

Oct. 17, 1939.

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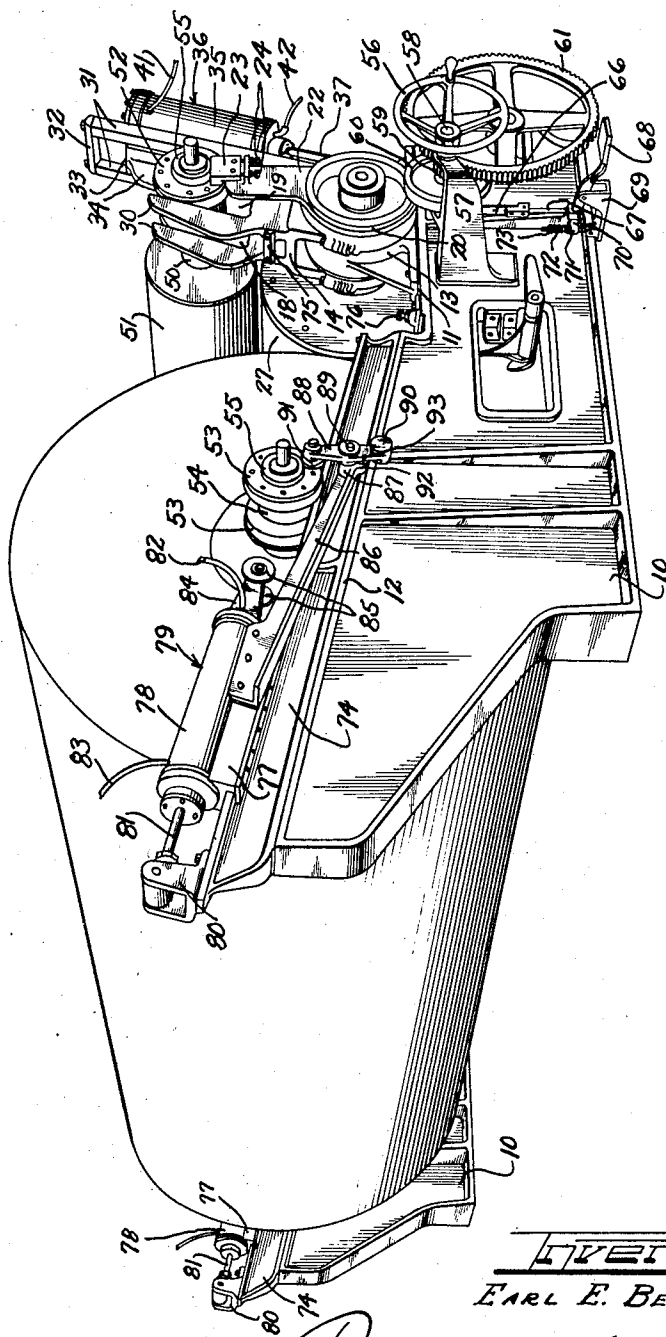
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PAPER WINDER

Filed Jan. 24, 1938

7 Sheets-Sheet 1

Fig. 1.



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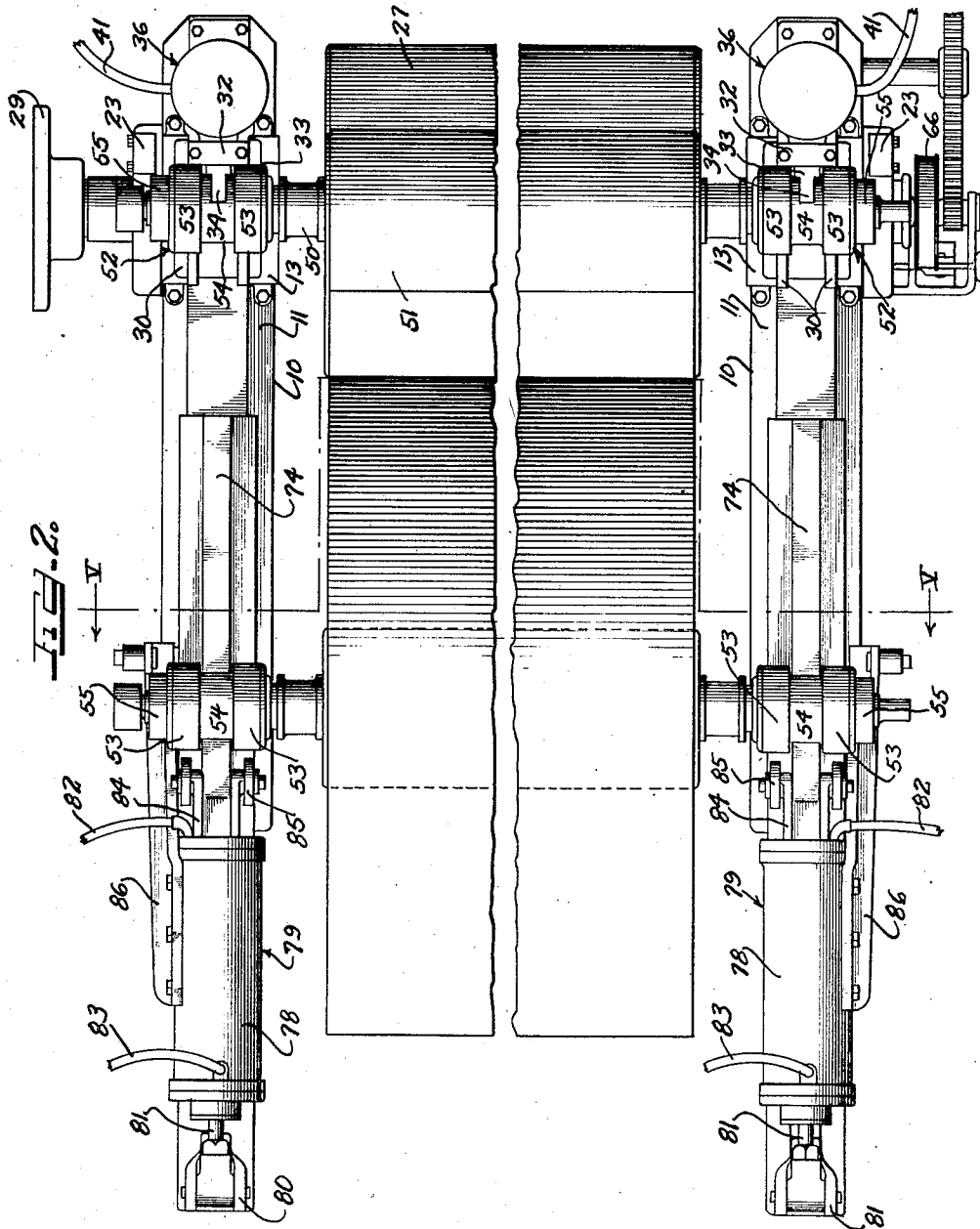
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2,176,198

