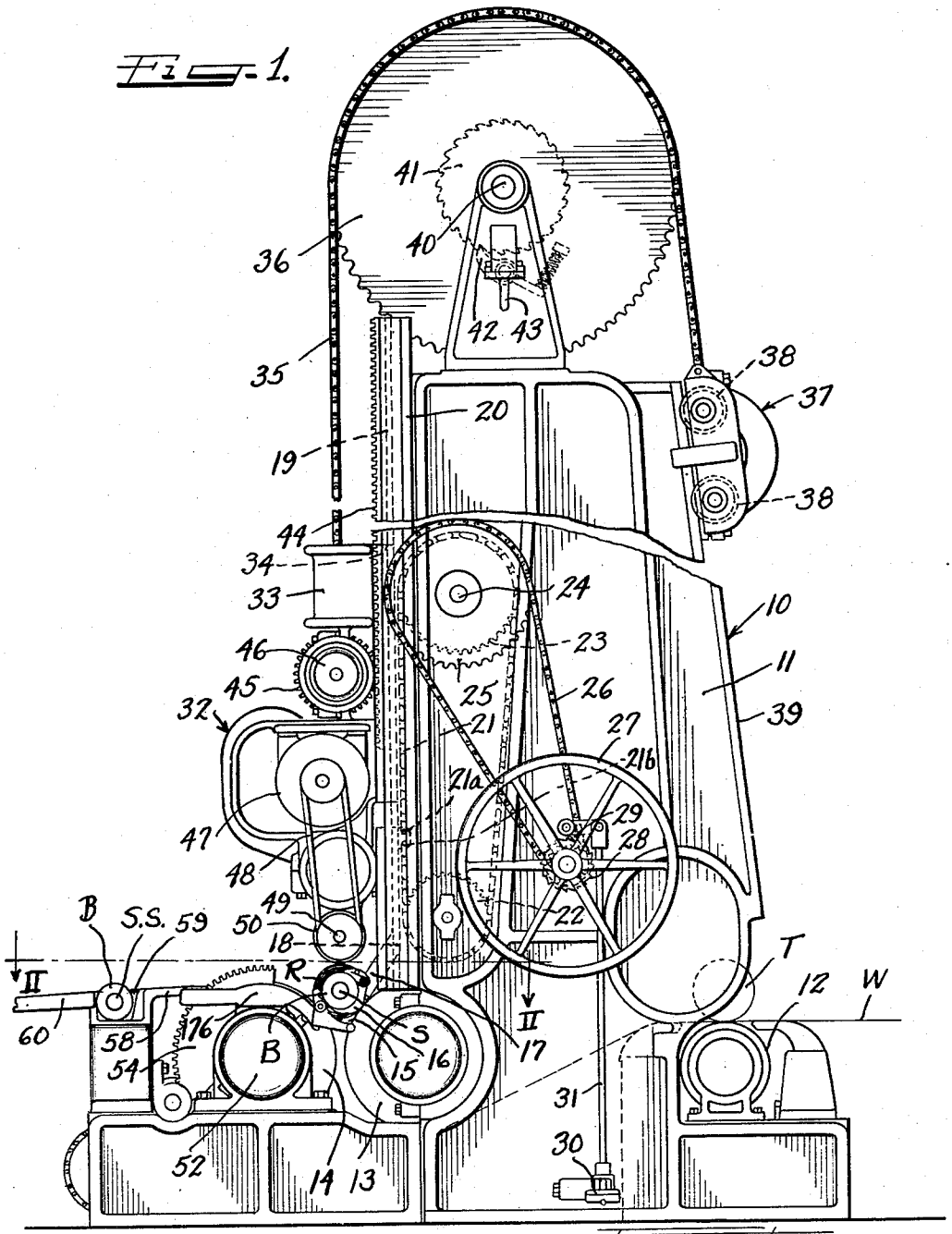
Dec. 28, 1943. E. E. BERRY ET AL 2,337,585

ROLL HANDLING APPARATUS

Filed Jan. 31, 1942 6 Sheets-Sheet 1

Fig. 1.



Inventors

Earl E. Berry.

Lloyd Hornbostel.

by Charles Bell Attys

Dec. 28, 1943. E. E. BERRY ET AL 2,337,585

ROLL HANDLING APPARATUS

Filed Jan. 31, 1942 6 Sheets-Sheet 2

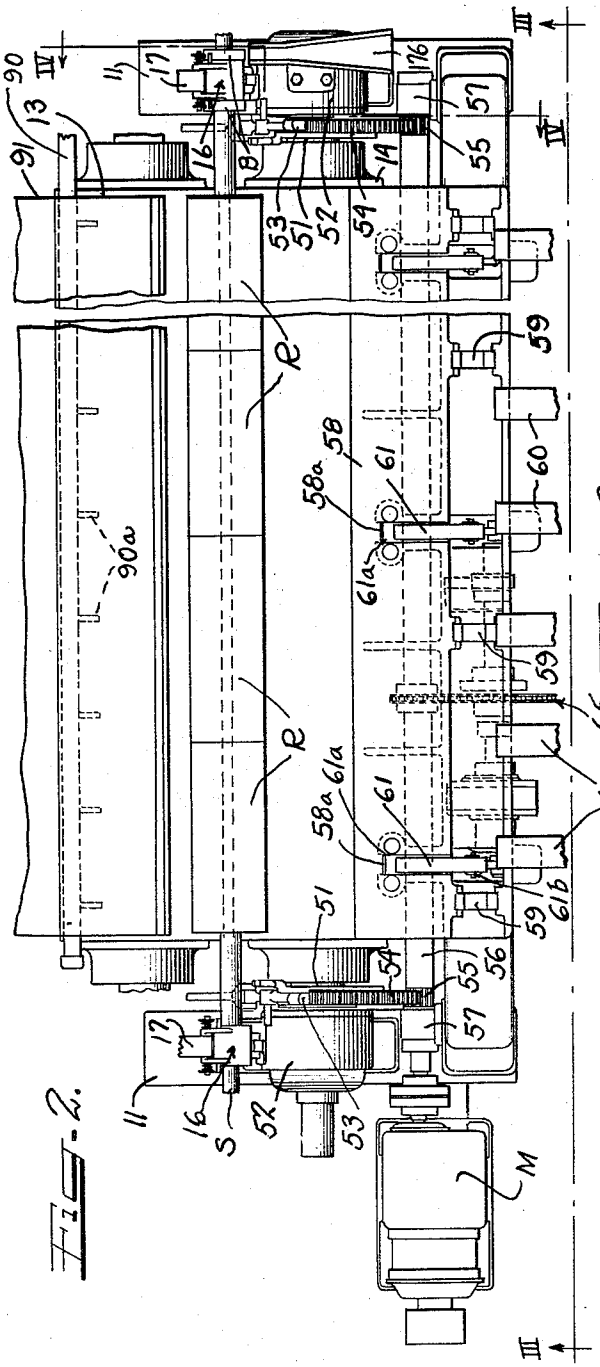


FIG-2.

