No. 686,906. Patented Nov. 19, 1901.

# A. E. RHOADES.

## SPINNING FRAME.

(Application filed Aug. 23, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig: 1.

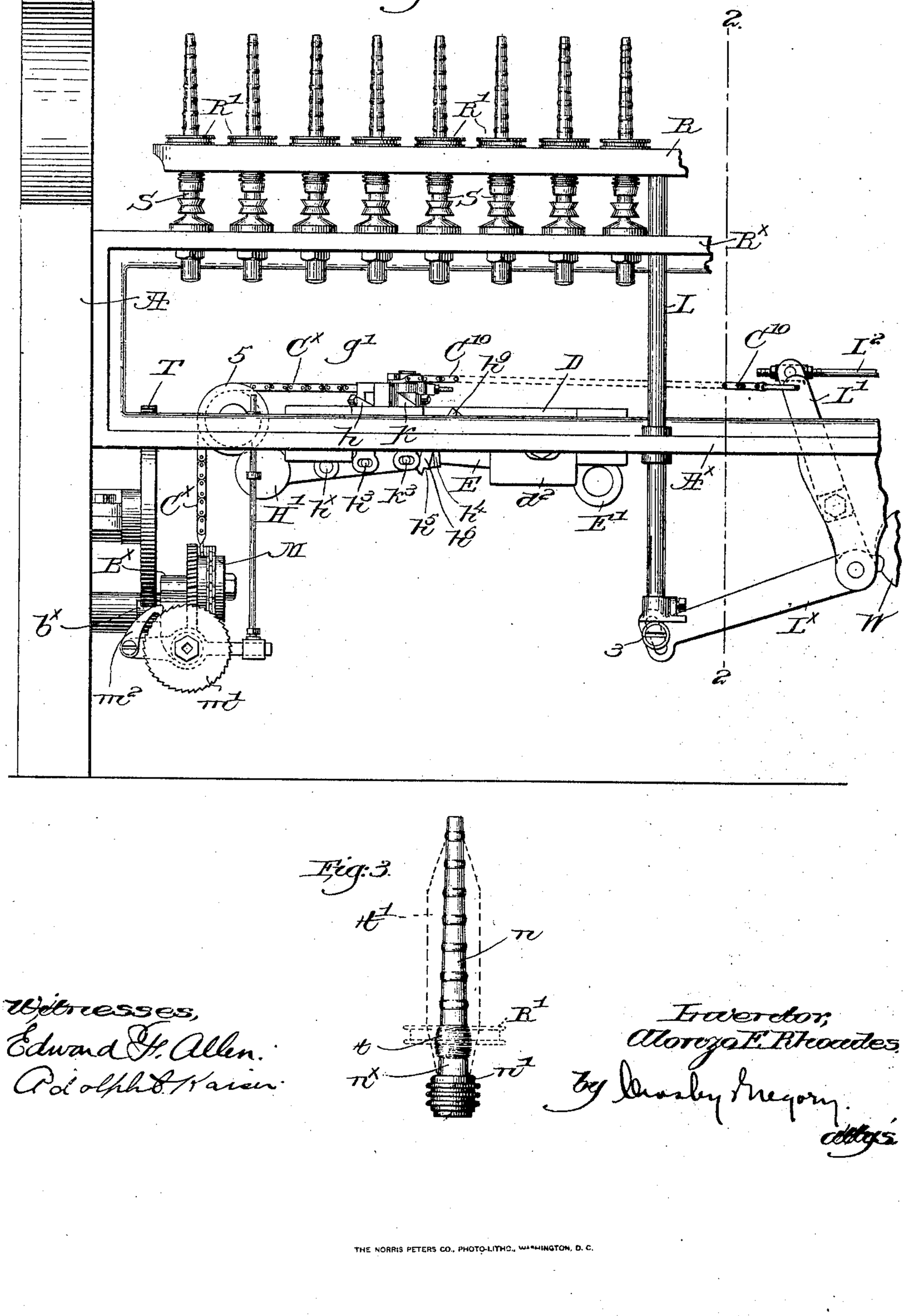


Fig: 3.




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(No Model.) 3 Sheets—Sheet 2.

Fig: 2.