PAPER WINDER

Filed Jan. 24, 1938

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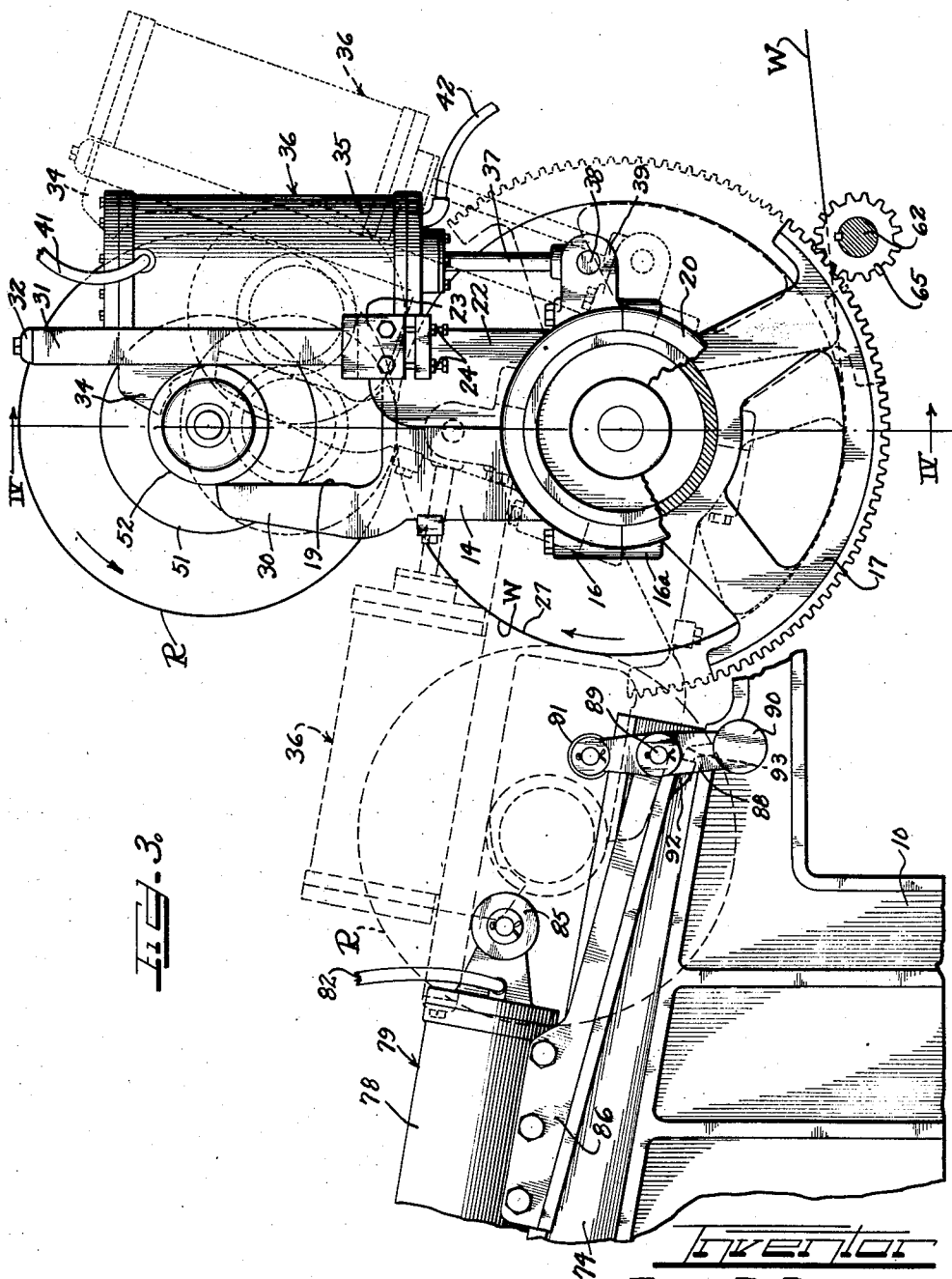
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2,176,198

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Filed Jan. 24, 1938

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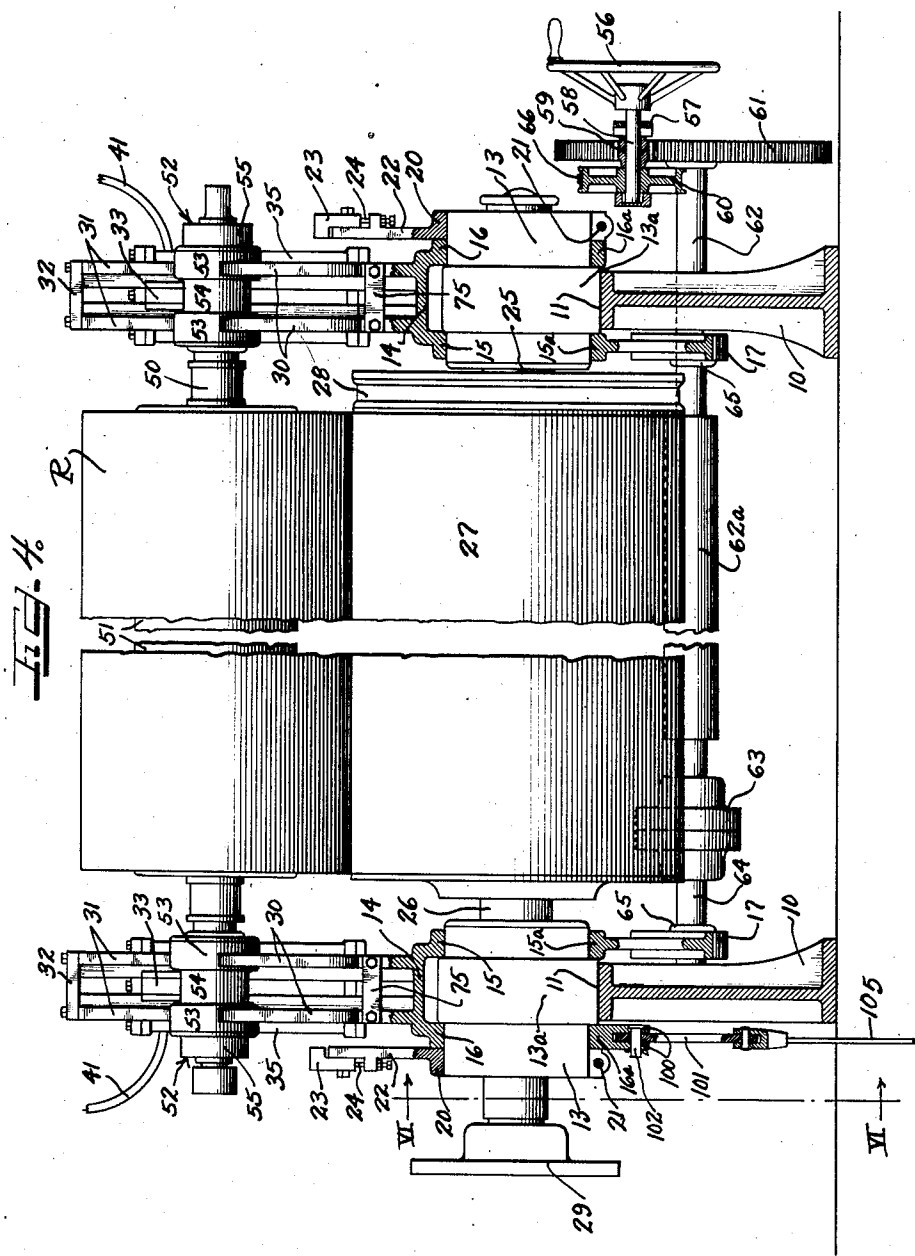
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2,176,198

PAPER WINDER

Filed Jan. 24, 1938

7 Sheets-Sheet 4



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2,176,198

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Filed Jan. 24, 1938

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Fig. 5.

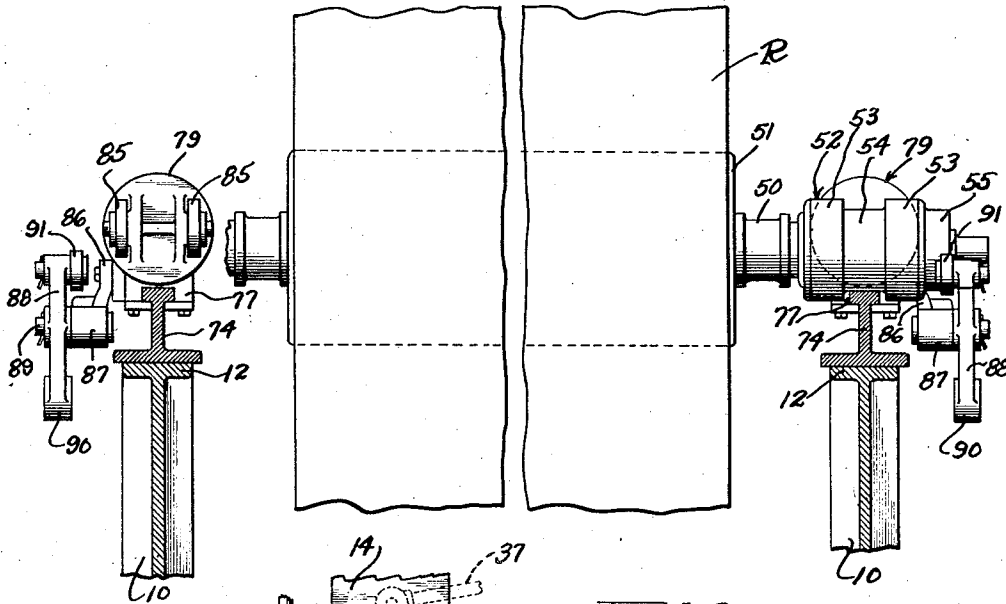
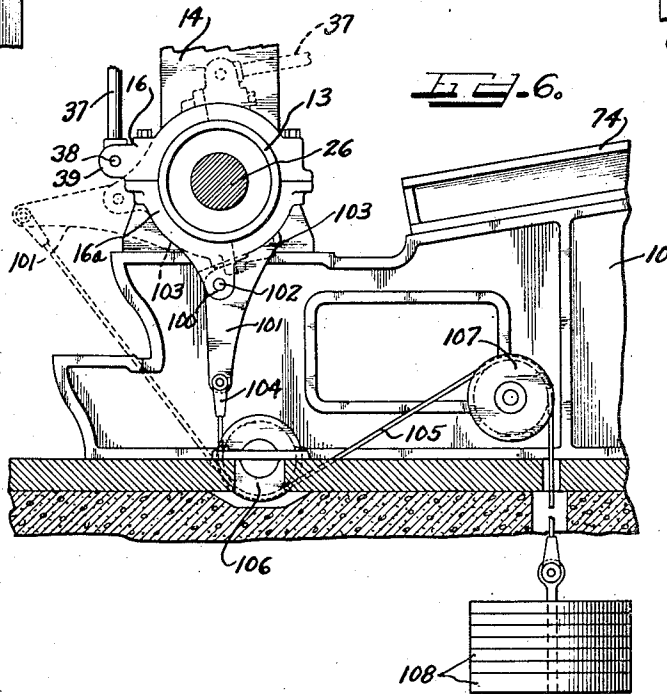


Fig. 6.



