

A. E. RHOADES.
 TRAVERSE MOTION FOR YARN SPINNING APPARATUS.
 APPLICATION FILED NOV. 17, 1909.

954,343.

Patented Apr. 5, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

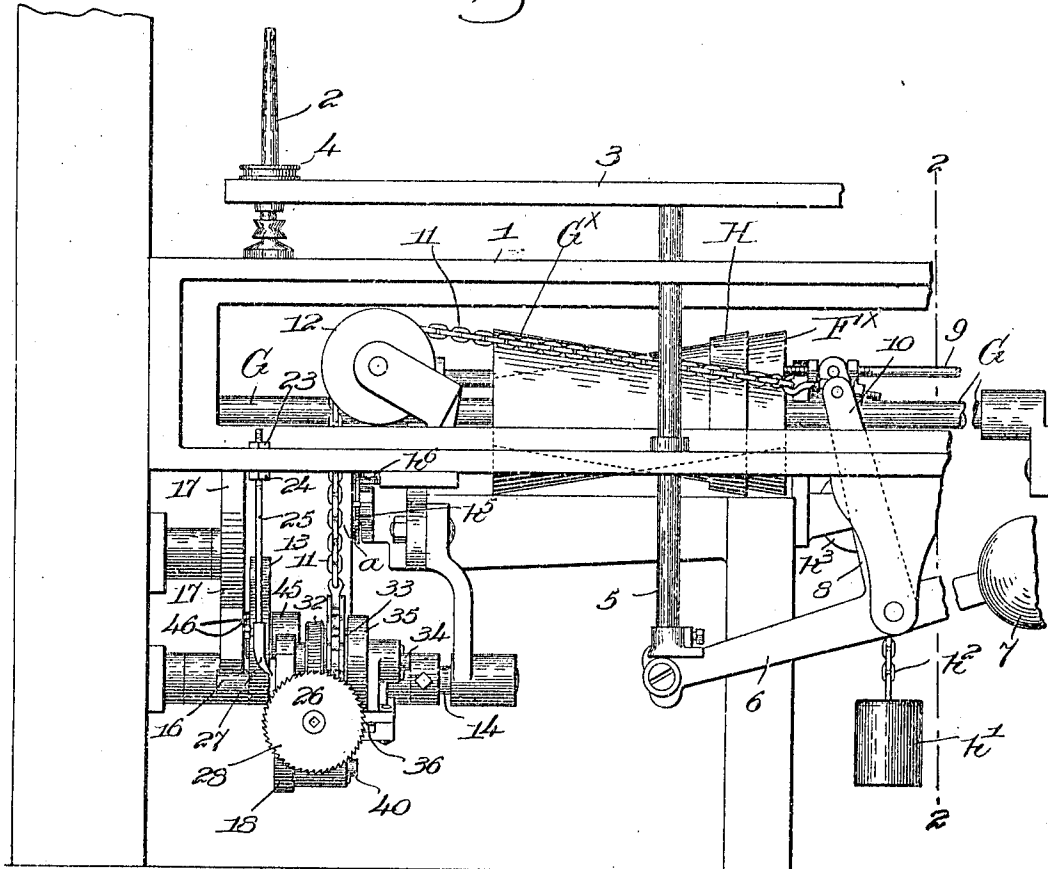
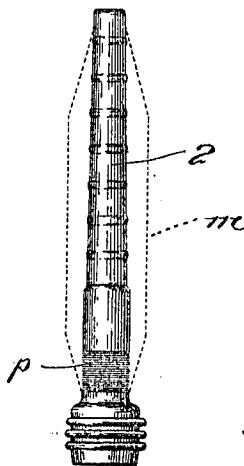


Fig. 7.



