A. E. RHOADES.

TWISTER.

APPLICATION FILED DEC. 12, 1908.

989,050.

Patented Apr. 11, 1911.

4 SHEETS—SHEET 1.

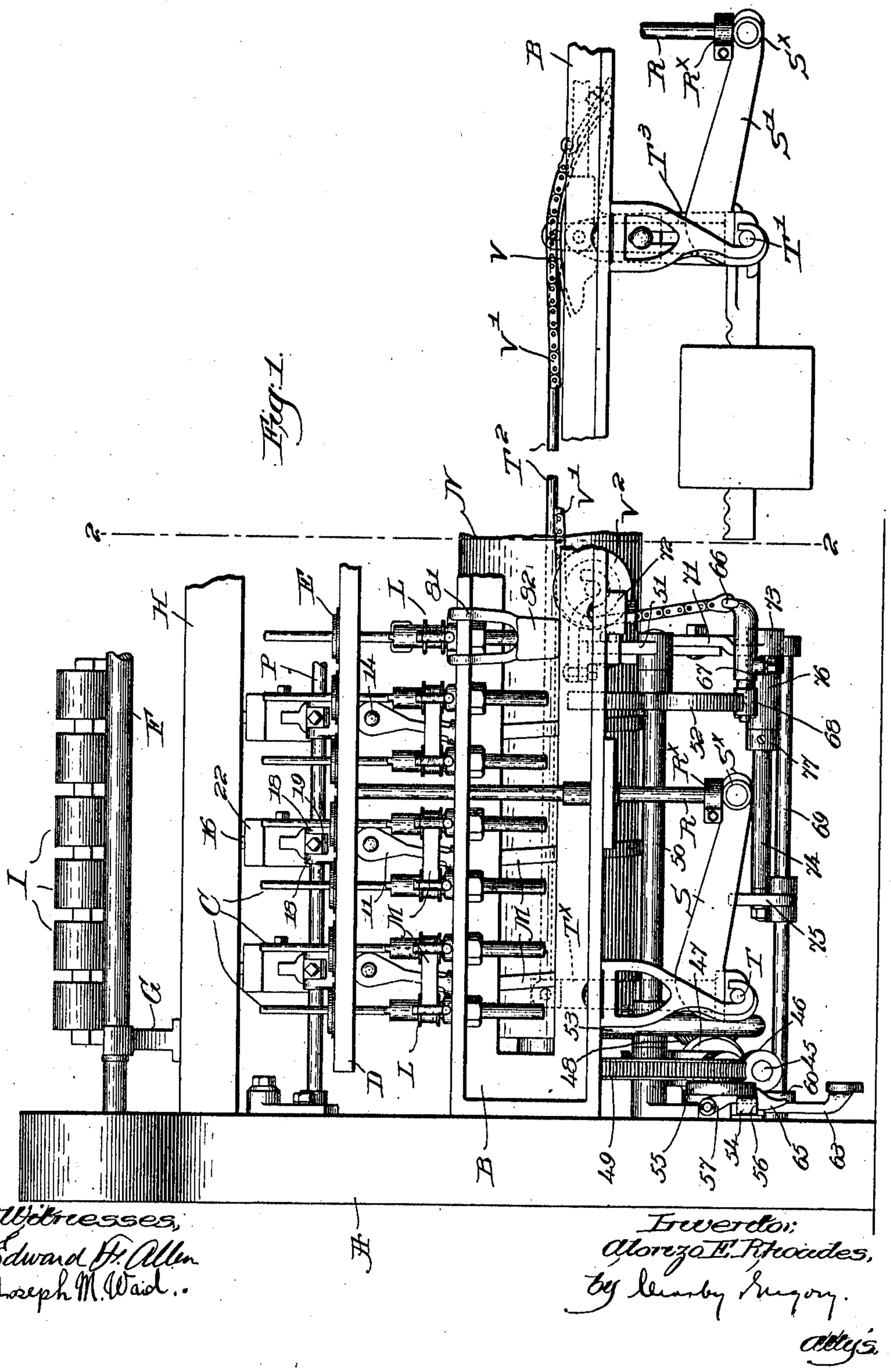


Fig. 1.

Witnesses,
Edward F. Allen
Joseph M. Waid..

Inventor:
Alonzo E. Rhoades,
by Lemby Gregory.
Atty's.

A. E. RHOADES.

TWISTER.

APPLICATION FILED DEC. 12, 1908.

989,050.

Patented Apr. 11, 1911.

4 SHEETS—SHEET 2.

Fig: 2.