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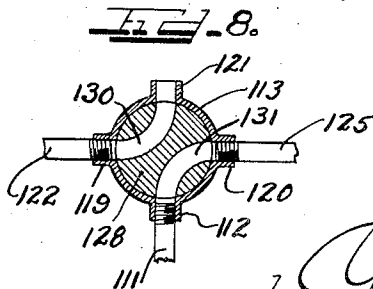
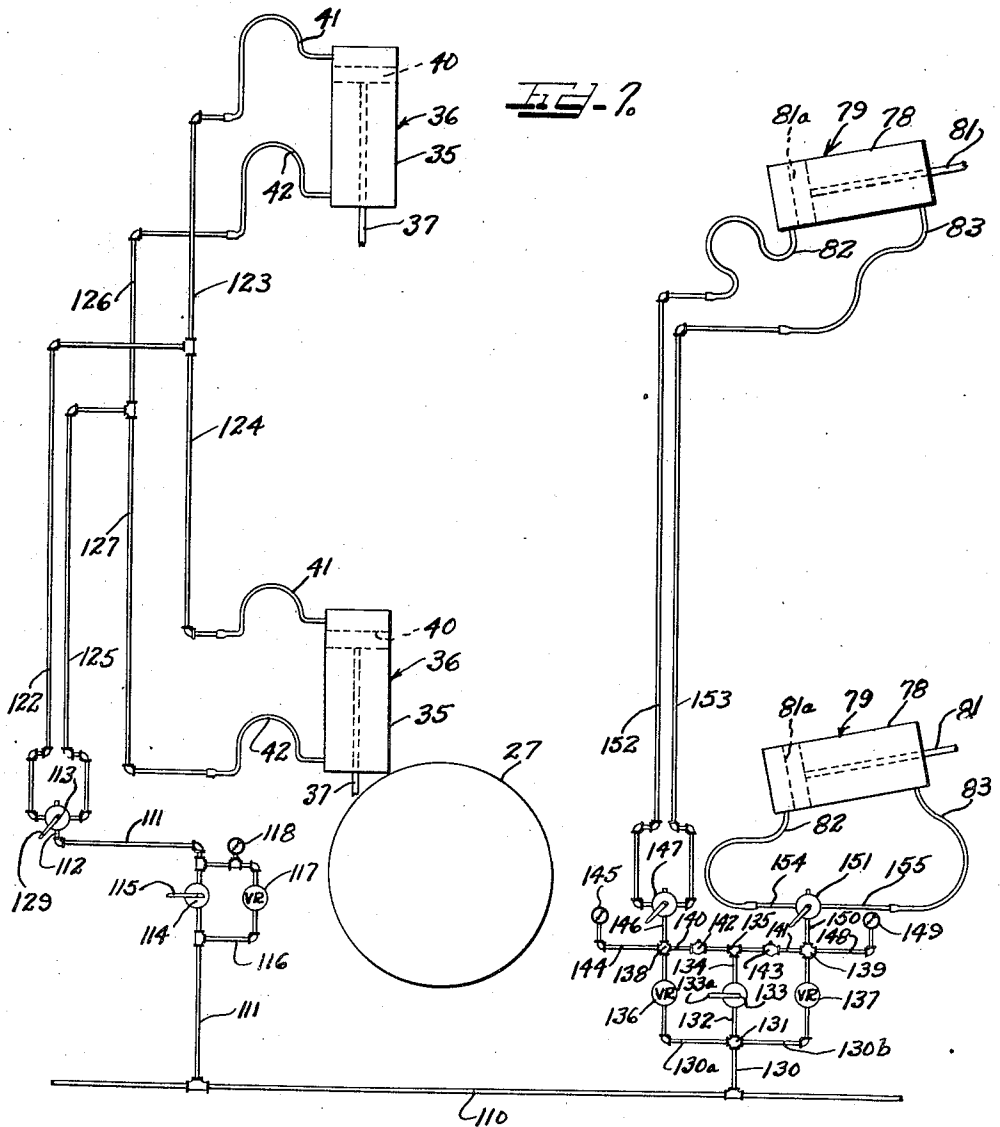
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2,176,198

PAPER WINDER

Filed Jan. 24, 1938

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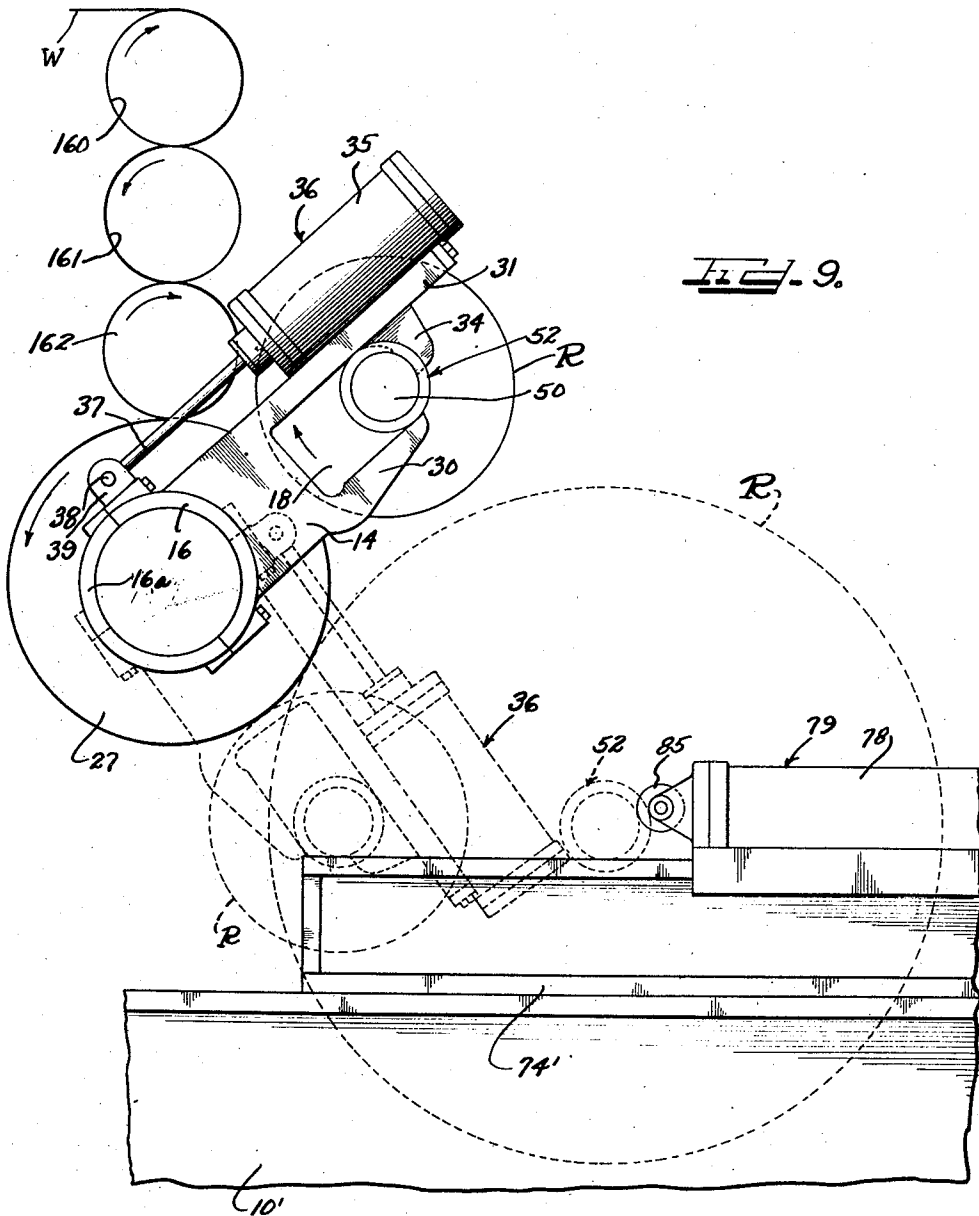
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2,176,198

PAPER WINDER

Filed Jan. 24, 1938

7 Sheets-Sheet 7



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UNITED STATES PATENT OFFICE

2,176,198

PAPER WINDER

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Application January 24, 1938, Serial No. 186,595

30 Claims. (Cl. 242—65)

This invention relates to apparatus for winding web or sheet material into a roll and more specifically relates to machines for winding paper into rolls.