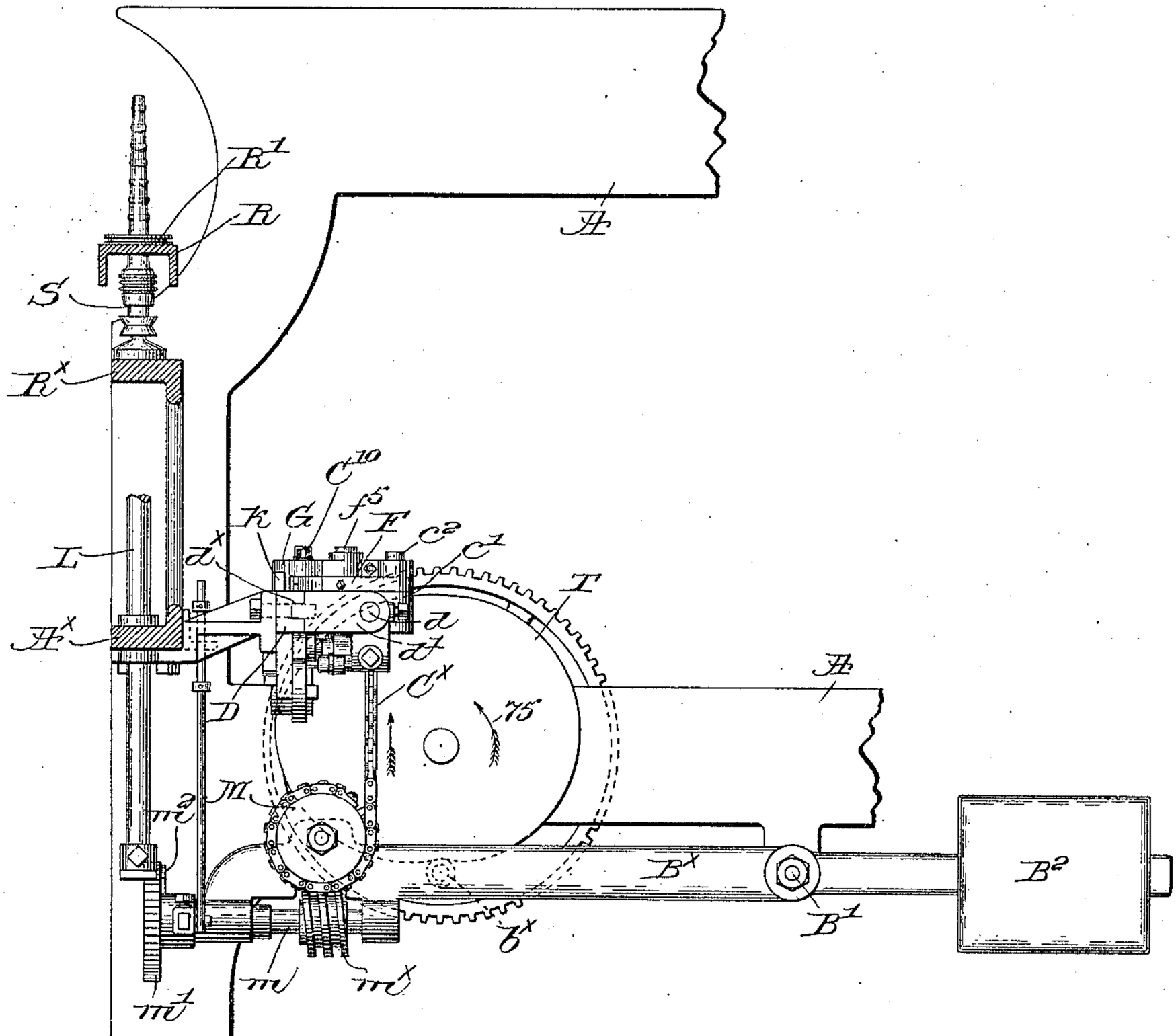
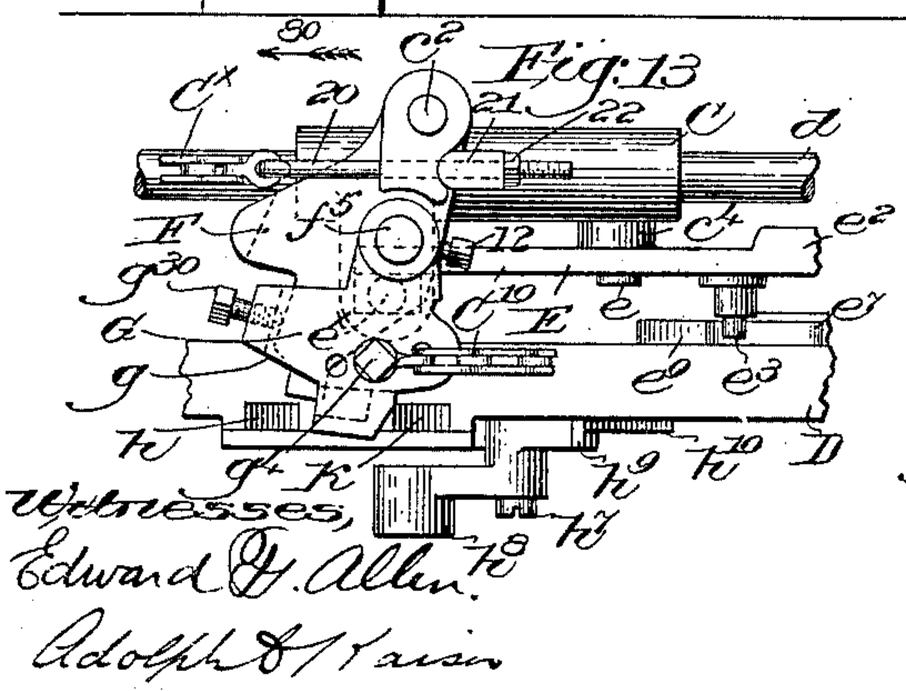



Fig: 13.




Witnesses,
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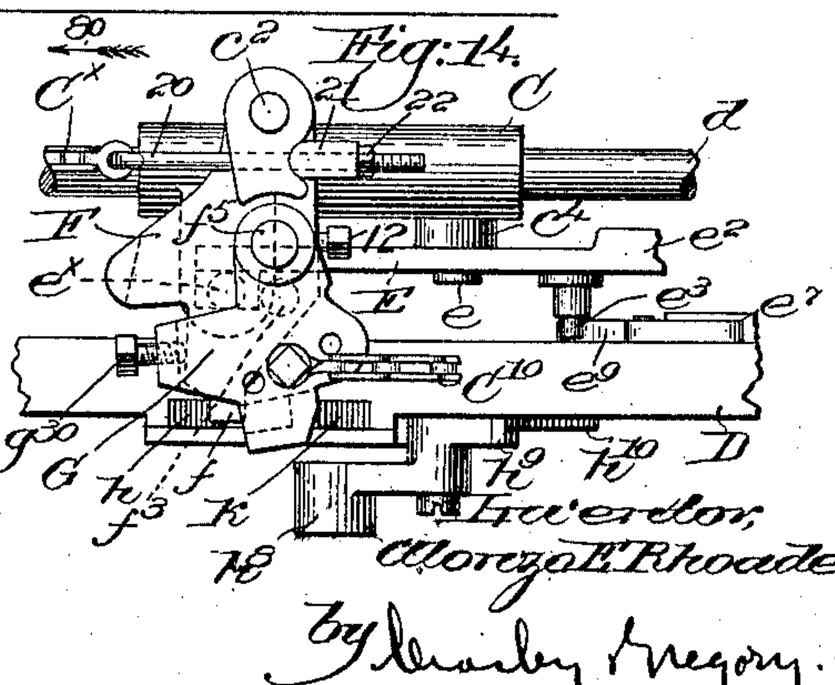
Adolph Baisen

Fig: 14.

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## SPINNING FRAME.

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(No Model.) 3 Sheets—Sheet 3.

Fig: 4.

