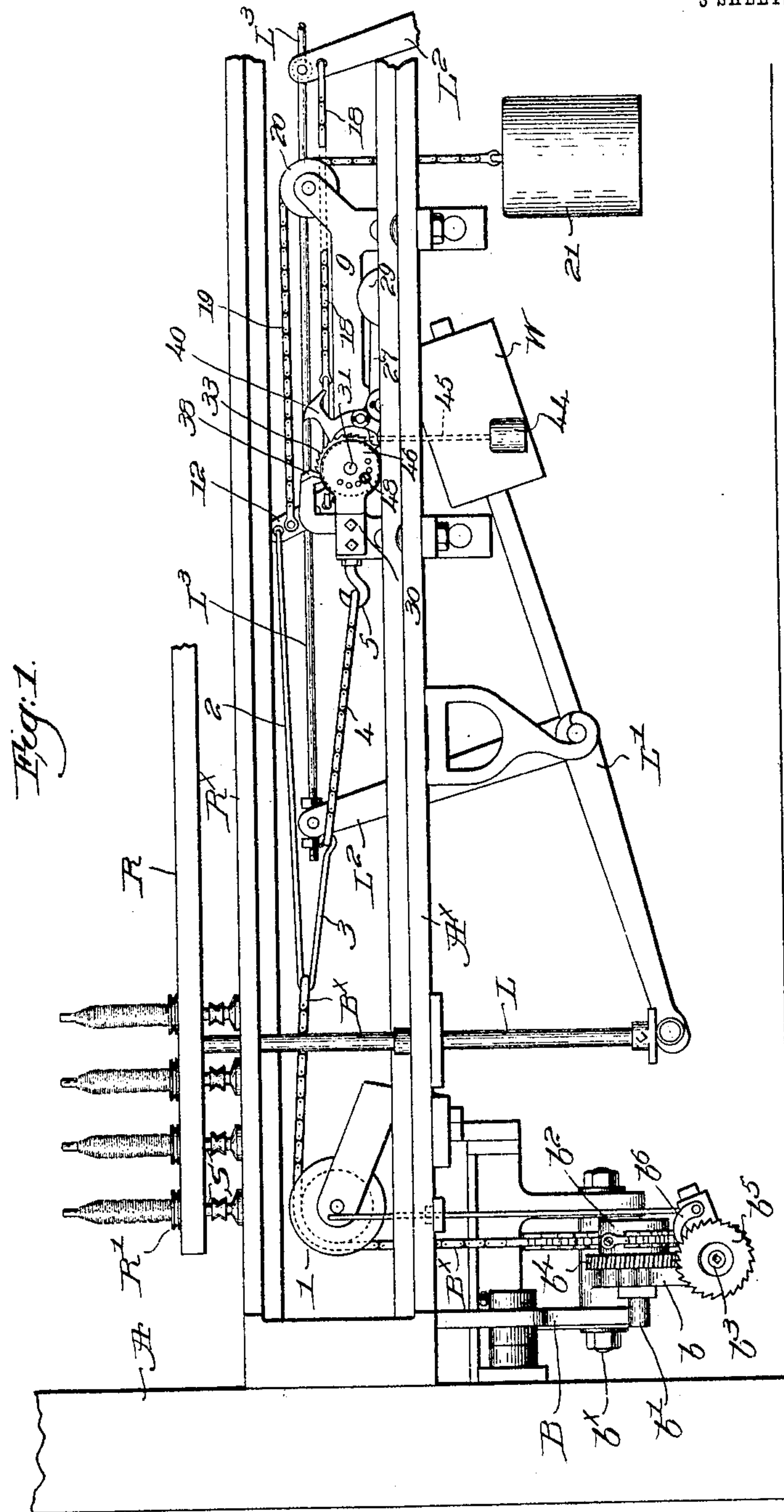


913,164.

Patented Feb. 23, 1909.