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Inventor,
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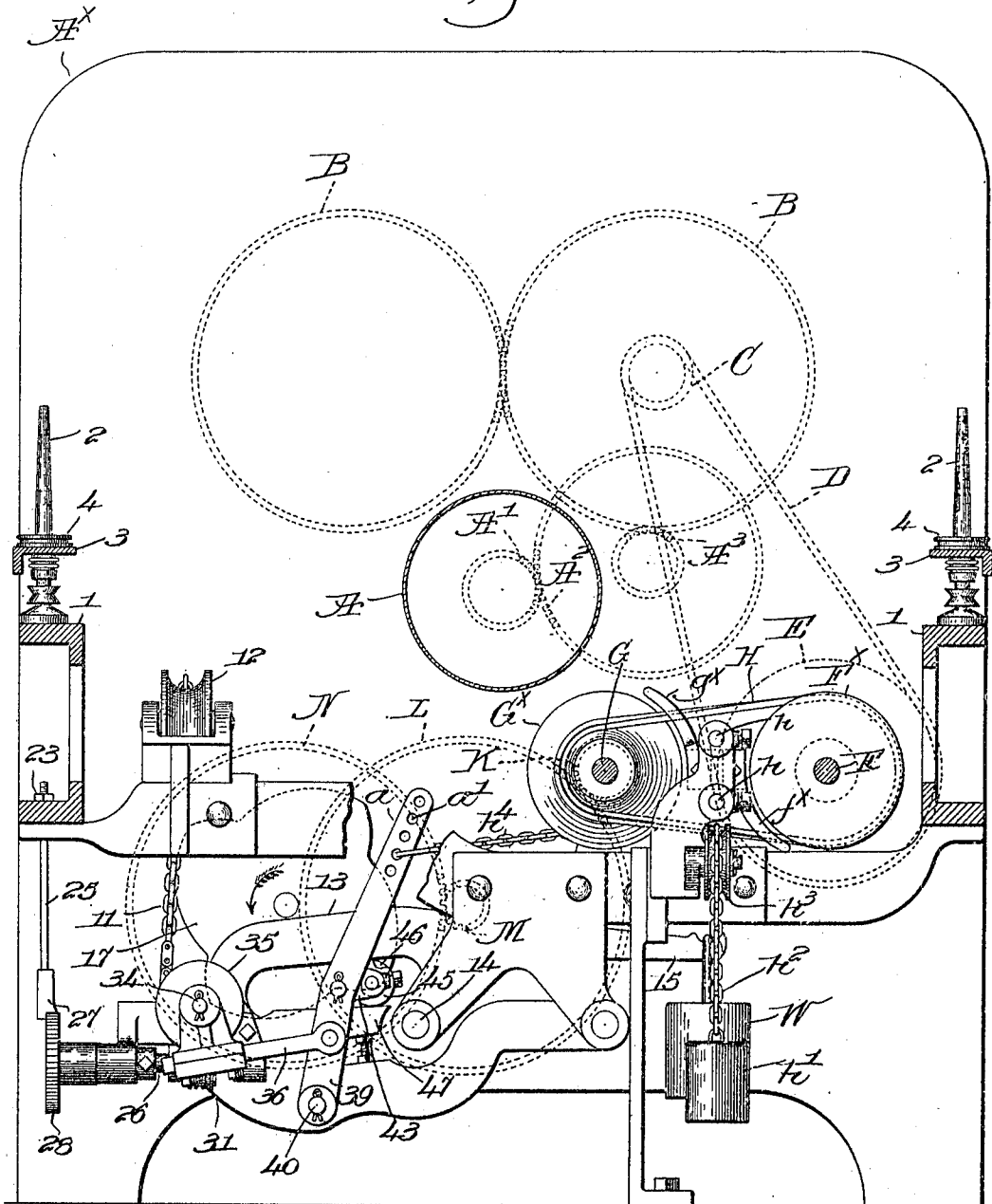
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3 SHEETS—SHEET 2.

Fig. 2.



