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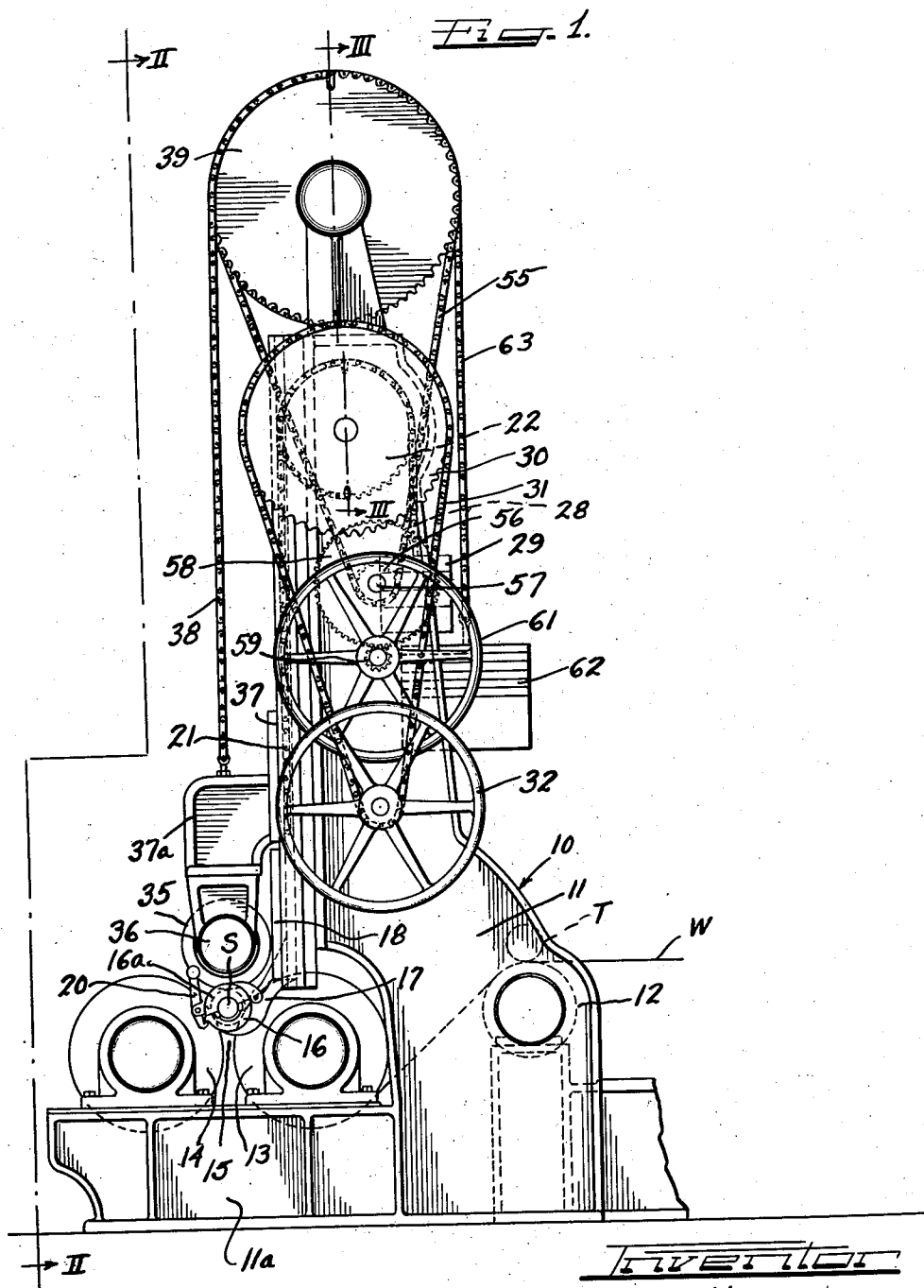
L. HORNBOSTEL

2,357,202

APPARATUS FOR WINDING WEB MATERIALS

Filed July 8, 1942

11 Sheets-Sheet 1



INVENTOR

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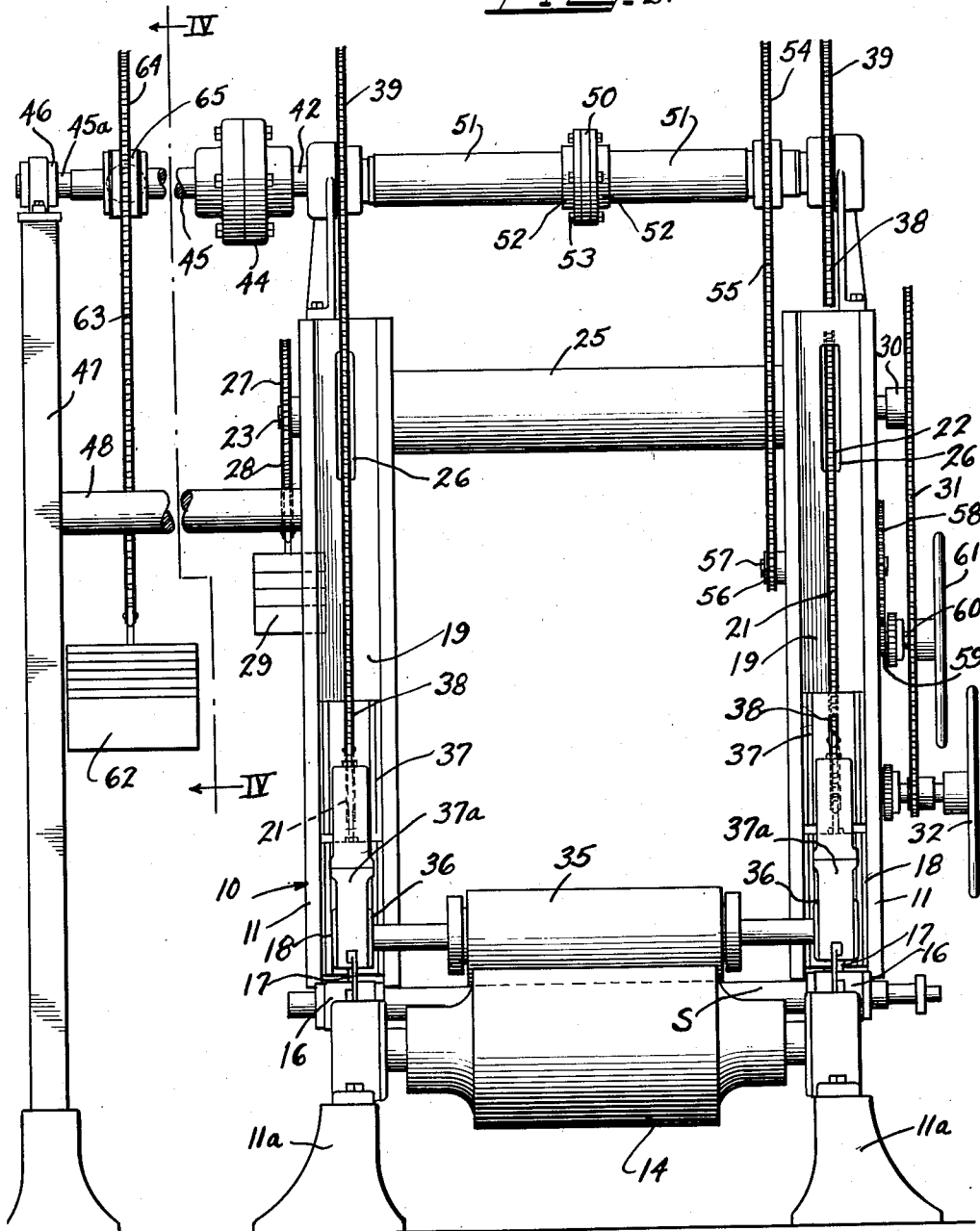
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APPARATUS FOR WINDING WEB MATERIALS

Filed July 8, 1942

11 Sheets-Sheet 2

Fig. 2.



LLOYD
LLOYD HORNOSTEL.

Charles Hill

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Fig. 2.

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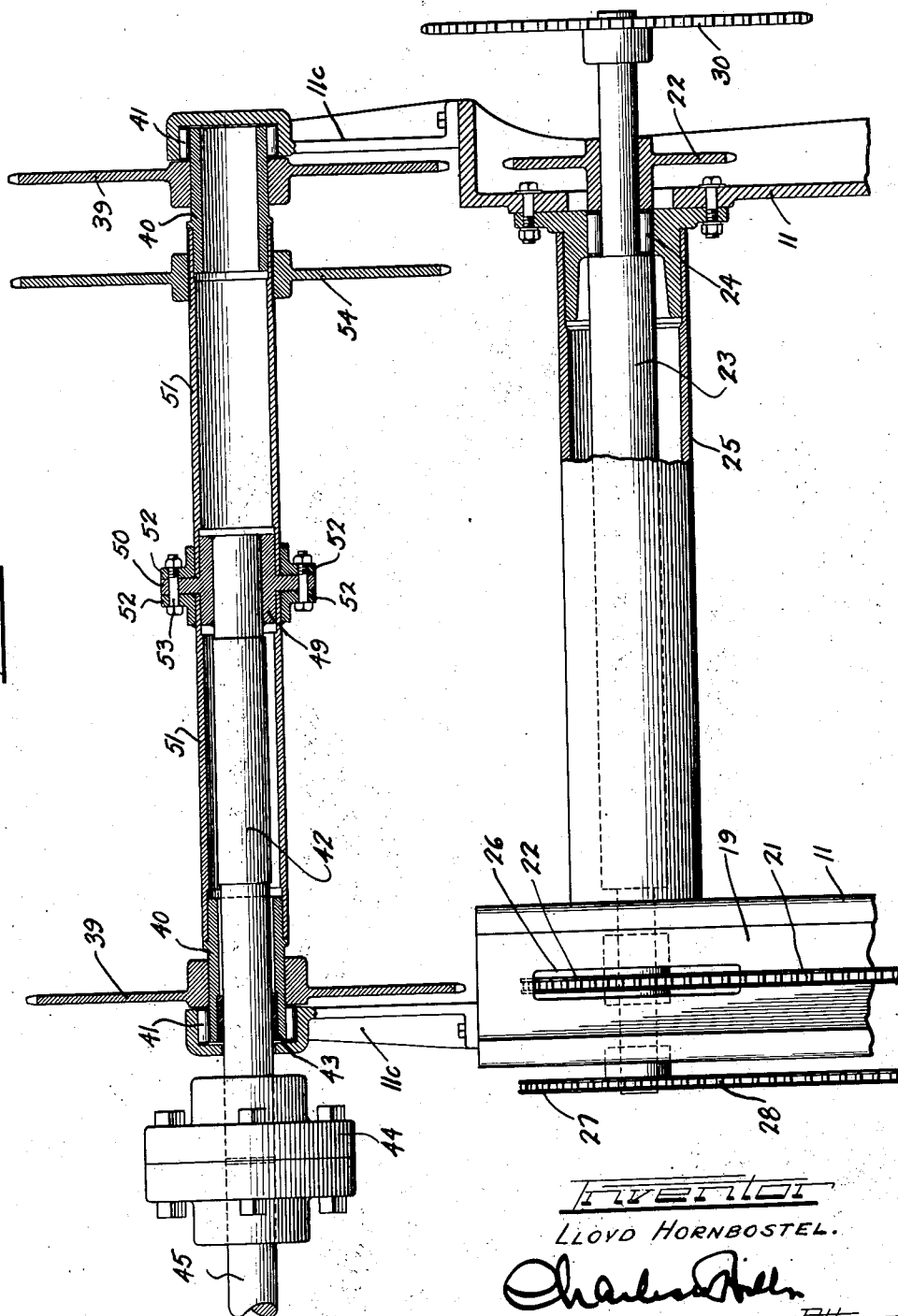
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APPARATUS FOR WINDING WEB MATERIALS

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11 Sheets-Sheet 3

Fig. 3.



LLOYD HORNOSTEL.

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Fig. 3.