3 SHEETS—SHEET 1.



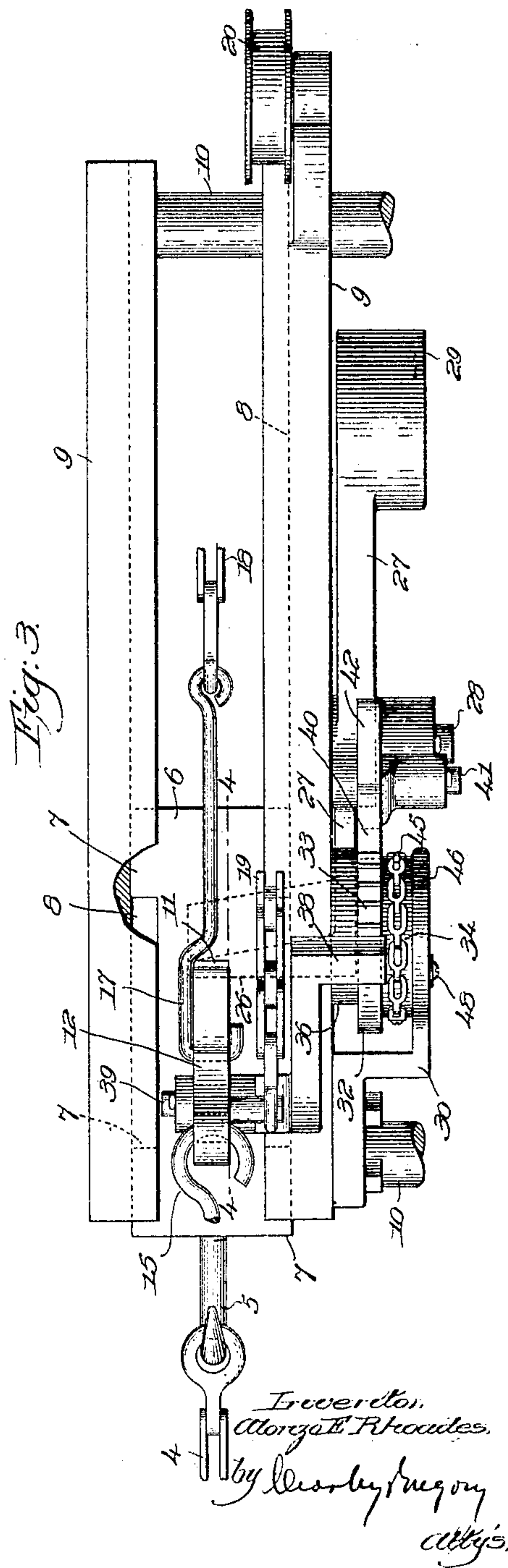
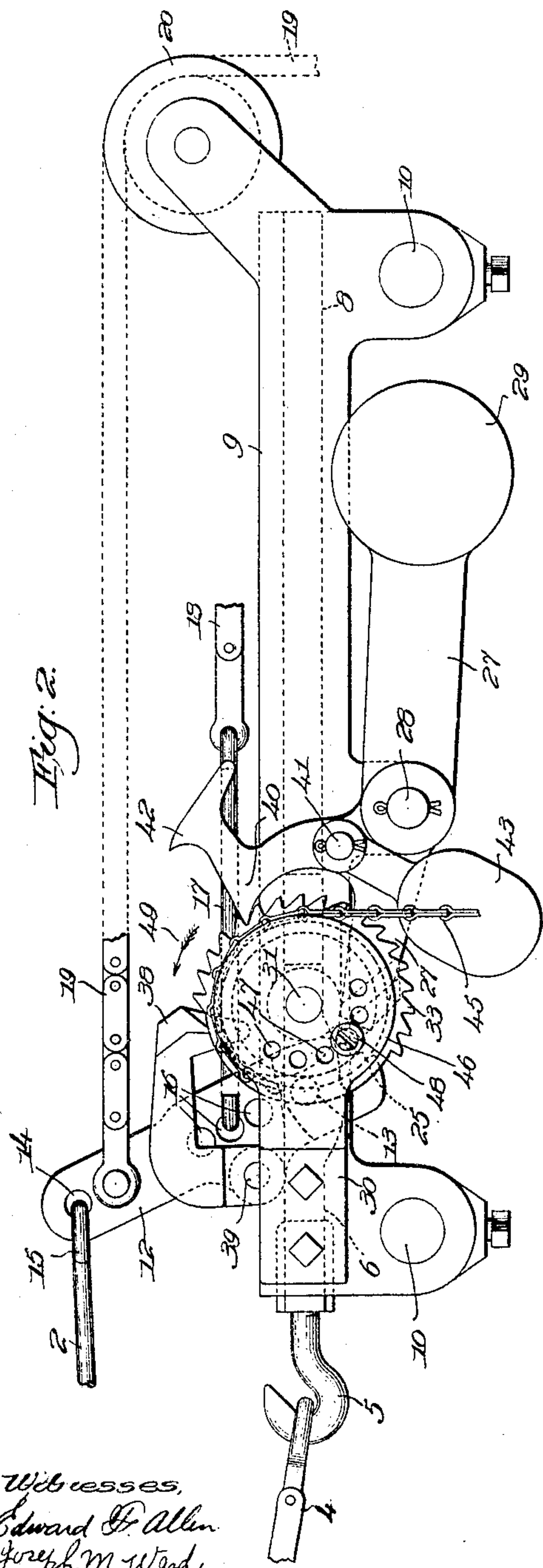
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Patented Feb. 23, 1909.

