amplitude of each advance of the ratchet and the preliminary winding will be prolonged.

As the weighted arm 41 is always tending to turn the ratchet backward I have provided a detent therefor, shown as a tooth 47 on the side of a detent pawl 48, Figs. 3, 5 and 7, fulcrumed on a stud 49 fixed in the bracket 37, the detent pawl having at the other side of its fulcrum an arm 50 enlarged to form a weight 51. Said weight acts to lift the tooth 47 and maintain it in engagement with the ratchet to normally prevent retrograde rotation thereof while permitting the forward or advance movement of the ratchet step-by-step due to oscillation of the traverse-shifter.

The pawl 48 is upturned beyond the tooth 47 and is provided with an elongated, flat or shelf-like extension 52 in front of and adjacent the ratchet 39, said extension lying beneath a pin 53 extended laterally from

one member of a two-part locking device, shown separately in Fig. 8, which acts at times to lock the traverse-shifter from movement relatively to the carriage. Said locking device comprises two oppositely extended members or arms 54, 55 coaxially mounted on a stud 56 fixed in and extended laterally from the traverse-shifter 12, the arm 54 carrying the pin 53 and being cut away at its under side near its pivot stud to form a shelf 58 which overhangs and is adapted to rest upon a lateral stop 57 on the adjacent part of arm 55, see Fig. 8.

When the tooth 47 of the detent pawl is in engagement with a toothed portion of the ratchet 39 the extension 52 is held depressed and the weight 51 elevated in the position shown in the drawings, and the weight of the arm 54 is sufficient, acting through the shoulder 58 and stop 57, to elevate the arm 55 (made in the form of a locking pawl) out of engagement with the notch 59 formed in a keeper 60 rising from and fixed on the carriage 8, see dotted lines Fig. 3, so that there is no obstacle to oscillation of the shifter 12 by the movements of the builder-arm *b*. A pivotally connected link 61 depends from the weight 51 and at its lower end it is jointed at 62 to the adjacent end of a releasing lever 63 fulcrumed at 64 on a downturned lug on the carriage, the opposite end of the lever being formed as a toe 65 extended beneath a lateral pin 66 on the weighted arm 27 of the carriage-locking latch 20. Upon a horizontal stud 67 on the rear wall 5 of the carriage supporting frame is mounted a resetting roll 68, so located with relation to the weight 51 that at times the latter will engage and be lifted by said roll 68, for a purpose to be hereinafter explained.

In the operation of the mechanism which has now been fully described the oscillation of the builder-arm *b* operates through the intervening connections to rock the traverse-shifter 12 on its fulcrum 13 during the preliminary winding of the yarn, and with a short traverse, it being remembered that at this time the carriage is locked from movement by the latch 20, as shown in Figs. 3 and 5, and on each forward stroke of the traverse-shifter, or to the right, Fig. 3, the pawl 44 will engage and effect an angular advance of the ratchet 39 so that a series of such advances will finally bring the notch or recess 40 opposite to the tooth 47 of the detent pawl, and thereupon the said pawl is lifted or rocked on its fulcrum 49, the weight 51 being then free to act, and the elevation of the extension 52 brings it into engagement with and lifts the pin 53. As said pin is lifted, the arm or member 54 of the locking device for the traverse-shifter is elevated so that the latch-like member or arm 55 drops, and if the traverse-shifter is at the

right hand end of its stroke, viewing Fig. 3, said member 55 will at once drop into the notch 59 in the keeper 60. Thereupon, return stroke of the traverse-shifter on its fulcrum 13 is prevented, and said shifter is maintained nearly in the upright position shown in Fig. 3. When the weight 51 descends, which it will be remembered is at the time the pawl-tooth 47 is free to and does enter the recess 40 of the ratchet, said weight acts through the link 61 and the recessed lever 63 to elevate the toe 65 of the latter, said toe lifting the pin 66 and thereby the weighted arm 27 of the carriage locking latch 20, and said latch is permitted to drop down out of engagement with the shoulder 21 as soon as the carriage is moved toward the builder-motion, or to the left, viewing Fig. 3. This movement is effected at the time that the builder-arm descends after the traverse-shifter and carriage have been locked together. The carriage having thus been automatically unlocked from its open supporting frame, and the shifter having been locked to the carriage, it will be manifest that on the next rise of the builder-arm, the weight W acting through the various connections, including the rod 18, will move the carriage and the traverse-shifter as a unit to the right, but with a much longer stroke, corresponding substantially to the stroke of the builder-arm, for now there is no rocking movement between the carriage and the traverse-shifter. The unlocking of the carriage occurs when the preliminary winding has been completed, and such completion is the result of the step-by-step advance of the ratchet 39 to the position necessary to disengage or release the pawl-tooth 47. The longer the time required to effect the step-by-step advance of the ratchet before release of such tooth, the more yarn will be laid upon the bobbin during the preliminary or bunch winding, for if a large bunch is desired, the ratchet will be set so that a greater number of advanced steps have to be taken than would be the case were the bunch to be a small one. After the preliminary winding is completed, there is nothing to further advance the ratchet, as it will be remembered that the traverse-shifter moves in unison with instead of relatively to the carriage.