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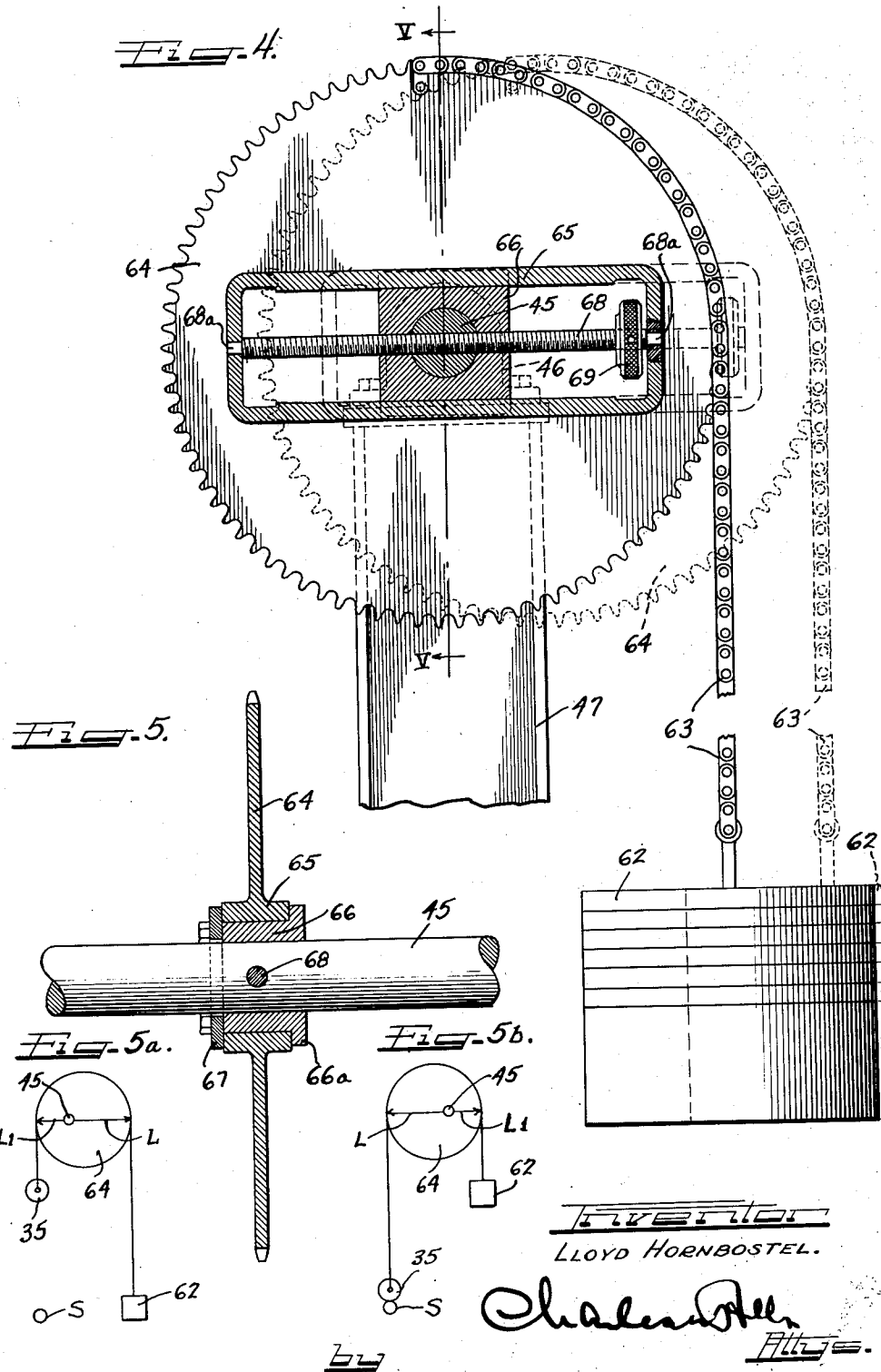
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APPARATUS FOR WINDING WEB MATERIALS

Filed July 8, 1942

11 Sheets-Sheet 4



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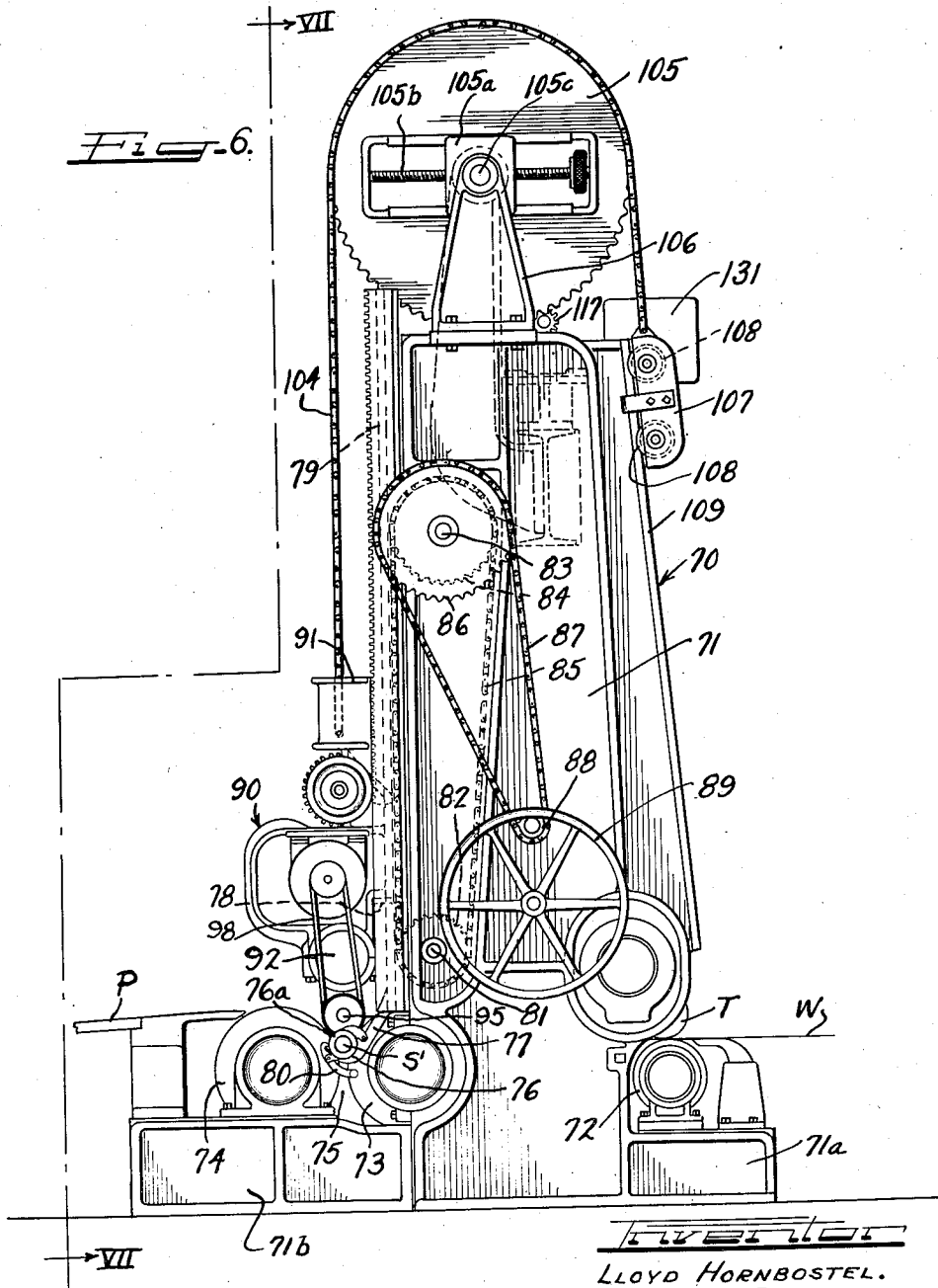
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2,357,202

APPARATUS FOR WINDING WEB MATERIALS

Filed July 8, 1942

11 Sheets-Sheet 5



LLOYD HORNOSTEL.

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Aug. 29, 1944.

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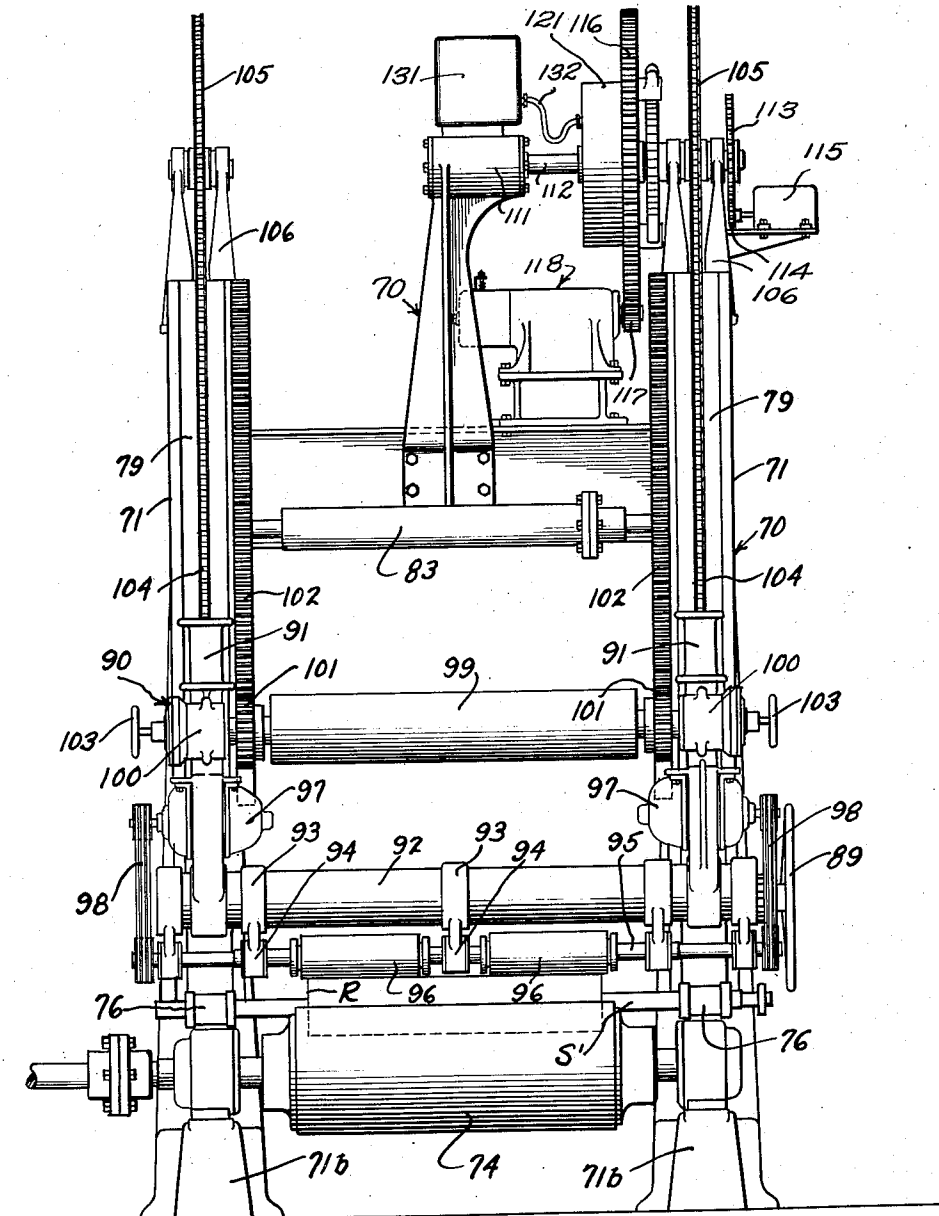
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APPARATUS FOR WINDING WEB MATERIALS

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11 Sheets-Sheet 6

Fig. 7.



LLOYD HORNOSTEL.

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Fig. 7.

Fig. 7.