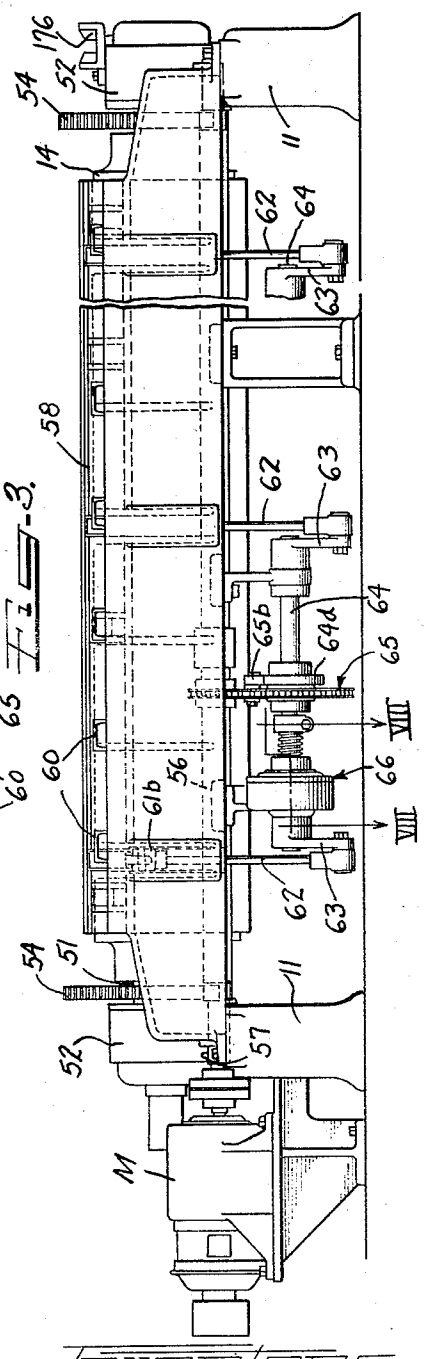


FIG-3.

INVENTORS
EARL E. BERRY.
LLOYD HORNBOSTEL.

BY Charles Hall ATTYS.

Dec. 28, 1943. E. E. BERRY ET AL 2,337,585

ROLL HANDLING APPARATUS

Filed Jan. 31, 1942 6 Sheets-Sheet 3

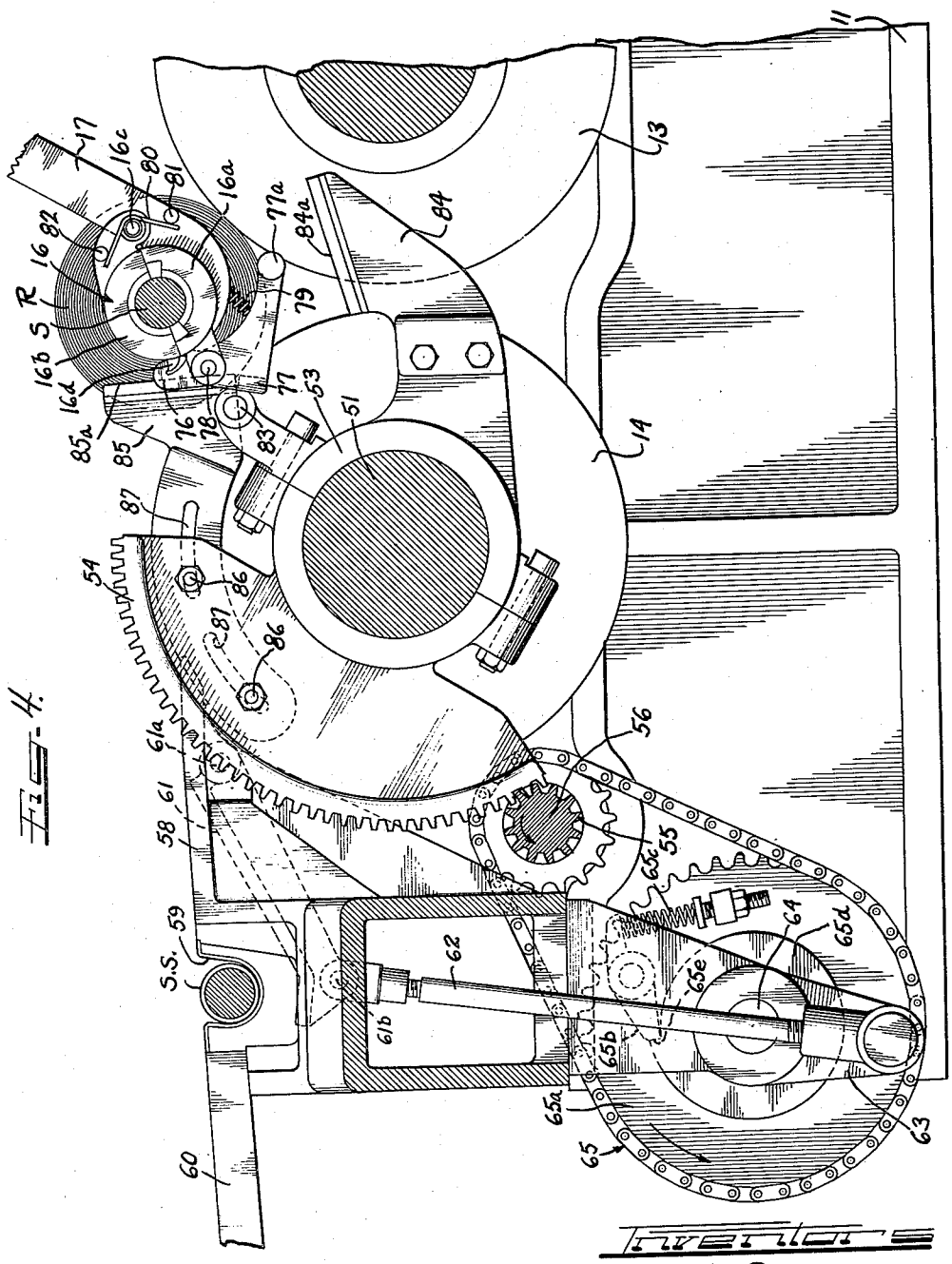


FIG. 4.

Inventors

EARL E. BERRY.

LLOYD HORNBOSTEL.

By Charles Bell Attys.