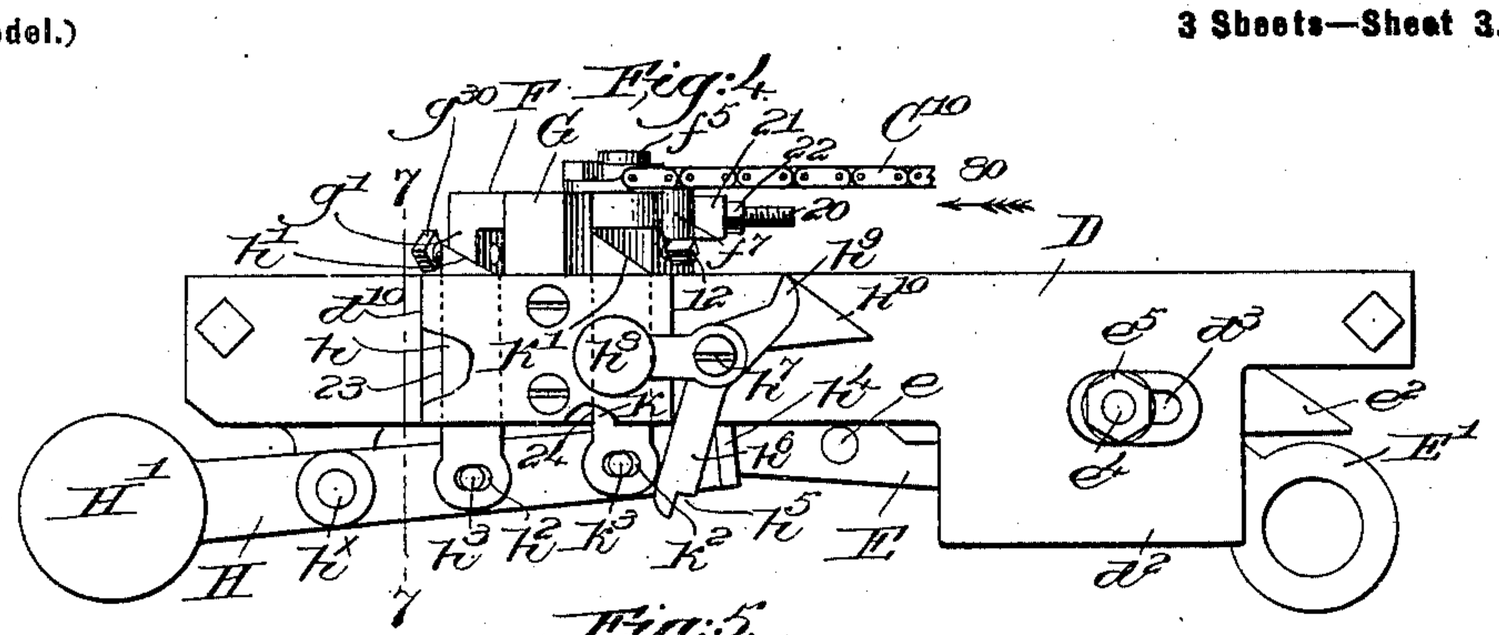


Fig: 5.

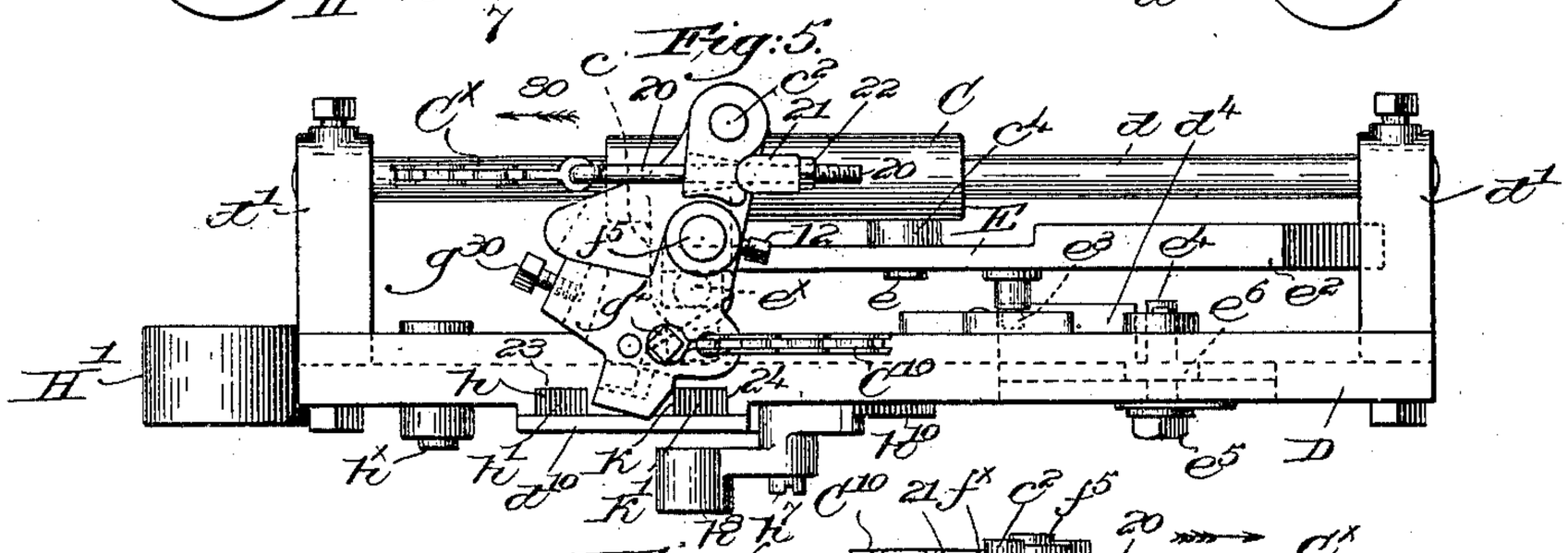


Fig: 6.

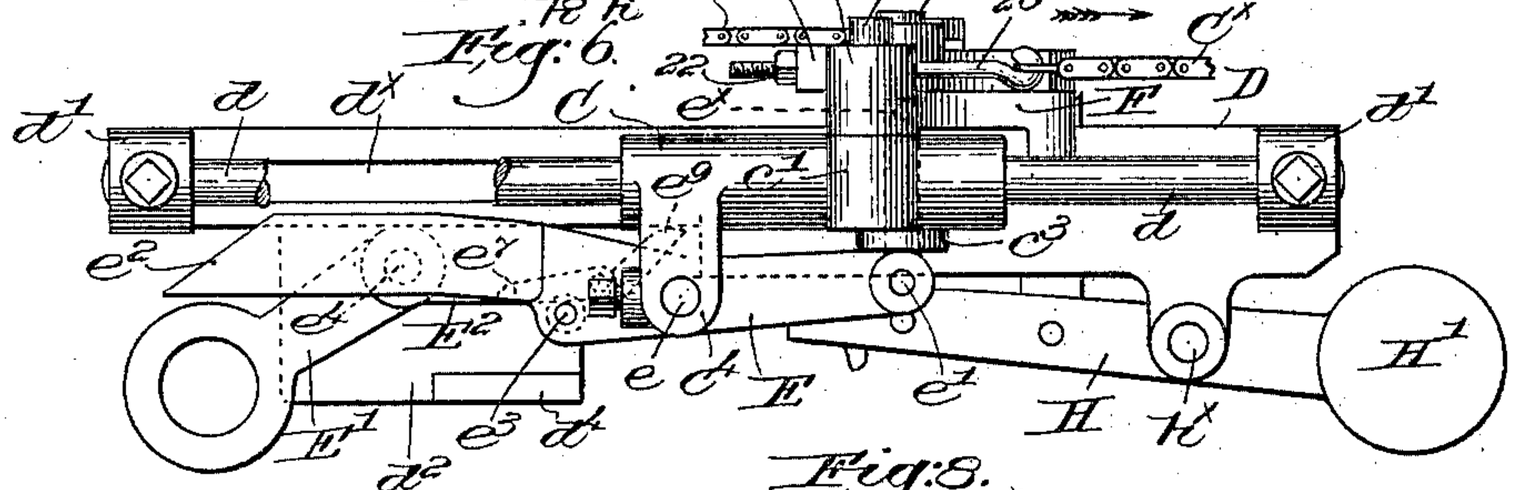


Fig: 7.