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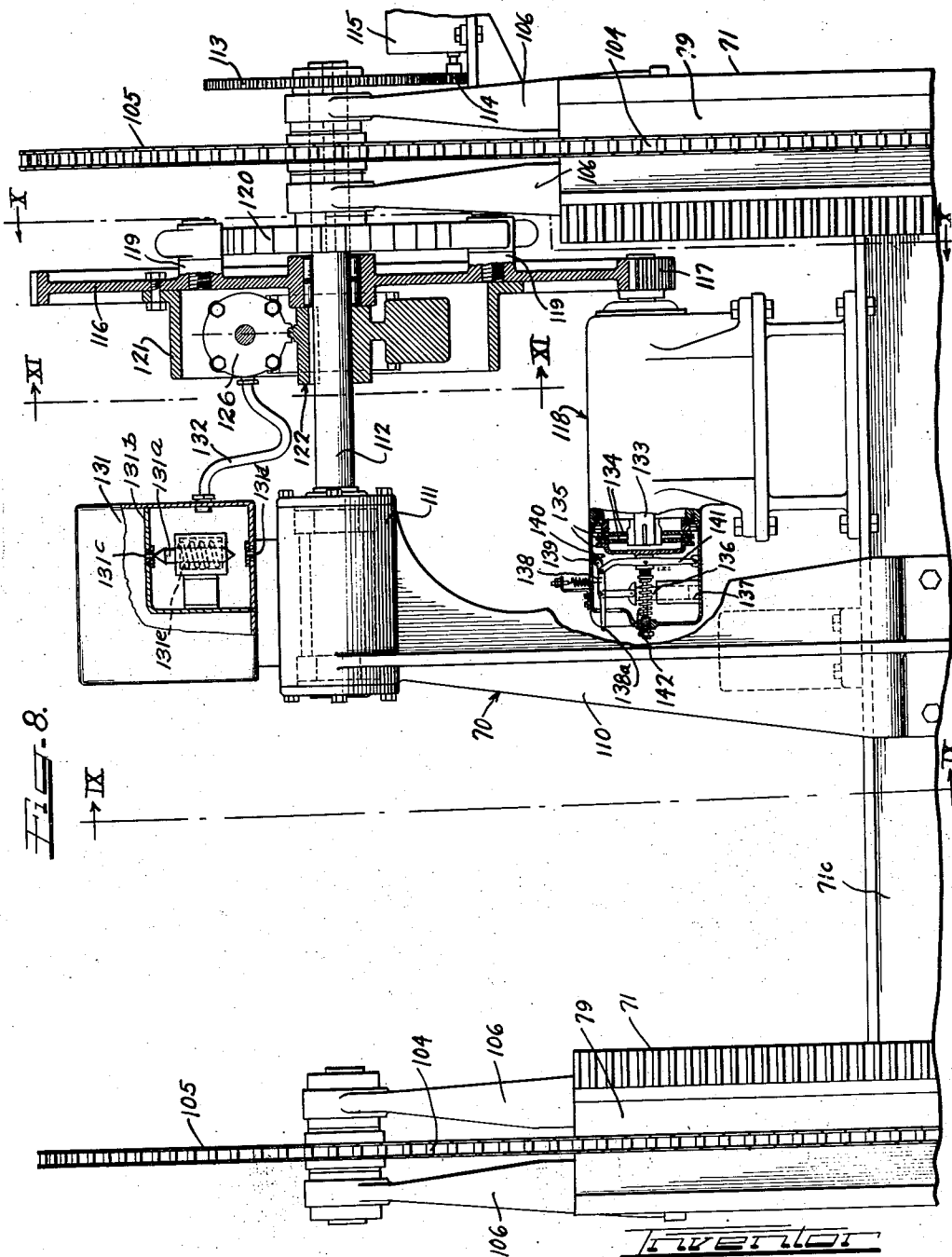
L. HORNBOSTEL

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APPARATUS FOR WINDING WEB MATERIALS

Filed July 8, 1942

11 Sheets-Sheet 7



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Aug. 29, 1944.

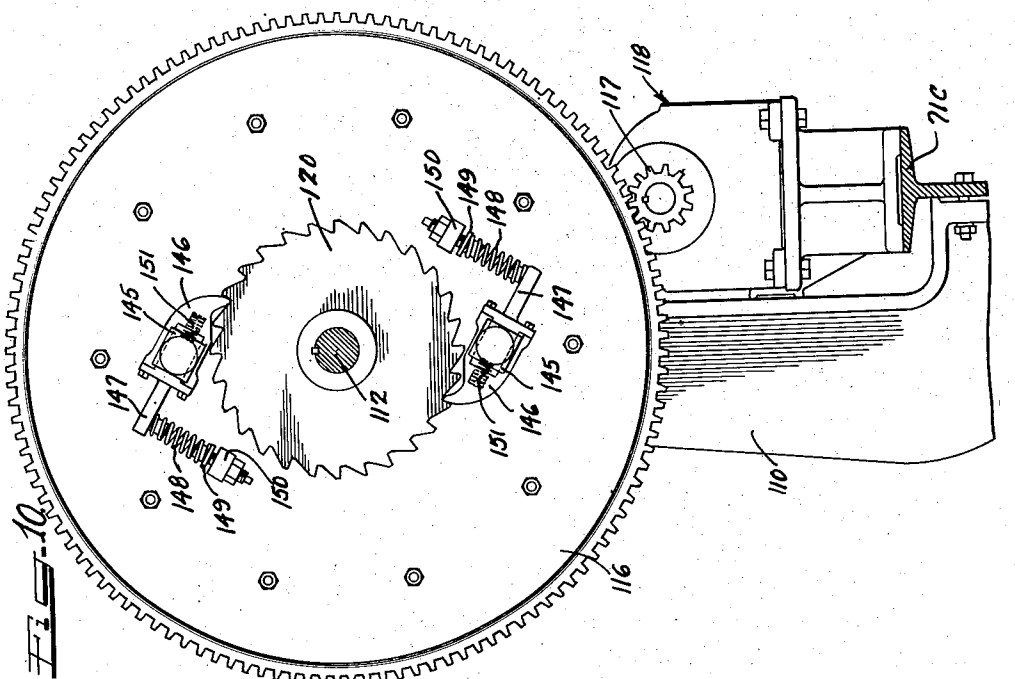
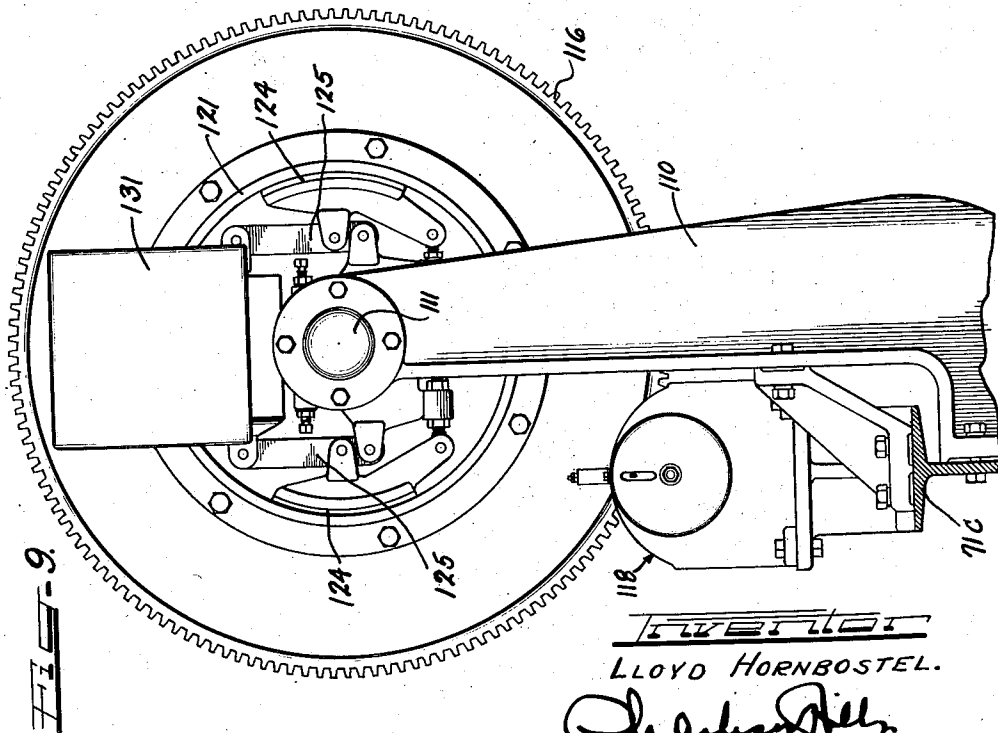
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APPARATUS FOR WINDING WEB MATERIALS

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WITNESSES
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Aug. 29, 1944.

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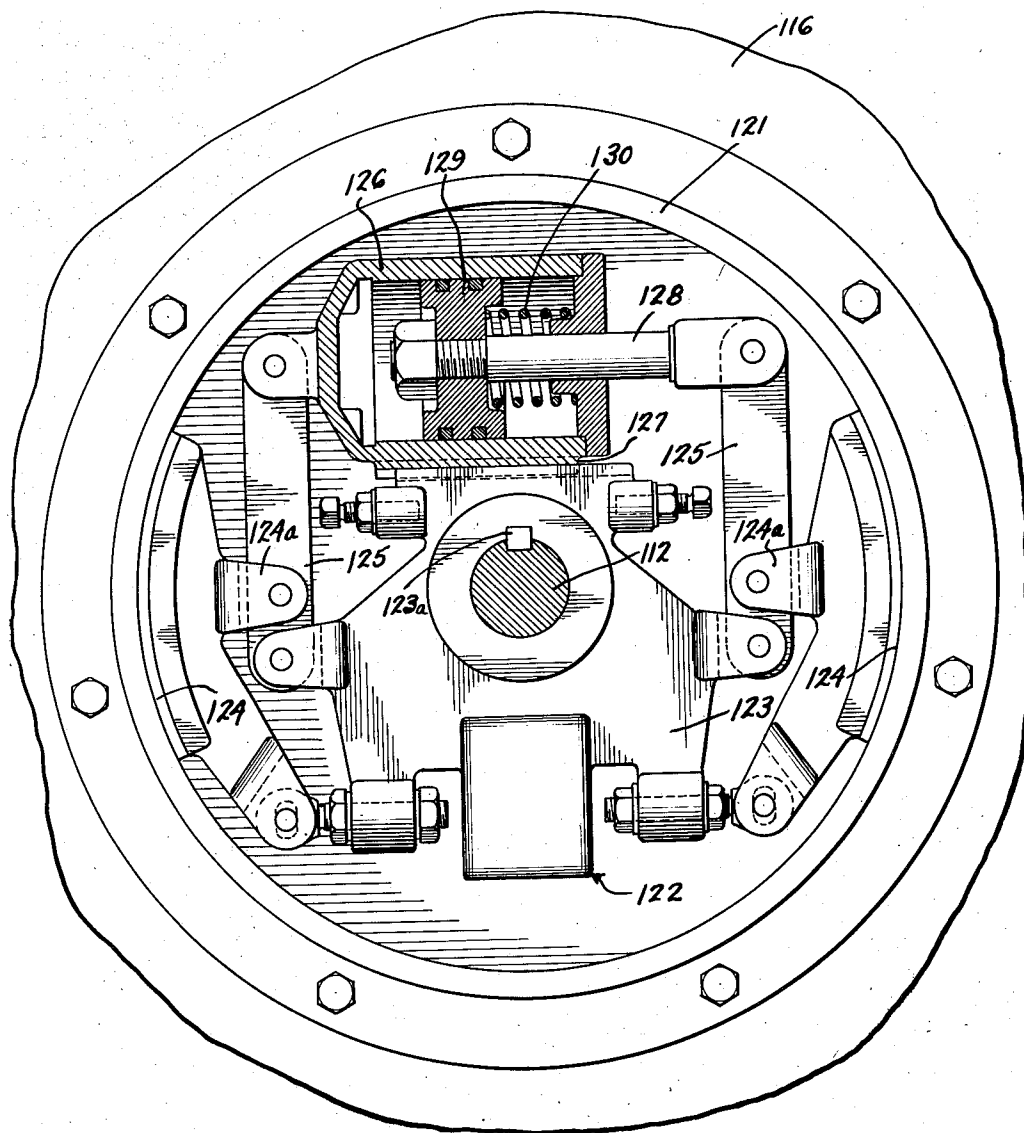
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APPARATUS FOR WINDING WEB MATERIALS

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11 Sheets-Sheet 9

Fig. 11.