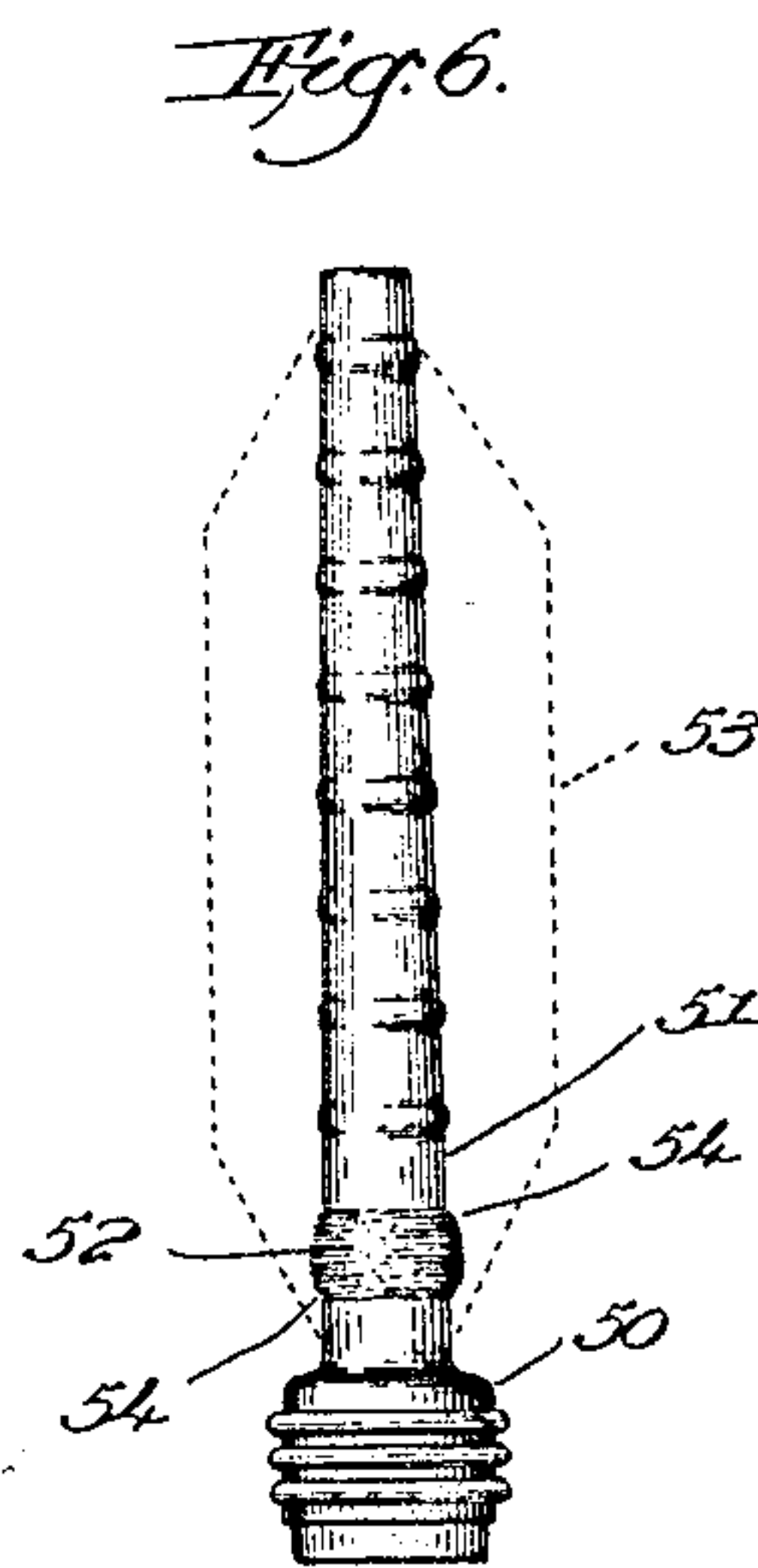
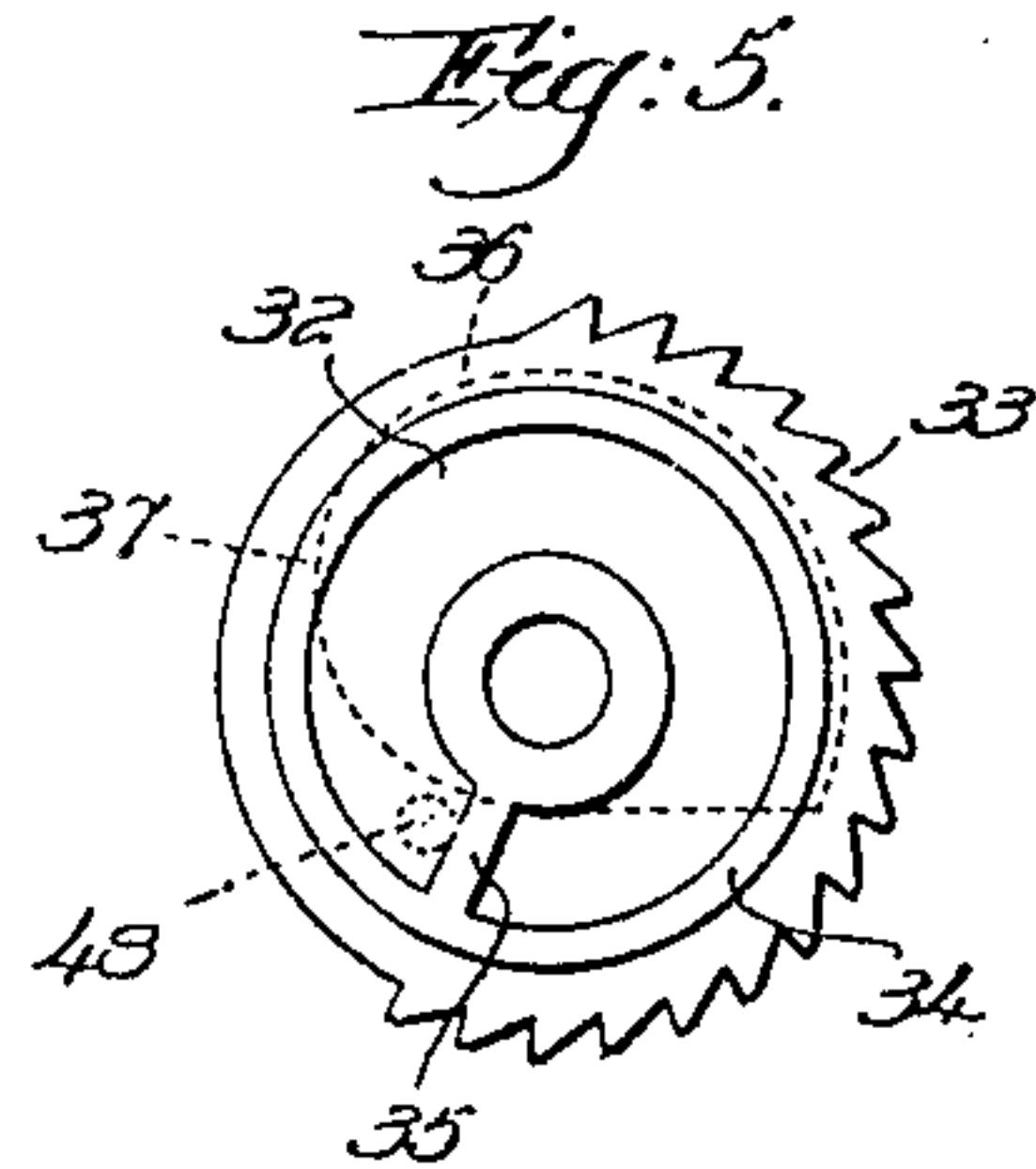
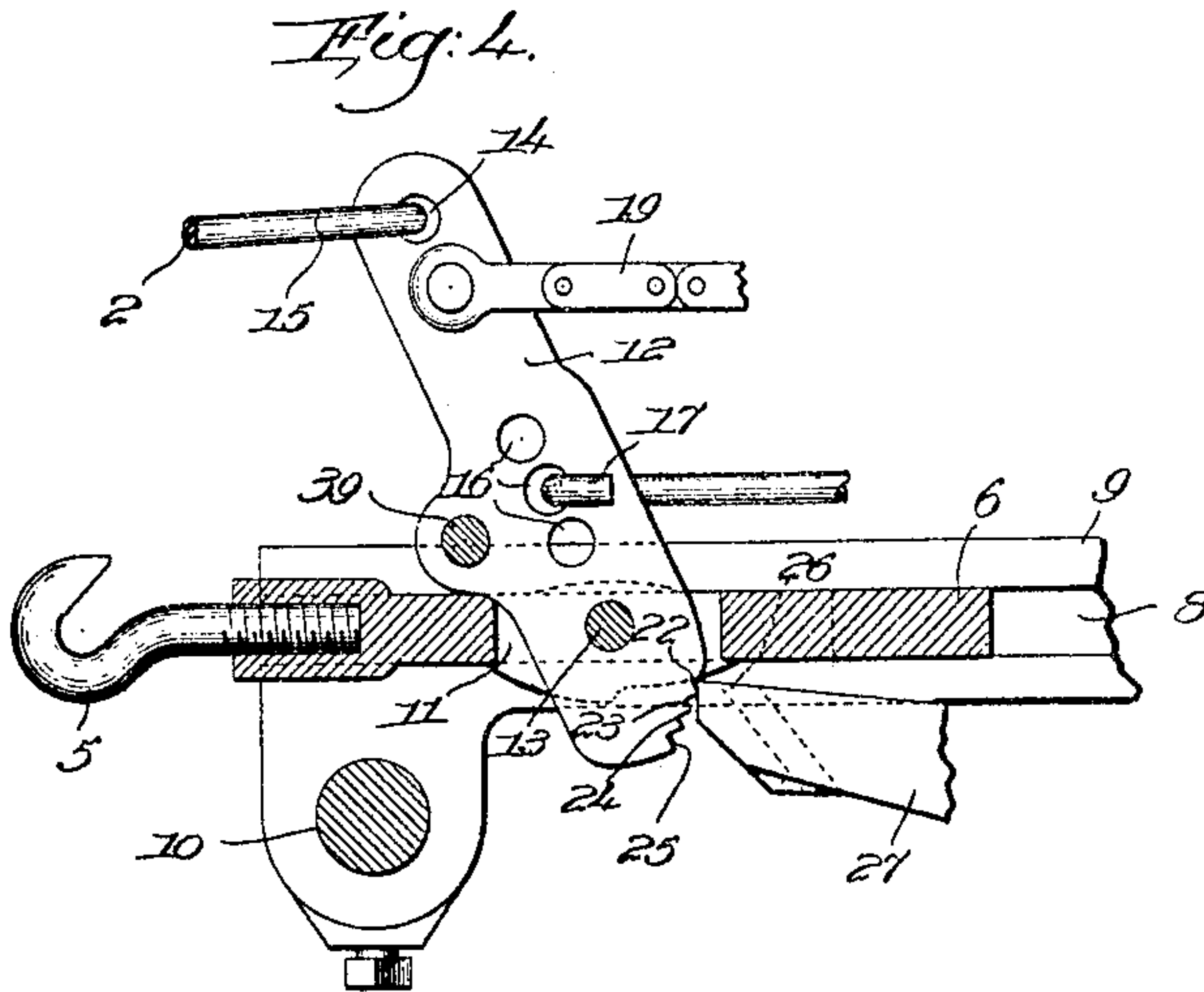
3 SHEETS—SHEET 2.