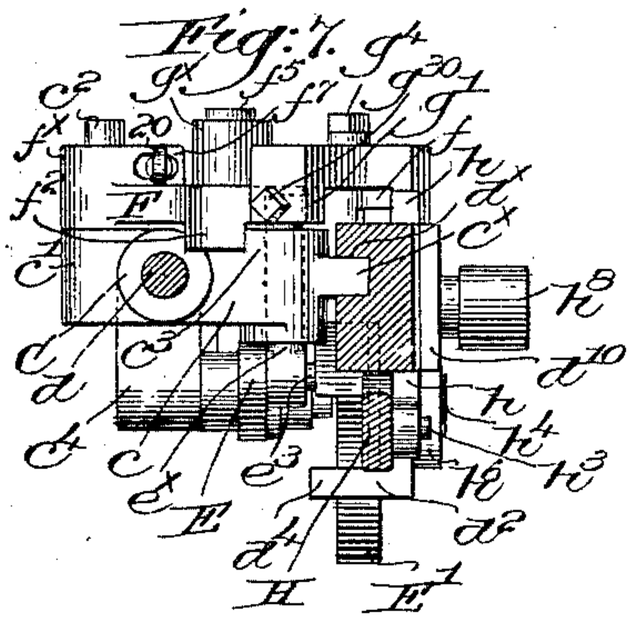


Fig: 8.

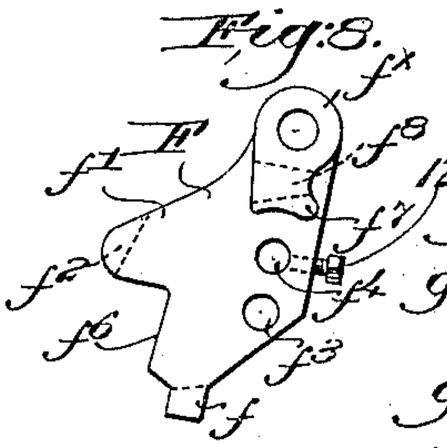


Fig: 10.

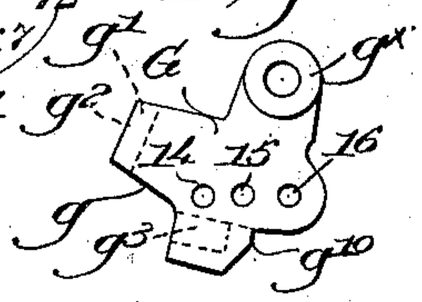


Fig: 9.

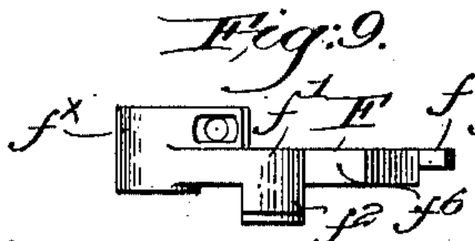


Fig: 11.

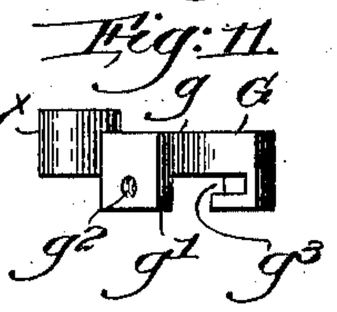
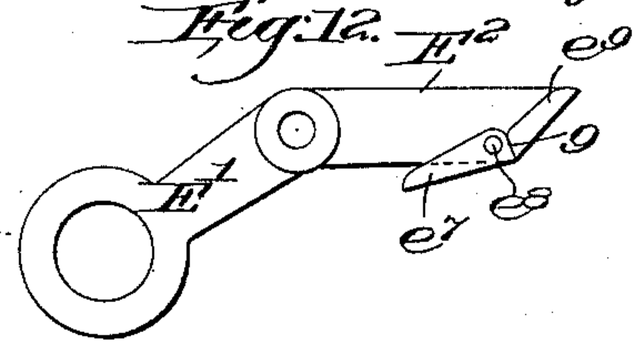


Fig: 12.



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# UNITED STATES PATENT OFFICE.

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## SPINNING-FRAME.

SPECIFICATION forming part of Letters Patent No. 686,906, dated November 19, 1901.

Application filed August 23, 1901. Serial No. 72,973. (No model.)

*To all whom it may concern:*

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

This invention relates to spinning-frames, and it has more especial reference to that part of the apparatus technically termed the "builder-motion," which controls the manner in which the yarn is laid upon a yarn-receiver or bobbin mounted upon a rotating spindle.

The filling-carriers or bobbins now very largely used in the shuttles of automatic filling replenishing "feeler-looms" require to be wound with a preliminary winding or bunch of yarn, after which the main or service winding is laid, a feeler acting when the yarn has been woven off in the loom down to the preliminary winding to effect a change of filling while there yet remains enough yarn in the shuttle to extend one or more times across the loom.

My present invention has for its principal object the production of novel means for effecting a preliminary winding or bunch and a subsequent main or service winding of yarn upon a yarn-receiver or bobbin.

Another object of my invention is the provision of means for regulating the portion of the preliminary winding on the barrel of the yarn-receiver.

These and other novel features of my invention will be fully described hereinafter, and particularly pointed out in the following claims.

My invention is adapted to the winding of either ordinary wooden bobbins or filling-carriers or those which are provided with a metallic band to coöperate with the feeler when the yarn has been woven off sufficiently to expose the band.

Figure 1 is a front elevation of a portion of a spinning-frame, showing the builder-motion and coöperating parts embodying one form of my invention, the ring-rail being shown in position at the top of the preliminary winding or bunch of yarn on the bobbin, said winding having been completed. Fig. 2 is a transverse sectional view on the line 2 2, Fig. 1, looking toward the left, the rocker-arm being omitted. Fig. 3 is a side elevation, enlarged, of a bobbin, showing the preliminary winding or bunch thereon as completed, the ring-rail at such time being at the upper end of such winding and ready to descend to begin the main winding with the full traverse, the rail being indicated in dotted lines. Fig. 4 is an enlarged front elevation of the carriage, its support, and the means for controlling the traverse to form the preliminary and the main windings in a position corresponding to Figs. 1 and 2. Fig. 5 is a top or plan view, also enlarged, of the mechanism illustrated in Fig. 4. Fig. 6 is a rear side elevation, partly broken out, of the mechanism shown in Fig. 4. Fig. 7 is a transverse section in the line 7 7, Fig. 4, looking toward the right. Figs. 8 and 9 are details in plan and side elevation of one of the members of the traverse-controlling means. Figs. 10 and 11 are similar views of another member of said controlling means. Fig. 12 is a side elevation, detached, of the unlocking device to be described and shown in Figs. 4 to 6. Fig. 13 is a plan view of a part of the mechanism shown in Fig. 4 in the position occupied just before the winding back has been completed preparatory to beginning the formation of the preliminary winding of yarn on the bobbin; and Fig. 14 is a similar view, the winding back having been completed and showing the parts in position ready to make the first traverse for the preliminary winding, the ring-rail being moved downward from the upper end of such winding.