LLOYD HORNBOSTEL

LLOYD HORNBOSTEL.

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Att. 5.

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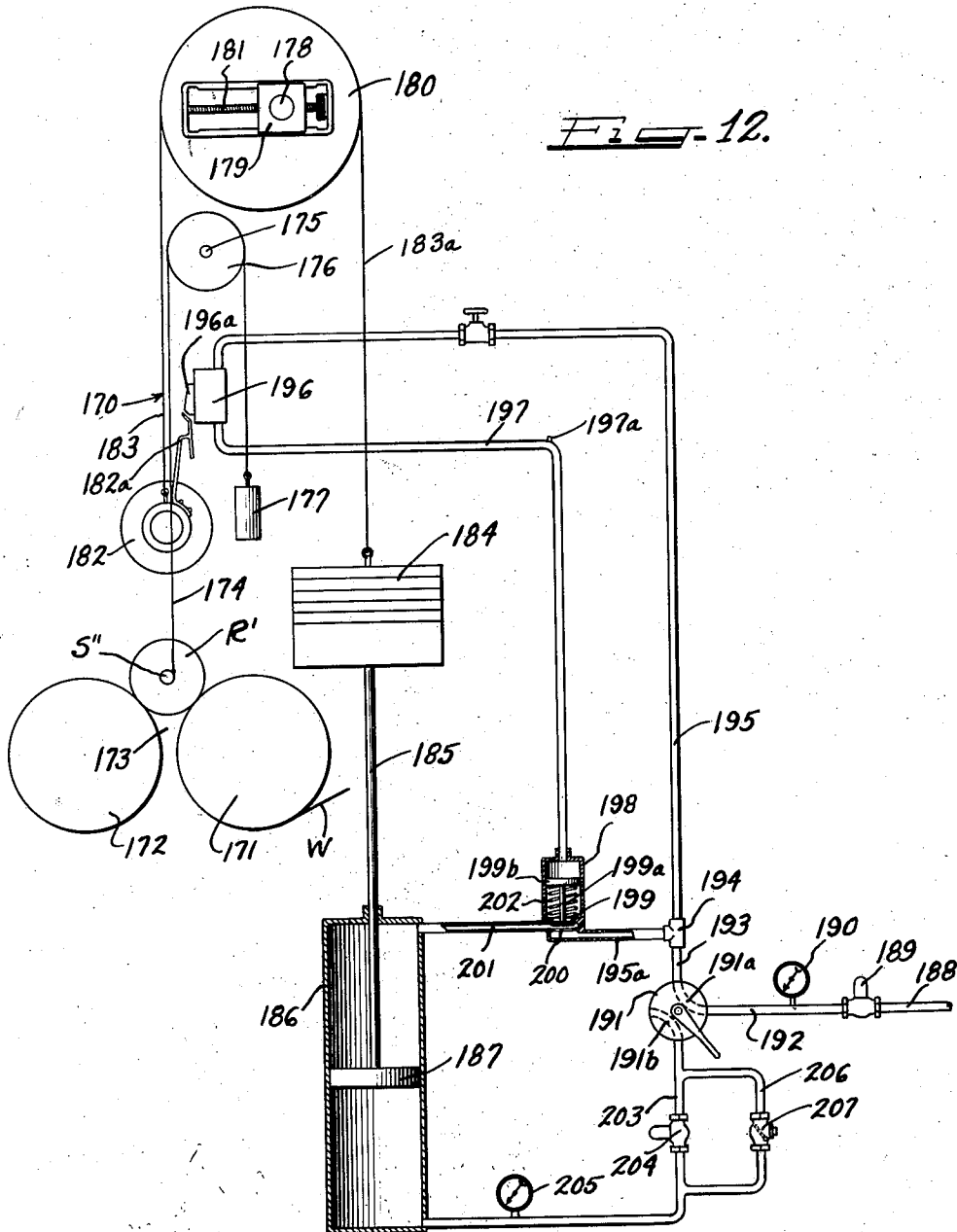
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APPARATUS FOR WINDING WEB MATERIALS

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11 Sheets-Sheet 10



LLOYD
LLOYD HORNBOSTEL.

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62

Att.

Aug. 29, 1944.

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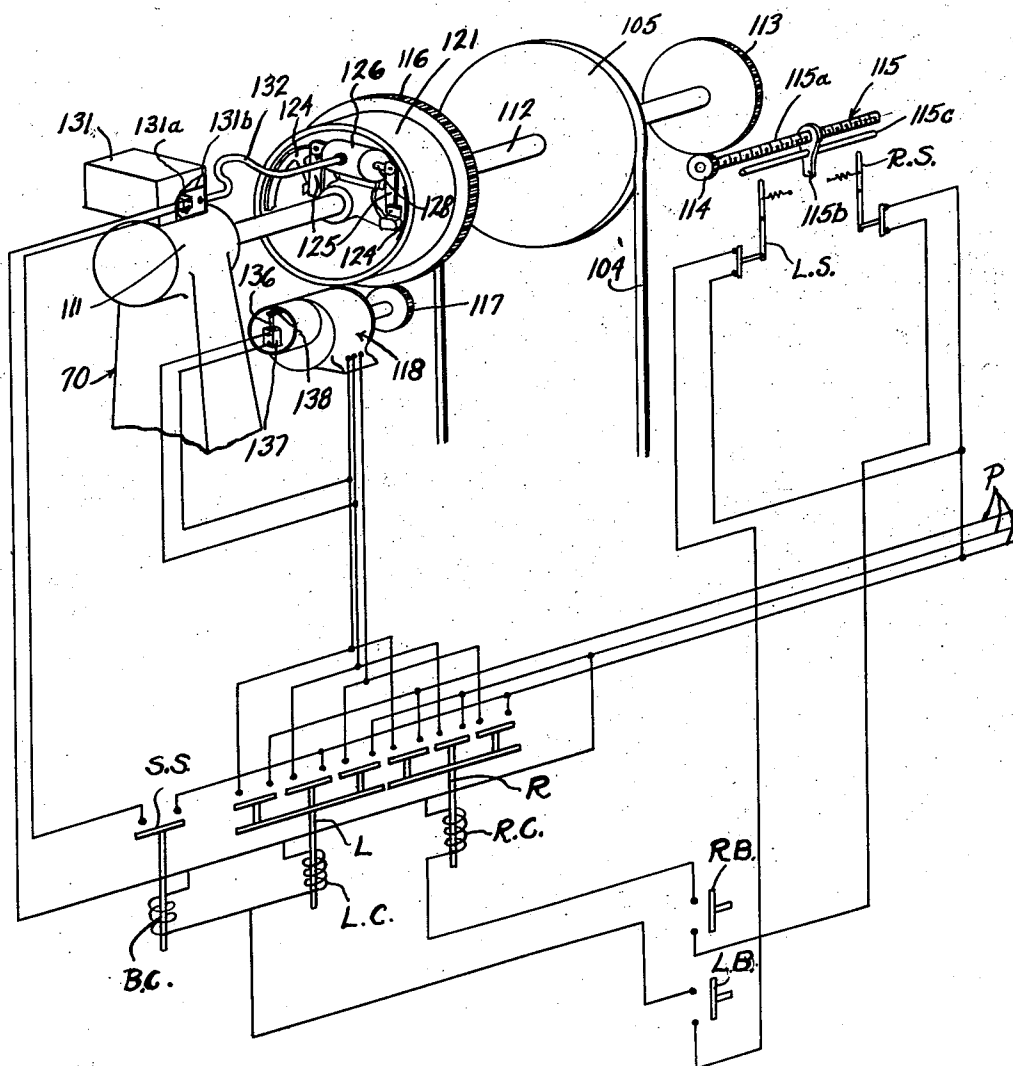
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APPARATUS FOR WINDING WEB MATERIALS

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11 Sheets-Sheet 11

Fig. 13.



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2,357,202

APPARATUS FOR WINDING WEB MATERIALS

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Application July 8, 1942, Serial No. 450,150

24 Claims. (Cl. 242—66)

This invention relates to machines for winding web material, such as paper, into rolls and particularly to rider roll control structures of such machines. The invention includes methods of winding web material into rolls wherein the pressure applied to the roll being wound automatically decreases as the roll increases in diameter.

While the invention will be hereinafter specifically described in connection with the winding of paper into rolls, it should be understood that the machines of this invention are not limited to such use and that the methods of this invention are likewise not limited to such use. Generally speaking, the invention relates to machines and methods for winding any type of web material into rolls.

According to this invention paper is wound into a roll on a winder shaft which is mounted in the nip between a pair of under drums. These under drums are rotatably mounted in spaced horizontal relation and the sheet to be wound is directed under one of the drums, up between the drums and thence around the winder shaft mounted in the nip of the drums. The drums are rotated to drive the sheet and winder shaft so as to cause the shaft to rotate and receive therearound a plurality of turns of paper.

In order to obtain a good tight start of the paper on the winder shaft, for preventing slippage between the roll being wound, and the under drum, and for preventing endwise movement of the rolls as they are being wound, a rider roll is allowed to rest on top of the winder shaft and the roll being wound. This rider roll will rotate with the roll being wound and its weight will cause the roll being wound to press down on the under drums and thereby prevent slippage or relative endwise movement.

The rider roll must raise away from the under drums as the roll being wound increases in diameter and accordingly must be movably mounted on the winding machine. When the winding operation is completed, the rider drum must be moved away from the wound roll so that the wound roll can be discharged from the winding machine. The winding machine should therefore have some means for holding the rider roll in elevated position away from the wound roll.

The present invention now provides adjustable counterweight means for the rider roll so that the exact desired pressure can be applied on the roll being wound. This feature of the invention can take the form of a sprocket having

an adjustable block at the center thereof for varying the eccentricity of the sprocket relative to its mounting. The degree of eccentricity will control the effective weight of the counterweight on the rider roll. As a result of such a construction, it is not necessary to add or subtract weight from the counterweight in order to obtain a desired effective weight of the rider roll on the paper.

Another feature of the invention resides in equal distribution of the counterweight effect to both ends of the rider roll. This can be accomplished in the machines of this invention by the use of a hollow cross shaft with the counterbalance effect applied at the center of the shaft to eliminate torsion twist variations upsetting an even counterweight effect on both ends of the winder roll. If the counterweight effort were applied to one end of a shaft a slight deflection or twisting of this shaft would upset equal balance conditions.

The effective weight of the rider roll may, on some machines, be sufficiently light to permit the rolls to be raised and lowered by manual manipulation and, in one form of the machines of this invention, such manual control devices are provided. These machines are normally rather narrow.

On the other hand, in very wide winding machines, accommodating the winding of very wide webs of paper, the effective weight of the rider roll may be too great for manual control. Therefore, in accordance with another form of this invention, motor driven means are provided to raise and lower the rider rolls.

An important feature of the motor controlled rider roll machines is the provision of an automatic brake on the driving motor for holding the rider in elevated position whenever the motor is shut off together with the provision of a ratchet connection between the motor lift and the rider roll which will permit the roll to raise during the winding operation even though the motor is locked.

Another feature of the motor controlled rider roll machines of this invention is the provision of spring pawls on the ratchet teeth which will permit the rider roll to drop in the event that it dances upwardly during operation to catch the next tooth on the ratchet. The spring pawls, in such event will allow the rider roll to lower and still have its effective weight borne on the paper being wound.

A still further feature of the motor controlled rider roll machines of this invention is the pro-

vision of an automatically operating brake which will cause the motor to directly lift the rider roll without operation of the pawls.

In still another embodiment of the invention the raising and lowering of the rider roll is controlled by air pressure.