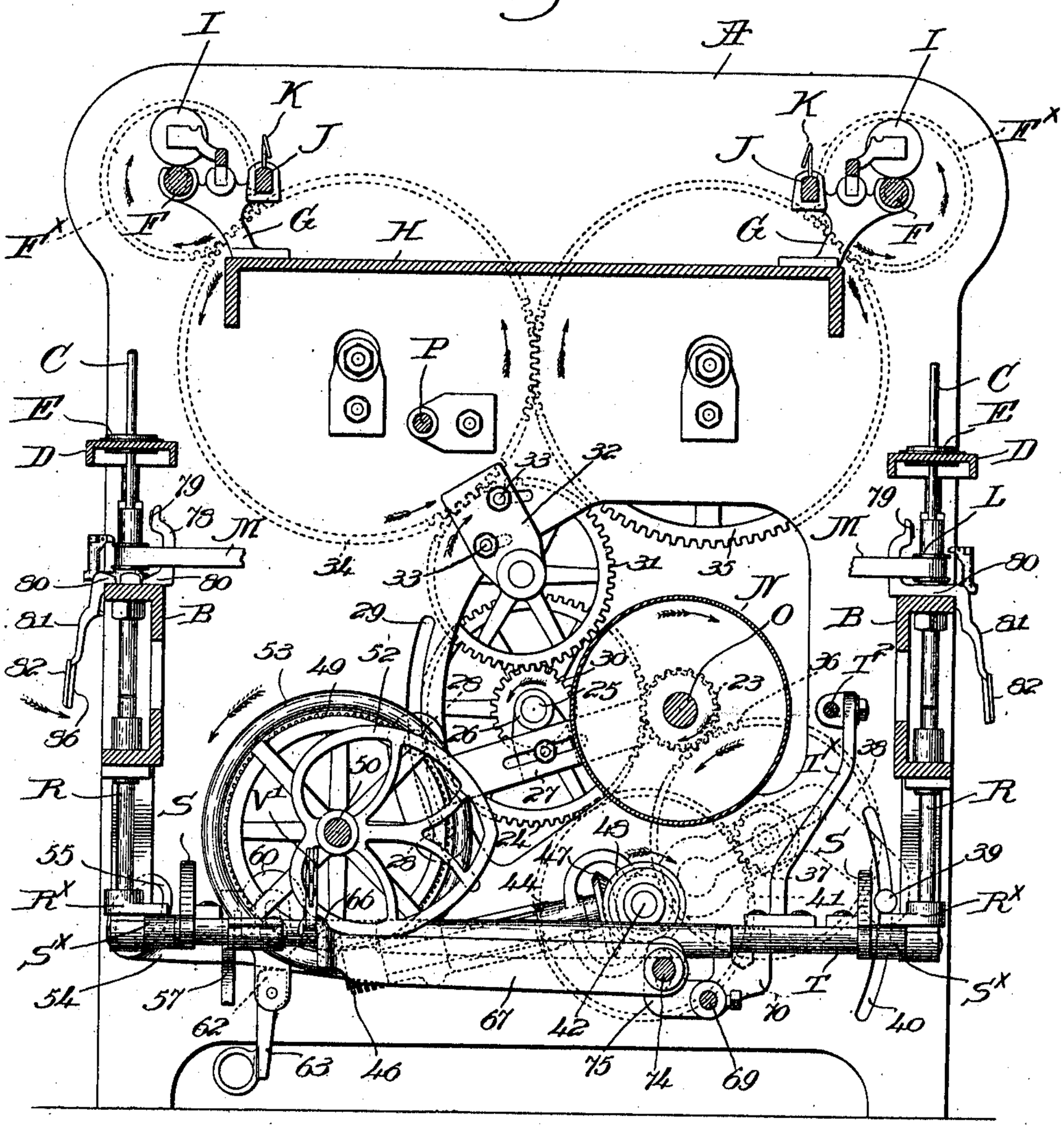
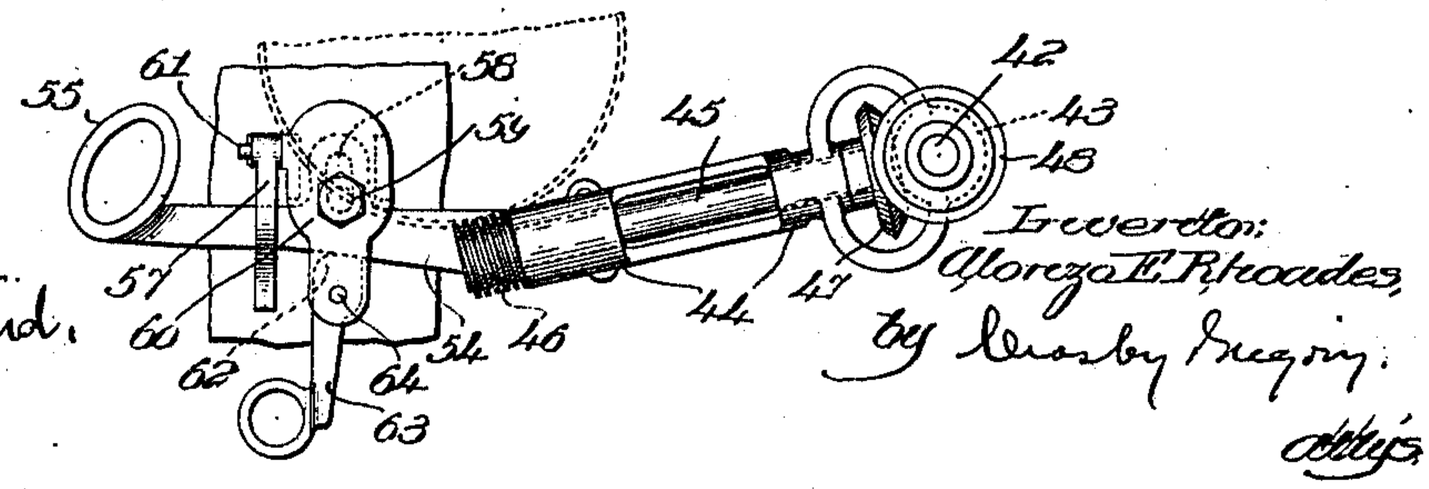