A. E. RHOADES.
YARN SPINNING APPARATUS.
APPLICATION FILED MAR. 27, 1908.

913,164.

Patented Feb. 23, 1909.
3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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YARN-SPINNING APPARATUS.

No. 913,164.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed March 27, 1908. Serial No. 423,521.

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 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 that type of apparatus wherein means are provided to effect the winding of yarn upon a yarn-receiver or bobbin in such manner that a preliminary winding or bunch is first laid and thereafter a main or service winding of yarn is laid, such wound bobbins being thereafter used in the shuttles of automatic filling-replenishing looms of the "feeler" class. In such looms the change of filling is effected by or through the feeler when the yarn has been woven off down to a predetermined extent, the preliminary winding or bunch containing sufficient yarn to maintain continuity of the filling when a change of filling is effected through the action of the feeler.

As will be manifest to those skilled in the art any interference with the free drawing off of the yarn in the shuttle during the weaving operation invariably tends to yarn breakage, and in practice I have observed that there is at times a tendency to yarn breakage caused by the yarn in the main winding catching over the end of the bunch nearer the head of the bobbin. This catching is due to an abruptness or squareness, as it may be termed, of the inner end of the preliminary winding, so that the final layers of the main winding behind such abrupt end of the bunch are caught or held thereby and broken by the forward pull of the yarn in the direction of the tip of the bobbin. As the result of study and observation I believe that this abruptness of the inner end of the bunch is a result of the manner in which the same has been formed heretofore, and is due to the fact that the "gain" dependent upon the winding mechanism of the builder-motion is insufficient for the laying on of the yarn which forms the preliminary winding. It will be understood that the "gain" of the traverse is that movement of the ring-rail whereby at each up-stroke it rises a little higher, and at each downstroke descends not quite so low as on the previous

downstroke, to lay the yarn in successive layers upon the bobbin. When the builder-arm has a constant stroke the traverse will be of constant length unless modified, and in bunch-building apparatus such modification has been effected heretofore in such manner that during the preliminary winding or formation of the bunch the traverse is shortened, and then automatically lengthened to its full extent when main winding is begun. The "gain" when winding with full traverse gives satisfactory results in practice, but the same gain when winding with the short traverse appears to be insufficient to impart the desired gradual taper to the bunch, particularly at its inner end, as successive layers of yarn are laid, giving the abrupt or more nearly cylindrical shape to the bunch instead of the desired tapered contour.

My present invention has for its principal object the production of means, in an apparatus of the type hereinbefore mentioned, whereby the normal "gain" is increased during the formation of the preliminary winding of yarn upon a yarn-receiver, at the time of the shorter traverse, whereby such winding has a tapering end over which the yarn will not catch during the weaving off when the bobbin is in the loom-shuttle. I have also simplified the construction of the apparatus in different particulars, and provided simple and readily adjusted means for determining the amount of yarn to be laid in the preliminary winding.