As the pressure exerted by the roll being wound on the under drums increases due to the increased weight of the roll, the effective weight of the rider roll should be decreased so that a uniformly hard wound roll will be obtained. This is automatically accomplished on the machines of this invention by arranging the eccentric mounting of the counterweight sprocket in a manner to decrease the length of the eccentric arm to the rider roll while increasing the length of the eccentric arm to the counterweight as the rider roll is raised by the roll of paper. By this arrangement, the counterweight effect on the rider roll is least when the winding operation is started and most when the roll of paper is completely wound. No adjustment during the winding operation need be made to bring about this effect, since the initial eccentric adjustment of the sprocket relative to its shaft will control the increasing effect of the counterweight.

An object of this invention, therefore, is to provide a winding machine which automatically compensates for the increasing weight of the material being wound to produce a uniformly hard roll of material.

A still further object of the invention is to provide a web winding machine having an automatic rider roll control to decrease the effective weight of the rider roll on the material being wound as the roll of material increases in diameter.

A further object of this invention is to provide a web winding machine with a counterbalanced rider roll wherein the counterbalancing effect is always equally applied to both ends of the rider roll.

A still further object of this invention is to provide a power control for rider rolls of web winding machines.

A specific object of the invention is to provide a paper winder with a motor operated rider roll control adapted to raise and lower the rider roll at the finish and start of a winding operation without interfering with the rider roll effect on the paper during the winding operation.

A still further object of this invention is to provide a fluid pressure operated control for the rider roll of a paper winding machine.

Another object of the invention is to provide an improved method of winding web material.

Another object of the invention is to provide a method of winding paper wherein the increasing weight of the paper on a winding drum is automatically offset by decreasing rider roll pressure on the roll of paper as the roll increases in diameter.

A specific object of this invention is to provide a readily adjustable eccentric counterweight control for paper winding machines.

Still another specific object of this invention is to provide a motor driven control for the rider roll of a paper winding machine which will lower the rider roll onto the winder shaft at a high rate of speed without permitting the accumulation of slack in the counterbalancing linkage for the rider roll when the rider roll is deposited on the winder shaft.

A still further specific object of this invention is to provide means which will automatically

hold the rider roll in an elevated position during the removal of the wound roll from the machine.

Other and further objects of the invention will be apparent to those skilled in the art from the following detailed descriptions of the annexed sheets of drawings, which, by way of preferred examples, illustrate several embodiments of the invention.

On the drawings:

Figure 1 is an end elevational view of one form of paper winder according to this invention wherein the rider roll is manually raised and lowered.

Figure 2 is a side elevational view of the machine of Figure 1 along the line II—II of Figure 1.

Figure 3 is an enlarged vertical cross-sectional view, with parts in elevation, taken along the line III—III of Figure 1.

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

Figure 5 is a cross-sectional view, with parts in elevation, taken along the line V—V of Figure 4.

Figure 5a is a diagrammatic view illustrating the counterbalance arrangement of Figures 4 and 5 at the completion of the winding operation.

Figure 5b is a diagrammatic view similar to Figure 5a illustrating the counterbalance arrangement at the start of the winding operation.

Figure 6 is an end elevational view of another embodiment of paper winding machine according to this invention wherein the rider roll is raised and lowered by means of an electric motor.

Figure 7 is a side elevational view of the machine of Figure 6 along the line VII—VII of Figure 6.

Figure 8 is an enlarged side elevational view, with parts in vertical cross section, of the upper portion of the machine of Figures 6 and 7.

Figure 9 is an enlarged end elevational view taken along the line IX—IX of Figure 8.

Figure 10 is an enlarged end elevational view, with parts in cross section, taken along the line X—X of Figure 8.

Figure 11 is an enlarged end elevational view, with parts in cross section, taken along the line XI—XI of Figure 8.

Figure 12 is a somewhat diagrammatic end elevational view, with parts in vertical cross section, of a fluid pressure operated rider roll control for machines of this invention.

Figure 13 is a wiring diagram for the machine of Figures 6 to 11 with parts of the machine in perspective and somewhat diagrammatically illustrated.

As shown on the drawings:

In Figures 1 and 2, the reference numeral 10 designates generally a winder machine having manually controlled raising and lowering means for the rider roll. The winder machine 10 includes a pair of end frames 11, 11 with projecting pedestal portions 11a, 11a. A drum 12 is rotatably supported in the frame structure 11 and is adapted to receive a web of paper W from the reel of a paper making machine. Trimmers such as T can cooperate with the drum 12 for cutting off the deckle edges of the web W.

The web W is directed from the top of the drum 12 beneath a first winder under drum 13 rotatably mounted in bearing supports carried by the pedestal portions 11a, 11a of the frame structure. A second winder under drum 14 is similarly rotatably mounted in closely spaced horizontal relation from the drum 13. The two drums 13

and 14 provide a nip 15 therebetween for receiving therein a winder shaft S.

Bearing caps 16, 16 rotatably mount the ends of the winder shaft S and are supported from arms 17, 17 of carriages 18, 18. The carriages 18, 18 are slidably mounted in vertical tracks 19, 19 of the frames 11, 11.

As best shown in Figure 1, each bearing cap 16 has a hinged cover 16a adapted to be opened for releasing the winder shaft S. The covers 16a are adapted to be held in locked position by means of trip latches such as 20.

The carriages 18 have chains 21 attached thereto and these chains are each trained over a separate sprocket 22.

As best shown in Figure 3, the sprockets 22 are fixed on a shaft 23 which is rotatably mounted on bearings such as 24 carried by the end frames 11, 11 of the machine. A tubular reinforcing member 25 extends between the end frames 11, 11 and is affixed thereto for rigidifying the structure. The shaft 23 can extend through this tubular member. As shown in Figures 2 and 3 the chains 21 can enter slots 26 in the frames 11 so as to travel around the sprockets 22 and be affixed thereto as shown in Figure 1.

The shaft 23 also has secured thereon a third sprocket 27 disposed outside of the frames 11, 11 at the rear end of the machine.

A chain 28 is trained around this sprocket 27 and has one end secured to the sprocket and the other end secured to a counterweight 29. The counterweight 29 will tend to rotate the shaft 23 for turning the sprockets 22 to raise the carriages 18, 18 although the counterweight is not sufficiently heavy to actually lift, without additional manual effort, the carriages 18, 18.

The other end of the shaft 23 likewise projects beyond the front end frame 11 and a fourth sprocket 30 is secured thereon. This sprocket 30 is adapted to be rotated through a chain 31 by a hand wheel 32. The hand wheel 32 is rotatably carried by the front end frame 11 at a level below the sprocket 30. Rotation of the hand wheel in reverse directions will therefore effect a raising and lowering of the carriages 18 and the bearing caps 16. The counterweight 29 will be effective to balance the weights of the carriages so that manual operation of the hand wheel 32 is quite easy.

A rider roll 35 is rotatably mounted in bearings 36 carried by arms 37a of carriages 37. The carriages 37 are also slidable in the vertical tracks 19 above the carriages 18.

The arms 37a support the bearings 36 to position the rider roll 35 directly over the winder shaft S.

Chains 38, 38 are secured at one end to the arms 37a, 37a, and are secured to sprockets 39, 39 at the other ends thereof. The sprockets 39, 39 as best shown in Figure 3, are secured on tubular members 40, 40, which members, in turn, are rotatably mounted in bearings 41 carried on extensions 11c of the end frames 11.

A shaft 42 extends through the tubular member 40 at the rear end of the machine and is rotatably mounted in this tubular member 40 on a plain bearing 43. The shaft 42 is joined through a coupling 44 with a shaft 45 having a free end 45a mounted in a bearing 46 on top of a support frame 47 as best shown in Figure 2. The support frame 47 can be anchored to the rear end frame 11 of the machine through a spacer shaft or other rigidifying means 48.

As best shown in Figure 3, the shaft 42 extends

midway between the frames 11c, 11c and has a boss 49 secured thereon. This boss has a peripheral flange 50 at the mid-portion thereof. Tubular members 51, 51 have their inner ends disposed over the boss 49 and their outer ends disposed over and affixed to the tubular members 40, 40. Flanged collars 52 are secured to the inner ends of the tubular members 51 and bolts 53 extend through the collars 52 and flange 50 for joining the tubular members 51 together and for uniting the tubular members to the shaft 42. A third sprocket 54 is secured on one of the tubular members 51.

An endless chain 55, as best shown in Figure 2, is trained around the sprocket 54 and around a smaller sprocket 56 on a stub shaft 57 carried by the front end frame 11. The other end of the stub shaft 57, as best shown in Figure 2, has a gear 58 keyed thereon meshing with a small gear 59 on a stub shaft 60 which is adapted to be manually rotated by a hand wheel 61. The sprocket and gear reduction provided by the sprockets 54 and 56, and by the gears 58 and 59 facilitate manual rotation of the hand wheel 61 to rotate the sprocket 39 for raising and lowering the rider roll 35.

In addition, however, the raising and lowering of the rider roll is further facilitated by a counterweight 62 connected through a chain 63 to a sprocket 64 on the shaft 45 and the eccentric setting of the sprocket 64 controls the effective weight of the rider roll 35 on the winder shaft S and roll of paper being wound on the winder shaft S. The sprocket 64 also automatically decreases the effective weight of the rider roll on the roll of paper being wound as the roll increases in diameter.

As shown in Figures 4 and 5, the sprocket 64 has an elongated hub portion 65 slidably mounted on a block 66 receiving the shaft 45 therethrough.

As shown in Figure 5 this block 66 has an out-turned flange 66a at one end thereof adapted to overlie one face of the hub 65. An apertured end plate 67 is bolted to the other end of the block 66 to overlie the other end face of the hub 65. This arrangement provides for a sliding movement of the hub over the block while holding the sprocket 64 on the block.

A screw rod 68 extends along the length of the hub 65 in the hollow portion thereof and is rotatably mounted in the hub at its ends as at 68a. A knurled turning knob 69 is secured on the threaded rod 68 to facilitate manual rotation of the rod. The rod is threaded through the block 66 and extends through the shaft 45. Rotation of the rod will slide the hub 65 along the block 66 to provide for any desired eccentric displacement of the periphery of the sprocket 64 relative to the shaft 45.

This variable eccentric mounting for the sprocket 65 automatically increases the effective weight of the counterweight 62 on the rider roll 35 as the rider roll is raised upwardly by the roll of paper on which it rests. This automatic feature is illustrated diagrammatically in Figures 5a and 5b. Figure 5a shows the position of the sprocket 64, the rider roll 35 and the counterweight 62 at the completion of a winding operation. In this position, the counterweight 62 is acting on the rider roll 35 through a long lever arm L and the rider roll 35, in turn, is acting on the counterweight 62 through a relatively short lever arm L₁, since the eccentric mounting of the sprocket 64 on the shaft 45 is such that these lever arm lengths will be reached when the rider

roll has been raised by the roll of paper being wound.

At the start of the winding operation as illustrated in Figure 5b the rider roll 35 is resting on the winder shaft S, the counterweight 62 is in elevated position and the arm lengths L and L₁ are reversed so that the longer arm L is between the rider roll and the shaft while the shorter arm L₁ is between the counterweight and the shaft. In this condition, therefore, the counterweight 62 will have less lifting effect on the roll 35 since it only acts through a short lever arm. As the rider drum 35 is raised during the winding operation, however, the short arm increases in length while the long arm decreases in length to increase the counterweight effect on the rider roll and "lighten" the roll.

By means of the eccentric mounting, therefore, any desired rider roll weight can be initially placed on the winder shaft and this weight will then be automatically decreased as the weight of the roll being wound increases. It is thus possible to maintain a substantially constant weight on the winder drums to insure the winding of a uniformly hard roll. The eccentric mounting is readily varied by manual rotation of the knob 69 and the counterweights need not be varied as heretofore to change their effect on the rider roll.

The counterweight effect will always be equally applied to both ends of the rider roll since it is transmitted through the shaft 42 which shaft, in turn, is coupled to the tubular members 51 at the mid-point between the sprockets 39. Any twisting of the tubular members must thus be equal and no variation in movements of the sprockets can occur.