Referring to Figs. 1 and 2, the frame A sustains the usual spindle-rail $R^{\times}$, on which are mounted rotatable sleeve-whirl spindles, and these parts, together with the vertically-reciprocating ring-rail R, provided with rings R′, one for each spindle, the lifter-rods L, only one of which is shown, the rocker $L^{\times}$, Fig. 1, having a roll 3 for the foot of the lifter-rod and provided with a weight W to elevate the ring-rail, and the upturned rocker-arm L′, rigidly connected with the rocker and transmitting reciprocating movement through the

link $L^2$ to the other lifter-rod, (not shown,) may be and are all of usual or well-known construction in spinning-frames.

The builder-arm $B^\times$, fulcrumed on the frame at B', is provided with a roller or other stud $b^\times$, Fig. 2, constituting a follower to cooperate with an actuating or traverse cam T, (herein shown as heart-shaped,) said builder-arm having mounted upon it the winding mechanism of usual construction, including a drum M, pick-shaft $m$, provided with a worm $m^\times$ to effect gradual rotation of the drum, pick-wheel $m'$ on said shaft, and an actuating-pawl $m^2$, operated in usual manner, the rotation of the cam rocking the builder-arm on its fulcrum to effect, through connections to be described, the traverse of the ring-rail. A weight $B^2$ on the inner end of the builder-arm counterbalances the weight of the winding mechanism and maintains the follower $b^\times$ in engagement with the actuating-cam T.

It is understood that the gradual unwinding of the chain $C^\times$, secured at one end on the drum M and connected indirectly with the ring-rail, effects the "gain" of the traverse—that is to say, the movement of the ring-rail—whereby at each upstroke it rises a little higher and at each dowstroke descends not quite so low as on the previous downstroke to lay the yarn in successive layers upon the bobbin from the lower end or base thereof to the upper end.

The chain $C^\times$ leads up over a sheave 5, Fig. 1, rotatably mounted on the girder $A^\times$, forming part of the main frame, and is adjustably connected, by means to be described, with a carriage C, mounted to slide longitudinally on a supporting-bar $d$, Figs. 5 and 6, rigidly mounted in lateral ears $d'$, secured to or forming part of a stand D, mounted on the girder $A^\times$.

The carriage C has a lateral extension $c$, (best shown in Fig. 7,) provided with a fin $c^\times$ to enter a horizontal guideway $d^\times$ in the stand D, parallel to the bar $d$, the latter, with said guideway, forming a track for the carriage. An offset $c'$ of the latter is provided with an upturned stud $c^2$, and the extension $c$ has an upright hub $c^3$, Figs. 6 and 7, the top of which is shown in Fig. 7 as slightly lower than the top of the stand D, and at the inner or right-hand end of the carriage C (viewing Fig. 5) the latter has a depending portion $c^4$, provided with a lateral fulcrum-stud $e$ for a locking-lever E, which has pivotally connected therewith at $e'$ a locking-pin $e^\times$, (see dotted lines, Figs. 5 and 6,) upturned to slide loosely in the hub $c^3$, the pin being long enough to project a considerable distance above the top of the hub $c^3$ when it is in operative position, as shown in Fig. 7. The opposite end of the lever E is enlarged, as at $e^2$, to increase its weight and to normally lift the locking-pin, and a follower-stud $e^3$ projects laterally from said lever on the side nearest the stand D and at the weighted end of the lever.

An unlocking device (shown separately in Fig. 12) is illustrated as a bent lever $E'$ $E^2$, fulcrumed at $e^4$ on an apron $d^2$ on the stand D, the fulcrum-stud $e^4$ passing through a longitudinal slot $d^3$, Fig. 1, in the apron and being clamped in adjusted position by a nut $e^5$, a collar $e^6$ on the stud resting upon the inner face of the apron, (see Fig. 5,) said apron having a lateral elongated stop $d^4$ thereon (see Figs. 5 and 7) projecting beneath a switch $e^7$, pivoted at $e^8$ on the lever-arm $E^2$, Fig. 12, a cam-lug $e^9$ on said lever-arm being upwardly inclined from the pivoted end of the switch.

Referring to Fig. 12, it will be seen that the switch may be swung upward on its fulcrum, the adjacent end of the cam-lug forming a stop-shoulder 9 to limit downward swing of the switch. The latter is in the path of the follower-stud $e^3$, it being remembered that the locking-lever E moves bodily with the carriage C while the unlocked lever $E'$ $E^2$ is fulcrumed on a fixed stud $e^4$, the heavier lever-arm E' normally holding the arm $E^2$ against the bottom of the stand D, as in Fig. 6, so that the carriage if moving toward the left, Fig. 6, would cause the follower-stud to pass beneath and lift the point of the switch, the latter dropping into the position shown in Fig. 12 after the stud has passed. This will be referred to hereinafter when the operation of the machine is described.

The upright stud $c^2$ at the back of the carriage is loosely extended through a hub $f^\times$ of a member F of the traverse-shifting means, said member being shown separately in Figs. 8 and 9 as a plate having the hub at one end, a toe $f$, of reduced thickness, at the other end, and an offset $f'$ at one side provided with a depending stop $f^2$ to bring up against the nearest ear $d'$ if the connection between the controlling means and the rocker-arm L' should be released. The bottom of the hub $f^\times$ rests on the flat top of the carriage-offset $c'$, (see Fig. 7,) so that the member F may at times swing horizontally on the stud $c^2$ as a fulcrum, the plate having a hole $f^3$ therein to at times be entered by the locking-pin $e^\times$. A second hole $f^4$, between the hole $f^3$ and the fulcrum of the member F, is adapted to receive a headed stud $f^5$, held in place by a set-screw 12, Fig. 5, the stud passing through a hub $g^\times$ of the other member G of the traverse-shifting means, (see Figs. 10 and 11,) the set-screw 12 being supported in the member F. (See Fig. 8.) This member G is peculiarly shaped, it having an offset $g$ at one side provided with an overhang $g'$, having a threaded hole $g^2$ for an adjusting-screw $g^{30}$, the bottom of the hub $g^\times$ resting on the top of the member F, while the overhang $g'$ extends over the face $f^6$ of the said member F, as best shown in the plan views, Figs. 4, 13, and 14. At its free end the member G is thickened and provided with a recess $g^3$, into which the toe $f$ enters (see Figs. 4, 13, and 14) to prevent any lifting of the member G at its free end. A chain or other flexible connection $C^{10}$ is at-

tached at one end to the rocker-arm L′, Fig. 1, and at its other end it is swiveled to a bolt $g^4$, adapted to be seated in any one of a series of holes 14 15 16 in the member G, Fig. 10, at different distances from the free end of said member.

The hub $f^\times$ has an ear $f^7$ at its outer side provided with a hole $f^8$ to receive the shank of a hook 20, which is attached to the adjacent end of the winding-chain $C^\times$, a collar 21 surrounding the end of the shank, which is threaded, between the ear $f^7$ and a set-nut 22, screwed onto the shank, Fig. 5. By setting up or easing off the nut the amount of yarn in the preliminary winding will be decreased or increased, because of the difference in the length of the chain $C^\times$ to be unwound by the drum M before the main or service winding is begun.