The various novel features of my invention as embodied in one practical form 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 one form of my present invention, the apparatus being shown in readiness to begin the formation of the preliminary winding or bunch, the ring-rail being at the bottom of its traverse; Fig. 2 is an enlarged detail in front elevation of the traverse shifting or changing 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. 3 is a top plan view of the parts illustrated in Fig. 2; Fig. 4 is a longitudinal section through the carriage on the line 4—4, Fig. 3, showing the traverse controlling member and the shiftable or variable fulcrum with which said member coöperates during the preliminary winding; Fig. 5 is a front elevation of the rotatable member of the means by which is determined the number of layers of yarn to be laid in the preliminary winding; Fig. 6 is an enlarged elevation of a yarn-receiver or bobbin showing the completed preliminary winding or bunch thereon, the completed service winding being indicated by dotted lines.

Having reference to Fig. 1 the frame A, spindle-rail R^x on which are mounted suitable rotatable spindles S, the vertically-reciprocating ring-rail R provided with a ring R' for each spindle, the lifter-rods L (only one being shown), a coöperating rocker as L' for each lifter-rod, one of said rockers having an attached weight W to elevate the ring-rail, the upturned rocker-arms L² rigidly connected with said rockers, and the connecting links, as L³, to transmit from the weighted rocker L' simultaneous reciprocating movement to the several lifter-rods, may be and are of usual construction and operate in a manner well known to those familiar with spinning or similar yarn-twisting machines.

The builder-motion comprises the builder-arm b fulcrumed at b^x and provided with a roller or other stud b' to coöperate with an actuating or traverse-cam B, (which in practice may be of the general shape shown in my United States Patent No. 798704, dated September 5, 1905), and the winding mechanism mounted on the arm, including the drum b², the pick-shaft b³ having the usual worm to rotate the worm-gear b⁴ attached to the drum, effecting gradual rotation of the latter, the pick-wheel b⁵, and the actuating pawl b⁶, operating as usual, the builder-motion as a whole being of well-known construction, the builder-arm being given a constant stroke by the cam B, and the gradual rotation of the drum b² letting off the attached chain or other connection B^x, attached at one end to the drum and at its other end being connected indirectly with the ring-rail, to effect the gain of the traverse. The chain B^x leads up over a guide-sheave 1 on the girder A^x and is attached to a bridle made by bending a rod to present long and short portions 2, 3, the latter being connected by a chain or other flexible member 4 with a hook 5 on a carriage 6, having lateral projections 7, Fig. 3, to slide in horizontal guide-ways 8 in the sides 9 of an open frame, said sides being rigidly connected by cross-bars 10, the frame being rigidly attached to the girder A^x. Said carriage has a longitudinal slot 11 therein to receive the lower

end of a traverse-shifter, shown as a lever 12 pivoted near its lower end at 13 on the carriage and having its longer end upturned above the carriage and provided with a hole 14 to receive the hook 15 formed on the long part 2 of the bridle hereinbefore referred to. The said part 2 is a species of link directly connecting the chain B^x and the traverse-shifter, while the bridle part 3 and flexible member 4 provide a separate connection between the carriage and the chain B^x, which may be termed the builder connector, and the respective connections between it and the traverse-shifter 12 and carriage 6 may be termed the auxiliary or traverse-shifter connector and the main or carriage connector, respectively.

As most clearly shown in Fig. 4 the shifter 12 has a series of three holes 16 between the hole 14 and the pivot 13, and nearer the latter, any one of said holes being adapted to receive the hook 17 of a flexible member or chain 18 attached to the next rocker-arm L² beyond the carriage, partly shown in Fig. 1.

The preliminary winding or bunch is governed as to its traverse by or through oscillation of the lever 12, transmitted to the ring-rail through the chain 18, rocker-arm L², etc., and the shortest traverse for the preliminary winding is effected by catching the hook 17 in the hole 16 nearest the shifter pivot 13, while the longest traverse for such winding is attained by engaging the hook in that hole of the series 16 farthest from the said pivot.

Near the upper end of the traverse-shifter 12 is connected a chain 19, carried over a guide-sheave 20 on the carriage supporting frame 9 and having attached to its depending end a weight 21, Fig. 1, which acts in conjunction with the weight W to keep the builder connector B^x and the intervening connections taut when the carriage and the traverse shifter 12 move in unison during the main or service winding, and also when the shifter is rocked during preliminary winding. The forward or right hand edge of the shifter 12, Fig. 4, is provided below its pivot with a series of transverse notches or shoulders 22, 23, 24, 25, arranged one below the other and successively nearer a vertical line drawn through the pivot 13, any one of the notches being adapted to engage a transverse extension 26 formed on a lever 27 fulcrumed on a stud 28 projecting frontward from the lower part of the frame 9, and weighted at 29, the extension 26 constituting a shiftable or movable fulcrum for the traverse-shifter 12 during the preliminary winding, as will be explained, the weighted end 29 tending to lift the extension 26, which latter extends under the carriage, as shown in Fig. 3.

From the foregoing description it will be

clear that when the fulcrum 26 engages any one of the notches 22—25 the lever 12 will rock about such fulcrum when the builder-arm *b* rises and falls, the carriage 6 at such time having a very slight reciprocatory movement, inasmuch as the pivot 13 is a short distance above the shiftable fulcrum, but the carriage reciprocation is so slight that it is of no moment in the operation of the apparatus. When the builder-arm rises the lever 12 swings to the right, Figs. 1, 2 and 4, about the beveled edge of the fulcrum 26, and through the chain 18 and connected parts the ring-rail is permitted to rise, but its stroke or traverse will be very much shorter than the stroke of the builder-arm, as the chain 18 is connected to the lever 12 so near its fulcrum, a layer of the yarn being laid on the yarn-receivers or bobbins during the rise of the ring-rail. The latter descends when the builder-arm is depressed, but owing to the winding mechanism the builder connector *B*^{*} is given off slightly at each descent of the builder-arm, so that the rail *R* will not descend quite so low as on its preceding down-stroke, and on its next up-stroke it will rise a little higher than before, imparting the "gain" to the traverse. The slight gain due to the winding mechanism of the builder-motion is diminished by the same structure that shortens the traverse during preliminary winding, previously explained, so that such winding or bunch tends to be built with too abrupt or blunt ends.