The machine of Figures 1 to 5 inclusive is operated by threading the paper web W over the drum 12, under the drum 13, and up over the top portion of this drum. The hand wheel 32 is rotated to lower the bearing caps 16 into the nip area between the drums 14 and 13. The winder shaft S is placed in the bearing caps and the leading end of the paper is tucked around the winder shaft so that, as the shaft is rotated by the under drums 13 and 14, the paper will be wound around the shaft. A hand wheel 61 is next rotated to lower the rider roll 35 down on top of the shaft. The eccentric mounting for the sprocket 64 is adjusted so that the rider roll will exert the desired amount of weight on the shaft. The under drums are then driven to rotate the shaft and a roll of paper is thus wrapped around the shaft. During the winding operation the rider roll is moved upwardly by the roll of paper and, as it moves upwardly, its effective weight on the roll automatically decreases as explained above, due to the eccentric mounting for the counterweight. When a roll of sufficient diameter has been wound, the hand wheel 61 is rotated to raise the rider roll off of the wound roll of paper. The bearing caps are unlatched and the finished roll is discharged off of the under drum. Suitable locking devices (not shown) can be provided for the hand wheels 32 and 61 to prevent lowering of the rider roll when it is in its elevated position for the discharging operation, and to prevent lowering of the bearing caps when they are unlatched.

In Figures 6 and 7, the reference numeral 70 designates generally a winder machine having electric motor controlled raising and lowering means for the rider roll. The winder machine 70 includes a pair of end frames 71, 71 with rear-

wardly projecting pedestal portions such as 71a (Figure 6) and forwardly extending pedestal portions 71b, 71b (Figures 6 and 7). A drum 72 is rotatably mounted on the pedestal portions 71a and is adapted to receive the web of paper W thereover. Trimmers such as T can cooperate with the drum 72 for cutting off the deckle edges of the web W.

A first under drum 73 is rotatably mounted in bearing supports carried by the end frames 71 and a second under drum 74 is rotatably mounted in bearings carried by the pedestal portions 71b of the end frames. The two drums 73 and 74 are in spaced horizontal relation and define a nip 75 therebetween.

A winder shaft S' is adapted to be mounted in the nip 75 between the under drums 73 and 74 in bearing caps 76, 76. These bearing caps 76 are carried on the arms 77 of carriages 78 which are slidably mounted in vertical tracks 79 formed in the end frames 71.

As best shown in Figures 6, each bearing cap 76 has a hinged cover 76a adapted to be opened for releasing the winder shaft S'. Each cover 76a is adapted to be held in locked position during the winding operation by means of a trip latch 80.

A cross shaft 81 is mounted in the end frames 71 and carries sprockets such as 82 as shown in Figure 6. A second cross shaft 83 is mounted in the end frames 71 near the tops of the end frames and carries sprockets such as 84. Chains 85 are trained around the sprockets 82 and 84 adjacent each end frame 71 and these chains are each attached to a carriage 78.

The shaft 83 extends through the front end frame 71 and has another sprocket 86 secured thereon. This sprocket 86 is driven by a chain 87 from a small gear 88 carried on a stub shaft by the end frame 71. The gear 88 is rotated by means of a hand wheel 89 through a gear train (not shown). The hand wheel 89 is thus adapted to be rotated for driving the shaft 83 and the sprockets 84 which in turn drive the chains 85 to raise and lower the carriages 78 and thereupon raise and lower the bearing caps 76 for the winder shaft S'.

A rider roll assembly 90 is mounted on the end frames 71 above the carriages 78 for the winder shaft bearing caps. This assembly 90 includes end carriages 91 slidable in the same tracks 79 as the carriages 78. The carriages 91 are connected through a cross shaft 92. This cross shaft supports a plurality of straps 93 each carrying a bearing housing 94 in which is rotatably mounted a rider roll support shaft 95. Rider rolls 96 are carried on the shaft 95 and can, if desired, be keyed to the shaft to be driven therewith. Alternatively, the rider rolls 96 can rotate freely on the shaft 95 and rotary cutters (not shown) can be secured to the shaft for cutting a roll of paper R being wound on the winder shaft S' into a plurality of rolls. The shaft 95 is adapted to be driven at both ends from motors 97 carried by the carriages 91. Belts 98 connect the motors 97 to the drive pulleys on the ends of the shaft 95.

A cross shaft 99 is rotatably mounted in bearings 100 carried by the carriages 91. This cross shaft has gears 101 thereon meshing on vertical racks 102 carried by the end frames. As the assembly 90 is raised and lowered, the shaft 99 must rotate because of the rack and gear connection with the main frame.

Braking devices (not shown) controlled by hand wheels 103 are provided in the housings of the

bearings 100 to impede rotation of the shaft 99 and thereby impart resistance to the raising and lowering of the assembly 90.

Chains 104 are secured at one of their ends to the carriages 91 and are trained around sprockets 105 rotatably carried on extension supports 160 on the tops of the end frames 71. The other ends of the chains 104 are connected to counterweights such as 107 (Figure 6) having wheels 108 rideable on ways such as 109 provided by the ends frames 71.

Each sprocket 105 is similar to the sprocket 64 described in connection with Figure 4 and includes a mounting block 105a slidably mounted in the sprocket and controlled by a screw rod 105b so that the sprocket can have any desired degree of eccentricity relative to its axis 105c.

This arrangement is such that the rider roll assembly 90 can be counterbalanced by the weights 107 to any desired degree and therefore have a readily controlled effective weight on the roll of paper R. This effective weight can be adjusted so that it will automatically decrease as the roll R increases in diameter thereby raising the assembly 90.

As best shown in Figure 8, a cross frame 71c is carried by the end frames 71 near the tops thereof. A vertical support frame 110 is mounted on the cross frame 71c and extends upwardly therefrom to provide a bearing support 111 for a shaft 112 which extends through one pair of supports 106 for carrying a sprocket 105. The sprocket 105 is keyed on the shaft 112.

A gear 113 is secured on the outer end of the shaft for driving a small gear 114 of a limit switch 115 for a purpose to be more fully hereinafter described.

A gear 116 is mounted on the shaft 112 in free rotatable relation thereon. This gear 116 meshes with a gear 117 on the drive shaft of a motor 118. The motor 118 is carried on the cross frame 71c.

A pair of pawl supports 119 are secured to one face of the gear 116. These supports carry pawls which engage a ratchet 120 keyed to the shaft 112.

The other face of the gear 116 has a brake drum 121 secured thereon. A brake mechanism 122 is mounted in the drum 121 and is keyed to the shaft 112.

As best shown in Figure 11, the brake mechanism 122 includes a body member 123 disposed around the shaft 112 and keyed against relative rotation by means of a key 123a. The body member 123 has brake shoes 124 pivotally connected thereto at their lower ends. These brake shoes 124 are adapted to engage the inner face of the brake drum 121.

Links 125 are pivoted at their lower ends to the body member 123 and to inwardly projecting ears 124a of the brake shoes. The upper end of one link 125 is pivoted to a housing 126 which is slidably mounted as at 127 on the body member. The other link 125 has the upper end thereof pivoted to a piston rod 128 carrying a piston 129 in the housing 126. A spring 130 urges the piston and housing in a direction to move the brake shoes 124 off of the brake drum 121.

As best shown in Figures 8 and 9, a compressed air tank 131 supplies air through a flexible hose or tube 132 to the interior of the housing 126, to force the piston 129 against the spring pressure 130 for moving the links 125 outwardly and thereby cause the brake shoes 124 to engage the brake drum 121. The hose 132 is arranged so that it will permit oscillation of the brake assembly 122

during operation of the machine. A solenoid controlled air valve 131a is provided in a compartment 131b of the tank 131 for admitting compressed air through a port 131c from the tank 131 to the compartment and the tube 132 and for closing a port 131d between the compartment and the outside atmosphere to actuate the brake shoes whenever the motor 118 is receiving current. The solenoid control for the air valve is connected in the circuit with the motor 118 as shown in Fig. 13.

When the solenoid is de-energized, a spring 131e moves the valve 131a to close port 131c and open port 131d for venting air from the housing 126 to permit disengagement of the brake shoes 124.

As best shown in Figure 8, the motor 118 is equipped with a brake device that is automatically applied whenever the motor is deenergized for the purpose of locking the drive shaft 133 of the motor. As shown, this drive shaft 133 has disks 134 splined on the end thereof and adapted to be frictionally engaged by means of brake disks 135.

The brake disks 135 are actuated into braking engagement with the disks 134 by means of a core 136 of a solenoid 137. This core 136 controls a lever 138 with a roller 139 on its free end engaging an abutment 140 of a casing in which the brake assembly is mounted. Another lever 141 is pivotally mounted on the lever 138 at one end and on the casing at the other end. This lever 141 is spring urged by means of a spring 142 in a direction for applying the brake disks 135. However, whenever the core 136 of the solenoid 137 is depressed by passage of current through the solenoid 137, the lever 138 is pulled downwardly to swing the lever 141 for moving the disks 135 against the pressure of the spring 142 to release the disks 134 and permit the motor to operate. The lever 138 has an extension 138a projecting beyond the casing to permit manual disengagement of the brake.

The motor 118 thus has the drive shaft locked whenever the motor is deenergized. On the other hand, as soon as the motor is energized current flows through the solenoid 137 to release the brake and permit the drive shaft to be driven without brake interference.

The pawl supports 119 of Figure 8, as best shown in Figure 10, rotatably carry blocks 145 straddled by pawls 146. The pawls are slidable on the blocks 145 and are rotatable with the blocks. The pawls have tail portions 147 acted on by compression springs 148. The compression springs have the opposite ends seated on adjustable supports 149 carried in threaded relation in bosses 150 formed on the face of the gear 116. The compression of the springs 148 can be adjusted by threading the abutment members 149 through the bosses 150.

The springs 148 serve to urge the pawls into engagement with the teeth of the ratchet 120. An additional set of compression springs 151 are provided between the blocks 145 and the pawls 146 for urging the pawls to move the tail portions 147 thereof against the blocks. These compression springs are adapted to be compressed whenever the ratchet 120 is moved in a counterclockwise direction as shown in Figure 10. This arrangement of the pawls permits, as more fully hereinafter described, the rider roll assembly to be lowered on top of the paper roll in the event that this assembly should dance and cause the pawls to engage the next tooth on the ratchet

prior to the time that the paper roll has increased in diameter sufficiently to raise the assembly to cause this engagement.

As shown in Figure 13, electric power lines P supply current through relay switches R or L to drive the motor 118 in opposite directions. When it is desired to drive the motor 118 for lowering the rider rolls 96 (Figure 7), push button L, B. is manually closed to energize coil L, C. and cause relay switch L to close. The brake device of the motor 118 will then be released since the solenoid coil 137 will also be energized to pull the solenoid core 136 for releasing the brake. A coil B, C. is energized simultaneously with the coil L, C. to close a solenoid switch S, S. for energizing the solenoid air valve 131a to supply air from the tank 131 to the housing 126 thereby causing the brake shoes 124 to engage the drum 121. The motor 118 will then drive the shaft 112 to rotate the sprocket 105 for lowering the chains 104 to lower the rider rolls 96 until the limit switch 115 stops the motor. This switch 115 has a screw shaft 115a driven through gears 113 and 114 from the shaft 112. The screw shaft 115a drives a rider 115b held against rotation by a rod 115c. The rider 115b is moved by the screw shaft 115a against a switch L, S. to trip this switch and open a circuit to the lowering button L, B., releasing this button from closed position and stopping flow of current from the motor 118 when the rider rolls 96 have been lowered onto the winder shaft S'.

When it is desired to raise the rider rolls 96 off of the roll of paper being wound, the button R, B. is manually depressed to energize coil R, C. and thereby close the relay R for driving the motor 118 in a direction to rotate the gear 116 for raising the rider roll. The gear 116 will drive the pawls 146 (Fig. 10) for rotating the ratchet 120 to drive the shaft 112 and thereby rotate the sprocket 105 for actuating the chain 104 to raise the rider rolls 96. This raising operation will continue until the screw shaft 115a of the limit switch 115 moves the rider 115b against a switch R, S. for tripping this switch and opening a circuit to the raising button R, B. thereby releasing this button and stopping flow of current to the motor. Of course, whenever the motor is energized the solenoid 137 controlling the motor brake is energized to release the brake.