The main or service winding is begun with the first stroke of the carriage and traverse-shifter in unison, and continues until the main or service winding is completed, the carriage gradually moving to the right, Figs. 1 and 3, as the builder-connection B^x is let off little by little by the winding mechanism, to impart the gain to the long traverse, and as will be understood, such gain is relatively greater for the long traverse than it was for the short traverse. As the carriage and the parts mounted there-

on gradually move to the right, Figs. 1 and 3, the weight 51 will gradually approach the roll 68, and as the advance of the carriage continues, the weight will rise on the roll, and as it rises, the detent pawl 48 will thereby be depressed to withdraw the tooth 47 from the notch 40 of the ratchet. At the instant that the weight 51 is at its highest point, the pawl-tooth will be completely disengaged from said ratchet, and the weighted arm 41 is then free to act to turn back the ratchet in a direction opposite to the arrow 100, Fig. 3, to its initial position, such position and the amount of such turning back, depending upon the angularity of the weighted arm 41 to the notch 40. By changing the angularity of said arm 41, it will be obvious that the angular distance through which the ratchet must be advanced during bunch winding will be regulated. Now after the ratchet has been re-set, the weight 51 is carried past the re-setting roll 68, and said weight gradually descends, permitting the detent tooth 47 to again engage the ratchet at the starting point of the next advance movement of the latter. The lowering of the extension 52 does not have any effect, however, on the traverse-shifter locking device 54, 55, and the winding with the longer traverse will continue until such winding is completed. When the carriage is thereafter wound back in usual manner it is moved to the left, Fig. 1, and on such return movement the latch 20 again rises into engagement with the shoulder 21 on the carriage-supporting frame when the carriage resumes its position shown in Fig. 3. The engagement of the tooth 47 with the latch maintains the weight 51 raised on such return movement of the carriage after said weight has passed to the left of the roll 68, and through the link 61 the toe 65 is depressed and thereby moved away from the pin or stud 66. This permits the weight 29 to act through the toes 28, 26 to hold the latch 20 up in position to engage the shoulder 21 as soon as the carriage has been moved far enough to the left to permit it. During winding back the latch member 55 remains in engagement with its notched keeper 60, as has been stated, and such engagement continues after the latch 20 has again locked the carriage to its supporting frame, but on the first up-stroke of the builder-arm when a fresh set of bobbins is to be wound the traverse-shifter 12 will swing to the right, Fig. 3, thereby withdrawing the latch member 55 from the notch 59. Immediately the heavier arm 54 drops downward and its shoulder 58 acts upon the projection 57 to lift the latch member 55 into inoperative position, shown in Fig. 3, and the preliminary winding of the yarn on the fresh bobbins continues, as described. By the descent of arm 54 the transverse pin 53 is properly

positioned with relation to the extension 52, to be elevated thereby when the preliminary winding is completed.

The preliminary winding *w* is shown in full lines on the barrel of the yarn-receiver or bobbin N, and the main or service winding is indicated by dotted lines at *w*^x.

From the foregoing description it will be seen that the re-setting of the various parts of the traverse motion is effected automatically and that the re-setting is completed by the usual winding-back operation without requiring any attention on the part of the operator. The unlocking of the carriage is effected automatically when the short traverse is to be changed or shifted to the long traverse, and the carriage is again locked automatically by the winding-back operation. So, too, the locking and unlocking of the traverse-shifter and the carriage is automatic, and the re-setting of the ratchet 39, with the reengagement of its detent device, are automatic. The stops 14 serve to limit the rocking movement of the traverse-shifter 12 relatively to the carriage, so that any undue movement of such traverse-shifter is prevented. By making the extension 52 quite long some part of it is always under the pin 53, irrespective of the angular position of the traverse-shifter, and the construction of the carriage locking means, and the traverse-shifter locking means, each in two relatively movable parts, provides for movement of one part or member in advance of the other, as required by the operation of the mechanism as a whole.