Fig: 3.



Witnesses,
Edward G. Allen.
Joseph M. Ward.

Inventor:
Alonzo E. Rhoades,
by Crosby Gregory.
Attys.

A. E. RHOADES.

TWISTER.

APPLICATION FILED DEC. 12, 1908.

989,050.

Patented Apr. 11, 1911.

4 SHEETS—SHEET 3.

Fig: 4.

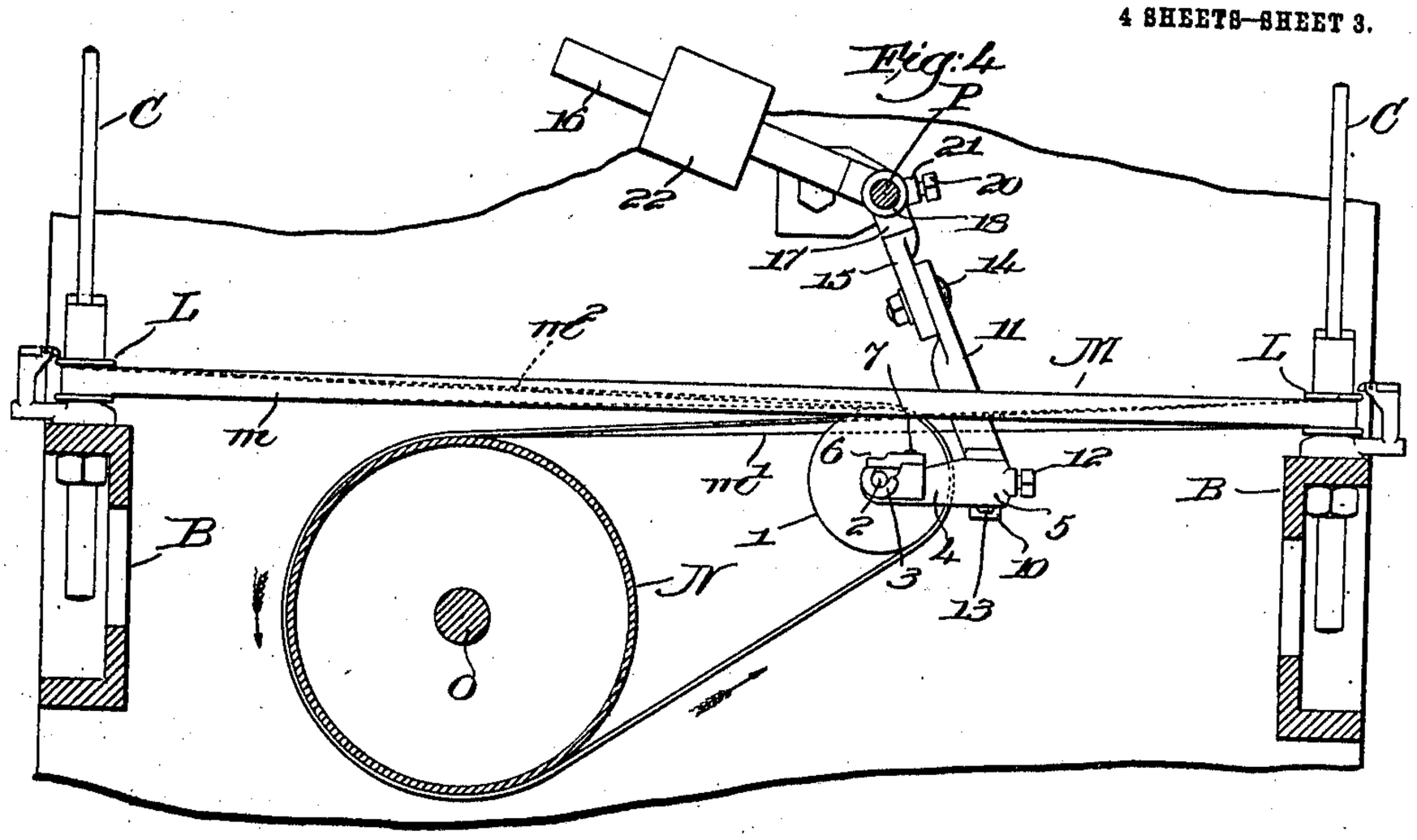