Dec. 28, 1943. E. E. BERRY ET AL 2,337,585

ROLL HANDLING APPARATUS

Filed Jan. 31, 1942 6 Sheets-Sheet 4

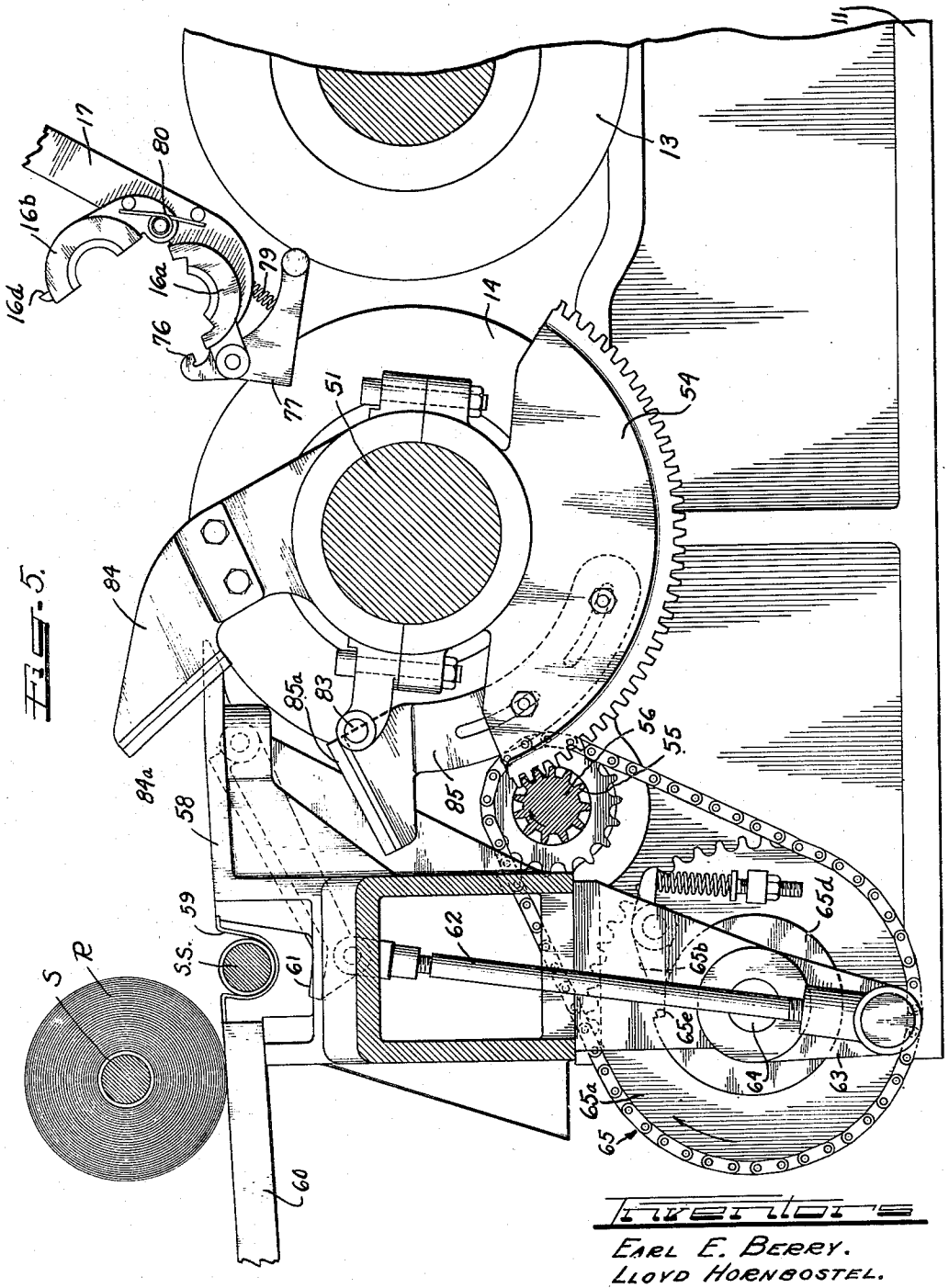


Fig. 5.

Inventors

Earl E. Berry.

Lloyd Hornbostel.

by Charles Pell Attys.

Dec. 28, 1943. E. E. BERRY ET AL 2,337,585

ROLL HANDLING APPARATUS

Filed Jan. 31, 1942 6 Sheets-Sheet 5

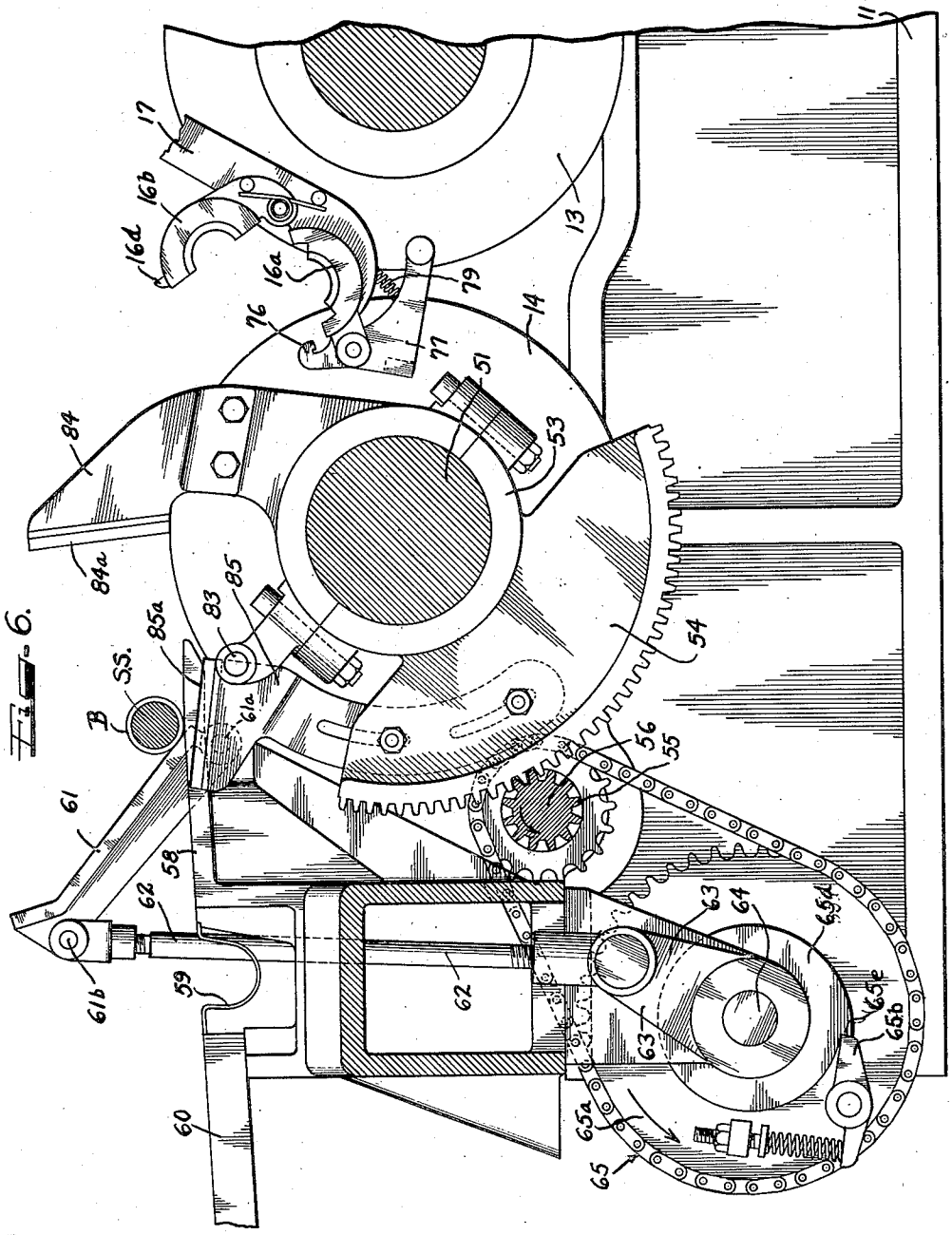


Fig. 6.

Inventors
Earl E. Berry.
Lloyd Hornbostel.

By Charles Miller Fitz
Attys.

Dec. 28, 1943. E. E. BERRY ET AL 2,337,585

ROLL HANDLING APPARATUS

Filed Jan. 31, 1942 6 Sheets-Sheet 6

Fig. 8.

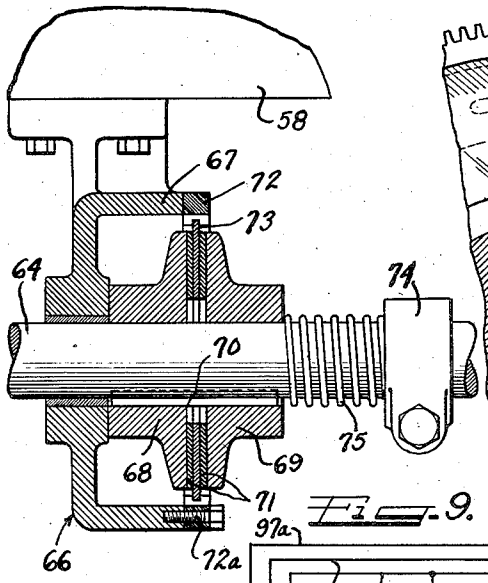


Fig. 7.