It has been customary heretofore to wind paper onto a winder shaft revolved by surface contact through the paper with a driven under drum.

It has also been proposed to swing the winder shaft and roll being wound thereon circumferentially around the winder drum from a vertical position to an almost horizontal position. Such moving of the winder shaft and roll circumferentially around the winder drum relieves some of the weight from the drum so that, as the weight of the roll increases, the paper will not be wound too tight.

While these known machines provide for relieving of pressure between the winder drum and the roll, they do not provide for an increase of pressure between the roll and drum above that produced by the dead weight of the roll and shaft on the drum.

The machines of this invention now provide for the maintenance of a desired pressure greater, equal to, or less than that produced by the dead weight of the winder shaft and roll on the winder drum. According to this invention the winder shaft can be pneumatically or hydraulically forced against the winder drum or moved away from the drum to create any desired pressures and thus make possible the winding of a roll with any desired degree of hardness.

The machines of this invention also provide for individual control of pressures on opposite ends of the roll to compensate for variations in paper thickness and the like so that a uniformly hard roll can be obtained.

The machines of this invention further provide for the transfer of the roll being wound to inclined tracks without stopping the winding operation and without interfering with the pressure between the roll and the winding drum. This transfer permits the initial holding means to be moved back to starting position for receiving a new winder shaft therein. Then when the roll is completely wound this new winder shaft is put into operation without delay to receive the end of the paper cut from the wound roll.

It is then an object of this invention to provide apparatus for winding web material into rolls of any desired hardness.

A further object of this invention is to provide a paper winder having means to hold the winder shaft and roll being wound against a winder drum with any desired amount of pressure.

A further object of this invention is to provide a paper winder that can be set to maintain a fixed pressure between the roll being wound and the winder drum.

Another object of this invention is to provide a paper making machine having fluid pressure operated jacks controlling the hardness of the roll being wound on the machine.

Another object of this invention is to provide a paper winder with an individually operated pressure control for opposite ends of the roll being wound.

Another object of this invention is to provide a paper winder providing for the quick transfer of a paper web from one winder shaft to another winder shaft.

A further object of this invention is to provide a paper winder capable of winding paper on winder shafts while regulating the hardness of the roll being wound independently of the weight of the roll or winder shaft.

A further object of this invention is to provide a paper winder utilizing the bottom roll of a calender stack as a winder drum and having means holding the roll being wound against the bottom roll of the calender stack with any desired amount of pressure.

Other and further objects of this invention will become apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings.

On the drawings:

Figure 1 is a perspective view of a paper winder machine according to this invention.

Figure 2 is a broken top plan view of the machine.

Figure 3 is a fragmentary side elevational view of the machine with parts broken away and shown in cross section.

Figure 4 is a vertical cross-sectional view, with parts shown in elevation, taken along the line IV—IV of Figure 3.

Figure 5 is a fragmentary vertical cross-sectional view, with parts shown in elevation, taken along the line V—V of Figure 2.

Figure 6 is a view taken along the line VI—VI of Figure 4.

Figure 7 is a diagrammatic view showing the control mechanism for the fluid pressure jacks of the machine.

Figure 8 is a vertical cross-sectional view taken through one of the four-way valves shown in Figure 7.

Figure 9 is a side elevational view, with parts shown diagrammatically, of a modified embodiment

ment of the invention showing the manner in which the principles of this invention can be applied to a calender stack for directly winding, into a roll, paper discharged from the calender stack.

As shown on the drawings:

As shown in Figures 1 to 5 inclusive, the reference numerals 10 designate the main frame members for the machine. These frame members 10 are mounted vertically in spaced parallel relation.

Each frame member 10 has a horizontal top portion 11 at one end thereof and an inclined top portion 12 at the other end thereof and above the horizontal portion 11. The inclined portion 12 slopes toward the horizontal portion 11.

The horizontal portions 11 of the frames 10 have bolted thereon bearing housings 13. As best shown in Figure 4, these bearing housings 13 have a central portion 13a of greater diameter than the end portions thereof.

A supporting member 14 having strap portions 15 and 16 is mounted on each bearing housing 13 with the strap portions 15 and 16 thereof extending around the top half of the bearing housing. These strap members about the enlarged central portion 13a of the bearing housing and are thus held against axial movement.

Complementary strap members 15a and 16a are secured to the strap members 15 and 16 and extend around the other half of the bearing housings.

The strap members 15a carry a sector gear 17 formed integral therewith. The sector gears are below the bearing housings between the frame members.

Each member 14 provides open ended bearing yokes 18 and 19 for a purpose to be hereinafter more fully described.

The members 14 are thus pivotally mounted on the bearing housings 13 and the bearing yokes provided by these members can be swung around the bearing housings by operation of the sector gears as will be hereinafter described.

The outer ends of each bearing housing 13 have ring members 20 fixedly clamped thereon by means of clamping bolts such as 21. Each ring member 20 has an arm 22 extending vertically upward from the top of the ring members. Lugs 23 are bolted to the tops of the arms 22 and are adjustable vertically on said arms by means of adjusting bolts 24.

The bearing housings 13 contain bearings (not shown) for rotatably supporting the trunnions 25 and 26 of a winder drum 27 disposed between the frame members 10.

The winder drum 27 has a large diameter grooved wheel 28 secured to one end thereof for receiving a Sheahan carrier rope (not shown) therearound to guide or feed the web of paper to the winder drum. The Sheahan carrier is disclosed in the Sheahan U. S. Patent 1,504,727. A coupler 29 is secured to the end of the trunnion 26 at the back side of the machine for coupling the drum with a source of power (not shown) to rotate the same.

The winder drum 27 is thus rotatably mounted between the bearing housings 13 and extends transversely between the frames 10.

The bearing yokes 18 and 19 provided by each member 14 comprise short arms or fingers 30 on one side thereof and longer arms or fingers 31 on the other side. The longer fingers 31 of each member 14 are connected at the top by means of a cross bar 32 bolted to the fingers. The fingers 31 of

each member 14 provide tracks for a carriage 33 slidable between the fingers 31. The carriages 33 have bearing housing engaging portions 34 adapted to fit between the bearing yokes 18 and 19 for acting on the bearings mounted in said yokes as will be hereinafter described.

Each carriage 33 is secured to the fluid pressure cylinder 35 of a double acting hydraulic or pneumatic jack 36.

The jack cylinders 35 are thus slidably supported adjacent the track fingers 31.

Each jack 36 has a piston rod 37 extending through the bottom thereof and pivotally connected by means of a pin 38 to ears 39 formed on the straps 15 and 16 of the member 14 as best shown in Figure 3.

A piston 40 (Figure 7) is secured to the other end of the piston rod 37 in each cylinder 35.

As is customary in double-acting fluid pressure jacks, both ends of each cylinder 35 may be supplied with fluid under pressure through flexible tubes or hoses 41 and 42. Thus both sides of the piston 40 in the jacks 36 can be subjected to fluid pressure for sliding the cylinders 35 relative to the piston since the piston rods 37 are anchored.

Since the jacks 36 are slidably carried by the fingers 31 of the members 14 and since the piston rods of the jacks are pivotally anchored on the strap portions 15 and 16 of the member 14, the jacks are movable circumferentially around the bearing housings 13 with the members 14.

As best shown in Figures 1 to 4 a winder shaft 50 is mounted above the winder drum 27. The shaft 50 has a central hub or spool portion 51 of larger diameter than the shaft. The ends of the shaft receive bearing housings 52 in free rotatable relation to the shaft so that the same can freely revolve within the bearing housings on bearings contained in the housings.

Each bearing housing 52 has two large diameter annular portions 53 separated by a smaller diameter annular portion 54. The bearing housings also have annular collars 55 on the outer ends thereof.

In mounting a winder shaft 50 in the machine to receive a roll of paper on the spool portion 51 thereof, the members 14 are swung about the bearing housings 13 by rotation of a hand wheel 56 (Figures 1 and 4) to position the bearing yokes 18 and 19 in alignment with the lugs 23. The hydraulic jacks 36 are operated to move the carriages 33 and bearing engagement portions 34 thereof to the top of the fingers 31. The winder shaft 50 is then lowered by means of an overhead crane (not shown) so that the bearing housings 52 thereon are mounted in the bearing yokes 18 and 19. The large diameter annular portions 53 of the bearing housings are adapted to slide in the yokes 18 and 19 along the inner edges of the fingers 30 and 31. The collar portions 55 of the bearings 52 rest on the lugs 23 and the position of these lugs is adjusted to hold the spool 51 in spaced relation above the winder drum 27.

As best shown in Figure 1, a bracket 57 is secured to the front frame member 10 and extends outwardly therefrom. The bracket 57 rotatably supports a shaft 58. The hand wheel 56 is secured to the end of the shaft 58.