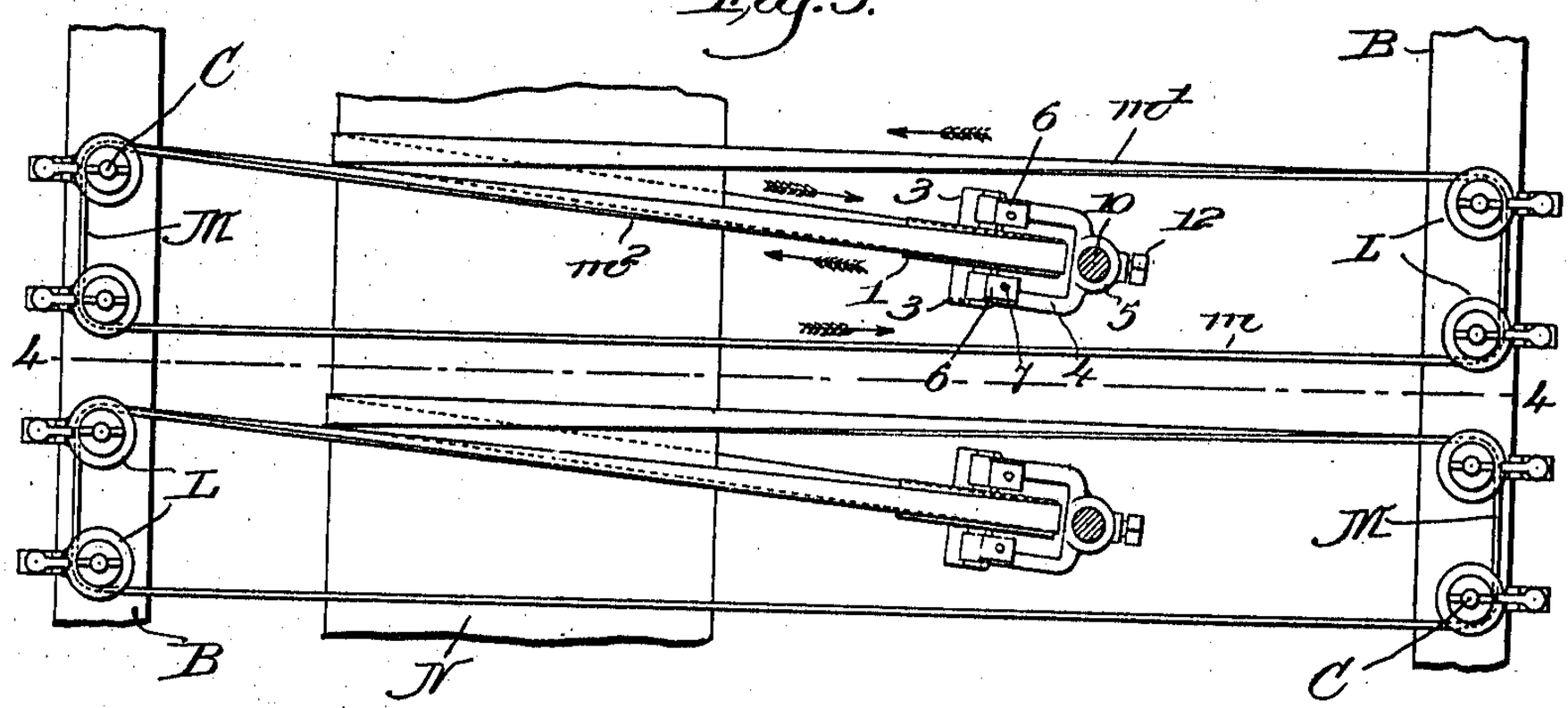


Fig: 5.



Witnesses.
Edward F. Allen.
Joseph M. Ward.

Inventor:
George E. Rhoades,
By Crosby Gregory.
Attys.

A. E. RHOADES.

TWISTER.

APPLICATION FILED DEC. 12, 1908.

989,050.

Patented Apr. 11, 1911.

4 SHEETS—SHEET 4.

Fig: 8.