Various changes or modification may be made by those skilled in the art without departing from the spirit and scope of my invention as set forth in the appended claims.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In apparatus of the class described, means to effect the winding of yarn upon a yarn-receiver with a short traverse, other and primarily inoperative means movable thereafter to complete automatically the winding with a long traverse, a builder-motion to actuate both said means and impart gain to the traverse, and an instrumentality acting only in connection with the second-named means to prevent movement thereof until the winding with the short traverse is completed.

2. In apparatus of the class described, means to effect the winding of yarn upon a yarn-receiver with a short traverse, other and primarily inoperative means movable thereafter to complete automatically the winding with a long traverse, a builder-motion to actuate both said means and impart gain to the traverse, said first-named means mounted on said second-named means and

movable with and also relatively to the same, an instrumentality acting only in connection with the second-named means to prevent movement thereof until the winding with the short traverse is completed, and a device to lock said two means from relative movement when the second-named means is free to move and effect winding with the long traverse.

3. In apparatus of the class described, means to effect the winding of yarn upon a yarn-receiver with a short traverse, other and primarily inoperative means movable thereafter to complete automatically the winding with a long traverse, a builder-motion to actuate both said means and impart gain to the traverse, an instrumentality acting only in connection with the second-named means to prevent movement thereof until the winding with the short traverse is completed, and a device actuated by operative movement of the first-named means when effecting short traverse to render inoperative automatically the said instrumentality when the winding with such short traverse is completed.

4. In apparatus of the class described, means to effect the winding of yarn upon a yarn-receiver with a short traverse, other and primarily inoperative means movable thereafter to complete automatically the winding with a long traverse, a builder-motion to actuate both said means and impart gain to the traverse, a stationary support on which the second-named means is slidably mounted, a locking shoulder on the support, and a latch pivotally mounted on the said second-named means to engage the shoulder and prevent movement of such means on its support until winding with the short traverse is completed.

5. In apparatus of the class described, a builder-motion, a reciprocating ring-rail, a carriage, a traverse-shifter fulcrumed thereon and connected with the ring-rail, to reciprocate the latter with a short traverse when said traverse-shifter is rocked, a single connector between the builder-motion and the traverse-shifter, means on the latter to cooperate with the carriage and prevent rocking movement of the traverse-shifter after a primary winding of yarn has been laid upon a yarn-receiver with the short traverse, means to lock the carriage from movement during such primary winding, and an instrumentality to cause release of the carriage and locking of the traverse-shifter, automatically, when the primary winding is completed, whereby the carriage and traverse-shifter thereafter move as a unit with a long traverse to lay a secondary winding of yarn upon the yarn-receiver.

6. In apparatus of the class described, a builder-motion, a reciprocating ring-rail, a carriage, a traverse-shifter fulcrumed there-

on, a builder-connector directly connecting the builder-motion and traverse-shifter, to either rock the latter or effect reciprocation of the carriage when the traverse-shifter is locked thereon, a transmitting connection between the ring-rail and traverse-shifter and attached thereto near its fulcrum, to effect short traverse of the ring-rail by rocking movement of the traverse-shifter, separate means to lock the carriage from movement and to lock the traverse-shifter from movement relatively to the carriage, respectively, and an instrumentality governed by rocking movement of the traverse-shifter to render operative automatically the shifter-locking means and to render inoperative the carriage-locking means at the end of a predetermined period of short traverse, the carriage and traverse-shifter thereafter moving in unison by the operation of the builder-motion to reciprocate the ring-rail with a long traverse.

7. The combination, with a builder-motion and a reciprocating ring-rail, of a carriage adapted to be reciprocated by or through the builder-motion, an operating connection between the latter and the ring-rail, including a traverse-shifter fulcrumed on the carriage, to effect reciprocation of the ring-rail first with a short traverse and thereafter with a long traverse, means to lock the carriage from operative movement during short traverse of the ring-rail, an instrumentality to lock the traverse-shifter from movement relatively to the carriage during long traverse, and means governed by rocking of the traverse-shifter relatively to said carriage to unlock automatically the latter and render operative the traverse-shifter locking instrumentality when the change is to be made from short to long traverse, said means including a member advanced step-by-step a predetermined amount during the period of short traverse.