As best shown in Figure 4, the shaft 58 also carries in fixed relation thereon a small gear 59 and a brake drum 60. The gear 59 meshes with a large gear 61 secured on the end of a shaft 62 projecting through the front frame member 10.

As best shown in Figure 4, the shaft 62 extends through the front frame 10 under the winder

drum 27 and has a large diameter hollow portion 62a to obtain high torsional strength for the least amount of weight of the shaft. For assembly purposes, the end of the shaft 62 is joined through a coupler 63 with a short shaft 64 rotatably mounted in the rear frame member 16. The shafts 62 and 64 have small gears 65 keyed thereon meshing with the sector gears 17 as shown in Figures 3 and 4. It is thus obvious that a rotation of the hand wheel 56 will swing the members 14 around the bearing housings 13.

As shown in Figures 1, 2 and 4, the brake drum 60 on the shaft 58 has a brake band 66 wrapped therearound and secured to frame 10 at one end thereof. The other end of the brake band 66 is connected through a link 67 as shown in Figure 1 to a foot pedal 68 pivotally mounted on a bracket 69 secured to the floor in front of the front frame member 10. Obviously the bracket can be integral with the frame member 10 if desired.

The bracket 69 pivotally carries a threaded rod 70 extending through an eye 71 formed on the inner end of the pedal member 68. A coiled spring 72 is disposed around the rod 70 above the eye member 71 and is held under controlled compression by a nut 73 threaded on the end of the rod. The spring 72 thus urges the eye end 71 of the foot pedal downward to hold the brake band under tension and thus hold the brake drum 60 against rotation. However, when the foot pedal 68 is depressed the eye end 71 of the pedal is raised to release the brake band 66 and permit rotation of the brake drum 60. This brake arrangement is desirable to control manual operation of the hand wheel 56.

When it is desired to start that winder shaft 50 rotating to receive paper therearound the foot pedal 68 is depressed and the hand wheel 56 is rotated to swing the bearing yokes 18 and 19 for carrying the bearing housings 52 off of the lugs 23. The spool 51 is then in contact with the winder drum 27. The portions 34 of the carriages 33 engage the small diameter annular portions 54 of the bearing housings 52 to hold the shaft 50 against lateral movement. The spool portion 51 of the winder shaft 50 can be urged against the winder drum 27 with any desired amount of force by operation of the jacks 36 to move the carriages 33 toward the drum. The winder drum is then rotated and the end of a web of paper threaded between the spool 51 and the winder drum and started around the spool. From then on the spool 51 is rotated by surface contact through the paper with the winder drum.

A roll of paper R (Figures 3 and 4) is thus built up on the spool 51 and this roll R can be wound to any desired hardness by manipulation of the jacks 36 to apply the desired pressure between the winder drum 27 and the roll. As the roll R builds up on the winder shaft it may reach a weight exerting a greater amount of pressure on the winding drum than is desired. For this reason and for the purpose of mounting a new winder shaft in the machine, the roll is transferred from the bearing yokes 18 and 19 onto tracks or ways 74 mounted on top of the inclined portions 12 of the frames 10. As shown in Figure 1, the bearing yokes 18 and 19 receive the enlarged portions 53 of the bearing housings 52. A rotation of the hand wheel 56 to swing the members 14 toward the tracks 74 will move the winder shaft in the bearing yokes 18 and 19 about the periphery of the winder drum 27. The small diameter portions 54 of the bearing hous-

ings 52 are adapted to fit on the tracks 74 and the larger diameter portions 53 of the bearing housings provide flanges to hold the bearing housings on the tracks 74.

The members 14 have cross bars such as 75 bolted thereon adapted to contact stop members such as 76 shown in Figure 1 for aligning the portions 54 of the bearing housings 52 with the tracks 74. During this lowering operation the jacks 36 hold the roll R against the winder drum 27 with the desired amount of pressure. The lowering operation is illustrated in dotted lines in Figure 3.

As shown in Figures 1 and 5, the tracks 74 have carriages 77 slidably mounted thereon. The carriages 77 support the fluid pressure cylinders 78 of another pair of double-acting hydraulic or pneumatic jacks 79.

Brackets 80 are secured to the ends of the tracks 74 as shown in Figures 1 and 2 for anchoring the projecting ends of piston rods 81 extending from the jacks 79. As shown in Figure 7, the other ends of the piston rods 81 are secured to pistons 81a in the cylinders 78. Fluid under pressure is supplied to either end of the cylinders 78, so as to act on either side of the pistons 81a therein, through flexible tubes or hoses 82 and 83. The cylinders 78 of the jacks 79 can thus be moved toward or away from the winder drum 27 depending upon which end of the cylinder is subjected to fluid pressure.

The ends of the jacks 79 facing the winder drum 27 have brackets 84 secured thereon. Wheels 85 are rotatably mounted on the brackets 84 in spaced relation and are adapted to contact the portions 53 of the bearing housings 52 for a purpose to be hereinafter more fully described.

The carriages 77 for the hydraulic jacks 79 have arms 86 bolted thereon and extending toward the winder drum 27. As best shown in Figure 5, the arms 86 are provided with eye ends 87. Link members 88 are pivotally carried on the ends of the arms 86 by means of pins 89 extending through the mid-portions of the links and the eye ends 87 of the arms. The lower ends of the links are weighted as at 90 to hold the links in vertical position. The top ends of the links rotatably carry rollers 91 adapted to contact the collars 55 of the bearing housings 52 as will be more fully hereinafter described.

As shown in Figures 1 and 3, the eye ends 87 of the arms 86 have abutment members 92 on the under sides thereof cooperating with stop members 93 on the links 88 to prevent a tilting of the upper half of the links toward the winder drum 27. However the links are free to tilt in the other direction so that when the arms 86 are advanced under the bearing housings on the tracks 74 the rollers 91 of the links can pass under the collars 55 of the bearing housings. However when the arms 86 are moved away from the winder drum 27 the rollers 91 of the links 88 will contact the collars 55 of the bearing housings 52 to move the winder shaft and roll thereon away from the winder drum.

Thus when the bearing yokes 18 and 19 are aligned with the tracks 74 the jacks 79 can be operated to either engage the wheels 85 thereon with the portions 53 of the bearing housings for forcing the roll against the winder drum or the jacks can be operated in the reverse direction to pull the roll away from the winder drum or release the pressure between the roll and the winder drum by withdrawing the arms 86 so that

the rollers 91 on the links 88 pull against the collars 55 of the bearing housings.

It should be noted that the wheels 85 straddle the bearing housing engaging portions 34 of the carriages 33 so that the pressure between the roll and the winder drum is not released when switching from the jacks 36 to the jacks 79. The jacks 36 can then be released from the bearing housings on the winder shaft and when the roll builds up to move the bearing housings out of the bearing yokes 18 and 19, the members 14 can be rotated back to vertical position. A new winder shaft 50 is then mounted on the lugs 23 with its bearing housings 52 seated in the bearing yokes 18 and 19. In the meantime the first roll continues to build up while supported on the tracks 74 and any desired amount of pressure of the roll on the winder shaft can be maintained by operation of the jacks 79. If the roll, due to its own weight, and the incline of the tracks 74 exerts more pressure against the winder drum 27 than is desired, this pressure can be relieved by the reverse operation of the jacks 79 as will be more fully hereinafter described.

Since the roll mounted in the bearing yokes 18 and 19 may attain an appreciable weight and may be hard to handle during the lowering operation to the tracks 74 a counterbalancing device is provided to resist this downward movement of the roll and to make it possible, with the aid of the brake device previously described, to stop the roll at any desired position on the periphery of the winding drum between the top of the drum and the tracks 74. This counterbalancing device is illustrated in Figures 4 and 6 of the drawings.

As shown in Figures 4 and 6 the strap member 16a disposed around the bearing housing 13 on the rear side of the machine is provided with a pair of ears 100. A toggle member 101 is pivoted on said ears by means of a pin 102. The toggle member 101 has an offset portion 103 adapted to abut the strap member 16a.

The lower end of the toggle member 101 is pivotally coupled by means of a coupler 104 to one end of a cable 105 trained under a pulley 106 at the base of the machine and over a second pulley 107 spaced laterally and above the pulley 106. The other end of the cable is attached to counterweights 108.

When the members 14 are rotated to lower the bearing yokes 18 and 19 for carrying the winder shaft and roll thereon to the tracks 74 the counterweight 108 will be effective to resist this movement with a force proportional to the distance of the yokes from the vertical.

When the members 14 are rotated in the opposite direction to bring the empty bearing yokes 18 and 19 back above the winder drum the counterbalance will be effective to aid such movement only until the toggle reaches a vertical position. A further rotation of the members 14 to bring the yokes into alignment with the lugs 23 will cause the toggle member 101 to pivot about the pin 102 and the offset portion 103 will merely move away from the strap 16a.