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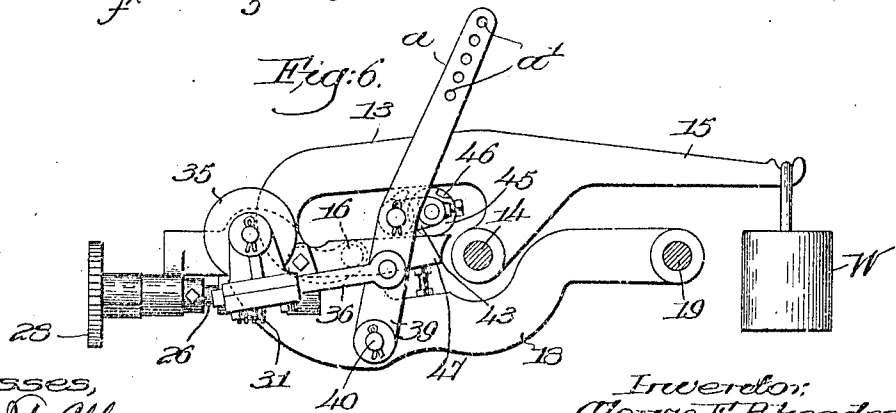
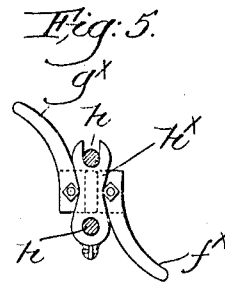
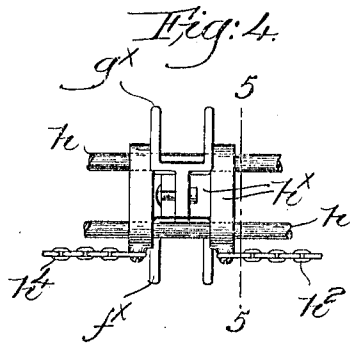
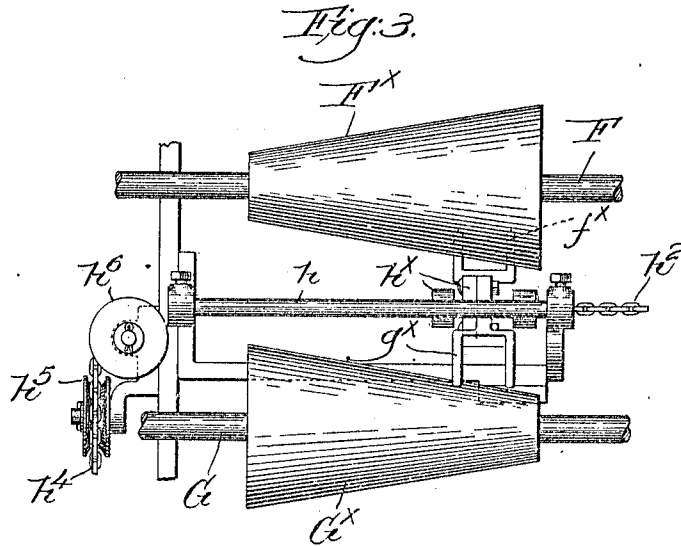
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3 SHEETS—SHEET 3.



Witnesses,
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Attest

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.

954,343.

Specification of Letters Patent.

Patented Apr. 5, 1910.

Application filed November 17, 1909. Serial No. 528,431.

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 has for its object the production of a novel traverse motion for yarn spinning apparatus of the type wherein the yarn is wound upon a yarn-receiver or bobbin in such manner that a primary winding is first laid, and thereafter a secondary or main winding to complete the building of the yarn-mass. Bobbins so wound are generally designed for use in automatic filling-replenishing feeler looms, the change of filling therein being effected through the instrumentality of a feeler when the yarn has been woven off to a predetermined extent, a sufficient length of yarn being contained in the primary winding to preserve continuity of filling when filling-change is effected.

This primary winding should not be confounded with the so-called "cop-bottom" found in the spinning art, as it is altogether different therefrom in character and function, the ideal primary winding, sometimes termed the "bunch" being composed of several layers or wraps of yarn practically cylindrical in shape and tapered at its ends, while the cop-bottom is a substantially pear-shaped or conical winding of yarn which, as its name implies, forms the bottom of the cop.

The yarn should be so laid that in the weaving operation it will draw off easily and freely from the bobbin at all times, even when closely approaching the primary winding, and afterward, or yarn breakage will occur. For that reason the lower end of the primary winding, adjacent the base or head of the bobbin, must not be too abrupt or square, and it is highly desirable that in such winding the yarn shall not be crowded upon itself to make an unduly thick mass, but shall lie evenly and smoothly, in order to avoid catching and breakage. That is, the contiguous turns of yarn in the several layers or wraps of the primary winding should be laid with the same uniformity and

evenness as they are laid in the formation of the secondary or main winding, but this has heretofore been difficult to effect because of the relatively short traverse (about five-eighths of an inch, in practice) with which the primary winding is laid.