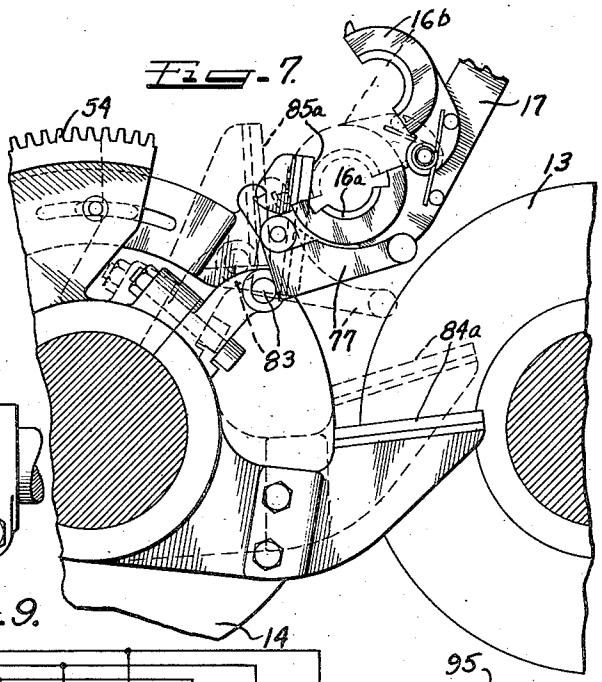
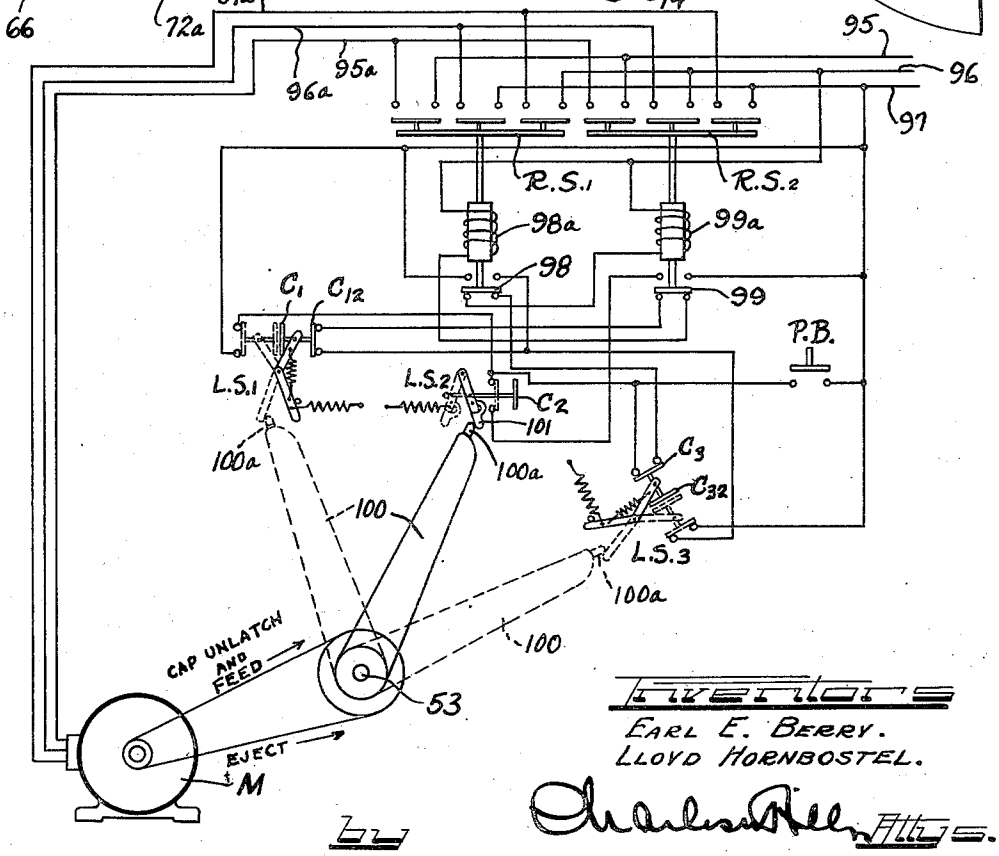


Fig. 9.



Inventors
EARL E. BERRY.
LLOYD HORNBOSTEL.

by Charles Allen Attys.

Patented Dec. 28, 1943 2,337,585

UNITED STATES PATENT OFFICE

2,337,585

ROLL HANDLING APPARATUS

Earl E. Berry and Lloyd Hornbostel, Beloit, Wis., assignors to Beloit Iron Works, Beloit, Wis., a corporation of Ohio

Application January 31, 1942, Serial No. 429,024

20 Claims. (Cl. 242—66)

This invention relates to apparatus, especially useful in a paper winding machine, to eject rolls of paper from the machine and to feed a spare winder shaft to the machine for the next winding operation.

More particularly the invention relates to apparatus for automatically opening up the bearing caps of a web winding machine, for automatically ejecting wound rolls from the machine, and for automatically supplying a new winder shaft to the bearing caps of the machine.

The apparatus of this invention will hereinafter be specifically described in combination with a paper rewinder and slitter machine with which it is particularly useful. However, it should be understood that the roll-ejecting and winder shaft feeding mechanism is not limited to use with the particularly disclosed paper rewinder and slitter assembly herein.

In accordance with this invention a paper rewinding machine of the type including a pair of driven under drums and a vertically movable slitter assembly is provided with vertically movable split bearing caps for a winder shaft. Mechanism is provided to release the winder shaft from the caps and discharge the shaft and wound roll or rolls thereon out of the machine.

Upon discharge of the wound roll from the apparatus, additional mechanism automatically moves a spare winder shaft out of a pocket in the machine to feed the spare shaft to the bearing caps. The bearing caps are then closed and the machine is ready for the next winding operation.

The rewinder machine can receive the full width paper web from the reel of a paper machine and will first trim the deckle edges of this web.

The vertically movable slitter assembly of the rewinder machine is brought down on top of the roll being wound on the winder shaft after a few turns of trimmed paper have been wound on the shaft. Positively driven slitter disks on this assembly cut through these turns of the web to completely sever the web into a plurality of strips or ribbons. The slitter disks then ride on top of the rolls being wound to continue to slit the incoming web. As a result a plurality of rolls will be formed simultaneously on the same winder shaft but the threading of individual ribbons of paper on the winder shaft is avoided since the slitting operation does not start until the full width web has been wound for several turns on the shaft.

As a result of this invention the manual handling of rolls and winder shafts into and out of a rewinder machine is eliminated and one ejection operation of the handling apparatus takes care of a plurality of individual rolls.

It is, then, an object of this invention to provide a paper winding machine capable of simultaneously winding a plurality of independent rolls and capable of simultaneously ejecting all of the wound rolls.

A further object of the invention is to provide roll-handling apparatus which automatically opens the winder shaft bearing caps of a rewinder machine, ejects the wound rolls from the machine and feeds a spare winder shaft to the machine.

Another object of the invention is to provide improved roll-handling apparatus for paper rewinders which positively feeds a spare winder shaft into the bearing caps of the rewinder after ejecting the wound roll or rolls from the rewinder.