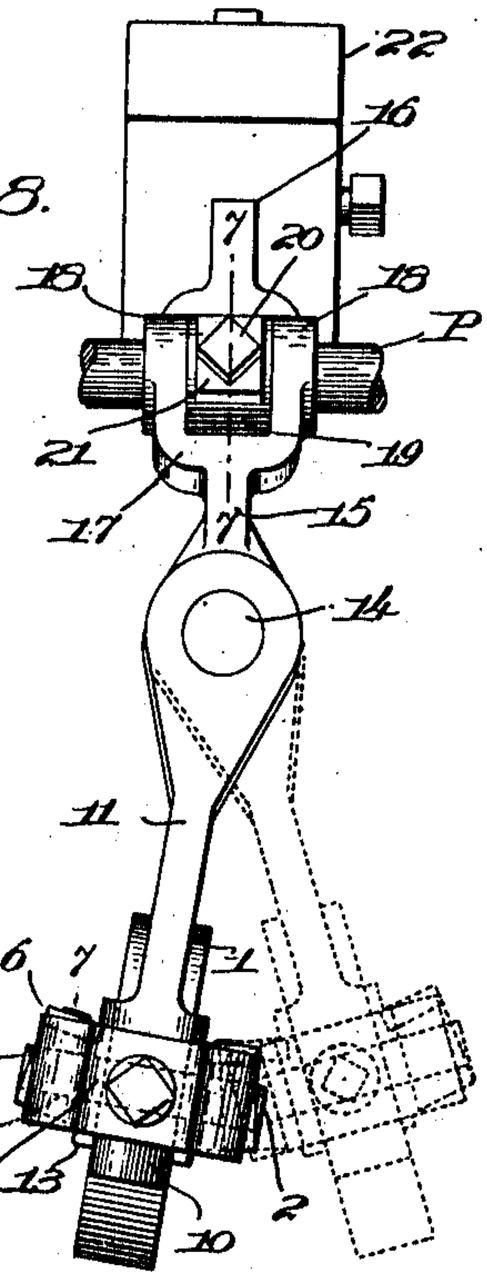


Fig: 6.

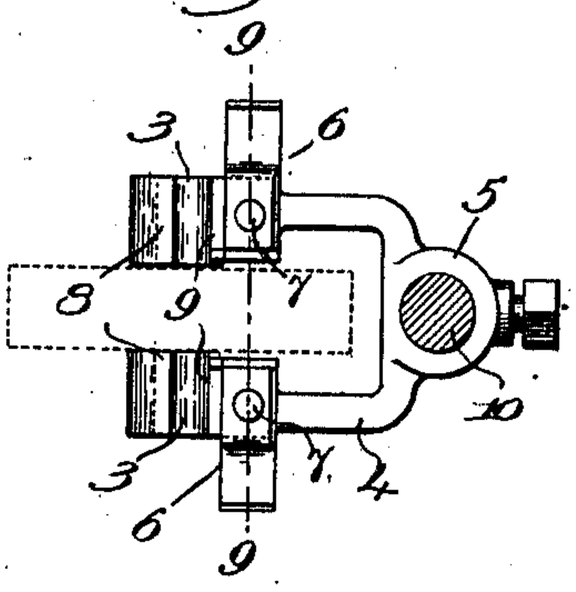


Fig: 7.

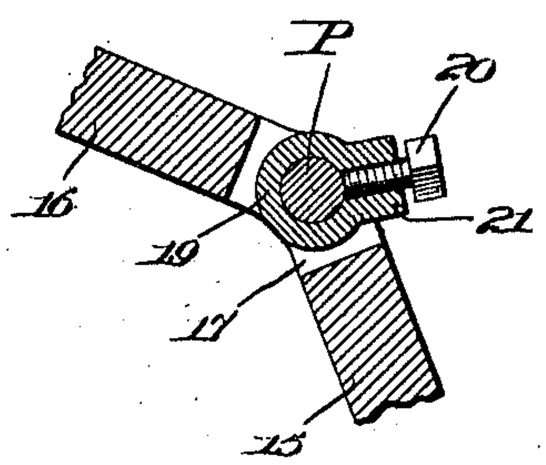


Fig: 10.

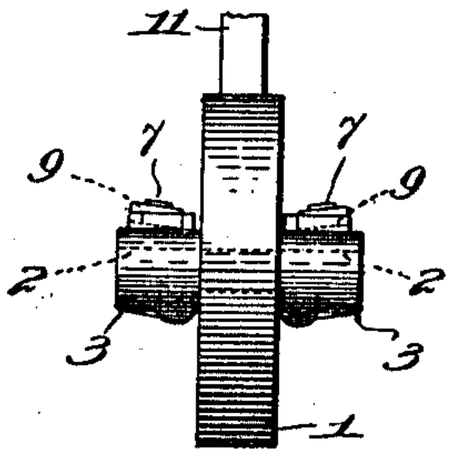
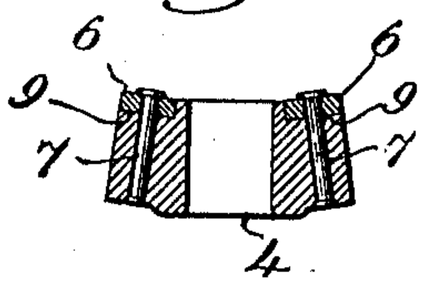


Fig: 9.



Witnesses,
Edward E. Allen.
Joseph M. Ward.

Inventor;
Alonzo E. Rhoades.
by Crosby Gregory.
Attys.

UNITED STATES PATENT OFFICE.