Inasmuch as the locking-lever E is mounted on the carriage, it will be manifest that when the locking-pin $e^\times$ is in the hole $f^3$ of the member F the latter will be locked from movement relatively to the carriage and it will be held in the position shown in Fig. 5; but if the locking-pin is withdrawn the member F can swing on its fulcrum $c^2$, as in Fig. 13, and it may now be stated that during the formation of the preliminary winding the member F is unlocked and is automatically locked at the beginning of the main or service winding, the operation being set forth in detail hereinafter.

Referring now to Figs. 4 and 5 more particularly, the stand D has two vertical recesses 23 24 formed in its outer face to receive a depressor, shown as a slide-bar $h$, vertically movable in the recess 23 and beveled at its upper end, as at $h'$, its lower end below the stand D having a transverse slot $h^2$ loosely entered by a stud $h^3$ on a lever H, fulcrumed below the stand at $h^\times$ and weighted at its outer end, as at H′. A similar slide-bar $k$ is vertically movable in the recess 24, its upper end being also beveled at $k'$ and having a transverse slot $k^2$ at its lower end to loosely receive a stud $k^3$ on the lever H, a cover-plate $d^{10}$ on the stand maintaining the slide-bars in the recesses. The inner end of lever H is provided with a transverse rib $h^4$, extended outward beneath the stand D, to be engaged by a notch $h^5$ in a latch $h^6$, fulcrumed on the stand at $h^7$, Fig. 4, said latch having a weighted offset $h^8$, tending to swing the latch to the right, Fig. 4, against the rib $h^4$ when the main winding is being laid upon the bobbin. The latch is upturned above and to the right of its fulcrum (viewing Fig. 4) to form a trip $h^9$, which extends above the stand D when the notch $h^5$ and rib $h^4$ are in engagement, the trip then being in the path of the thickened end of the member G, the bottom of such thickened portion sliding upon the top of the stand. A cam-wing $h^{10}$ is shown as extended from the trip, for a purpose to be described. The thickened end of the member G extends across the stand D toward the front of the spinning-frame far enough to include in its longitudinal path of movement the upper beveled ends of the slide-bars $h$ and $k$, and its inner upright face is beveled to form an upright edge $g^{10}$, which rocks on the upright flat face of the slide-bar $k$ as a fulcrum during the formation of the preliminary winding, as will be described.

Referring to Fig. 3, the bobbin or yarn-receiver therein shown is of well-known construction, comprising a substantially cylindrical barrel $n$, having an enlarged head or base $n'$, and the barrel near the head is technically termed the "feeler-wood," as indicating the portion of the barrel on which the preliminary winding or bunch of yarn is laid. The barrel has actually a slight taper; but the feeler-wood, which is indicated at $n^\times$, is cylindrical. It is desired to wind upon this bobbin a preliminary winding or bunch, as $t$, of the yarn and thereafter to complete the winding by the main or service line, (indicated at $t'$ by dotted lines,) and in my present invention the mechanism is constructed and arranged to automatically wind the bunch and thereafter the main or service winding, both of such windings being laid with the filling wind—that is, the traverse is uniform during the winding of the bunch $t$, although it is shorter than the traverse with which the main winding $t'$ is laid, the gain of the traverse being provided for to lay the yarn in succeeding layers around the bobbin.

For a clear understanding of the operation of the apparatus the same will be described, beginning with the start of the main or service winding. Referring, therefore, more particularly to Figs. 4, 5, and 6, with general reference to Figs. 1 and 2, the parts are shown in the position assumed at the completion of the preliminary winding or bunch. The short traverse has been finished and the locking-pin $e^\times$ has entered the hole $f^3$ of the member F of the traverse-shifting means, so that the said member is locked to move bodily with the carriage C, and the forward end of the coöperating member G is between the slide-bars $h$ $k$. The traverse or actuating cam T rotates in the direction of the arrow 75, Fig. 2, and as it rotates from the position shown in said figure the builder-arm $B^\times$ will be swung downward and will act through the chain $C^\times$ to move the carriage C and the parts mounted thereupon to the left, Figs. 4 and 5, in the direction of the arrow 80, or, viewing Fig. 6, to the right, and the rocker $L^\times$ will be swung to permit the ring-rail to descend, the rail starting from the top of the bunch or preliminary winding and making its full traverse, effected by the cam T, to the lower end of and below the bunch. The pull on the chain $C^\times$ is opposed by the resistance transmitted through the chain $C^{10}$, and the first effect of the movement of the carriage in the direction of the arrow 80 will be to swing the member G on its fulcrum until the inner end of the screw $g^{30}$ engages the face $f^6$ of the member