A further object of the invention is to provide roll handling apparatus for paper winder machines which sweeps in one direction to release the winder shaft bearing caps of the machine, then sweeps in the opposite direction to discharge the wound roll or rolls from the machine and next sweeps in a reverse direction to feed the spare winder shaft into the machine.

Other and further objects of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which, by way of preferred example, illustrate one embodiment of the invention.

On the drawings:

Figure 1 is a broken side elevational view of a paper rewinder equipped with a slitter mechanism and a roll-handling apparatus.

Figure 2 is a fragmentary broken plan view along the line II—II of Figure 1.

Figure 3 is a broken front end elevational view along the line III—III of Figure 2.

Figure 4 is an enlarged fragmentary cross-sectional view, with parts in elevation, taken along the line IV—IV of Figure 2.

Figure 5 is a view similar to Figure 4 but illustrating the parts in relative position after the ejection movement.

Figure 6 is a view similar to Figure 4 but illustrating the parts in position for feeding in the spare winder shaft.

Figure 7 is a fragmentary view similar to Figures 4 to 6 but illustrating the movements of the parts for unlatching the bearing caps.

Figure 8 is an enlarged fragmentary cross-sec-

tional view with parts in elevation taken along the line VIII—VII of Figure 3.

Figure 9 is a wiring diagram illustrating the automatic control of the ejector and spare winder shaft feed mechanism.

As shown in the drawings:

In Figure 1 the reference character 10 designates generally a winder or rewinder machine adapted for receiving a web of paper W directly from the unwinding stand (not shown) of a paper making machine. The machine 10 includes a frame structure 11 rotatably supporting a bottom slitter shaft 12 adapted to receive the web W thereover. Trimmers such as T are provided for cutting off the deckle edges of the web W. The web W is directed from the top of the shaft 12 beneath the first winder under drum 13. A second winder under drum 14 is rotatably mounted in closely spaced horizontal relation from the drum 13. The two under drums 13 and 14 provide a nip 15 therebetween for receiving therein a winder shaft S on which a roll R is wound from the web W. The shaft S is carried at its ends in split bearing caps 16. The bearing caps 16 are mounted on the ends of arms such as 17 carried on carriages such as 18. The carriages 18 are slidable in vertical grooves 19 provided by standards such as 20 in the frame structure. The arms 17 can thus ride vertically in the grooves 19 toward and away from the under drums 13 and 14 and will ride upwardly as the roll R builds up in diameter.

The bearing caps 16, prior to the winding operation, can be set at any desired level in the nip 15 between the under drums 13 and 14 by means of chains such as 21 which have the ends thereof connected to the carriages such as 18 at 21*a* and 21*b* respectively.

The chains such as 21 are trained around lower sprockets such as 22 and upper sprockets such as 23. The upper sprockets 23 are keyed on a shaft 24 carrying, at one end thereof, another sprocket 25 operated through a chain 26 from a hand wheel 27 on the side of the machine. A ratchet 28 rotatable with the hand wheel 27 cooperates with a pawl 29 to hold the chain 26 in fixed position for preventing unauthorized lowering of the carriages 18. The pawl 29 is adapted to be tripped when desired by a foot pedal 30 connected to the pawl through a linkage 31.

The carriages such as 18 can raise freely in the grooved tracks such as 19, since the chain 21 will rotate the sprockets 22 and 23 thereby rotating the sprocket 25 to move the chain 25 and hand wheel 27. The ratchet will merely click past the pawl 29 during this raising movement. However, the carriages 18 cannot be lowered unless the pawl is tripped by the foot pedal 30.

The bearing caps 16 will therefore raise away from the under drums 13 and 14 as the roll R builds up in diameter but when the roll R is ejected from the bearing caps the bearing caps will not fall down unless they are manually lowered by operation of the hand wheel and foot pedal.

A rider slitter assembly 32 including subframes such as 33 at the ends thereof having groove-engaging carriages such as 34 riding in the grooves 19 of the frame standards 20 is provided above the bearing cap carriages 18. The slitter assembly is thus mounted in the main frame 11 of the winder machine to ride up and down above the roll R being wound by the machine.

Sprocket chains such as 35 are attached at one end thereof to the sub-frames 33 and are trained around sprocket wheels such as 36 rotatably mounted on the top of the frame structure 11. The other ends of the chains 35 are secured to counterweights such as 37. The counterweights 37 have rollers 38 thereon riding on ways such as 39 of the frame 11.

The sprockets 36 can be secured to a single shaft 40 which carries a ratchet 41 acted on by a spring-pressed pawl 42 and adapted to be manually disengaged by a trip handle 43. The slitter roll assembly 32 can thus be manually raised in the grooves 19 away from the roll R and the counterweights 37 facilitate this manual raising of the assembly. The pawl 42, when allowed to engage the ratchet 41, will hold the assembly in its raised position until it is tripped by the operating handle 43.

The frame standards 20 carry rack bars such as 44. The rack bars 44 are in toothed engagement with spur gears such as 45 carried by the end frames 33 in bearing housings such as 46. In order to impart resistance to the rotation of the spur gears 45 friction clutches can be used thereby resisting the raising and lowering of the assembly.

Motors such as 47 drive belts such as 48 which rotate the slitter disk shaft 49. The slitter disk shaft contains a plurality of disk-type slitters such as 50 adapted to cut the web W being wound into a roll and also adapted to cut through the first few turns of paper on the winder shaft S for completely severing the web into independent ribbons and thereby make possible the production of a plurality of rolls at the same time on a single winder shaft. The winder shaft can be grooved to permit entry of the edges of the cutter thereby insuring the cutting of the first few turns of paper on the shaft.

As best shown in Figures 2 and 3, the under drum 14 has axle portions 51 rotatably mounted in bearing housings 52 carried by the main frames 11. Straps 53 are rotatably mounted on these axle portions 51 between the drum 14 and the bearing housings. The straps 53 have gear segments 54 thereon meshing with spur gears 55 on a drive shaft 56 which extends across the machine and is rotatably mounted in bearing housings 57. A motor M is coupled to the shaft 56 to drive the same.

A discharge platform 58 is carried by the main frame and extends across the top of the under drum 14 in spaced relation from the winding nip between the drums. This platform has pockets 59 adapted to receive the spare winder shaft (not shown). Roll supporting ribs 60 extend from the platform 58 to guide the rolls of paper out of the machine.

Slots 58*a* are formed in the platform 58 and receive the spare winder shaft feeder arms 61 therein. The feeder arms 61 are pivotally mounted as at 61*a* to the platform structure and, when in inoperative position, lie flush with the top of the platform or just under the top of the platform.

The other ends of the arms 61 are pivotally connected as at 61*b* to link rods 62. The link rods 62 are pivoted on crank arms 63 carried by a shaft 64 which is driven through a sprocket and chain drive 65 from the shaft 56. In extremely wide machines, a pair of shafts 64 and a pair of sprocket chain drives 65 may be used.

In order to impart resistance to the rotation of the shaft 64 and to prevent "coasting" of the shaft, a friction clutch assembly 66 best

shown in Figure 8 is provided. As therein shown, the platform structure 58 carries a cup-shaped housing 67 through which the shaft 64 is freely rotatable. A pair of clutch elements 68 and 69 are keyed to the shaft 64 by means of a key 70. These clutch elements carry friction clutch disks 71 on their opposed faces.

The housing 67 has an internally toothed ring 72 bolted to the open end thereof as by bolts such as 72a. A plate 73 is disposed between the friction disks 71 and has external teeth meshed with the internal teeth of the ring 72. The plate 73 thus floats in the ring 72 in geared or splined relation thereto.