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

TWISTER.

989,050. Specification of Letters Patent. Patented Apr. 11, 1911.

Application filed December 12, 1908. Serial No. 467,252.

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 Twisters, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to apparatus for spinning or twisting yarn, and is more especially connected with so-called "twisters" and it has for its object the production of various novel features of construction, arrangement, and operation, to be explained in detail in the subjoined specification and particularly pointed out in the following claims.

The twister which forms the subject-matter of this application is designed especially to enable the spindles to be driven by flat bands or tapes instead of the usual round bands.

I have herein made various improvements in the driving mechanism whereby the power is transmitted from one point to another positively and without the use of belts or chains. As will appear hereinafter I have also made certain improvements in the builder-motion whereby the rotation of the builder-cam may be stopped manually when desired.

Figure 1 is a front elevation of a portion of a twister embodying my present invention, taken at the end at which the power is transmitted from the cylinder to other parts, and showing the builder-motion, partly broken out to save space. Fig. 2 is a transverse section through the frame, on the line 2—2, Fig. 1, looking toward the left. Fig. 3 is a detail of a portion of the builder-motion, to more clearly illustrate the means for normally maintaining the builder-cam in operative connection with the means for rotating the same. Fig. 4 is a transverse section through the frame, between two adjacent groups of spindles, on the line 4—4, Fig. 5. Fig. 5 is a top plan view showing two groups of spindles, their driving bands, and the slack take-up for each band.

The box-like frame end A in which the gearing is protected and inclosed, the side rails B in which the twisting spindles C are rotatably mounted, the vertically-reciprocating ring-rail D provided with suitable rings E, the lower, front delivery-rolls F, one at each side of the frame, rotatably mounted in stands G on the top-board H, the top-rolls I, and the transverse-rods J having guide-eyes K for the yarn, may be and are all of substantially well known construction, each spindle having an attached whirl L adapted to receive a flat or tape driving band M.

The spindle-driving drum or cylinder N extends lengthwise of the frame, as usual, but by reference to Figs. 2, 3, and 4 it will be seen that it is located at one side of the center of the frame, its shaft O in practice being provided at one end with fast and loose pulleys, (not shown) of usual construction and forming no part of my invention.

Herein the spindles C are arranged in groups of four, as clearly shown in Fig. 5, a pair at the front of the frame being directly opposite the other pair of the group at the back of the frame, and an endless flat or tape driving band M for each group passes from one pair of spindles, at the left, Fig. 5, across the frame, as at m, Figs. 4 and 5, around the second pair of spindles and back at m' to the cylinder N and around the latter to the sheave or roll 1 of the slack take-up device. From said sheave the band is reversed, and leads over the cylinder, at m^2, but without touching it, to the first mentioned pair of spindles. The long run m is in a vertical plane, but the run m' is given a half turn, and the run m^2 is also given a half turn between the spindle at the left, Fig. 5, and the sheave 1. It will be noticed, however, that the two runs m' and m^2 are long, so that the twist or half turn is easily made and without any strain on the band.

From the direction arrows on Fig. 5, it will be clear that the several spindles of a group run in the same direction, and at the same speed.

The take-up device for each band is located between the runs m and m', so that there is no interference with the band and the latter runs freely and smoothly without any undue strain.

A single supporting bar or shaft P is provided for all of the take-up devices,

fixedly held at its ends in the ends of the main frame at a distance above the series of driving bands M.

In order that the slack or stretching of the bands shall not interfere with the proper driving of the spindles it is necessary to maintain the bands taut and under a proper tension, and also to make provision for taking up automatically any slack as soon as it occurs, and as each of the bands will vary in slackness or stretching it is necessary to provide individual take-up devices, each one coöperating with its own particular band.

The several take-up devices are mounted on the supporting rod P, and one of said devices will be described in detail.

The sheave or roll 1 has journals 2 which are rotatably mounted in opposite bearings 3 formed in the ends of a yoke 4 having a hub 5 with its axis at right angles to the bearings, the latter being normally closed by caps 6 pivoted at 7 on the yoke.

I prefer to make the journals 2 of tough wood thoroughly impregnated with a lubricant, as thereby the use of oil in the bearings is obviated while the wear between the bearings and the journals is minimized.

The hub 5 receives the round shank 10 of a depending hanger 11, the shank being at an obtuse angle to the hanger, as best shown in Fig. 4, and by means of a set screw 12 the yoke 4 can be held at any desired lateral position, the adjustment being made about the shank as a center.

A cotter-pin 13 is shown as retaining the yoke on the shank when the set screw is loosened for purposes of adjustment.

The upper end of the hanger 11 is connected by a clamp-swivel 14 with the lower arm 15 of a bent lever 15, 16, bifurcated at 17 and having hubs 18, to receive the supporting rod P.