F, and thereafter the two members will move back and forth as one, and as the outer end of the member G passes over the beveled end $h'$ of the slide-bar $h$ it will depress the latter, and thereby lower the rib $h^4$ until the latch $h^6$ swings over to bring the rib and the notch $h^5$ into engagement, at that time both of the slide-bars being lowered out of the path of the outer end of the member G. The next stroke of the carriage C will of course be in a direction opposite to the arrow 80 and the full length of the long traverse, and this long stroke, communicated to the ring-rail by the intermediate connections, will effect the long traverse for laying the yarn upon the bobbin in the formation of the main or service winding $t'$, and the gain of the traverse during such winding is effected in usual manner through the winding mechanism on the builder-arm. The gain of the traverse permits the carriage C at each right-hand stroke (viewing Figs. 4 and 5) to move a little farther toward the right, and just before the service-winding is completed this gradual advance of the carriage will bring the forward end $g^{10}$ of the member G into contact with trip $h^9$, rocking the latch $h^6$ and withdrawing its notch from engagement with the rib $h^4$, so that the lever H will by reason of its weighted end H' swing up into the position shown in Fig. 4, elevating the slide-bars $h$ and $k$, and very shortly after this movement of the slide-bars into the position shown the winding will be completed. In this apparatus, as is usual in spinning-frames, when a bobbin or set of bobbins has been filled it is necessary to wind back by hand, thereby setting the apparatus ready to begin the winding of a new set of bobbins, the winding back being effected by throwing out the pawl $m^2$ and rotating the pick-wheel $m'$ in such a manner that the chain $C^\times$ will be wound upon the drum M. Remembering now that at the completion of the main winding the carriage C and parts carried thereby are nearer the right-hand end of the stand D, the winding back will move the carriage bodily to the left, and during such movement the forward end $g^{10}$ of the member G will pass over the beveled end $k'$ of the slide-bar $k$, depressing the same momentarily; but owing to the difference in leverage of the slide-bars $k$ and $h$ such depression of the slide-bar $k$ will not depress the rib $h^4$ far enough to be engaged by the latch $h^6$, so that as soon as the member G has passed over the upper end of the slide-bar $k$ the latter will return to the position shown in Fig. 4. This condition of affairs is shown in Fig. 13, wherein the position of the parts is shown just before the winding back is completed. During the formation of the main winding with the long or full traverse the locking-pin $e^\times$ has remained in the hole $f^3$ of the member F; but inasmuch as the locking-lever E travels with the carriage the stud $e^3$ and the locking-lever will have been gradually moved until said stud has passed beneath and beyond the point of the switch $e^7$, permitting the latter to drop into the position shown in Fig. 12, so that when the winding back is effected the said stud will contact with and ride over the upper face of the switch at or about the time that the forward end of the member G has reached the position shown in Fig. 13, between the slide-bars $h$ and $k$. The completion of the winding back carries the stud $e^3$ onto the cam portion $e^9$ of the lever-arm $E^2$, depressing the latter until it strikes the stop $d^4$, and then the continued movement of the carriage toward the left, Figs. 4 and 5, acts through the cam $e^9$ and the stud $e^3$ to tilt the locking-lever E, lowering the locking-pin $e^\times$ and withdrawing it from engagement with the member F. As soon as the member F is unlocked the pull on the chain $C^{10}$ will exert a greater influence on the member F than will the pull in the opposite direction on the chain $C^\times$, owing to the difference in leverage between the points of application of the two chains relative to the fulcrum $c^2$, and both members F G will be moved from left to right, viewing Figs. 13 and 14, into the position shown in the latter figure, with the fulcrum edge $g^{10}$ of the member G against the upright face of the slide-bar $k$, which slide-bar serves as the fulcrum for the members F G during the formation of the preliminary winding or bunch upon the bobbin, and hereinafter the slide-bar $k$ will be designated as the "fulcrum" member. When the members F and G have assumed the position shown in Fig. 14, the hole $f^3$ in the former member will be off to one side of the top of the locking-pin, so that the latter cannot operate again to lock the member F to the carriage until it registers with the hole. The apparatus is now ready to begin the preliminary winding or bunch, and the rotation of the actuating-cam T acts, as before, to reciprocate the carriage C with the same stroke heretofore imparted to it; but at this time the members F G move together as one on the fulcrum member $k$, and inasmuch as the chain $C^{10}$ is attached to the member G quite near the fulcrum edge $g^{10}$ it will be manifest that the long stroke of the carriage will effect a very much shorter stroke for the ring-rail, such stroke depending on the particular hole (14, 15, or 16) in which the bolt $g^4$ is inserted, the longest traverse being effected when the bolt is in the hole 16 and the shortest when it is in the hole 14. The winding mechanism controls the gain of the traverse during the formation of the preliminary winding or bunch, as well as during the formation of the main winding, and therefore the carriage C will be gradually advanced toward the right, Fig. 14, during the bunch formation, and this gradual gain of the carriage acts to gradually separate the face $f^6$ from the inner end of the screw $g^{30}$ until when the bunch-winding is completed the two members F and G have assumed the relative position shown in Fig. 5, and at such time the hole $f^3$ of the member F will be directly over the locking-pin $e^\times$

and the weighted end $e^2$ of the locking-lever will immediately lift the pin into locking position, so that thereafter the stroke of the bolt $g^4$ will be equal to the stroke of the carriage C, and the parts have thus arrived in the position shown in Figs. 4, 5, and 6 and incidentally Figs. 1 and 2, ready to begin the formation of the service-winding.

If reference be had for a moment to Fig. 14, it will be noticed that the adjusting-screw $g^{30}$ is turned outward, so that the greatest relative movement of the members F and G is permitted, and it will be manifest that if the screw is set up, acting upon the face $f^6$, the result will be to swing the member G to the left about its fulcrum $f^5$, thereby pulling on the chain $C^{10}$ and lowering the ring-rail, and if the screw $g^{30}$ is set back the ring-rail will be raised, so that by this means the location of the upper end of the preliminary winding or bunch $t$ is brought nearer to the end of the bobbin, so that the bunch will be located at the desired point upon the feeler-wood.

With the set-screw as shown in Fig. 14 the upper end of the bunch to be wound will be located as near the head of the bobbin as is possible.

It is to be observed that with one actuating or traverse cam imparting a uniform stroke to the carriage I am enabled by or through the traverse-shifting means to produce a short traverse, very much shorter than the traverse due to the shape of the cam T, and to automatically change from the short to the long traverse, the latter corresponding to the stroke of the carriage C and due to the shape of the actuating-cam. I am also enabled to vary the position of the preliminary winding or bunch upon the bobbin by the means hereinbefore described to accurately locate the bunch at that part of the bobbin where it is desired to have it, and by the adjustable connection of the chain $C^{\times}$ with the member F of the traverse-shifting means I am enabled to determine the amount of yarn which would be wound in the bunch.

My invention is not restricted to the precise construction and arrangement of parts herein shown, as I have shown herein one practical embodiment of the invention without attempting to show or describe various changes or modifications thereof which may be made by those skilled in the art without departing from the spirit and scope of my invention.

When the carriage is moved in a retrograde direction by winding back, the forward end of the member G engages the upper edge of the cam-wing $h^{10}$, should the latch $h^6$ be accidentally set, and will depress the trip $h^9$ out of the way to prevent a smash of the parts.

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

1. In a spinning-frame, a builder-motion, and controlling means therefor to effect automatically the formation of a preliminary winding, and thereafter a main or service winding, of yarn upon a yarn-receiver, both windings being laid with filling-wind.

2. In a spinning-frame, a builder-motion, and controlling means therefor to effect automatically the formation of two successive windings of yarn, of unequal volume, laid with the filling-wind upon a yarn-receiver.

3. In a spinning-frame, a builder-motion, and controlling means therefor to effect automatically the formation of a preliminary winding with a short, uniform traverse, and a succeeding main winding with a long and uniform traverse, of yarn upon a yarn-receiver.

4. In a spinning-frame, a builder-motion, and controlling means therefor to effect automatically the formation of two successive windings of yarn upon a yarn-receiver, both windings being laid with the filling-wind.

5. In a spinning-frame, a builder-motion, controlling means therefor to effect automatically the formation of two successive windings of yarn upon a yarn-receiver, constituting a bunch and a service winding, and means to adjust the traverse for the formation of the bunch.

6. In a spinning-frame, a builder-motion, controlling means therefor to effect automatically the formation of two successive windings of yarn upon a yarn-receiver, each being laid with the filling-wind, and means to vary the relative volume of said windings.

7. In a spinning-frame, a rotatable spindle, a yarn-receiver thereon, a builder-motion, controlling means to effect automatically the formation of a preliminary winding of yarn upon the yarn-receiver and thereafter a service-winding, and means to govern the position of the preliminary winding upon the yarn-receiver.

8. In a spinning-frame, a rotatable spindle, a yarn-receiver thereon, a builder-motion, controlling means to effect automatically the formation of a preliminary winding of yarn upon the yarn-receiver and thereafter a service-winding, and means to severally vary the position of the preliminary winding upon the yarn-receiver and govern the volume of said winding.

9. In a spinning-frame, a builder-motion, a filling-wind-actuating device therefor, and means to automatically change from a short, uniform traverse to a long, uniform traverse after a bunch of yarn has been wound upon a yarn-receiver to complete the main winding of yarn with the long traverse.