A strap 74 is disposed around the shaft 64 in spaced relation from the housing and abuts a coil spring 75 which acts on the clutch element 69. The strap 74 can be adjusted on the shaft 64 to vary the spring compression as desired.

With the spring 75 urging the clutch element 69 against the plate 73 the plate 73 will be squeezed between the friction disks 71, and since it is geared or splined to the ring 72, it will impart resistance to the rotation of the shaft 64. In the event that a plurality of shafts 64 are used, a plurality of friction clutch assemblies 66 would be used, one for each shaft.

Referring again to Figures 2 and 3, it will be noted that one of the bearing housings 52 for the under drum 14 has a trough-like track 176 mounted on the top thereof. This track is open ended and extends from a point adjacent the bearing cap 16 for the winder shaft S. The winder shaft S and spare winder shaft SS are preferably equipped with thrust bearings B on one end portion thereof for thrusting against the sides of the bearing cap 16. One of these thrust bearings B is adapted to ride in the track 176 for guiding the spare winder shaft into the bearing cap. As shown in Figure 1, the track 176 slopes downwardly at its inner end below the tops of the rolls 13 and 14.

As best shown in Figures 4 to 7, the bearing caps 16 each are composed of a bottom member 16a fixedly carried by the arm 17 and a top member 16b pivoted to the arm 17 as at 16c. The top member 16b has a dog or tooth 16d projecting from the free end thereof adapted to be engaged by the latching finger 76 of a latching device 77 which is pivoted to the lower cap portion 16a as at 78. The latching device 77 is counterweighted as at 77a and a spring 79 may be interposed between the latching member 77 and the arm portion 17 to further urge the latching device for moving the finger 76 into engagement with the tooth 16d.

A spring 80 is disposed around the pivot 16c for the bearing cap portion 16b and has the ends thereof acting respectively on a stop 81 on the arm 17 and a stop 82 on the bearing cap portion 16b. The spring 80 is thus effective in urging the cap 16b to the open position shown in Figures 5 to 7.

The straps 53 disposed around the axles 51 of the drum 14 each carry a tripping pin 83 adapted to engage the latching device 77 to trip the finger 76 off of the tooth 16d and permit the cap portion 16b to spring to open position.

Each strap 53 also carries an ejector arm 84 having an abutment face 84a adapted to engage the end portions of the winder shaft S for moving the same out of the bearing caps and out of the machine.

The gear segment 54 carries a spare winder shaft pusher arm 85 having an abutment face 85a to engage the spare winder shaft and push the same over the drum 14 into the open bearing caps.

The abutment faces 84a and 85a of the arms 84 and 85 are maintained in spaced opposed relation and the arm 85 is adjustably mounted on the gear segment 54 through bolts 86 which extend through slots 87 in the arm 85.

As best shown in Figures 4 to 6, the chain and sprocket drive such as the drive 65 between the shaft 64 and the shaft 56 described above in connection with Figures 2 and 3 includes a sprocket 65a freely mounted on the shaft 64. A pawl 65b is pivotally mounted on the sprocket 65a and is spring urged by a spring 65c also carried by the sprocket against a cam 65d keyed to the shaft 64. The cam 65d has a single tooth 65e adapted to be engaged by the pawl 65b.

As explained above, the shaft 56 is driven by the motor M to drive the chain of the chain drive 65. This chain drives the sprocket 65a to rotate the pawl 65b around the cam 65d until the pawl engages the tooth 65e whereupon the shaft 64 will be driven. The motor M is a reversible motor as will be hereinafter fully described.

When the rolls such as R are completely wound by the under drums 13 and 14 as shown in Figure 4, the shaft 56 is driven by the motor M in a counter-clockwise direction. This will raise the gear segment 54 thereby swinging the straps 53 to move the pins 83 against the bearing cap latching devices 77 and release the latching fingers 76 from the teeth 16d of the bearing caps. The bearing caps will then spring open.

During the latch tripping operation with the shaft 56 moving in a counter-clockwise direction the sprocket 65a will also be moved in a counter-clockwise direction to move the pawl 65b against the tooth 65e and thereby driving the shaft 64 to position the crank arms 63 at the bottom of their strokes. The spare winder shaft feeding arms 61 thus have the ends 61b thereof moved below the pocket 59 for the spare winder shaft SS. The spare winder shaft SS is already positioned in the pocket for the feeding operation.

The motor M is then reversed to drive the shaft 56 in a clockwise direction. This will effect a lowering of the gear segments 54 and a raising of the ejector arms 84 to position their faces 84a against the ends of the winder shaft S. Continued movement of the ejector arms will force the winder shaft S to carry the rolls R thereon over the top of the under drum 14 with one of the thrust bearings B on the shaft spaced above the track 176. After the arms 84 have pushed the shaft S over the top of the drum 14 the rolls R will roll downwardly over the platform 58 across the pocket 59 and over the discharge arms 60.

During this clockwise movement of the shaft 56 the pawl 65b on the sprocket 65a has merely backed away from the tooth 65e of the cam 65d and has rotated around the cam so that the shaft 64 is not driven, as shown in Figure 5. As a result the feed arms 61 for the spare winder shaft will not be moved.

After the rolls R have rolled past the pocket 59 for the spare winder shaft SS the motor M is again reversed to again drive the shaft 56 in a counter-clockwise direction as indicated in Figure 6. This counter-clockwise rotation of the shaft 56 will again raise the segment gears 54 and will again move the pawl 65b on the sprocket

65a against the tooth 65e on the cam 65d thereby driving the shaft 64 to raise the crank arms 63 thereon and move the links 62 to raise the arms 61 for lifting the spare winder shaft SS out of the pocket 59 and rolling the same over the platform 58 onto the drum 14. By the time the spare winder shaft SS reaches the drum 14 the abutment faces 85a on the feed arms 85 have been raised due to the raising of the gear segments 54 into pushing engagement with the spare winder shaft SS to move the same over the top of the drum 14. One of the thrust bearings B on the spare winder shaft will ride in the track 176 and the feed arms 85 will continue to move to carry the spare shaft over the crown of the drum whereupon it will roll down into engagement with the ejector arms 84 and be lowered into the open bearing caps as illustrated in Figure 7. The bearing caps are then manually closed and the spare winder shaft is in position for the next winding operation.

During the next winding operation, the shaft S can be retracted from the rolls R wound thereon and deposited in the pocket 59. It thereupon becomes a spare winder shaft for the following winding operation.

The roll handling apparatus thus first moves in one direction to open the bearing caps, then moves in a reverse direction to eject the wound rolls of paper from the under drum and next moves back to feed in the spare winder shaft.

At the start of the winding operation the leading end of the web W is trained under the drum 13 and between the winder shaft and the drum. It is then tucked over the winder shaft between the shaft and the drum 14. Tuckers (not shown) can be used for the tucking operation. To facilitate the tucking operation and to move the leading end of the web W from the roll 13 over the top of the winder shaft, an air pipe 90 (Figure 2) can be mounted across the top of the drum 13. This air pipe can have nozzles 90a along its length to direct streams of air under the web overlying the drum 13 thereby blowing the leading end of the web over the winder shaft S so that the tuckers can engage the leading end and tuck the same between the shaft and the drum 14. If very lightweight paper is being directly wound around a collapsible winder shaft, it may be desirable to protect the first few turns of paper against tearing when the collapsible shaft is withdrawn by covering the shaft with a sheet of heavier paper. For this purpose a tray 91 as also shown in Figure 2 can be mounted above the drum 13 for holding sheets of heavier liner paper. A sheet of liner paper can be laid over the drums 13 and 14 and over the leading end of the web W to be wound. The winder shaft is then inserted on top of the liner paper and an air blast from the pipe 90 will then raise both the leading end of the web W and the liner sheet from the roll 13 to permit the tuckers to tuck both sheets around the shaft.