By loosening the clamp-swivel the hanger can be swung to the right or left, to the proper angular position best adapted for positioning the sheave 1, and the latter can be laterally adjusted on the shank 10 when the hanger 11 is in any one of its adjusted positions, giving a wide range of adjustment and great accuracy in positioning the sheave to secure the desired coöperation with its band M.

The bent lever or carrier 15, 16 can rock on the rod P, and it is held from lateral movement thereon by a collar 19, see Fig. 1, fixedly held on the rod by a set-screw 20, the collar being interposed between the hubs 18, and as shown in Fig. 4 the neck 21 serves as a stop to limit upward movement of the arm 15, due to the weight 22 adjustably mounted on the arm 16.

The weight 22 is heavy enough to counterbalance the hanger 11 and connected parts and to tend always to swing the hanger away from the cylinder N, so that the sheave 1 exerts a uniform and continuous pull on the bight of the band passed around the sheave, the further out the weight on the carrier-arm 16 the greater the tension exerted on the band.

When a frame is set up the collars 19 are set in proper position on the rod P, and any subsequent adjustment of individual take-up devices is generally effected by the lateral adjustment of its yoke relatively to the hanger, and by the angular adjustment of the latter relatively to the rocking carrier.

Having more particular reference to Fig. 2 the positive connections by which other parts of the twister are driven from the cylinder N will now be explained. The cylinder shaft O at its end within the box-like frame end A has fast upon it a pinion 23 in mesh with a large gear 24 having its shaft 25 mounted in a bearing 26 adjustable on a radius arm 27 loosely embracing the cylinder-shaft O and having its free end adjustably sustained by bolts 28 extended through a segmental slot 29 in the frame end A, the gear 24 having an attached pinion 30. Said pinion meshes with a shift-gear 31 carried by a bracket 32 adjustably held by bolts 33 on the frame-end A, the shift-gear being shown in Fig. 2 as meshing with a much larger gear 34 which meshes with a like gear 35, said gears 34, 35 being symmetrically disposed with relation to the width and height of the main frame. Obviously the gears 34, 35 rotate in opposite directions, and at the same speed, and they in turn rotate the front driving rolls F by meshing with the smaller gears $F^{\times}$ fixedly connected with the roll-shafts, so that the latter are driven positively from the cylinder N without the use of belts or chains, as is now usual. In the arrangement shown the yarn is led through the guide K over the top-roll I and down in front of it and then between the rolls I and F, but if it is desired to lead the yarn forward directly between said rolls the shift-gear 31 is shifted to the right, Fig. 2, into mesh with the gear 35, thereby reversing the direction of rotation of gears 34, 35 and the drawing-rolls F F.

By means of the radius arm 27 and the change-gear 24, and pinion 30 thereon variations in the speed transmitter can be arranged without any alteration in the cylinder-speed, as will be manifest.

I actuate the builder-motion from the cylinder, by means of the gear 36 and connected pinion 37, Fig. 2, adjustable on a swinging arm 38 which is held in the required position by coöperation of a clamping bolt 39 with the frame-end, slotted at 40 for the bolt, the gear 36 meshing with the cylinder pinion 23, while pinion 37 meshes with a large gear 41 fast on a short shaft 42, on

which the arm 38 is fulcrumed. This shaft also serves as a support for a hub 43 formed on the open head of an elongated sleeve-bearing 44, best shown in Fig. 3, rotatably supporting a transmitting shaft 45 having at one end a worm 46 and at its other end a bevel-gear 47 within the open head of the bearing and driven by a like gear 48 fast on shaft 42. Worm 46 is adapted to engage and drive a worm-gear 49 fast on a shaft 50, see also Fig. 1, supported in the end A and also by a bracket 51 secured to the rail B, a traverse-actuating cam 52 and a hand wheel 53 being fixedly secured to the shaft, the cam serving to actuate the builder-motion, to be described, said cam being shown as heart-shaped in Fig. 2.

When winding back after a frame has been doffed the worm and worm gear referred to are disengaged, and I have shown a novel device to lock the said parts in operative engagement during the twisting action.

The bearing 44 has a forward extension 54 provided at its front end with a loop-handle 55, and normally the shoulder 56 of a latch 57 engages the lower edge of the extension and holds it in the position shown in Figs. 1, 2, and 3, with worm 46 in mesh with the worm-gear 49. Said extension has an upright slot 58, see dotted lines Fig. 3, through which passes the shank of a bolt 59 rigidly attaching a bracket 60 to the frame end A, the extension being movable between said parts a distance determined by the length of the slot 58. The latch depends from a pivot 61 on the front of the bracket, and when the latch-shoulder 56 is under the extension 54 the latter is held up, as shown, and it is further held up by the cam-end 62 of a combined supporting and releasing lever 63, pivoted at 64 on the lower end of the bracket 60, as clearly shown in Fig. 3. To release the extension the lever 63 is swung to the left, Figs. 2 and 3, disengaging the cam-head from the extension, while the free end of said lever wipes over the curved face 65 at the lower end of the latch, swinging the latter to the right, Fig. 1, and releasing said extension so that the latter drops and disengages the worm 46 from the worm gear 49.