In United States Patent No. 941,648 granted to me on the thirtieth day of November, 1909, I show and describe a traverse motion wherein the primary winding is laid with a short and gradually increasing traverse up to a predetermined point, after which the winding is completed with a traverse of uniform length, the speed of the traverse being uniform throughout the entire winding, but the "gain" of the traverse diminishes gradually from maximum to minimum during the formation of the primary winding.

As the yarn is delivered to the bobbins at a uniform speed during the winding operation it will be readily understood that if the ring-rail reciprocates at uniform speed the yarn must be crowded or piled up on itself to a greater extent during short traverse than will be the case when the traverse is lengthened, and the decrease of the gain in my patent just referred to prevents too much yarn being laid at the lower end of the bobbin.

In my present invention I have provided means whereby the yarn in the primary winding is laid with substantially the same evenness as pertains when the main winding is laid, so that the highly desirable smooth and substantially cylindrical contour of the primary winding is attained. Inasmuch as crowding and piling up of the yarn tends to breakage during the weaving operation such objection is thereby overcome and no variation in the yarn is necessary throughout the winding operation.

I have embodied herein the means shown in my patent for effecting gradually increasing traverse during the formation of the primary winding, and in connection therewith I have provided novel means to effect the reciprocation of the ring-rail at maximum speed at the beginning, the speed being gradually decreased as the formation of the primary winding progresses. When such winding is completed the speed of the ring-rail has attained its minimum, and the secondary or main winding is laid at such minimum speed, while the traverse is uni-

form or constant during such winding. Thus in my present invention the traverse gradually increasing from minimum to maximum, and ring-rail speed increasing gradually from maximum to minimum, co-
 5 operate to build the primary winding with smooth and even turns of the yarn in the several layers without crowding, and as there is no tendency to pile up the yarn at the
 10 ends of the primary winding the gradual taper thereat is effected by means of a uniform gain.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in
 15 the following claims.

Figure 1 is a front elevation of a portion of a spinning-frame having one embodiment of my present invention applied thereto, the
 20 apparatus being shown in readiness to begin the winding of a set of bobbins; Fig. 2 is a transverse sectional view taken on the line 2—2, Fig. 1, looking toward the left and partly broken out; Fig. 3 is a top plan
 25 view of the speed-changing means governing the speed of the ring-rail; Fig. 4 is a front elevation of the belt-shifter illustrated in Figs. 2 and 3, the speed-cones being omitted; Fig. 5 is a transverse section of the belt-shifter, on the line 5—5, Fig. 4,
 30 looking toward the left; Fig. 6 is a side elevation of the builder-motion shown in Fig. 1 but detached from the other parts of the apparatus; Fig. 7 is a side elevation of
 35 a bobbin with a small portion of yarn wound thereon, shortly after the beginning of the primary winding, the completed or full bobbin being indicated by dotted lines.

The spindle-rail 1 provided with usual
 40 rotatable spindles for the bobbins 2, the vertically reciprocating ring-rail 3 in practice provided with rings 4, the lifter rods, as 5, rocker 6 having a lifting weight 7 to elevate the ring-rail, the rocker-arm 8 and link 9,
 45 and the branch 10 of arm 8, are all of usual construction and operate in well known manner. A flexible connection or chain 11 attached to the branch 10 passes over the
 50 guide-sheave 12, Figs. 1 and 2, and thence to the winding drum of the builder-motion, the latter herein comprehending the levers 13, 18, the former fulcrumed at 14, and having an extension 15 and a roller or other
 55 stud 16, at opposite sides of the fixed fulcrum, the roller constituting a follower to coöperate with the actuator, shown in Fig. 2 as a four-point traverse-cam, substantially as in my patent referred to, the weight W holding the follower against the cam. So,
 60 too, the lever or member 18, having a fixed fulcrum 19 behind the fulcrum 14 and substantially in the same plane, is as set forth in my patent. The member 13 has a constant stroke, as will be manifest, while the
 65 member 18 has a variable stroke, the weight