The wiring diagram of Figure 9 illustrates the manner in which the motor M can be controlled through its reversing cycles for moving the roll-handling apparatus as described above.

In Figure 9 the reference numerals 95, 96 and 97 represent 3-phase current conductors to reversing switches RS_1 and RS_2. These conductors communicate through the switches with power lines 95a, 96a, and 97a respectively to the motor M of the machine.

The switch RS_1 is controlled by a contactor 98 including an operating or energizing coil 98a. The switch RS_2 is likewise controlled by a contactor 99 including an operating coil 99a.

A control arm 100 is swingably mounted, for example, on a strap 53 of the machine so as to swing with the ejector arm 84. The control arm 100 can obviously be mounted in any suitable position as long as it has the same swinging movement imparted thereto as is imparted to the ejector arm or strap 53.

This control arm 100 has a tipped end 100a for actuating limit switches LS_1, LS_2 and LS_3. The limit switches LS_1 and LS_3 have spring-biased toggle arms controlling a pair of contactors. In other words the limit switch LS_1 includes a contactor C_1 and a contactor C_{12} while the limit switch LS_3 has a contactor C_3 and a contactor C_{32}.

The limit switch LS_2 has a single contactor C_2. However the control arm of this limit switch carries in pivotal relation thereto a depending latch 101 which is acted on by the arm 100a. This latch 101, due to its pivotal mounting, effects movement of the contactor C_2 of the switch only when the arm 100 is driven in a clockwise direction. When the arm moves past the switch in a counter-clockwise direction the latch 101 is merely tripped without in any way moving the switch.

A push-button P. B. is mounted in the circuit and, when this push-button is manually depressed, it closes the circuit through the contactor C_3 of the limit switch LS_3 and the contactor 98 to the coil 99a. This coil is thus energized and raises the contactor 99 so as to throw the reversing switch RS_2 across the 3-phase line in such a way as to drive the motor M in a direction for unlatching the bearing caps of the machine.

As the contactor 99 raises it closes, in addition to the reversing switch RS_2, a pair of contacts that by-pass the push-button so that the motor will continue to run even though the push-button is released. In other words, a holding circuit is thrown into operation for maintaining the reversing switch RS_2 in closed position irrespective of the position of the push-button.

The motor will continue to run in a cap-unlatching direction until the end 100a of the arm 100 trips the limit switch LS_3 for moving the contactor C_3 thereof to open position and thereby breaking the holding circuit. The reversing switch RS_2 will then drop to open position. However, when this occurs the contactor C_{32} of the limit switch LS_3 closes the circuit through the contactor C_{12} of the limit switch LS_1 and the contactor 99 of the reversing switch RS_2 to the coil 98a of the reversing switch RS_1. The coil will thereupon move the reversing switch RS_1 to a position for throwing the motor across the 3-phase line in such a way as to cause it to run in the eject direction as indicated. The contactor 98 at the same time closes its own holding circuit and the motor will continue to run until the arm gets back to the limit switch LS_1. As explained above, the arm in swinging back to the limit switch LS_1 will not affect the switch LS_2 since it will merely trip the latch 101 thereof.

When the arm trips the limit switch LS_1 the contactor C_{12} thereof opens the holding circuit through the coil 98a and the reversing switch RS_2 drops to open position. At the same time, however, the contactor C_1 closes the circuit through the contactor C_3 of the limit switch LS_3 and the contactor 98 of the reversing switch RS_1 to the coil 99a of the reversing switch RS_2 thereby again moving the switch to its closed position and again

reversing the motor. The contactor 99 will again complete its holding circuit and the motor will continue to run in a direction for feeding in the spare winder shaft until the arm end 100*a* trips the limit switch LS_2 thereby breaking the holding circuit and causing the reversing switch RS_2 to open. The motor will then stop and the cycle of unlatching the bearing caps, ejecting the wound counter rolls, and feeding in the spare winder shaft is completed. The arm stops in the position shown in solid lines to hold the limit switch LS_2 in open position and the system will be deenergized until the push-button P. B. is again manually actuated to start the next cycle of operation.

If desired, of course, the motor can be controlled by manually operated switches. The wiring diagram of Figure 9, however, permits full automatic operation of the motor.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

We claim as our invention:

1. In a web winding apparatus including mechanism for winding a web around a winder shaft, split bearing caps mounted on the apparatus for positioning the winder shaft relative to the winding mechanism, and ejector means adapted to engage the winder shaft for ejecting the shaft and wound web thereon out of the apparatus, the improvements which comprise spring means urging the bearing caps into open position, latch means holding the bearing caps in closed position, and latch-tripping means engageable with said latch means to open the bearing caps before the ejector means moves the shaft and wound web.

2. In a web winding apparatus including a pair of driven under drums adapted to receive a winder shaft therebetween for winding a web therearound, split bearing caps for the shaft mounted on the apparatus for movement toward and away from the under drums, and ejector means adapted to engage the winder shaft for ejecting the shaft and wound web thereon out of the apparatus, the improvements of spring means urging the bearing caps into open position, latch means holding the bearing caps in closed position, and latch-tripping means engageable with said latch means to open the bearing caps before the ejector means moves the shaft and wound web.

3. In a web winding apparatus including mechanism for winding a web into a roll around a winder shaft, split bearing caps mounted on the apparatus for positioning the winder shaft in winding position, and ejector means for moving the wound roll and winder shaft out of the apparatus, the improvement which comprises means on the apparatus for automatically opening the bearing caps before the ejector means moves the shaft and wound roll.

4. In a web winding apparatus including a pair of driven under drums adapted to receive a winder shaft therebetween for winding a web therearound, split bearing caps mounted on the apparatus for movement toward and away from the under drums to position the winder shaft for the winding operation, and swingable means adapted to engage the winder shaft for ejecting the shaft and wound web thereon out of the apparatus, the improvements of spring means urging said bearing caps into open position, latch means holding the bearing caps in closed position, and latch tripping means movable with the swingable ejecting means and engageable with said latch means to open the bearing caps before the swingable means engage the winder shaft.

5. In a paper winding apparatus including driven under drums, winder shaft bearing caps mounted on said apparatus for movement toward and away from the under drums and roll-ejector mechanism for discharging wound rolls out of the apparatus, the improvements which comprise latch means holding the bearing caps in closed positions, tripping means movable with said ejecting mechanism for tripping the latch means to open the bearing caps, and means for feeding a spare winder shaft to the open bearing caps after the wound roll has been ejected from the apparatus.

6. A paper winder comprising a main frame, a pair of driven under drums rotatably mounted in said frame, vertical tracks in said frame, carriages slidably mounted in said tracks, bearing caps carried by said carriages adapted to position a winder shaft in the winding nip between the under drums while allowing the shaft to raise relative to the winding drum as a roll is built up therearound, swingable ejector arms engageable with the winder shaft to move the wound rolls over one of the under drums and out of the winder, a spare winder shaft pocket adjacent said under drums, feed arms for lifting the spare winder shaft out of the pocket, and a pusher for moving the spare winder shaft over said under drums into said bearing caps.