The pairs of fluid pressure jacks 36 and 79 are operated through valves as shown in Figure 7. The jacks will be described as being actuated with compressed air although it should be understood that other fluid means under pressure, such as oil, can be used in place of air.

As shown in Figure 7, numeral 110 designates a main supply pipe for compressed air. A branch pipe 111 communicating with the pipe 110 supplies air to the air inlet 112 of a four-way valve

113 controlling the operation of the jacks 36. A spring pressed valve 114 is interposed in the pipe line 111 between the air inlet 112 and the main supply line 110. This valve 114 is normally closed but is adapted to be manually opened by manipulation of a handle 115 thereof.

A by-pass pipe line 116 is provided around the valve 114. This by-pass pipe line 116 contains a pressure reducing valve 117 and an indicating gauge 118. The pressure reducer 117 is adjustable to supply any desired pressure up to the full line pressure of the supply pipe 110 to the valve 113.

The valve 113, as best shown in Figure 8, has two pressure outlets 119 and 120 and a bleeder vent 121 open to the atmosphere. The pressure outlet 119 of the valve 113 receives a pipe line 122 communicating through branch pipes 123 and 124 with the flexible hoses 41 in communication with the top ends of the jacks 36.

The pressure outlet 120 receives a pipe line 125 communicating through branch pipes 126 and 127 with the flexible hoses 42 entering the lower ends of the jacks 36.

The valve 113 has a core or rotor 128 (Figure 8) adapted to be manually rotated by means of an external lever 129 (Figure 7). The core 128 of the valve 113 has two passageways 130 and 131 therethrough for communicating with the various inlet and outlet ports of the valve as shown in Figure 8.

When it is desired to lower the cylinders 35 of the jacks 36 the valve 113 is rotated to position the passageways therein as shown in Figure 8. In this position air from the pipe 111 enters the valve at 112, passes through the passageway 131, through the pipe line 125 and branch pipes 126 and 127, through the hoses 42 and into the bottoms of the cylinders 35. At the same time the portion of the cylinders above the pistons 40 are vented to the atmosphere through the hoses 41, branch pipes 123 and 124, pipe 122 and passageway 130 of the valve 113. This supplying of compressed air to the lower ends of the jacks forces the cylinders 35 downwardly since the pistons 40 are anchored through the piston rods 37 against movement. This downward movement of the cylinders brings the engaging portions 35 of the carriages 33 into contact with the bearing housings 52 for forcing the spool 51 against the winder drum 27.

When it is desired to raise the cylinders the valve 113 is manipulated to vent the lower ends of the cylinders with the atmosphere and to supply compressed air to the upper ends of the cylinders.

With the pressure reducing valve 117 set to supply the desired pressure to the valve 113, it is obvious that the jacks will maintain this uniform pressure against the winder shaft. The reducing valve 117 can be varied to increase or lessen the pressure as desired during the winding operation.

When it is desired to quickly move the jack cylinders 35 such as when disengaging the same from the bearing housings on the winder shaft after the bearing housings have been deposited on the tracks, the full pressure of the supply line 110 can be conveyed to the jacks without changing the setting of the reducing valve by merely opening the spring pressed valve 114. The valve is readily opened by manually depressing the handle 115 to overcome the spring pressure of the valve.

A second branch pipe 130 also communicates

with the main supply line 110. The pipe 130 has a four-way coupling 131 thereon which coupling receives by-pass pipe lines 130a and 130b as well as a pipe 132. The pipe 132 is connected to a normally-closed spring retained valve 133 that can be opened by manual manipulation of a handle 133a. The other side of the valve receives a pipe 134 connected to a T 135.

The by-pass pipe lines 130a and 130b have variable pressure reducing valves 136 and 137 respectively therein and are connected to four-way couplings 138 and 139 respectively. Pipe lines 140 and 141 respectively join the T 135 with the couplings 138 and 139. Check valves 142 and 143 are mounted in the pipe lines 140 and 141 respectively. These check valves open to permit air passage only from the pipe 134.

The coupling 138 receives a pipe line 144 having a pressure indicating gauge 145 thereon. The coupling 138 also receives a pipe 146 connected to a four-way valve 147.

The four-way coupling 139 receives a pipe line 148 having a pressure indicating gauge 149 at the end thereof. The coupling 139 also receives a pipe 150 connected to the inlet side of a four-way valve 151.

The valves 147 and 151 are similar to the valve 113 described in Figure 8 and include two pressure outlets and a bleeder vent.

One of the pressure outlets of the valve 147 receives a pipe line 152 connected through the flexible hose 82 to the lower end of the jack 79 at the rear side of the machine. This end of the jack faces the winder drum 27. The other pressure outlet of the valve receives a pipe line 153 connected through the hose 83 to the other end of said jack at the rear side of the machine.

The valve 151 receives a pipe 154 in one of the pressure outlets thereof. The pipe 154 is connected through the hose 82 to the lower end of the jack 79 on the front side of the machine. This end of the jack 79 faces the winder drum 27.

The other pressure outlet of the valve 151 receives a pipe 155 connected through the flexible hose 83 to the other end of said jack 79 on the front side of the machine.

In operation of the jacks 79 the pressure reducing valves 136 and 137 are set to maintain a desired amount of pressure supply to the valves 147 and 151 as indicated by the gauges 145 and 149. Air will thus flow from the supply line 110 through the by-pass lines 130a and 130b into the valves 147 and 151. Since the valve 133 is normally closed and since the check valves 142 and 143 do not permit passage from the by-pass lines to the valve 133, the valves 147 and 151 will receive air pressure in an amount determined by the setting of the reducing valves. The valves 147 and 151 can then be manipulated to supply this air pressure to either end of the jacks 79 for sliding the jack cylinders toward or away from the winder drum. Since each jack 79 has a separate control valve 147 or 151 the jacks can be separately operated and permit the forcing of one end of the roll on the tracks 74 against the winder drum to exert more pressure on the drum than the other end of the roll. This may be desirable to obtain a uniform hard roll of paper due to variations in the thickness of the paper being wound.

When it is desired to quickly slide the jack cylinders 78 in either direction, the valves 147 and 151 are set to supply air to the desired ends of the jacks and the spring retained valve 133 is opened to apply fully pressure of the supply line 110 through the valves 147 and 151 to the jacks.

This spring valve 133 thus permits a rapid operation of the jacks without disturbing the setting of the pressure reducing valves. Such rapid operation may be desirable to bring the wheels 85 of the jacks from spaced relation to the bearing housings 52 into operative contact with the bearing housings and also to bring the rollers 81 from spaced relation to the bearing housings into contact with the collars 55 of the housings.

In the modified form of the machine according to this invention shown in Figure 9 the winder drum 27 is the last roll of a stack of calender rolls 160, 161, 162. In Figure 9, parts identical with the parts of the machine described in Figures 1 to 8 have been marked with the same reference numerals.

In the machine shown in Figure 9, the side frame members such as 10' have horizontal tops for receiving the tracks such as 74' on which the hydraulic jacks 79 are slidably mounted. The tracks 74' are horizontal instead of being inclined and are positioned below the winder drum 27.

In operation of the machine shown in Figure 9, a paper web W passes around the calender rolls 160 to 162 as shown where it is subjected to pressure between the rolls. The web after leaving the roll 162 passes around the winder drum 27 and is wound into a roll R on a winder shaft 50 having the bearing housings 52 described in Figures 1 to 8 rotatably secured to the ends thereof. The roll R is held against the winder drum 27 by the hydraulic jacks such as 36 acting on the bearing housings 52 which are slidably mounted in the bearing yokes such as 18.

As the roll R builds up, the bearing yokes are swung downward by rotation of the members 14 as described in Figures 1 to 8 and the bearing housings 52 of the winder drum 50 are deposited on the horizontal tracks such as 74'. The hydraulic jacks such as 36 hold the roll against the winder drum during this lowering operation.

The jacks such as 79 are then brought into operative engagement with the bearing housings 52 in the same manner described in Figures 1 to 8 to hold the roll R against the winder drum.

The jacks 36 are then released from the bearing housings 52 and the bearing yokes such as 18 can be swung upward for receiving a new winder shaft therein. The roll R continues to build up while supported on the tracks such as 74' and when it reaches a desired size the new winder shaft is placed into contact with the winder drum 27 in the same manner described in Figures 1 to 8.

In this modification of the machine, therefore, the winder drum is utilized as the last roll of a calender stack and the paper is wound into a roll as it issues from the calender stack. The paper roll being wound can be held against the winder drum with any desired amount of pressure and this pressure can be maintained during the transferring of the roll from the bearing yokes to the horizontal tracks.