7 lifting its free end while it is depressed by the member 13 as it descends. The pick-shaft 26, pick-wheel 28 and worm 31 fast thereon, the worm-gear 32, Fig. 1, driven
 70 by said worm and having fixedly connected with it the drum 33 of the winding mechanism mounted at 34 on the member 18, the chain 11 passing around the drum and being gradually let off therefrom as the winding
 75 proceeds; the mutilated gear 35 on the drum and coöperating with the rack-bar 36, pivotally connected with the link 39 fulcrumed at 40 on the member 18; the roll-carrier 43 connected with the upper end of the link,
 80 ann provided with the rolls 45, 46, the latter coöperating with the under side of the member 13, and the roll 45 bearing on the rest 47 mounted on the member 18, are in general as in my patent, except that here-
 85 in the extension of the free end of the member 13 is omitted and the upper end of the link 39 is prolonged, at *a*, for a purpose to be described, said prolongation having a series of holes *a'* therein. While the stroke of the member 18 increases gradually in
 90 amplitude it will be observed that said member rises to practically the same point on each up-stroke, owing to the nearly horizontal position of the rest 47 when the member 18 is at the upper end of its stroke, and
 95 I have herein caused the means for actuating the pick-wheel to be controlled by the member 18 and actuated on the up stroke thereof.

Referring to Figs. 1 and 2, the pick-pawl
 100 27 is attached to the lower end of a rod 25 depending from and passing through a hole in a part of the side rail of the main frame, the rod being screw-threaded to receive col-
 105 lars or nuts 23, 24, screwed onto the rod above and below the rail, respectively, by means of which the vertical position of the pawl can be adjusted. On each up-stroke of the member 18 the pick-wheel 28 is brought
 110 into engagement with the pawl 27 and is partly turned or angularly advanced, the resilience of the rod or pawl-carrier 25 permitting the slight lateral movement of the
 115 pawl when it is engaging and turning the pick-wheel, and as the angular advances thereof are uniform, for the reasons above stated, the step by step rotation of the pick-
 120 shaft 26 and the parts actuated thereby will be uniform in character. Consequently the letting off of the chain 11 from the drum 33 will be by equal amounts and the resultant
 "gain" of the traverse will be constant from beginning to end of the entire winding op-
 125 eration.

The rotation of the shaft 26 operated
 125 through the mutilated gear 35 and rack-bar 36 to swing forward the link 39 from the position shown in Figs. 2 and 6, and thereby the rolls 45, 46 will be moved away from the
 130 fulcrum 14, so that while the stroke of the

member 13 of the builder-motion is constant the oscillating movement imparted to the member 18 will gradually increase in amplitude as the rolls move toward the free ends of the members 13, 18 and the traverse of the ring-rail will be gradually increased, as in my patent above referred to. Thus the primary winding of yarn is begun with the minimum traverse, and the traverse is gradually increased up to the point at which the mutilated gear no longer advances the rack-bar 36, the link 39 ceasing its swinging movement on its fulcrum 40 at the same time, and thereafter the traverse is uniform, the secondary or main winding being laid therewith. The gradual and desired taper at the ends of the primary winding of yarn, is properly formed by the gain of the traverse, which at the beginning of such winding has a length of about five-eighths of an inch and works up to the full length, say about one and five-eighths of an inch, by the time the primary winding is completed.

I will now describe the means by which the yarn is laid evenly without crowding during the primary winding.

Referring to Fig. 2 the shaft of the usual spindle-driving cylinder A operates through the train of gearing A^1 , A^2 , A^3 to drive the large intermeshing gears B, B, the latter in practice being suitably connected with the drawing rolls, (not shown) as is usual in apparatus of this character, such gearing being contained within the inclosed end A^* of the frame. The shaft of one of the gears B is provided with a sprocket C, connected by a sprocket-chain D with a larger sprocket E fast on one end of a horizontal shaft F extended longitudinally of the main frame, a parallel shaft G being arranged near it, said shafts being below and at one side of the cylinder A and out of the way of the usual spindle-driving bands. Opposed speed cones F^* , G^* are mounted on these two shafts and connected by a belt H which is arranged to be shifted longitudinally to thereby vary the speed of the shaft G, as it will be manifest that the shaft F is rotated at a constant speed.