7. Roll handling apparatus for a paper rewinder having a pair of driven under drums and split bearing caps for positioning a winder shaft in the winding nip between the drums which comprises straps swingably mounted at the ends of one of the under drums, ejector arms carried by said straps for engaging the winder shaft, pusher arms carried by said straps for feeding a new winder shaft to the bearing caps, gear segments for swinging said ejector and pusher arms, a drive shaft, gears on said drive shaft engaging said gear segments, a crank shaft, spare winder shaft feed arms pivotally mounted adjacent the under drum with the straps at the ends thereof, links connecting the crank shaft with the feeder arms, a sprocket freely mounted on said crank shaft, a chain driven by the drive shaft for rotating said sprocket, a pawl on said sprocket, a cam keyed on said crank shaft having a pawl abutment tooth, means for rotating said drive shaft in one direction to move the ejector arms against the winder shaft for ejecting the wound rolls from the machine, and means for rotating the drive shaft in the opposite direction to move the pawl against the cam abutment tooth for driving the crank shaft to raise the links and feeder arms for depositing a spare winder shaft onto said under drum for engagement by said pusher arms whereupon said pusher arms will deposit the spare shaft in the bearing caps.

8. Roll handling apparatus for winding machines having an under drum and bearing caps for positioning a winder shaft relative to the drum which comprises a motor, a drive shaft adjacent the under drum driven by the motor, ejector arms swingable at the ends of the under drum, gears connecting the ejector arms with the

drive shaft, bearing cap opening means movable with the ejector arms, means driving the motor in one direction to move the bearing cap opening means into position for opening the bearing caps, and means for driving the motor in the opposite direction to move the ejector arms for discharging the wound roll out of the machine.

9. A roll handling apparatus for paper winding machines which comprises a main drive shaft, swingably mounted ejector arms driven by said main drive shaft, spare winder shaft feeding arms, a crank shaft for raising said arms to feed a spare winder shaft to the winding machine, and a cam and pawl driving connection between the main drive shaft and the crank shaft.

10. In a roll handling apparatus including a driven main shaft the improvement of spare winder shaft feed mechanism which comprises a plurality of spare winder shaft feeding arms, a crank shaft for raising and lowering said arms, a friction clutch device resisting rotation of the crank shaft, and a cam and pawl drive connection between the main drive shaft and the crank shaft.

11. In a roll handling apparatus for a winding machine including a driven under drum and bearing caps for positioning a winder shaft relative to the drum for the winding of a roll therearound, the improvements of thrust bearings on the winder shaft engageable with one of the bearing caps, a track adapted to receive one of the thrust bearings on the winder shaft, and means for feeding the winder shaft to the bearing caps with a thrust bearing thereon riding in said track.

12. In a roll handling apparatus for a winder machine having a driven under drum, the improvements of a discharge platform fixedly mounted adjacent said drum to receive the wound roll thereover, said platform defining a pocket for a spare winder shaft and recesses for spare winder shaft feeding arms, spare winder shaft feeding arms seatable in said recesses to extend under the spare winder shaft when the latter is seated in said pocket, said arms having their drum adjacent ends pivoted to the platform, links connected to the other ends of the feeding arms, and a crank shaft for driving the links to raise the feeding arms for lifting the spare winder shaft out of the pocket to roll the same over the under drum.

13. In a roll handling apparatus for a winding machine having a pair of driven under drums, the improvements of a pair of winder shaft positioning caps mounted for movement on said machine toward and away from the under drums to hold the winder shaft and roll being wound thereon in winding position relative to both under drums, each of said caps having a pivoted cover portion adapted to be opened for removal of the winder shaft, roll ejector mechanism adjacent said under drums to move wound rolls out of the machine, and bearing cap cover opening means on the ejector mechanism.

14. In a roll handling apparatus for a winding machine having a pair of driven under drums, the improvements of a pair of winder shaft positioning caps mounted for movement on said machine toward and away from the under drums to hold the winder shaft and roll being wound thereon in winding position relative to both under drums, each of said caps having a pivoted cover portion adapted to be opened for removal of the winder shaft, a spring on each bearing cap urging the cover thereof to open position, a latch on each bearing cap for holding the cover in closed position, latch tripping means swingably mounted at the ends of an under drum, and means for driving the tripping means upon completion of the winding operation to open said covers.

15. In a web winding apparatus, a pair of driven under drums, a winder shaft cooperating with said under drums to receive and wind a web into a roll, ejector means engageable with the shaft to eject the roll and shaft from cooperating position, a spare winder shaft pocket adjacent an under drum, a spare winder shaft in said pocket, means for raising the spare winder shaft out of the pocket to roll the same onto the adjacent drum, and pushers for receiving the spare winder shaft from said means to push the shaft into cooperating position with both drums.

16. Automatic roll handling apparatus for a winder machine having a pair of driven under drums, a winder shaft cooperating with said drums to receive and wind a web into a roll, and a spare winder shaft adjacent an under drum which comprises, ejector mechanism for removing the shaft and roll from cooperating position with said drums, spare winder shaft feed mechanism for feeding the spare winder shaft into cooperating position with said drums, a main drive shaft for both mechanisms, a reversible motor for said drive shaft, means automatically reversing said motor to drive the main shaft in opposite directions, and a cam and pawl drive operatively interposed between the main drive shaft and the spare winder shaft feed mechanism to drive the latter mechanism in one direction only.

17. Roll ejector and spare winder shaft feed apparatus for an under drum type paper winder which comprises mechanism swingably mounted at the ends of an under drum, ejector arms on said mechanism having winder shaft abutment faces, pusher arms on said mechanism having spare winder shaft abutment faces in spaced opposed relation from the winder shaft abutment faces of the ejector arms, means for swinging the mechanism in one direction to thrust the abutment faces of the ejector arms against a winder shaft upon completion of the winding operation for ejecting the wound roll over the drum, means for depositing a spare winder shaft on the drum, and means for swinging the mechanism in the reverse direction to thrust the pusher arm faces against the deposited spare winder shaft for moving the spare shaft to winding position.

18. In combination, a pair of driven under drums, a winder shaft cooperating with said drums to receive and wind a web of paper into a roll, roll ejector mechanisms at the ends of a drum adapted to engage the end portions of shaft to remove the shaft and roll from cooperating position, a common drive shaft for both mechanisms, a reversible motor for driving said shaft, a crank shaft, a sprocket rotatable on the crank shaft, a chain driven by the drive shaft rotating said sprocket, a pawl on said sprocket, a cam affixed to the crank shaft having an abutment engageable by the pawl when the sprocket is rotated in one direction and ridable past the pawl when the sprocket is rotated in the other direction, a spare winder shaft feed mechanism raised by said crank shaft to deposit a spare shaft onto a drum, and means for reversing said motor to rotate the drive shaft in opposite directions to move the ejector mechanisms in reverse directions whereby said pawl and cam effect movement of the crank shaft in one direction

only to cause the feed mechanism to remain at rest during movement of the ejector mechanism in one direction.

19. The structure of claim 18 including a friction clutch on the crank shaft for resisting free rotation of the shaft.

20. In a paper winding apparatus, a pair of driven under drums, a winder shaft cooperating with said under drums to receive and wind a paper web into a roll, bearing caps holding the winder shaft in drum cooperating position, an abutment ring on the shaft adapted to thrust against a bearing cap, a track, ejecting means for moving the shaft and roll thereon out of the caps over the track, a spare winder shaft having an annular cap abutment ring, and means for feeding the spare winder shaft into the bearing caps with the abutment ring riding in the track to align the spare shaft relative to the caps.

EARL E. BERRY.
LLOYD HORNBOSTEL.