8. The combination, with a builder-motion and a reciprocating ring-rail, of a carriage adapted to be reciprocated at times by or through the builder-motion, a traverse-shifter fulcrumed on the carriage, connections between said traverse-shifter and the builder-motion and ring-rail, to reciprocate the latter with a short traverse by rocking movement of the traverse-shifter or with a long traverse by reciprocation of the carriage, separate means to lock the carriage from movement and to lock the traverse-shifter relatively to the carriage, respectively, and an instrumentality mounted on the carriage and governed by rocking movement of the traverse-shifter to control both of said locking means and render one operative when the other is inoperative, and vice versa.

9. In apparatus of the class described, a builder-motion, a reciprocating ring-rail,

connecting means, including a rocking member, to solely control the reciprocation of the ring-rail with a short traverse and lay a primary winding of yarn upon a yarn-receiver, a carriage adapted to be reciprocated and connected with the builder-motion only through said rocking member, a single pivotal connection between the latter and the carriage, and a locking device cooperating only with the carriage during the period of short traverse to prevent operative movement thereof until the completion of the primary winding, the carriage when released being reciprocated by or through the builder-motion to lay a secondary winding of yarn with a long traverse.

10. In apparatus of the class described, a builder-motion, a reciprocating ring-rail, connecting means, including a rocking-member, to solely control the reciprocation of the ring-rail with a short traverse and lay a primary winding of yarn upon a yarn-receiver, a carriage adapted to be reciprocated and connected with the builder-motion only through said rocking member, a single pivotal connection between the latter and the carriage, and a locking device cooperating only with the carriage during the period of short traverse to prevent operative movement thereof until the completion of the primary winding, the carriage when released being reciprocated by or through the builder-motion to lay a secondary winding of yarn with a long traverse, combined with a pawl on the rocking member, a ratchet on the carriage advanced step-by-step by cooperation with the pawl during the primary winding, and means made operative by a predetermined advance of the ratchet to render the carriage locking device inoperative.

11. In apparatus of the class described, a builder-motion, a reciprocating ring-rail, connecting means, including a rocking member, to solely control the reciprocation of the ring-rail with a short traverse and lay a primary winding of yarn upon a yarn-receiver, a carriage adapted to be reciprocated and connected with the builder-motion only through said rocking member, a single pivotal connection between the latter and the carriage, and a locking device cooperating only with the carriage during the period of short traverse to prevent operative movement thereof until the completion of the primary winding, the carriage when released being reciprocated by or through the builder-motion to lay a secondary winding of yarn with a long traverse, combined with a pawl on the rocking member, a ratchet on the carriage advanced step-by-step by cooperation with the pawl during the primary winding, means made operative by a predetermined advance of the ratchet to render the carriage locking device inoperative, and manually-adjusted means to vary the ampli-

tude of the advance of the ratchet and thereby regulate the length of the period of short traverse.

12. The combination with a builder-motion and a reciprocating ring-rail, of a carriage adapted to be reciprocated by or through the builder-motion, an operating connection between the ring-rail and builder-motion, including a traverse-shifter mounted on and movable with and also relatively to the carriage, a single pivotal connection between the carriage and traverse-shifter and about which the latter rocks during the formation of a preliminary winding of yarn upon a yarn-receiver with a short traverse, means to lock the carriage from movement during the period of short traverse, separate means to lock the traverse-shifter and carriage together after the period of short traverse is completed, whereby said parts reciprocate as a unit and cause the formation of the main winding with a long traverse, and means governed by rocking movement of the traverse-shifter, and including a weight, to render the carriage locking means inoperative and the locking means for the traverse-shifter operative when a period of short traverse is completed.

13. The combination with a reciprocating ring-rail, a builder-motion including an oscillating member, and a carriage reciprocated by said member with a constant stroke, of connections between said oscillating member and the ring-rail and including a rocking traverse-shifter, fulcrumed on the carriage, to effect reciprocation of the ring-rail with a short traverse, means to lock the carriage from movement during short traverse, other means to lock the traverse-shifter against rocking movement after short traverse is completed, a ratchet having a releasing notch and advanced step-by-step by rocking movement of the traverse-shifter during the period of short traverse, a weighted detent pawl coöperating with said ratchet and movable into abnormal position when the notch in said ratchet reaches operative position, and means whereby abnormal movement of the detent pawl renders the carriage locking means inoperative and the locking means for the traverse-shifter operative, the extent of the advance of the ratchet determining the length of the period of short traverse.