From the above descriptions it should be understood that the winder drums 27 of machines according to this invention receive paper webs W (Figures 3 and 9) therearound. The paper webs are then wound around winder shafts held in pressure relation to the winder drums by means of fluid pressure operated jacks. As the rolls are built up on the winder drums the same are lowered, while being held against the drums with any desired amount of pressure, and are deposited on tracks or ways. An additional set of

jacks is then brought into operation to hold the rolls deposited on the ways or tracks against the winder drums. These jacks do not interfere with the operation of the first used jacks and the maintenance of the desired pressure between the roll and the winder drums can be transferred from one set of jacks to the other set without releasing the pressure. This is accomplished by specially designed bearing housings on the ends of the winder shafts which have a small diameter portion engageable with the first sets of jacks and large diameter portions engageable with the second set of jacks. The second set of jacks straddle the bearing housing engaging portions of the first set of jacks.

When the rolls, on the tracks, build up to a size sufficient to move the bearing housings of the winder shaft out of the bearing yokes 18 and 19, these yokes can be rotated back to their initial positions above the winder drums for receiving a new winder shaft therein. This winder shaft is held in spaced relation from the winder drum on supporting lugs 23 until it is desired to place the new winder shaft into operation. At this moment the web being wound is cut as by means of an air slice, directed around the new winder shaft and the new winder shaft moved into contacting position with the winder drum by swinging the members 14 so as to move the bearing yokes 18 and 19 away from the supporting lugs 23.

Any desired amount of pressure can be maintained between the roll being wound and the winder drum during all operations of the machine. If it is desired to relieve the pressure between the roll being wound and the winder drum, the jacks 79 can be operated as described above to pull the roll on the tracks 74 away from the winder drum.

The swinging of the roll from its initial starting position on top of the winding drum to a position alongside of or below the winding drum can be readily effected by a single operator by manipulation of the hand wheel 56 and the foot pedal 68. The counterbalancing device described in Figure 6 prevents the roll from dropping too fast or getting away from the operator during the lowering operation. The brake arrangement described in Figures 1 and 4 permits the stopping of the roll at any point on the winder drum during the lowering operation.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. In a web winding machine, a winder drum, a winder shaft for receiving a web to be wound thereon into a roll by contact with the drum, and means swingable about the axis of the winder drum and operable on the ends of the winder shaft to maintain a desired pressure between the winder shaft and winder drum.

2. In a web winding machine, a winder drum, a winder shaft for receiving paper to be wound thereon into a roll by contact with the drum, and fluid pressure means swingable about the axis of the winder drum and operable on the ends of the winder shaft to maintain a desired pressure between the roll being wound and the winder drum.

3. In a paper winding machine including a

winder drum, a winder shaft for receiving paper to be wound thereon into a roll by contact with the drum, arms pivotally mounted about the axis of the winder drum and providing guides for the ends of said winder shaft and means to swing the arms for moving the shaft and roll of paper thereon around the surface of the winder drum, the improvement which comprises a pair of fluid pressure operated jacks movable with said arms and acting on the ends of the winder shaft to hold the roll being wound against the winder drum under a desired amount of pressure.

4. A paper winding machine comprising a revoluble winder drum, members having guiding arms pivotally mounted coaxially with said drum, a winder shaft for receiving paper to be wound thereon into a roll by contact with the winder drum, said winder shaft having its ends slidably cooperating with said guiding arms, means for urging the winder shaft against the drum, a pair of ways adjacent the winder drum, mechanism for swinging said guiding arm members and said means to move said winder shaft and roll of paper thereon over the surface of the winder drum for depositing the shaft on said ways, and additional means adapted to cooperate with the ends of said winder shaft after the same has been deposited on the ways to urge the shaft toward or away from the winder drum.

5. A paper winding machine comprising a revoluble winder drum, members having guiding arms pivotally mounted coaxially of said drum, a winder shaft for receiving paper to be wound into a roll by contact with the winder drum, said winder shaft having its ends slidably cooperating with said guiding arms, fluid pressure means for urging the winder shaft against the winder drum, a pair of ways extending laterally of the winder drum, mechanism for swinging said guiding arms and said fluid pressure means to move said winder shaft and roll of paper thereon over the surface of the winder drum to deposit the shaft on said ways, and additional fluid pressure means, adapted to cooperate with the ends of the winder shaft after the same have been deposited on the ways to urge the shaft toward or away from the winder drum.

6. A paper winding machine comprising a frame structure, bearing housings mounted on said frame structure, a winder drum rotatably mounted at its ends in said bearing housings, members rotatably mounted around said bearing housings, said members having arms defining open ended bearing yokes, the arms on one side of the yokes forming tracks, a winder shaft having bearing housings rotatably mounted on its ends, said bearing housings of the winder shaft adapted to slide into and out of said bearing yokes, carriage members slidably mounted on the tracks provided by said arms, said carriages having portions adapted to engage the bearing housings on the ends of the winder shaft, fluid pressure operated jacks carried by said carriages to hold the winder shaft against the winder drum, and mechanism for rotating the rotatable members on the first-mentioned bearing housings to move the bearing yokes and fluid pressure means for carrying the winder shaft over the surface of the winder drum while holding the shaft against the drum.

7. In a paper winder, a rotatable winder drum, guiding arms defining open ended bearing yokes pivoted about the axis of the winder drum at the ends of the drum, a winder shaft having mem-

bers freely rotatable around the ends thereof adapted to be mounted in said bearing yokes, stationary supports adapted to engage said members for holding the winder shaft in spaced relation from the drum, and mechanism to swing the guiding arms for moving the members in the bearing yokes off of the supports for bringing the winder shaft into operative engagement with the drum.

8. In a paper winder, a rotatable winder drum, a winder shaft for receiving paper to be wound thereon into a roll by contact with the drum, mechanism for swinging the winder shaft and roll of paper thereon around the surface of the drum, and fluid pressure means movable with said mechanism for holding the shaft and roll thereon against the drum.

9. In a paper winder, a winder drum, guiding arms at the ends of the drum pivoted coaxially with said drum, said arms defining open ended yokes, a winder shaft having freely rotatable members at the ends thereof seatable in said yokes, a pair of pneumatic jacks each operable to engage one of said members for holding the winder shaft against the drum, a pair of ways extending laterally from said drum, mechanism for moving the guiding arms and jacks toward the ways to deposit the members thereon, and a second pair of pneumatic jacks mounted on said ways each engageable with one of the members to move the winder shaft toward and away from the drum.

10. In a paper winder, a winder drum, members at the ends of the drum pivoted coaxially with said drum, each of said members defining a pair of spaced bearing yokes on each end of the drum, a winder shaft having bearing housings rotatably mounted on the ends thereof, each of said bearing housings having spaced annular portions separated by an annular portion of smaller diameter, said spaced annular portions adapted to slide in said yokes, a pair of tracks extending laterally from the winder drum adapted to receive the small diameter portions of the bearing housings thereon, and mechanism for swinging the members to bring the yokes into alignment with the tracks for transfer of the bearing housings and winder shaft from the yokes to the tracks.

11. In a paper winder, a winder drum, members at the ends of the drum pivoted coaxially with said drum, each of said members defining a pair of spaced bearing yokes on each end of the drum, a winder shaft having bearing housings rotatably mounted on the ends thereof, each of said bearing housings having spaced annular portions separated by an annular portion of smaller diameter, said spaced annular portions adapted to slide in said yokes, a pair of fluid pressure jacks each having a finger adapted to engage the small diameter portions of a bearing housing in the yokes for holding the winder shaft against the drum, a pair of tracks extending laterally from the winder drum adapted to receive the small diameter portions of the bearing housings thereon, mechanism for swinging the members to bring the yokes into alignment with the tracks for transfer of the bearing housings and winder shaft from the yokes to the tracks, and a second pair of fluid pressure jacks mounted on said tracks each having means adapted to straddle the fingers of the first pair of jacks and engage the spaced annular portions of the bearing housings to hold the winder shaft against the drum whereby the first pair of jacks may be re-

leased from the bearing housings without releasing pressure applied to the winder shaft.

12. In a paper winder, a winder drum, a winder shaft for receiving paper to be wound thereon into a roll by contact with the drum, bearing housings rotatably mounted on the ends of the winder shaft having spaced annular rims separated by a smaller diameter annular portion, members pivotally mounted coaxially with said drum at the ends of the drum, each of said members having two pairs of arms in spaced relation, the arms of each pair defining a bearing yoke and adjacent arms of each pair providing a pair of spaced parallel tracks, a carriage slidable on each pair of tracks having a finger extending between the bearing yokes, a cylinder of a fluid pressure jack mounted on each carriage, said rims of the bearing housings being slidable on said arms to mount the winder shaft in the yokes, said fingers being engageable with the smaller diameter portions of the bearing housing, and fluid pressure connections with each of said jacks to slide the cylinders for controlling pressure between the winder shaft and drum.