In my present invention I have provided means to increase the gain during preliminary winding so that the ends of the bunch so laid will be gradually tapered, this increase being effected by the coöperation of the fulcrum 26 with one after another of the notches 22—25. It should be observed that during preliminary winding the main connector 3, 4 is slack, as the advance of the carriage 6 is prevented by the fulcrum 26, as explained. Before explaining the means for shifting said fulcrum I will describe the manner in which the gain is increased. Should the fulcrum remain in engagement with the same notch during preliminary winding there would be no increase in the gain, but the fulcrum 26 is automatically shifted from the notch 22 to engage the notch 23, then the notch 24, and finally the notch 25, so that by each shift there is an increment of gain, the total gain being the reduced gain due to the winding mechanism of the builder-motion plus the increment due to the shift of the fulcrum. By each shift the rail descends to a less degree and on each upstroke rises higher than would be the case if the winding mechanism alone controlled the gain, so that the increased gain imparted during the preliminary winding imparts to the yarn mass so

laid a tapered shape at each end, preventing any catching of the yarn of the main winding when the bobbin is in the loom.

Upon the front of the frame 9 is bolted a bracket 30 which supports the outer end of a stud 31 on which is rotatably mounted a ratchet disk 32 having a series of teeth 33 on a portion of its periphery, Figs. 1, 2 and 5, and on the outer face of the disk is formed an annular rib constituting a drum 34, with a radial rib 35, best shown in Fig. 5, opposite the last tooth of the series 33. On the inner face of the disk 32 is formed or secured a cam 36, the shape of which is substantially as shown in Fig. 5, the gradual rise of the cam being shown at 37. Said cam is located above the end of the lever 27 nearer the fulcrum extension 26, see Fig. 3, and an actuating pawl 38 overhangs the ratchet disk 32 and is pivoted at 39 on the traverse-shifter 12, while a weighted stop-pawl 40 is pivoted on a stud 41 extended forward from the frame 9, the pawl 40 having a hook-like extension 42 adapted to be engaged at times by the pawl 38. By reference to Fig. 3 it will be seen that the said pawl 38 is of considerable width, so that such engagement with the detent or stop-pawl 40 may be effected. The weighted depending tail 43 of the stop-pawl serves to normally maintain it in engagement with the ratchet disk 32, to prevent rotation of the latter by means of a weight 44 attached to a chain 45 carried around and secured to the drum 34. The part of the bracket 30 adjacent the drum 34 is made circular, as at 46, and has a circularly arranged series of holes 47, into any one of which may be inserted a stop 48 which projects into the drum in the path of the rib 35. The angular movement through which the pawl 38 turns the ratchet disk 32 determines the amount of yarn to be laid in the preliminary winding, the farther ahead the setting of the ratchet when winding is begun the smaller the bunch, and conversely the larger will be the bunch the greater the number of teeth 33 to be engaged by the pawl 38.

I have shown the stop 48 as positioned in the third hole from the bottom of the series 47, and on the first swing of the traverse-shifter 12 to the right, Figs. 1 and 2, the pawl 38 will engage the first tooth of the series 33 and as the shifter swings back the disk 32 will be advanced one step in the direction of arrow 49, Fig. 2, and slightly changing the position of the fulcrum-shifting cam 36, the pawl 40 holding the ratchet disk in advanced position. This step-by-step advance continues as the preliminary winding proceeds, the part 37 of the shifting cam acting upon the adjacent part of the lever 27 to shift the fulcrum 26 successively from one to another of the notches 22—25, to provide for the increased gain during

the preliminary winding, the chain 45 being gradually wound upon drum 34, and the carriage 6 moving ahead slightly as the fulcrum shifts, until the fulcrum 26 is
5 entirely disengaged from the traverse-shifter. Thereupon the weight W acts through the chain 18 to pull the carriage ahead far enough to tighten the main connector 3, 4, the weight 21 assisting, the
10 traverse-shifter 12 assuming the position shown in Figs. 2 and 4, with relation to the carriage, and main winding is at once begun, the traverse-shifter and carriage moving as a unit, the reciprocation of the carriage to
15 lay the yarn with the long traverse being controlled directly by the oscillation of the builder-arm, as will be manifest. If a smaller bunch is to be wound, *i. e.*, one with less yarn, the stop 48 would be set in one
20 of the two holes 47 to the right of the position of the stop illustrated in Fig. 2, the ratchet disk being moved by hand in the direction of the arrow 49 to move the positioning rib 35 further to the right, and as
25 there would be a corresponding advance movement of the cam 36 obviously the latter would throw the fulcrum 26 out of operation earlier than if the apparatus be set as in Fig. 2. On the other hand if the stop 48 is
30 set in one of the holes to the left the pawl 38 must operate upon a greater number of teeth 33 in order to cause the shifting cam 36 to throw the fulcrum 26 out, and consequently the preliminary winding or bunch will con-
35 tain more yarn. The stop can be set in such position that the cam will throw out of operation the fulcrum 26 before any winding has been made, and in such case no bunch will be formed, inasmuch as the car-
40 riage 6 will reciprocate to lay the yarn with the full or long traverse with the first oscillation of the builder-arm.

It will be evident that the short traverse is effected through the rocking movement of
45 the lever 12 relatively to the carriage, such movement of the lever also acting through the pawl 38 and coöperating parts to control the time the preliminary winding shall continue, the shifting fulcrum 26 coöperating
50 with the lever 12 to increase the gain when winding the bunch, and when the traverse is to be changed or shifted the control by the builder-motion is shifted, by the traverse-shifter or lever 12, from itself to the
55 carriage, the circular part of the cam 36 keeping the fulcrum out of engagement with the traverse-shifter 12.

When the ratchet disk 32 has been turned until the last tooth of the series 33 is en-
60 gaged by the detent pawl 40 further advance of the disk and the drum 34 ceases, but as the carriage advances to the right the pawl 38 finally engages the hooked end 42 and disengages the detent pawl from the ratchet
65 teeth, the weight 44 at once acting through

chain 45 to reversely rotate the drum and disk back to starting position, so that the parts are thereby set automatically. This occurs soon after the main or service wind-
ing begins and the continued advance of the
70 carriage 6 will finally cause the pawl 38 to ride up over and past the top of the detent pawl 42, and when winding back is performed, after a set of bobbins has been
75 wound, the carriage is moved to the left to starting position, the pawl 38 sliding up over the head of the pawl 40 and the various parts are in position to start the winding of a new set of bobbins.