When the belt is near the larger end of the driving cone F^* , Figs. 1 and 2, it cooperates with the smaller end of the driven cone G^* and consequently the latter will be driven at a higher speed, whereas shifting of said belt to the left, Fig. 1, will effect a gradual reduction in the speed of the driven cone and its shaft G. Such belt shifting is effected automatically as will be described, during the formation of the primary winding of yarn. A pinion K fast on shaft G meshes with a larger gear L, see dotted lines Fig. 2, having an attached pinion M in mesh with a large gear N fast on the shaft of the actuator or traverse-cam 17, and it will now be understood that the speed of

rotation of such cam will be governed by the speed-changing means just described, the revolutions of the cam increasing or decreasing in speed as the speed of the cone G^* rises or falls. The trains of gears referred to, and the sprockets and connecting sprocket-chain, are inclosed within the frame end A^* . A belt-shifter h^* , provided with forks f^* , g^* , is longitudinally slidable upon fixed guide-rods h , h suitably sustained at their ends by the main frame between the cones, a weight h' connected by a chain h^2 with the belt-shifter effecting movement thereof to the right, Figs. 1 and 3, said chain passing over a guide-sheave h^3 . The movement of the belt-shifter in the opposite direction, or to the left, Figs. 1 and 3, is effected automatically by means of the chain or other flexible connection h^4 attached at its opposite ends to the belt-shifter and the link-extension a , respectively, said connection passing around suitable guide-sheaves h^5 , h^6 , shown clearly in Fig. 3. By hooking the chain h^4 into a lower or an upper one of the holes a' in the extension a the primary winding will be started with a somewhat lower or higher speed, respectively, the position of the link-extension at the time the primary winding is begun being shown in Fig. 2 very clearly. It will be obvious that at such time the traverse-cam 17 will be rotated at its maximum speed, because the belt H is at the larger end of the driving cone F^* , and therefore the speed of the ring-rail will be at its maximum when the traverse is at its minimum, the speed of the rail then causing the yarn to be laid smoothly and evenly, with the adjacent turns of yarn in a layer laid side by side, without crowding or piling up. As the movement of the link 39 on its pivot 40 serves to gradually increase the traverse such movement also acts, through the connection h^4 , to gradually move the belt-shifter h^* and thereby shift the belt H along the cones so that the speed of the ring-rail slightly decreases to accommodate the lengthened traverse. Thus each layer or wrap of yarn in the primary winding will be laid smoothly and evenly, and when the traverse reaches its maximum the speed of the rail will have attained its minimum, and there will be no further shifting of the belt H during the formation of the secondary or main winding. That is as it should be, for as the traverse is then uniform the speed of the ring-rail should be uniform, to correspond, and the layers of yarn are laid smoothly during the formation of the main winding. The entire yarn-mass is thus built up by successive layers of smoothly and evenly laid yarn, so that in the weaving operation the yarn will draw off freely without any tendency to catch or break when the primary winding is approached. As the rail-speed

is made to properly conform to the length of the traverse the uniform gain throughout the entire winding operation takes care of the shaping of the yarn-mass, the completed yarn-mass being shown by dotted lines *m*, Fig. 7, while a portion of the primary winding is shown by full lines at *p*. After a set of bobbins has been wound the winding-back operation restores the apparatus to starting position, and as the link 39 is returned to the position shown in Figs. 2 and 6 the weight *h'* effects the return of the belt-shifter and belt *H* to the proper starting position.

My invention is not restricted to the precise construction and arrangement herein shown and described, as various changes or modifications may be made by those skilled in the art without departing from the spirit and scope of my invention as set forth in the claims annexed hereto.

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 builder-motion including a member having a constant stroke and a member having a variable stroke, an actuator coöperating with one of said members to effect oscillation of both the said members, a reciprocating ring-rail, a connection between it and the builder-motion, means coöperating with the two members thereof and acting through said connection to effect reciprocation of the ring-rail with a gradually increasing traverse to a predetermined point, and thereafter to continue automatically the reciprocation of the ring-rail with a uniform traverse, and mechanism to drive said actuator at a speed gradually decreasing from maximum to minimum during the period of increasing traverse.

2. In apparatus of the class described, a builder-motion including a member having a constant stroke and a member having a variable stroke, a reciprocating ring-rail, a single connection between it and the said member having a variable stroke, means whereby the first-named member acts, through its fellow member and through said connection, to effect reciprocation of the ring-rail with a traverse gradually increasing to a predetermined maximum, and thereafter to continue automatically such reciprocation with a uniform traverse, and an instrumentality to gradually reduce the speed of the ring-rail from maximum to minimum during the period of increasing traverse.