10. In a spinning-frame, a reciprocating ring-rail, a builder-motion, a single actuating device therefor, and connections between the builder-motion and the ring-rail, to control the movement of the latter, said connections including means to automatically change from short to long traverse, to effect

the winding of a bunch of yarn upon a yarn-receiver with the former, and to complete the main winding with the latter, traverse.

11. In a spinning-frame, a reciprocating ring-rail, a builder-motion, including a builder-arm, an actuating-cam, to impart a constant stroke to said arm, connections between the latter and the ring-rail, to control the movement of the said ring-rail, and means acting through said connections to impart automatically a short traverse, and thereafter a long traverse, to the ring-rail.

12. In a spinning-frame, a reciprocating ring-rail, a builder-motion, a filling-wind-actuating cam therefor, connections between the builder-motion and the ring-rail, to control the movement thereof, and means operating through said connections to shift from a short traverse to a long traverse at a predetermined point in the winding, to thereby effect the formation of two windings of yarn upon a yarn-receiver, both laid with the filling-wind but with short and long traverse, respectively.

13. In a spinning-frame a builder-motion, including a builder-arm, and a winding mechanism carried thereby to govern the "gain" of the traverse, a traverse-cam to coöperate with and impart a constant stroke to the builder-arm, and means operatively connected with the latter to effect automatically the winding of a bunch of yarn with a short traverse upon a yarn-receiver, and thereafter the main or service winding with the longer, maximum traverse, the "gain" for both windings being governed by or through the winding mechanism.

14. In a spinning-frame, a reciprocating ring-rail, a builder-motion, including a builder-arm, an actuating-cam therefor, a carriage reciprocated by or through the builder-arm with a constant stroke, connections, including traverse-shifting means, between the carriage and ring-rail, to effect automatically reciprocation of the latter with a short traverse, and thereafter with full traverse corresponding to the stroke of the carriage.

15. In a spinning-frame, a reciprocating ring-rail, a builder-motion, a carriage reciprocated with a constant stroke by the builder-motion, connections between the carriage and ring-rail, to govern the reciprocation of the latter, and traverse-shifting means mounted on the carriage, to automatically effect reciprocation of the ring-rail with a full traverse, or with a shorter traverse, the latter acting to lay a bunch, and the former to lay the main winding, of yarn upon a yarn-receiver.

16. In a spinning-frame, a reciprocating ring-rail, a builder-motion, a carriage reciprocated thereby with a constant stroke, a winding mechanism to effect "gain" of the carriage, connections between the latter and the ring-rail, to reciprocate the same, said connection including a traverse-shifter mounted to swing on the carriage, a fulcrum member about which the free end of said shifter rocks during the formation of a preliminary winding of yarn upon a yarn-receiver, means to render said member inoperative at the termination of such winding, a locking device to prevent movement of the shifter relative to the carriage, during the formation of the main winding of yarn, and means to automatically release the shifter after the completion of the main winding and prior to the beginning of a new preliminary winding.

17. In a spinning-frame, a reciprocating ring-rail, a carriage, a traverse-shifter fulcrumed thereon, connections between the free end of said shifter and the ring-rail, means to reciprocate the carriage with a uniform stroke and to gradually advance the same, a fulcrum member upon which the free end of the shifter rocks during a predetermined reciprocation of the carriage, to impart a short traverse to the ring-rail, means operative by or through the carriage to render the fulcrum member inoperative after the period of short traverse has been completed, means to automatically lock the shifter to the carriage at the end of short traverse to thereafter move with the carriage and impart a long traverse to the ring-rail, and a device to unlock said shifter and carriage when the long traverse period has been completed.

18. In a spinning-frame, a ring-rail, a builder-motion, connections between it and the ring-rail, to traverse the latter and govern the "gain" thereof, said connections including a carriage having a constant stroke, and a traverse-shifter mounted thereon, and means to impart automatically, through said shifter, a short, uniform traverse to the ring-rail for a predetermined period, and thereafter a long, uniform traverse, to form respectively a bunch, and a main or service winding, of yarn upon a yarn-receiver.

19. In a spinning-frame, a ring-rail, a builder-motion, including a builder-arm, an actuating-cam therefor, a winding mechanism mounted on the arm, a carriage connected with said mechanism and having a constant stroke imparted to it by or through the builder-motion, traverse-shifting means, comprising two pivotally-connected members one of which is fulcrumed on the carriage, a connection between the free end of the other member and the ring-rail, a fulcrum about which said members swing during a predetermined reciprocation of the carriage, to impart a short traverse to the ring-rail, and means controlled by the carriage to render said fulcrum inoperative and to lock said members to move in unison with the carriage at the termination of the short traverse period, to impart a long traverse to the ring-rail.

20. In a spinning-frame, a ring-rail, a builder-motion, including a winding mechanism to govern the "gain" of the traverse, connections between the builder-motion and the ring-rail, said connections including a

carriage reciprocated with a constant stroke, a traverse-shifting device pivoted at one end on the carriage, means to automatically lock and unlock the carriage and shifting device at predetermined times, a fulcrum member movable into position to form a fulcrum for the free end of the shifting device, to thereby impart a short traverse to the ring-rail, and means automatically operated by or through the carriage at the termination of the short traverse period to render said fulcrum member inoperative, the shifting device being at such time locked to the carriage, to impart a long traverse to the ring-rail while the carriage and shifting device are locked together.

21. In a spinning-frame, a builder-motion, and controlling means therefor to effect automatically the formation of a bunch, and thereafter a main winding, of yarn upon a yarn-receiver, said means including a reciprocating carriage, a device fulcrumed thereon at one end, an intermittingly operative fixed fulcrum for the other end of said device, and means to lock said device to the carriage when said fixed fulcrum is inoperative, the bunch being formed when the said device is rocked on the fixed fulcrum and the main winding when the latter is inoperative.

22. In a spinning-frame, a ring-rail, a builder-motion, including a builder-arm, a winding mechanism mounted thereon to control the "gain" of the traverse, an actuating-cam for said arm, a reciprocating carriage, a two-part traverse-shifter fulcrumed thereon, a flexible connection between one member of the shifter and the winding mechanism, connections between the ring-rail and the outer end of the other member, means to vary the relative movement of said members, to govern the position of a preliminary winding of yarn upon a yarn-receiver, a locking device to lock the traverse-shifter from relative movement on the carriage, during the formation of the main winding of yarn, with long traverse, means to automatically unlock the shifter by or through the carriage when wound back, a movable fulcrum member to coöperate with the free end of the traverse-shifter to impart a short traverse to the ring-rail while forming the bunch, and means actuated by or through the movement of the carriage at the completion of the bunch, to render said fulcrum member inoperative and permit bodily movement of the shifter with the carriage, to impart a long traverse to the ring-rail during the formation of the main winding.

23. In a spinning-frame, a builder-motion, automatically-operating controlling means therefor to effect the winding of a bunch, and thereafter a main or service winding of yarn, upon a yarn-receiver, and means to vary the form of bunch.

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

ALONZO E. RHOADES.

Witnesses:

GEORGE OTIS DRAPER,

ERNEST W. WOOD.