It is not necessary that each advance of
80 the angularly movable instrumentality for controlling the quantity of yarn in the preliminary winding shall be coincident with a shift of the fulcrum for the traverse-shifter, for the stroke of the actuating pawl 38, the
85 size of the teeth 33, and the shape of the fulcrum-shifting cam 36, any or all, may vary the relation between the advance and the fulcrum shifting. For instance, it might be desirable that the ratchet disk 32 be ad-
90 vanced several steps for each shift of the fulcrum 26, or each advance might be accompanied by a fulcrum shift. In the latter case, if there are only four seats or notches with which the fulcrum coöperates, as in the
95 structure herein illustrated, it will be manifest that the fulcrum will be wholly disengaged from the traverse-shifter when four shifts of said fulcrum have been made coin-
100 cidentally with four advance steps of the ratchet disk or controller. As a matter of fact in the structure illustrated a plurality of advance steps of the ratchet disk will be made for each shift of the fulcrum for the
105 traverse-shifter.

In Fig. 6 the yarn-receiver or bobbin is of usual construction, the barrel being made cylindrical near the head 50, as at 51, and upon such cylindrical portion the prelimi-
nary winding or bunch of yarn 52 is laid,
110 and thereafter the main or service winding of yarn is laid, indicated by the dotted lines 53. As described the preliminary winding is laid with the shorter traverse, but with the augmented gain, to impart to the bunch
115 the taper 54 at its ends, the main winding being laid with the longer traverse.

Various changes or modifications may be made by those skilled in the art without de-
parting from the spirit and scope of my in-
120 vention 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, a
125 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 pri-
mary winding, to thereafter control the
130

ring-rail to effect a secondary winding with a long traverse, and an instrumentality co-operating with the first-named means to increase the gain when the primary winding is being laid.

2. 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 control the ring-rail to effect a secondary winding with a long traverse, an actuator common to both said means, and an instrumentality to temporarily coöperate with the first-named means and augment the gain when said means is controlling the reciprocation of the ring-rail.

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 to thereafter 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 to co-operate with the first-named means and augment the gain when the winding with the short traverse is being laid, said instrumentality also preventing the operation of the second-named means until the winding with the 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 to thereafter complete automatically the winding with a long traverse, a builder-motion to actuate both said means and impart gain to the traverse, an instrumentality to augment the gain when the winding with the short traverse is being laid, and also maintain inoperative the second-named means at such time, and a device to render said instrumentality inoperative automatically when the winding is changed from short to long traverse, thereupon permitting the second-named means to operate.

5. In apparatus of the class described, a builder-motion, a reciprocating ring-rail, connecting means between it and the builder-motion to solely control the reciprocation of the ring-rail and lay a primary winding of yarn upon a yarn-receiver with a short traverse, other and primarily inoperative means connected with the builder-motion to thereafter control the reciprocation of the ring-rail and lay a secondary winding of yarn with a long traverse, and an instrumentality to coöperate temporarily with the first-named means and augment the gain due to the builder-motion while the primary winding is being formed.

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

connecting means between it and the builder-motion to solely control the reciprocation of the ring-rail and lay a primary winding of yarn upon a yarn-receiver with a short traverse, other means connected with the builder-motion and inoperative during the primary winding, to thereafter control the reciprocation of the ring-rail and lay a secondary winding of yarn with a long traverse, and an instrumentality to coöperate with the first-named means during a predetermined time to augment the gain due to the builder-motion while the primary winding is being formed, said instrumentality during such period maintaining inoperative the second-named means.

7. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and different means each actuated by said member to effect the automatic formation of a primary winding with a short traverse, and a secondary winding with a long traverse, of yarn upon a yarn-receiver, combined with an instrumentality to augment the gain due to the builder-motion when the primary winding is being formed and to determine the instant when the short traverse is changed to the long traverse, said instrumentality including a member rocked during short traverse, and an automatically shifting fulcrum about which it rocks at such time.

8. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and different means each actuated by said member and operating successively to effect the automatic formation of a primary winding with a short traverse, and a secondary winding with a long traverse, of yarn upon a yarn-receiver, combined with an instrumentality to intermittently augment the gain due to the builder-motion when the primary winding is being formed through the operation of one of said means, and to maintain the other of said means inoperative, and a device to render said instrumentality wholly inoperative at a predetermined time and release the second-named means and thereby effect the change from the short to the long traverse.

9. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and different means each actuated by said member and operating successively to effect respectively the automatic formation of a primary winding with a short traverse, and a secondary winding with a long traverse, of yarn upon a yarn-receiver, combined with an instrumentality to augment the gain due to the builder-motion when the primary winding is being formed by one of said means and to retain the other of said means inoperative at such time, and to effect the

change from short to long traverse, and manually-adjustable means to determine when said instrumentality shall release the second-named means to effect such change
5 of traverse.

10. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and different means each actuated by said member to effect
10 the automatic formation of a primary winding with a short traverse, and a secondary winding with a long traverse, of yarn upon a yarn-receiver, combined with an instrumentality to augment the gain due to the builder-
15 motion when the primary winding is being formed, and to effect the change from short to long traverse, and a cam to operate said instrumentality first to effect the augmentation of gain and thereafter to effect the
20 change of traverse.

11. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and different means each actuated by said member to effect
25 the automatic formation of a primary winding with a short traverse, and a secondary winding with a long traverse, of yarn upon a yarn-receiver, combined with an instrumentality to augment the gain due to the builder-
30 motion when the primary winding is being formed, and to effect the change from short to long traverse, a cam to operate said instrumentality first to effect the augmented gain and thereafter to effect change of trav-
35 erse, and manually controlled means to vary the starting position of the cam and thereby regulate the time during which gain is augmented and also the time when traverse is changed.