3. In apparatus of the class described, means to effect the winding of yarn upon a yarn-receiver with a traverse gradually increasing from minimum to maximum and to complete the winding with the maximum traverse, and means to control the speed of

the traverse and gradually decrease it from maximum to minimum and continue the speed at the minimum during the period of maximum traverse.

4. In apparatus of the class described, a builder-motion including an oscillating member having a variable stroke, means to gradually increase the amplitude of its stroke to a predetermined maximum, a reciprocating ring-rail operatively connected with said member and by it reciprocated with a gradually increasing traverse to the maximum, and a variable speed actuating instrumentality for the builder-motion, governed by the member of the latter having a variable stroke, to act through the builder-motion and decrease the speed of the ring-rail as the traverse increases.

5. In apparatus of the class described, a builder-motion, a rotatable actuator therefor, a reciprocating ring-rail, means operatively connecting it with the builder-motion, and through said builder-motion reciprocating the ring-rail first with a gradually increasing traverse and thereafter with a uniform traverse, and an instrumentality governed by said builder-motion to rotate the actuator at a variable speed and acting through the builder-motion to gradually and automatically diminish the speed of the ring-rail from maximum to minimum during the gradual increase of the traverse from minimum to maximum.

6. In apparatus of the class described a builder-motion including two oscillating, separately fulcrumed members, an actuator to oscillate one member with a constant stroke, means to effect oscillation of the other member with a stroke gradually increasing up to a predetermined maximum, a reciprocating ring-rail, a connection between it and the member having the variable stroke, automatically operated mechanism to control said means and cause the latter to effect the increase in the stroke of the second-named member, said mechanism imparting a substantially uniform gain to the traverse, and an instrumentality controlling the actuator and through it gradually decreasing the speed of the ring-rail to a predetermined minimum.

7. In apparatus of the class described a compound builder-motion including two separately fulcrumed members, an actuator to oscillate one of said members with a constant stroke, speed changing mechanism operatively connected with and to govern the speed of the actuator, shiftable means coöperating with said rocking members whereby the second of said members is oscillated with a gradually increasing stroke up to a predetermined maximum, a reciprocating ring-rail connected with said member having the variable stroke whereby the ring-rail is reciprocated with a traverse gradually

increasing to a maximum, and a controlling connection between said shiftable means and the speed changing mechanism to act through the latter and cause the speed of the actuator, and hence the speed of the ring-rail, to gradually diminish while the traverse increases.

8. In apparatus of the class described, means, including a reciprocating ring-rail to effect the winding of yarn upon a yarn-receiver with a traverse gradually increasing from minimum to maximum and to complete the winding with the maximum traverse, means to cause the ring-rail to travel at a speed varying in an inverse ratio to the variation in the length of the traverse.

9. In apparatus of the class described, means, including a builder-motion and a reciprocating ring-rail to effect automatically the winding of yarn upon a yarn-receiver with the gradually increasing traverse to a predetermined maximum, and thereafter to complete the winding with such maximum traverse, an actuator for said means, cooperating with the builder-motion, and means to gradually and automatically reduce the speed of the actuator and thereby the speed of the ring-rail during the period of gradually increasing traverse, and thereafter to maintain the speed of the ring-rail constant.

10. In apparatus of the class described, means, including a reciprocating ring-rail to effect the winding of yarn upon a yarn-receiver with a traverse gradually and uniformly increasing from minimum to maximum to complete the winding with such maximum traverse, means to impart a substantially uniform gain to the traverse throughout the winding, and mechanism to gradually change the speed of the ring-rail from maximum to minimum during the gradually increasing traverse, and an instrumentality to govern automatically the change from minimum to maximum traverse and contemporaneously therewith to control the varying speed of the ring-rail.

11. In apparatus of the class described in combination, a builder-motion including an oscillating member, an actuating device to impart a constant stroke thereto, means actuated by said member to effect automatically the formation of two successive windings of yarn upon a yarn-receiver, the first winding being laid with a gradually increasing traverse and with a gradual decrease in the speed of the ring-rail, the second winding being laid with a uniform traverse and with a uniform speed of the ring-rail, and an instrumentality cooperating with said actuating device to control the variation in the speed of the ring-rail.