The motor driven machine of Figures 6 to 11 operates as follows:

The bearing caps 76 are lowered by manipulation of the hand wheel 89 to position the same adjacent the nip between the under drums 73 and 74. The winder shaft S' is then placed in the bearing caps and the leading end of the paper web W is tucked around this shaft.

The motor 118 is then started to lower the rider roll assembly for bringing the rider roll 96 down on top of the winder shaft S'. As soon as the motor 118 is energized, the motor brake is released as explained above. At the same time, the solenoid controlled air valve is automatically opened to supply air through the hose 132 to the brake 122 thereby causing the brake shoes to engage the brake drum. The gear 116 is driven by the gear 117 of the motor and, since the brake shoes are engaging the drum 121, the shaft 112 will be driven to rotate the sprocket 105 for raising the counterweight and for lowering the rider roll assembly. The other sprocket 105 is not positively driven although it will operate in unison with the driven sprocket because the rider roll assembly 90 must have both carriages 91 move

together since these carriages can only move when the cross shaft 89 rotates due to the rack and gear connection between the cross shaft and the main end frame. The shaft 112 will continue to be driven as long as the motor 118 is operating. As the shaft 112 is driven, however, the gear 113 thereon is driving the limit switch 150 and, when the rider rolls contact the winder shaft, the limit switch can be set so as to deenergize the motor. As soon as the motor is deenergized the motor brake is automatically applied and the brake shoes 124 are released from the drum 121. In the event that the limit switch does not function to de-energize the motor, or is not used for this purpose, the motor may continue to operate after the rider rolls have been deposited on the winder shaft. When this condition occurs, however, the brake 122 is not strong enough to continue driving the shaft 112 and the brake shoes will slip on the brake drum 121. This is caused by the fact that the brake 122 is not strong enough to raise the dead weight of the counterweight, and is only strong enough to drive when the weight of the counter roll assembly is offsetting the counterweight.

This motor drive arrangement can be quite rapid so as to quickly lower the rider roll assembly on top of the new winder shaft for starting the new winding operation.

The under drums are next driven to rotate the winder shaft and wrap the web of paper around the shaft for building up the roll R. As this roll builds up in diameter, the rider roll assembly, of course, is raised. The raising of the rider roll assembly is permitted without driving the gear 116 since the pawls will merely click over the ratchet 120. The full desired counterbalancing effect of the counterweights on the rider roll assembly is thus obtained and the brake of the motor 118 will lock the gear 116 against rotation.

Since the winding operation is carried out at very high speed, the rider roll assembly may dance or jiggle up and down on top of the roll being wound. In the event that this occurs and the pawls 146 engage the next set of the teeth on the ratchet 120 before such engagement is desired, the springs 151 in the pawl assembly will permit reverse rotation of the ratchet to lower the rider roll assembly down on top of the roll being wound.

When the roll of paper R is completely wound, the motor is again energized and driven in the reverse direction for lifting the rider roll assembly off of the completely wound roll of paper. As soon as the motor is energized, the motor brake is released and the gear 116 will drive the shaft 112 through the pawls 146 and ratchet 120 for rotating the sprocket 105 to raise the rider roll assembly. The gear 113 is then being rotated in the reverse direction to drive the limit switch 115 in the reverse direction. When the limit switch reaches its stop position the motor will be deenergized and the motor brake will automatically be applied. The pawls 146 will engage the teeth of ratchet 120 to lock the ratchet against rotation since the gear 116 is held stationary by the motor brake. The rider roll assembly will thus be held in elevated relation above the finished roll of paper and this roll is then discharged off of the under drums and over the discharge platform P (Figure 6).

It will be understood from the above descriptions that the motor is brought into operation for quickly raising and lowering the rider roll

assembly at the start and finish of a winding operation. The brake 122 is automatically brought into operation when the motor is being driven so that a direct drive can be obtained without requiring driving through the pawl and ratchet device. This pawl and ratchet device, on the other hand, operates freely when the motor is deenergized to permit full effect of the rider roll on the roll of paper being wound. The eccentric sprockets control the effective weight of the rider roll assembly on the paper roll and can be set so as to decrease the effective weight of the rider roll assembly at any desired rate as the roll of paper being wound increases in diameter.

The motor need only drive one eccentric sprocket for raising and lowering the rider roll assembly at the start and finish of a winding operation because the rider roll assembly itself is constructed so that it cannot cock during the lifting and lowering operations.

The machine 170 diagrammatically illustrated in Figure 12, like the machines 10 and 70, includes a pair of under drums 171 and 172 in spaced horizontal relation and defining therebetween a nip 173 for receiving the winder shaft S''. The web of paper W being wound is trained around the under side of the drum 171 and up around this drum to the winder shaft being driven by the drum for winding up a roll R' of the paper.

The winder shaft S'' can receive bearing caps (not shown) on the ends thereof and these bearing caps are counterbalanced through chains such as 174. The machine has a cross shaft 175 containing carrying sprockets such as 176 and receiving the chains such as 175 therearound. Counterweights such as 177 are secured to the other ends of the chains 174. The shaft 175 can be manually operated as described in connection with machines 10 and 70 for raising and lowering the winder shaft S''.

A second cross shaft 178 is provided on the machine above the shaft 175 and this shaft carries a block 179 on which a sprocket 180 is mounted. This sprocket 180 is eccentrically shiftable over the block 179 by means of the screw rod 181. The sprocket 180 is of the same construction as described hereinabove in connection with the machines 10 and 70.

A rider roll 182 is adapted to ride on the winder shaft S'' and roll of paper R' being wound thereon. This winder roll 182 is counterbalanced through chains such as 183 secured to sprockets (not shown) on the shaft 178. A chain 183a connects the sprocket 180 with a counterweight 184.

The counterweight 184 is mounted on the end of a piston rod 185 entering an air cylinder 186 and having a piston head 187 on the end thereof slidable in the air cylinder 186.

Air is supplied from a pipe line 188 through a pressure regulating valve 189 at a pressure indicated by a gauge 190. A four-way valve 191 receives air from the pipe 192 leading from the pressure regulating valve 189. The valve 191 has two passes 191a and 191b as indicated. With the valve in the position shown in Figure 12, air from the pipe line 192 flows through the pass 191a of the valve into a pipe line 193 and through a T 194 into pipes 195 and 195a. The pipe 195 extends to an air limit valve 196 which is actuated by a finger 182a on the rider roll 182. A pipe 197 extends from the limit valve 196 to the housing 198 of a piston-operated or diaphragm-operated valve 199 controlling a port 200 joining the pipe line 195a with a pipe line

201 to the air cylinder 186 on the piston rod side of the piston 187 therein.

The valve 199 has a stem 199a with a piston head 199b on the end thereof slidable in the housing 198.

A spring 202 surrounds the stem 199a and acts against the piston 199b for holding the valve 199 in opened position away from the port 200 so as to place the pipe lines 196 and 201 in communication.

A small bleeder opening 187a is provided in the pipe line 197.

The air limit 196 has an actuator 196a adapted to be acted on by the finger 182a for opening the valve. When air is admitted from the pipe line 195 through the valve 196 and through the pipe line 197 to the interior of the housing 198, the valve 199 will be closed. However, as long as the finger 182a is below the actuator 196a of the valve 196, the valve 196 will be closed and air will be supplied to the piston rod side of the piston 187 thereby adding air pressure to the counterweight 184 for raising the rider roll 182 until the finger 182a thereof strikes the switch actuator 196a whereupon, as explained above, the valve 199 will be closed and the raising operation will stop.

With the valve 191 in the position shown in Figure 12, the pass 191b of the valve is vented to the atmosphere. A pipe line 203 is connected with the valve 191. This pipe line 203 extends to the head end of the cylinder 186. An air pressure regulating valve 204 is provided in the pipe line 203. A gauge 205 can also be provided to indicate the air pressure in the line 203. A by-pass pipe 206 is provided around the valve 204 and this by-pass pipe includes a check valve 207 therein adapted to open in one direction only for permitting flow from the cylinder 186 to the valve 191.

The pressure regulating valve 204 can be set to control the pressure on the bottom side of the cylinder 186. Then when the valve 191 is positioned so that the pass 191b thereof connects the main line 192 with the line 203 for the purpose of raising the piston 187 the raising pressure can be definitely controlled.

The machine of Figure 12 operates as follows:

When the paper roll R' has been wound and it is desired to raise the rider roll 182 off of the roll of paper so as to permit the roll to be discharged off of the under drums 171 and 172, the valve 191 is moved to the position shown so that the pipe line 192 discharges into the pipe lines 195 and 195a. Air pressure is thus admitted to the pipe line 195 only up to the limit valve 196. Air pressure is admitted to the pipe line 195a into the pipe line 201 and into the piston rod end of the cylinder. The piston 187 is thus forced down to the head end of the cylinder and the rider roll will be rapidly raised until the finger 182 strikes the actuator 196a whereupon air will flow through the pipe line 187 to close the valve 199. The piston rod end of the cylinder will then no longer receive air from the pipe line 195a and the rider roll will be held in elevated position.

When it is desired to lower the rider roll, the main four-way valve 191 is thrown to move the pass 191a to exhaust position and to move the pass 191b for connecting the pipe 192 with the pipe 203. As soon as air is exhausted from the line 197, the valve 199 will open and the piston rod end of the cylinder will be exhausted. At the same time, air from the line 192 will flow

through the pass 191b into the line 203 for admitting air pressure to the head end of the cylinder 186 thereby raising the piston 187 and lowering the roll 182.

The air operated machine therefore also provides a quick operating arrangement for raising and lowering the rider roll. The counterbalance effect on the rider roll is controlled by the weight 184 and the eccentric sprocket 180 in the same manner as described in connection with the hand operated, and motor operated winder machine.

It will, of course, be understood that various details of the invention 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.

I claim as my invention:

1. A winding machine comprising end frames defining vertical tracks, a rider roll assembly mounted on said tracks, sprockets rotatably mounted on the top portions of said end frames, chains secured on said sprockets at one of the ends thereof and to the rider roll assembly at the other of the ends thereof, means connecting said sprockets for co-rotation, a third sprocket connected to said means, a chain secured at one end to said third sprocket, a counterweight secured to the other end of said last mentioned chain, and means for eccentrically shifting said third sprocket to vary the counterweight effect on said means for acting through the first mentioned sprocket chains on said rider roll assembly.

2. A web winding machine comprising a pair of end frames defining vertical tracks, a rider roll assembly rideable on said tracks, tubular means rotatably mounted on top of said end frames and extending between the frames, sprockets secured on said tubular means, chains extending from said sprockets to said rider roll assembly, a counterweight shaft extending into said tubular means, means securing the counterweight shaft to the tubular means at the mid-point between said sprockets, and a counterweight assembly secured on said shaft for applying equal amounts of torque to each of the sprockets.

3. A web winding machine comprising a pair of spaced opposed end frames, bearing supports mounted on top of said end frames, a tubular member extending between said end frames and rotatably mounted in said bearing supports, sprockets secured on said tubular member near the ends thereof, chains trained around said sprockets, a rider roll assembly on said machine, means connecting said chains to said rider roll assembly, means for rotating said tubular means to raise and lower the rider roll assembly, a counterweight shaft extending into said tubular means, means securing said shaft to the tubular means at a point midway between the sprockets, a shiftable sprocket on said counterweight shaft, means for eccentrically adjusting the sprocket on the shaft, a chain secured on said shiftable sprocket, and a counterweight supported by said chain whereby said counterweight will act through the shiftable sprocket and sprocket shaft to apply equal turning torque to each of the first mentioned sprockets.