While moving the releasing lever the operative grasps the hand wheel 53 and lets it rotate slowly after the extension 54 is unlocked, to prevent the ring-rail from dropping too suddenly, for otherwise the weight of the rail and other parts would act upon the builder-cam 52 to turn it around rapidly and the sudden drop of the rail might cause damage.

When it is desired to restore the parts to operative condition the attendant lifts the handle 55, raising the extension 54 to the position shown in the drawings, and the latch 57 swings into locking position. Then the lever 63 is returned to normal position, with its cam-head 62 engaging the lower edge of the extension, the worm 46 being held in mesh with worm-gear 49, the lever 63 acting as an additional lock in case the latch should be accidentally thrown out of locking position.

The ring-rail D has the usual attached and depending lifter-rods R provided at their lower ends with toes $R^{\times}$ which rest upon rolls $S^{\times}$ on the ends of the rocker-arms S and S′ Fig. 1, attached respectively to the usual transverse rock-shafts T and T′, shaft T having an upturned arm $T^{\times}$ connected by a link T^{2} with a similar arm T^{3}, (shown only in Fig. 1) fast on the rock-shaft T′. As shown in Fig. 1 the latter has a fixedly attached segment V to which is connected, as usual, a flexible member or chain V′ which passes over a guide-sheave V^{2} and down to a hook 66 on the builder-arm 67, provided with a follower-roll 68 coöperating with the builder-cam 52, see Fig. 1. A bar 69 is fixedly held at its outer end in a bracket 70 on the frame end A, and its inner end is fixedly held in a bracket 71 depending from a cross-girt 72, Fig. 1, the bracket 71 having a boss 73 in which is fixed the inner end of a fulcrum bar 74, supported at its outer end by a rigid arm 75 fast on the bar 69. The bracket 71 and cross-girt 72 are omitted in Fig. 2, and also the sheave V^{2}, to avoid confusion. The builder-arm 67 has a long hub 76 mounted to rock on the fulcrum-bar 74 between the boss 73 and a collar 77, in order to provide a firm support for the builder-arm and to maintain it against any twisting action. As the cam 52 rotates it acts upon the follower 68 and effects oscillation of the builder-arm, the downstroke of the latter pulling on the chain V′ and rocking the shafts T, T′ to elevate the lifter-rods R and thereby raise the ring-rail D, the latter descending as the cam permits the builder-arm to swing upward, as will be apparent. The reciprocation of the ring-rail effects the traverse of the yarn on the bobbins (not shown) carried by the spindles C, in well known manner.

When an end breaks the corresponding spindle must be stopped while the end is pieced up, and such stoppage is effected by a spindle brake, which is adapted to be actuated by the knee of the attendant, thereby leaving the hands free.

In Fig. 1 I have shown only one spindle provided with the brake, but it will be understood that in practice each spindle will be provided with a brake. The upturned arm 78 provided with a friction-pad 79 adapted to bear against the spindle above the whirl and thereby stop rotation, the seat 80 to rest upon the top of the spindle-rail B and made open to loosely embrace the

base of the spindle-bearing, the bifurcated leg 81 depending from the extension at its front and terminating in a broad and flat knee-plate 82 are substantially of usual construction.

Various changes or modifications may be made by those skilled in the art in different details of construction and arrangement of the apparatus herein shown and described without departing from the spirit and scope of my invention as set forth in the appended claims.

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

1. In apparatus of the class described, a set of spindles, a vertically-reciprocating ring-rail, a cylinder, driving bands between it and groups of the spindles to rotate the latter, a builder-motion, including a builder-cam, to control the ring-rail a worm-gear rotatable with the cam, a swinging transmitter-shaft having a worm movable into and out of mesh with said gear, a train of gearing between said shaft and the cylinder, to drive the shaft, a latch to lock the shaft in operative position, and manually operated means to release the latch and thereby effect disconnection of the worm and worm-gear.

2. In apparatus of the class described, a driving cylinder, a shaft having fast thereon a worm-gear and a builder-cam, an intermediate shaft, a train of gears between it and the cylinder, a sleeve-bearing mounted to rock on said intermediate shaft, a transmitting shaft in said bearing, provided with a worm to drive the worm-gear, gearing between the transmitting and the intermediate shafts, a latch to retain the transmitting shaft in operative position, and a manually operated device to disengage the latch when it is desired to stop rotation of the builder-cam.

3. In apparatus of the class described, a driving cylinder, a shaft having fast thereon a builder-cam and a hand-wheel, gearing between the cylinder and the cam-shaft, including a worm-gear and a worm to mesh therewith, a locking device to retain said parts in operative engagement, and means to at will disconnect the worm and worm-gear, the hand-wheel at such time being manually controlled to govern rotative movement of the cam-shaft.

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

ALONZO E. RHOADES.

Witnesses:
JESSE D. BROMLEY,
E. D. OSGOOD.