12. In apparatus of the class described, in combination, a builder-motion including an oscillating member having a constant stroke,

two different means to effect, respectively, the formation of a winding of yarn upon a yarn-receiver with a traverse gradually increasing from minimum to maximum, and to gradually decrease the speed of the traverse from maximum to minimum, one of said means being directly actuated by or through said oscillating member, and the other of said means effecting the oscillation of said member, and a controlling connection between said separate means whereby the operation of one is governed by or through the operation of the other.

13. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and means actuated by said member to effect automatically the formation of two successive windings of yarn upon a yarn-receiver, the first winding with a gradually increasing traverse, combined with automatic means to gradually decrease the speed of the traverse during the first winding and to maintain the speed uniform during the second winding.

14. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and means actuated by said member to effect automatically the formation of two successive windings of yarn upon a yarn-receiver, the first winding with a gradually increasing traverse, said means including a traverse-shifting device to determine the rate of such increase, combined with variable speed mechanism to actuate said oscillating member and decrease the speed of the traverse as the traverse increases, and controlling means for the speed changing mechanism governed by the traverse-shifting device.

15. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke, and a second oscillating member having a variable stroke, and shiftable means intermediate said members to effect a gradual increase in the stroke of the second-named member up to a predetermined maximum, and thereafter to effect the oscillation of said member with a uniform stroke, a ring-rail operatively connected with and reciprocated by said latter member with first a gradually increasing, and then a uniform, traverse, combined with a device to govern the operation of said shiftable means, and mechanism controlled by said shiftable means and acting through the builder-motion to gradually reduce the speed of the ring-rail as its traverse increases and to maintain the speed of the ring-rail uniform when the traverse is uniform.

16. The combination with a reciprocating ring-rail and a builder-motion including two oscillating members one of which has a constant stroke and an actuating cam to impart such constant stroke, of a connection be-

tween the other member and the ring-rail to control the movement of the latter, means whereby the member having a constant stroke oscillates the other member with a
5 gradually increasing stroke and then with a uniform stroke, to effect primary and secondary windings of yarn on a yarn-receiver, the first with a gradually increasing traverse, variable speed cones to drive the actuating cam, a shiftable connection between
10 said cones, and means to shift said connection automatically during the period of increasing traverse of the ring-rail, to decrease the speed of the actuating cam, and hence
15 the speed of the ring-rail during such period of increasing traverse.

17. The combination with a reciprocating ring-rail, a builder-motion including two oscillating members, and a connection between one of said members and the ring-rail, of means whereby said members are oscillated with a differential movement gradually decreasing from a maximum to a minimum, the member connected with the
25 ring-rail thereafter being oscillated with a uniform stroke, and an instrumentality controlled by the variation in the length of the traverse to begin the reciprocation of the ring-rail at maximum speed and to gradually diminish such speed until the traverse
30 attains its maximum.

18. The combination, with a reciprocating ring-rail, of a builder-motion, an actuating cam therefor, and a connection between the builder-motion and the ring-rail,
35 of means carried by the builder-motion to impart to the ring-rail first a gradually increasing traverse up to a predetermined maximum and thereafter a traverse of uni-

form length, an instrumentality to rotate the actuating cam at a speed decreasing gradually from maximum to minimum while the traverse is increasing in length and means to control automatically the variable speed of the actuating cam. 40 45

19. In apparatus of the class described means to effect the winding of yarn upon a yarn-receiver with a traverse gradually increasing from minimum to maximum and to complete the winding with a maximum
50 traverse, means to decrease gradually the speed of the traverse from maximum to minimum during the period of gradually increasing traverse, and means to vary the initial speed of the traverse at the beginning
55 of the winding of yarn.

20. In apparatus of the class described, a builder-motion including an oscillating member having a constant stroke and means actuated by said member to effect automatically the formation of two successive windings of yarn upon a yarn-receiver, the first winding with a gradually increasing traverse, combined with means to gradually decrease the speed of the traverse during the
60 first winding, and to maintain the speed uniform during the second winding, and a manually adjustable device to increase or decrease the initial speed of the traverse at the beginning of the first winding. 65 70

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

ALONZO E. RHOADES.

Witnesses:

G. L. BELL,
E. D. OSGOOD.