14. The combination with a ring-rail, a builder-motion, and a carriage adapted to be reciprocated thereby with a constant stroke to effect the traverse of the ring-rail and lay a primary winding of yarn upon a yarn-receiver with a long traverse, of a traverse-shifter pivotally mounted on the carriage and operatively connected with the ring rail, a single connection between the builder-motion and the traverse-shifter, a latch to engage and hold the carriage from

movement and thereby cause the traverse-shifter to be rocked with relation to the carriage, to form a preliminary winding with a short traverse, a locking device to prevent rocking movement of the traverse-shifter at the termination of the short traverse period, and mechanism governed by rocking movement of the traverse-shifter to effect release of the carriage, and the operation of the locking means for the traverse-shifter, after a predetermined period of short traverse, to thereby cause subsequent reciprocation of the carriage and traverse shifter as a unit by or through the single connection with the builder-motion, to effect the long traverse and lay the main winding of yarn.

15. In combination with a ring-rail, a builder-motion, and a reciprocating carriage, of a traverse-shifter fulcrumed on the carriage, a single connection between the builder-motion and the traverse-shifter, transmitting connections between the latter and the ring-rail, to effect reciprocation of the latter with a short traverse by rocking movement of the traverse-shifter, and to effect reciprocation of the ring-rail with a long traverse by reciprocating movement of the carriage and traverse-shifter as a unit, a ratchet having a deep notch, an actuating pawl on the traverse-shifter to advance the ratchet step-by-step, a weighted detent pawl having a tooth to engage and prevent retrograde movement of the ratchet, an extension on said pawl, a device to lock the traverse-shifter and having a projection adapted to be engaged by said extension, a latch to lock the carriage from movement during rocking movement of the traverse-shifter, and a controlling connection between the weighted detent pawl and said carriage-locking latch, movement of the tooth of the detent pawl into the notch of the ratchet permitting the weight to move the detent pawl into abnormal position and permit disengagement of the carriage-locking latch to release the carriage, the extension on the detent pawl at such time acting upon the locking device for the traverse-shifter to render the same operative and prevent relative movement of the traverse-shifter and carriage.

16. The combination with a ring-rail, a builder-motion and a reciprocating carriage having a traverse-shifter fulcrumed thereupon, of a transmitting connection between the traverse-shifter and the ring-rail to reciprocate the latter with a short traverse by rocking movement of the traverse-shifter, and to effect reciprocation of the ring-rail with a long traverse when the carriage and traverse-shifter are reciprocated as a unit, a single connection between the traverse-shifter and the builder-motion, separate means to lock the carriage from movement during the period of short traverse and to lock the traverse-shifter to the carriage during the pe-

riod of long traverse, an instrumentality governed by rocking movement of the traverse-shifter, means to render the carriage-locking means inoperative and to render operative the traverse-shifter locking means at the termination of the period of short traverse, said instrumentality including a ratchet advanced step-by-step, an adjustable device to automatically return the ratchet to initial position following a predetermined automatic advance movement thereof, detent means for the ratchet operatively connected with and controlling the locking means for the carriage and the traverse-shifter, respectively, and a device to temporarily disengage the detent means from the ratchet during reciprocation of the carriage, to thereby permit the ratchet to resume its initial position and to re-set the detent means, whereby upon winding back the carriage will be automatically locked and the locking means for the traverse-shifter will release the latter at the beginning of the next period of short traverse.

17. In apparatus of the class described, a reciprocating ring-rail, a builder-motion, including a winding mechanism, means connecting the winding mechanism and ring-rail to effect reciprocation of the latter, said means including a carriage, a traverse-shifter fulcrumed thereon, and automatically controlled devices to lock the carriage

when the traverse-shifter is rocked to effect reciprocation of the ring-rail with a short traverse, and to lock the traverse-shifter to the carriage when the latter is unlocked and moved with the traverse-shifter as a unit to effect reciprocation of the ring-rail with a long traverse, the gain due to the winding mechanism being uniform during each traverse period but of greater extent during long traverse.

18. In apparatus of the class described, a reciprocating ring-rail, means to control its reciprocation to effect a primary winding of yarn upon a yarn-receiver with a short traverse, other means inoperative during the primary winding, to thereafter act in unison with the first-named means and control the ring-rail to effect a second winding with a long traverse, and an instrumentality cooperating with both of said means to impart the gain to the traverse, the gain being uniform during both traverse periods but of greater length during the period of long traverse.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALONZO E. RHOADES.

Witnesses:

ROBERT JAMESON,
E. D. OSGOOD.