4. A paper winding machine comprising a pair of spaced opposed end frames defining spaced parallel vertical tracks, a pair of under drums between said end frames, bearings rotatably mounting the ends of the under drums on the end

frames, a rider roll between the end frames, carriages slideable in said tracks rotatably mounting the rider roll for movement into and out of the winding nip between the under drums, chains secured to said carriages, a sprocket rotatably mounted on top of each end frame receiving a chain therearound, means anchoring said chains to said sprockets, a tubular member extending between said sprockets connecting the sprockets for co-rotation, a counterweight shaft extending into said tubular member, means connecting said counterweight shaft to the tubular member at a point midway between the sprockets, and a counterweight tending to rotate said shaft for applying equal turning torque to each of said sprockets for identical counterweight effect on each of said carriages.

5. A web winding machine comprising a pair of spaced end frames, a pair of spaced horizontal winder drums between said end frames, bearings on said end frames rotatably mounting said winder drums, vertical tracks on said end frames, carriages mounted on said tracks, a rider roll between said end frames rotatably mounted in said carriages, said rider roll adapted to ride on a roll being wound by said under drums, a sprocket rotatably mounted on top of each end frame, chains connecting said sprockets with said carriages, a tubular member extending between the end frames and connecting said sprockets for co-rotation, a third sprocket between said first mentioned sprockets secured on said tubular member, a small sprocket rotatably mounted in one end frame, an endless chain connecting said small sprocket with the third sprocket, a hand wheel for rotating said small sprocket to drive the chain and thereby rotate the tubular member for raising and lowering the carriages, a support mounted alongside of an end frame, a counterweight shaft rotatably carried by said support, said counterweight shaft extending into said tubular member, means connecting said winder shaft with the tubular member at a point midway between said first mentioned sprockets, an adjustable eccentric sprocket on said counterweight shaft, a chain secured at one end to said eccentric sprocket, and a counterweight on the other end of said chain whereby said hand wheel can be manually operated to raise and lower the rider roll and whereby said counterweight will apply an equal counterbalancing force to each carriage in an amount determined by the degree of eccentricity of said eccentric sprocket.

6. In a winding machine, a rider roll counterbalances assembly comprising a pair of sprocket and chain assemblies for raising and lowering the rider roll, means for connecting the sprockets of said assemblies for co-rotation, and a counterweight torque applying device connected to said means at a point midway between said sprockets for equally distributing counterweight torque to each of the sprockets.

7. In a winding machine, a rider roll adapted to ride on a roll of paper being wound by said machine, lifting chains acting on the ends of said rider roll, a hollow cross shaft, sprockets affixed to said cross shaft anchoring the other ends of said chains, a counterbalance shaft extending into said cross shaft, and means connecting said counterbalance shaft to said cross shaft at a point midway between said sprockets for equally distributing counterweight effect to both chains.

8. A winding machine comprising a pair of end frames providing vertical tracks on one side thereof, and ways on the other sides thereof, a rider roll assembly mounted on said tracks, sprockets rotatably mounted on top of said end frames, means for eccentrically shifting said sprockets, chains trained around said sprockets, counterweights rideable on said ways secured to one of the ends of said chains, and the other ends of said chains being secured to said rider roll assembly whereby the counterweight effect on the assembly is regulated by the degree of eccentricity of said sprockets.

9. A winding machine comprising a main frame defining a rider roll track on one side thereof, and a counterweight track on the other side thereof, a shaft mounted on top of said frame, a sprocket on said shaft, means for eccentrically shifting said sprocket relative to said shaft, a rider roll assembly mounted on said rider roll track, a counterweight mounted on said counterweight track and a chain trained around said sprocket secured to said rider roll assembly and to said counterweight, whereby said counterweight effect is readily adjustable by eccentrically shifting said sprocket.

10. A winding machine comprising a frame, a winder drum rotatably mounted in said frame, a rider roll assembly mounted for vertical movement on said frame toward and away from said winder drum, a counterweight for said rider roll assembly, adjustable eccentric means between said counterweight and said rider roll assembly for regulating the counterweight effect on the rider roll assembly, a motor for raising and lowering said rider roll assembly, and automatic means connecting the motor in driving relation with the rider roll assembly only when the motor is energized.

11. A web winding machine comprising a main frame, winding mechanism mounted in said main frame, rider roll support carriages mounted on said frame for movement toward and away from said winding mechanism, sprockets rotatably mounted on top of said main frame, chains attached to said carriage and trained around said sprockets, counterweights on the other ends of said chains, a shaft fixed to one of said sprockets, a gear freely mounted on said shaft, pawls carried by said gear, a ratchet fixed to said shaft adapted to be engaged by said pawls, a brake device fixed to said shaft, a brake drum carried by said gear adapted to be engaged by said brake device, a motor for driving said gear, means automatically actuating said brake device to engage the brake drum whenever the motor is energized for driving the shaft to rotate said sprocket for raising and lowering the rider roll support carriages, a brake locking said motor whenever the motor is deenergized, and said ratchet and pawls permitting rotation of the shaft in one direction even when said motor is locked for allowing the rider roll carriages to raise during the winding operation.

12. A winding machine comprising mechanism for winding material into rolls, a rider adapted to rest on the rolls being wound to press the same against the winding mechanism, means movably mounting the rider on the machine to permit the rider to rise as the roll being wound increases in diameter, an electric motor for raising and lowering the rider, a brake locking said motor against rotation whenever the motor is deenergized, said brake adapted to hold the rider in elevated position, and a pawl and ratchet

device permitting the rider to be raised by the roll being wound even when the motor is locked.

13. A winding machine comprising a pair of under drums defining a winding nip adapted to receive a winder shaft for winding a roll of web material around the shaft, a rider roll adapted to ride on top of the roll being wound for holding the roll against the winder drum, a reversible electric motor for raising and lowering the rider roll, a pawl and ratchet drive connection between the motor and rider roll permitting the roll being wound to raise the rider roll without rotating the motor, a solenoid operated brake locking said said motor whenever the motor is deenergized to hold the rider roll in elevated position, and an air operated clutch device directly coupling said motor with the rider roll whenever the motor is energized to raise and lower the rider roll without acting through the pawl and ratchet connection.

14. A web winding machine comprising a main frame, a pair of under drums rotatably mounted in said main frame, a rider roll mounted for vertical movement on said main frame toward and away from the winding nip defined by said under drums, sprockets rotatably mounted on the top portions of said main frame, chains extending from said rider roll around said sprockets, counterweights on said chains, a drive shaft for one of said sprockets, a gear freely rotatable on said drive shaft, an electric motor driving said gear, a solenoid operated brake for locking said motor when the motor is deenergized, an air operated brake affixed to said shaft, a brake drum on said gear engaged by said brake whenever the motor is energized to drive the shaft, pawls on said gear, a ratchet fixed to said shaft for engaging said pawls, said pawls and ratchet being arranged for holding the shaft against rotation in one direction whenever the motor is locked to prevent lowering of the rider roll without interfering with raising of the rider roll by the roll being wound, whereby said motor is adapted to rapidly raise and lower the rider roll at the finish and start of a winding operation without actuating said pawls over said ratchet.

15. A winding machine comprising mechanism for winding web material into a roll, a rider roll adapted to ride on the roll being wound to hold the roll against the winding mechanism, a counterweight acting on the rider roll to control the effective weight thereof on the roll being wound, a pawl and ratchet device allowing the rider roll to raise while holding the same against lowering, and spring means in said pawl and ratchet device permitting the rider roll to rest on the roll being wound in the event that the rider roll is inadvertently raised above operating position.

16. In a web winding machine, rider roll raising and lowering mechanism which comprises a sprocket and chain assembly operatively connected to the rider roll, a shaft for driving said sprocket, a gear freely rotatable on said shaft, an electric motor in meshed engagement with said gear, a solenoid operated brake locking said electric motor whenever the motor is deenergized, an air operated brake coupling said gear with said shaft whenever the motor is energized, and a limit switch driven by said shaft for controlling energization of said motor.

17. In a web winding machine, rider roll raising and lowering mechanism which comprises a shaft, a sprocket affixed to said shaft, a chain trained over said sprocket, a counterweight on

one end of said chain, the other end of said chain being connected to said rider roll, means for eccentrically shifting said sprocket relative to said shaft for varying the counterweight effect on said rider roll, a gear freely rotatable on said shaft, pawls affixed to said gear, a ratchet engageable by said pawls keyed to said shaft, a clutch device for drivingly connecting said gear and shaft, a motor in meshed engagement with said gear, a brake locking said gear and motor whenever the motor is deenergized, control means energizing said clutch for coupling the gear to the shaft whenever the motor is energized whereby said ratchet and pawls will permit the rider roll to raise when the motor is de-energized and locked while holding the rider roll from dropping and whereby the motor when energized will directly drive the sprockets to raise and lower the rider roll.

18. In a web winding machine, mechanism for winding web material into a roll, a rider roll adapted to ride on the roll of material being wound to press the same against the winding mechanism, a sprocket rotatably mounted on the machine above the rider roll, a chain trained around said sprocket secured at one end to the rider roll and at the other end to a counterweight for counterbalancing the weight of the roll, a ratchet connected with said sprocket for co-rotation therewith, pawl devices engageable with said ratchet to hold the ratchet against rotation for preventing lowering of the rider roll, and spring means in said pawl devices allowing limited rotation of the sprocket to permit lowering of the rider roll onto the roll being wound in the event that the rider roll is inadvertently moved from operative position during the winding operation.

19. A web winding machine comprising mechanism for winding web material into a roll, a rider adapted to press the roll of material being wound against the winding mechanism, a counterweight for said rider, a piston rod on said counterweight, a cylinder receiving said piston rod, a piston slidably mounted in said cylinder fixed to said rod, means for introducing fluid under pressure to the piston rod side of said cylinder for augmenting the counterweight effect on the rider, and means for introducing fluid under pressure into the head end of the cylinder for raising the counterweight to lower the rider.

20. A winding machine comprising a pair of under drums defining a winding nip adapted to receive a winder shaft for winding therearound a roll of web material, a rider roll assembly mounted for vertical movement on said machine adapted to rest on the roll of material being wound to hold the roll against the under drums, a counterweight acting on said rider roll assembly, a fluid pressure operated piston for raising and lowering said counterweight, and a limit

valve actuated by the rider roll assembly to stop the raising operation whenever the rider roll reaches a predetermined height.

21. A web winding machine comprising mechanism for winding web material into a roll, a rider roll engageable with the roll being wound to hold the same on the winding mechanism, a counterweight for said rider roll assembly, a piston attached to said counterweight, an air cylinder receiving said piston in operative relation, an air pressure line, a valve for admitting air into either end of the cylinder to raise and lower the piston and thereby raise and lower the rider roll, and a second valve actuated by the rider roll assembly whenever the assembly reaches a predetermined height to shut off the air supply to the cylinder for stopping the raising operation.

22. In a winding machine having a rider roll assembly, the improvement of rider roll control mechanism which comprises a compressed air pipe, an air cylinder, a piston slidable in said cylinder connected to said rider roll assembly, pipe lines communicating with the ends of said cylinder, a valve adapted to alternately connect said compressed air pipe with said pipe lines, an air operated valve controlling flow of air into one end of said cylinder, and mechanism actuated by said rider roll controlling said air operated valve.

23. A web winding machine comprising a pair of rotatably mounted underdrums cooperating to define a winding nip, a rider roll assembly adapted to rest on a roll of web material being wound in said winding nip, a rider roll counterbalancing assembly including a counterweight for said rider roll assembly and an adjustable sprocket operatively positioned between the counterweight and the rider roll assembly, said adjustable sprocket having a hub portion defining an elongated aperture, a block portion slidably mounted in said elongated aperture, a mounting shaft extending through said block portion, a screw rotatably mounted at its ends in said hub portion and extending lengthwise of said aperture into threaded relation through said block for shifting the sprocket along the block to vary the eccentricity of the sprocket relative to said mounting shaft.

24. In a winding machine including a rider roll assembly, the improvements of a rider roll assembly counterbalance mechanism comprising a pair of sprockets, means for connecting said sprockets for co-rotation, a pair of chains each trained around a sprocket and secured at opposite ends thereof to the sprockets and to the rider roll assembly, and a counterweight torque-applying device connected to said means for connecting the sprockets at a point between the sprockets positioned for equally distributing counterweight torque to each of the sprockets.

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