12. The combination, with a reciprocating ring-rail, of a builder-motion, connections between it and the ring-rail to control the movement of the latter, and a manually ad-
45 justed, automatically operating instrumentality to change at a predetermined time from short to long traverse, said instrumentality including a rocking member, and a shifting fulcrum therefor to gradually in-
50 crease its angular movement, whereby the gain due to the builder-motion is augmented during the short traverse period.

13. The combination, with a builder-motion and a reciprocating ring-rail, of a carriage reciprocated by or through the builder-
55 motion, an operating connection between the ring-rail and carriage, including traverse-shifting means mounted on the carriage, to effect reciprocation of the ring-rail with a short traverse and thereafter with a long
60 traverse, and an instrumentality coöperating directly with said traverse-shifting means to automatically augment the gain of the short traverse and prevent reciprocation of the carriage until the short traverse period is
65 completed.

14. The combination, with a builder-motion and a reciprocating ring-rail, of a carriage reciprocated by or through the builder-motion, an operating connection between the ring-rail and carriage, including traverse-
70 shifting means mounted on the carriage, to effect reciprocation of the ring-rail with a short traverse and thereafter with a long traverse, and a manually adjustable instrumentality to coöperate directly with said
75 traverse-shifting means and intermittingly augment the gain of the short traverse and finally cause said means to automatically shift from short to long traverse.

15. The combination, with a builder-motion and a reciprocating ring-rail of a carriage reciprocated by or through the builder-motion, an operating connection between the ring-rail and carriage, including a traverse-
80 shifter mounted on and movable relatively to the carriage, a shifting fulcrum about which the traverse-shifter rocks during the formation of a preliminary winding of yarn upon a yarn-receiver with a short traverse, and means to move the fulcrum relatively to
85 said traverse-shifter to augment the gain of the short traverse, and thereafter to disengage the traverse-shifter altogether, whereupon the latter and the carriage reciprocate as a unit and cause the formation of the
90 main winding with a long traverse.

16. 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,
100 connections between the carriage and ring-rail, including a rocking traverse-shifter on the carriage, to effect reciprocation of the ring-rail with a short traverse, an automatically and intermittingly shifting member to
105 engage and form a movable fulcrum for said traverse-shifter during the short traverse period, whereby the gain of the short traverse is augmented, and an adjustable controller to coöperate with and shift the ful-
110 crum member and release it from the traverse-shifter when the change is to be made from short to long traverse, said fulcrum member preventing operative movement of the carriage during the short traverse.

17. 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 to lay a main winding of yarn upon a yarn-re-
120 ceiver with a long traverse, of a traverse-shifter pivotally mounted on the carriage and having a series of stepped notches at one end, a fulcrum member to engage one of said notches and cause the traverse-shifter
125 to rock thereupon while preventing operative movement of the carriage, to thereby lay a preliminary winding of yarn with a short traverse, and means to automatically change the fulcrum member from one to an-
130

other notch of the series successively, to augment the gain of the short traverse and cause the preliminary winding to be laid with tapered ends.

5 18. 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 to lay
10 a main 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 main connector between the carriage and the builder-motion and an auxiliary con-
15 nector between the latter and the traverse-shifter, a fulcrum member to engage the traverse-shifter and cause it to be rocked thereupon by or through the auxiliary connector to form a preliminary winding with
20 a short traverse, said fulcrum member at such time preventing operative reciprocation of the carriage, and means to automatically disconnect the fulcrum member and traverse-shifter at the termination of the
25 short traverse-period, to thereby cause subsequent reciprocation of the carriage and traverse-shifter as a unit by or through both connectors, to effect the long traverse.

30 19. 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 to lay a main winding of yarn upon a yarn-receiver with a long traverse, of a traverse-shifter
35 pivotally mounted on the carriage and operatively connected with the ring-rail, a main connector between the carriage and the builder-motion and an auxiliary connector between the latter and the traverse-shifter,
40 a fulcrum member to engage the traverse-shifter and cause it to be rocked thereupon by or through the auxiliary connector to form a preliminary winding with a short traverse, said fulcrum member at such time
45 preventing operative reciprocation of the carriage, means to automatically disconnect the fulcrum member and traverse-shifter at the termination of the short traverse-period, to thereby cause subsequent reciprocation of
50 the carriage and traverse-shifter as a unit by or through both connectors, to effect the long traverse, and a manually adjustable device to determine the duration of the short traverse period.

55 20. 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 to lay a

main winding of yarn upon a yarn-receiver with a long traverse, of a traverse-shifter 60 pivotally mounted on the carriage and operatively connected with the ring-rail, a main connector between the carriage and the builder-motion and an auxiliary connector between the latter and the traverse-shifter, 65 a fulcrum member to engage the traverse-shifter and cause it to be rocked thereupon by or through the auxiliary connector to form a preliminary winding with a short traverse, said fulcrum member at such time 70 preventing operative reciprocation of the carriage, means to automatically disconnect the fulcrum member and traverse-shifter at the termination of the short traverse-period, to thereby cause subsequent reciprocation of 75 the carriage and traverse-shifter as a unit by or through both connectors, to effect the long traverse, and a manually adjusted, automatically operated device to cooperate with said fulcrum member and determine 80 the duration of the short traverse period.

21. 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 to lay a 85 main 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 main connector between the carriage and the 90 builder-motion and an auxiliary connector between the latter and the traverse-shifter, a fulcrum member to engage the traverse-shifter and cause it to be rocked thereupon by or through the auxiliary connector to 95 form a preliminary winding with a short traverse, said fulcrum member at such time preventing operative reciprocation of the carriage, means to automatically disconnect the fulcrum member and traverse-shifter at 100 the termination of the short traverse-period, to thereby cause subsequent reciprocation of the carriage and traverse-shifter as a unit by or through both connectors, to effect the long traverse, a manually adjustable device 105 to determine the duration of the short traverse period, and means to automatically reset said device after the change from short to long traverse has been effected.

In testimony whereof, I have signed my 110 name to this specification, in the presence of two subscribing witnesses.

ALONZO E. RHOADES.

Witnesses:

ALEXANDER P. DAVIS,
EDWARD DANA OSGOOD.