13. In a paper winder, a winder drum, a pair of inclined ways extending laterally of said drum, a winder shaft, members rotatably mounted on the ends of the winder shaft adapted to roll on the ways, carriages slidable on the ways, cylinders of hydraulic jacks mounted on said carriages, said jacks each including a piston in the cylinder and a piston rod secured to the piston and extending out of the cylinder away from the winder drum, means anchoring the free ends of the piston rods, said cylinders having means engageable with one side of the shaft members to urge the shaft and roll thereon against the winder drum, and arms extending from the carriages having means thereon engageable with the other side of the shaft members to relieve pressure between the winder drum and roll.

14. In a paper winder, a winder drum, a pair of tracks adjacent the drum, a winder shaft, means rotatable on the ends of the shaft supported on said tracks, a cylinder of a fluid pressure jack slidable on each track, means on said cylinders engageable with one side of the rotatable shaft means, arms extending from said cylinders under the shaft means, links pivoted on the ends of said arms, rollers on the top ends of the links engageable with the shaft means, said links being adapted to pivot when the rollers are moved against the shaft means in a direction toward the cylinder to permit passage of the rollers beyond the shaft means, and abutment members holding the links against tilting when the rollers are moved away from the drum against the other side of the shaft means.

15. A paper winder comprising a winder drum, arms pivoted at the ends of the drum, said arms defining bearing yokes adapted to receive the ends of a winder shaft in slidable relation therein, tracks extending laterally from the winder drum adapted to receive the winder shaft from the yokes, fluid pressure means adapted to hold a winder shaft mounted in the yokes against the drum, additional fluid pressure means to urge a winder shaft on the tracks toward or away from the drum, and mechanism to swing the arms about their pivots for transferring a winder shaft from the yokes to the tracks.

16. A paper winder comprising a winder drum, guiding arms pivoted at the ends of the winder drum for holding a winder shaft on the drum, a pair of tracks extending laterally from the drum

adapted to receive a winder shaft and roll thereon from the arms, and mechanism for rotating the guiding arms to carry a winder shaft and roll thereon over the surface of the drum for deposit onto the tracks to continue the winding operation whereby the arms may be rotated back to starting position for receiving a new winder shaft without stopping the machine.

17. In a paper winder comprising a winder drum, bearing yokes at the ends of the drum for receiving the ends of a winder shaft therein, mechanism to swing the bearing yokes to carry the winder shaft radially around the drum, and a brake device to hold the yokes in a selected position relative to the drum.

18. In a paper winder comprising a winder drum, bearing yokes at the ends of the drum for receiving the ends of a winder shaft therein, mechanism to swing the bearing yokes to carry the winder shaft radially around the drum, and a counterbalance cooperating with said mechanism to resist the downward pull of the shaft and roll of paper thereon as the same are moved from the top of the drum.

19. A paper winder comprising front and rear vertical frame plates in spaced parallel relation providing horizontal supports and inclined ways sloping toward the supports, bearing housings mounted on the supports, a winder drum extending transversely between the frame plates and rotatably mounted at its ends in the bearing housings, members rotatably mounted around the bearing housings, said members defining yokes adapted to receive the ends of a winder shaft therein, arms fixedly secured on said bearing housing to hold the winder shaft in spaced relation from the winder drum, and mechanism to rotate said members for carrying the winder shaft in the yokes off of the arms into contact with the winder drum and circumferentially around the drum to deposit the shaft on the inclined ways.

20. In a paper winder, a winder drum, a winder shaft movable circumferentially around the drum, a fluid pressure jack acting against each end of the shaft to hold the shaft against the drum, said jacks being movable with said shaft, and means for supplying fluid under pressure to either end of said jacks.

21. In a paper winding machine, a winder drum, members having guiding arms pivotally mounted at the ends of the winder drum, a winder shaft having its ends slidably engaging said arms, sector gears carried by said members, a shaft extending transversely through the machine having gears thereon meshing with said sector gears, a large gear on the end of said transverse shaft on the front side of said machine, a stub shaft rotatably carried on the front side of said machine having a gear meshing with said large gear, a brake drum secured on said stub shaft, a hand wheel on the front end of said stub shaft, a brake band around said brake drum, and a foot pedal operable to release the band from frictional engagement with the drum, whereby operation of the foot pedal and hand wheel will swing the guiding arms to carry the winder shaft radially around the winder drum and release of the foot pedal will cause the brake band to hold the mechanism against further movement.

22. In a paper winder, a winder drum, members including guiding arms rotatably mounted at the ends of the drum coaxially with the drum, a toggle link pivoted to one of said members and

having an offset shoe portion engageable with the member, said link being in vertical position when the arms are vertically disposed above the winder drum, a cable secured to the bottom of the link, a pulley below the link receiving the cable therearound, a second pulley spaced above the first pulley receiving the cable thereover, and weights secured to the other end of the cable whereby the weights tend to hold the arms in vertical position but movement of the arms in one direction from the vertical will not be resisted by the weights.

23. In a paper winder, a winder drum, members including guiding arms rotatably mounted at the ends of the drum coaxially with the drum, a winder shaft having its ends slidably cooperating with said arms, mechanism for rotating said members to move the winder shaft circumferentially of the drum, a leg extending vertically downward from one of said members when the arms are in vertical position, and a counterweight secured to the end of the leg, whereby downward movement of the arms is resisted by an increasing force proportional to the distance of the arms from the vertical.

24. In a paper winder comprising a pair of spaced vertical frames, bearing housings secured on said frames, a winder drum between said frames having journals at its ends rotatably mounted in said bearing housings, members rotatably mounted around said bearing housings, said members having pairs of forked arms defining spaced yokes on each end of the drum to receive the ends of a winder shaft therein, two adjacent arms of each yoke also providing spaced tracks, carriages slidable on said tracks having a portion extending between the yokes on each end of the drum to cooperate with the winder shaft to hold the same in the yokes, cylinders of fluid pressure jacks mounted on said carriages, piston rods extending from said cylinders, and means pivoting the ends of the piston rods to said rotatably mounted members.

25. In combination with a calender stack, members rotatably mounted at the ends of the last roll of the stack coaxial with said roll, said members having guiding arms slidably cooperating with the ends of a winder shaft, and fluid pressure means movable with said members to hold a winder shaft and roll of paper thereon against the surface of said last roll.

26. In combination with a calender stack, members rotatably mounted at the ends of the last roll of the stack coaxial with said roll, said members having guiding arms slidably cooperating with the ends of a winder shaft, fluid pressure means movable with said members to hold a winder shaft and roll of paper thereon against the surface of said last roll, a pair of tracks below said roll adapted to receive the winder shaft and paper roll thereon from said arms, and additional fluid pressure means on said tracks for urging the paper roll on the tracks against said last roll of the calender stack.

27. In a paper winding machine, a winder drum, guides for a winder shaft, means for swinging said guides to move a winder shaft and roll of paper thereon circumferentially over the surface of the winder drum and means movable with the guides for maintaining a desired pressure between a roll of paper being wound and the winder drum.

28. In a paper winding machine, a winder drum, a winder shaft for receiving paper to be wound thereon into a roll by contact with the

winder drum, guides for said shaft, means for swinging said guides to move the winder shaft and roll of paper thereon circumferentially over the surface of the winder drum, means movable with the guides for maintaining a desired pressure between the roll of paper being wound and the winder drum, a pair of ways adjacent the winder adapted to receive the winder shaft and roll of paper thereon from the guides and additional means for urging the winder shaft and roll of paper thereon after its deposit onto said ways toward or away from the winder drum whereby the guides and first mentioned means can be swung back into position for receiving a new winder shaft without stopping the winding operation.

29. A web winding machine comprising a winder drum, primary guides for a winder shaft and roll of web material thereon, secondary guides for a winder shaft and roll of web material thereon, mechanism for swinging the primary guides to carry a winder shaft and roll of web material thereon over the surface of the drum for transfer to the secondary guides for continuing the winding operation whereby the primary guides may be swung back to starting

position for receiving a new winder shaft without stopping the machine, and means for maintaining a desired pressure between a roll being wound and the winder drum.

30. A paper winding machine comprising a winding drum, primary guides for a winder shaft and roll of paper thereon, secondary guides for a winder shaft and roll of paper thereon, said primary and said secondary guides permitting a roll of paper to increase in diameter as it is being wound by the winder drum, mechanism for swinging the primary guides to carry a winder shaft and roll thereon over the surface of the drum for transfer to the secondary guides for continuing the winding operation whereby the primary guides can be moved back to starting position for receiving a new winder shaft therein without stopping the winding operation, means movable with the primary guides for maintaining a desired pressure between a roll of paper being guided thereby and the winder drum, and additional means for maintaining a desired pressure between a roll of paper guided by the secondary guides and the winder drum.

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