

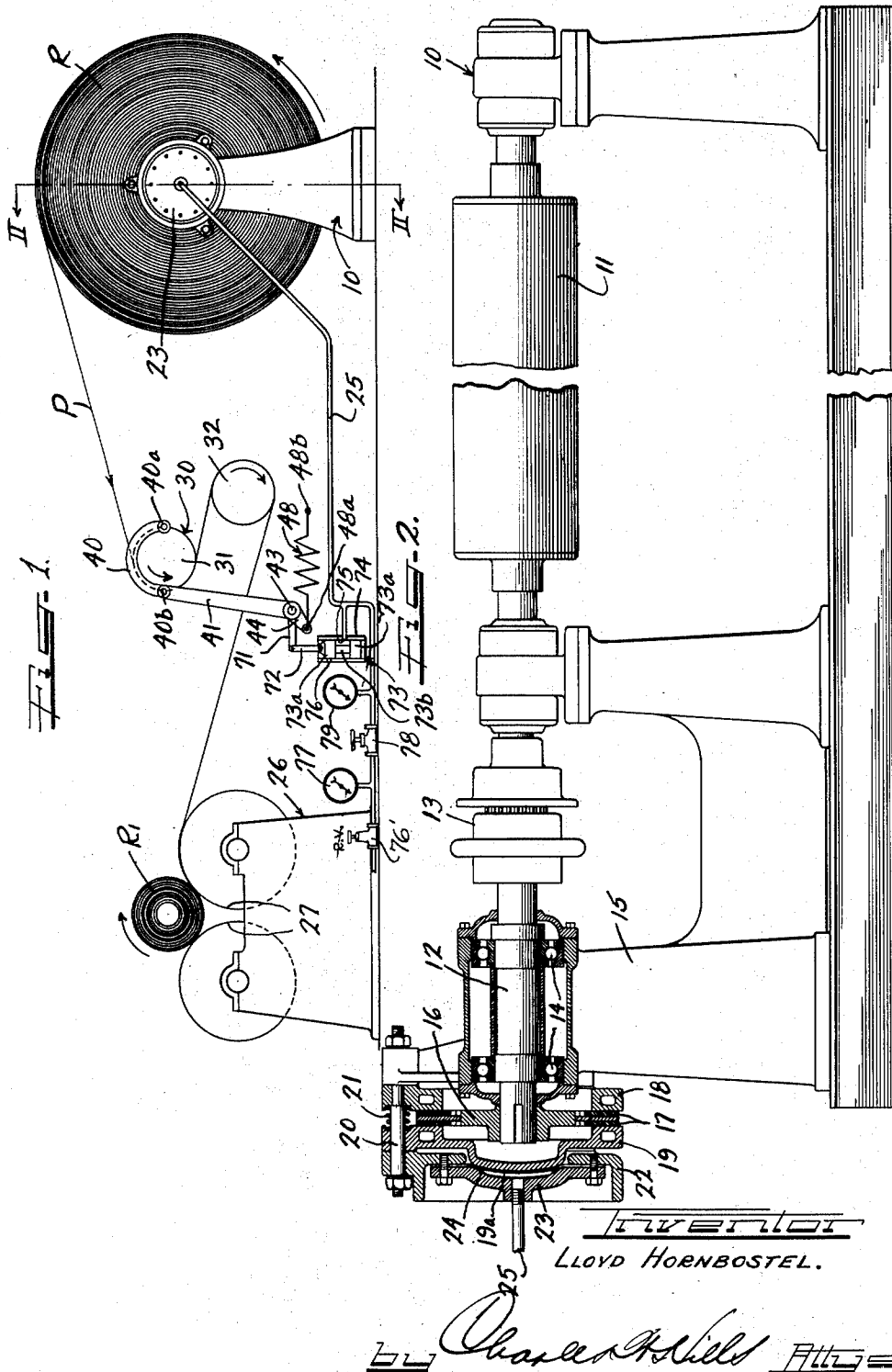
Oct. 10, 1950

L. HORNOSTEL
TENSION CONTROL DEVICE

2,525,600

Filed Jan. 29, 1944

5 Sheets-Sheet 1



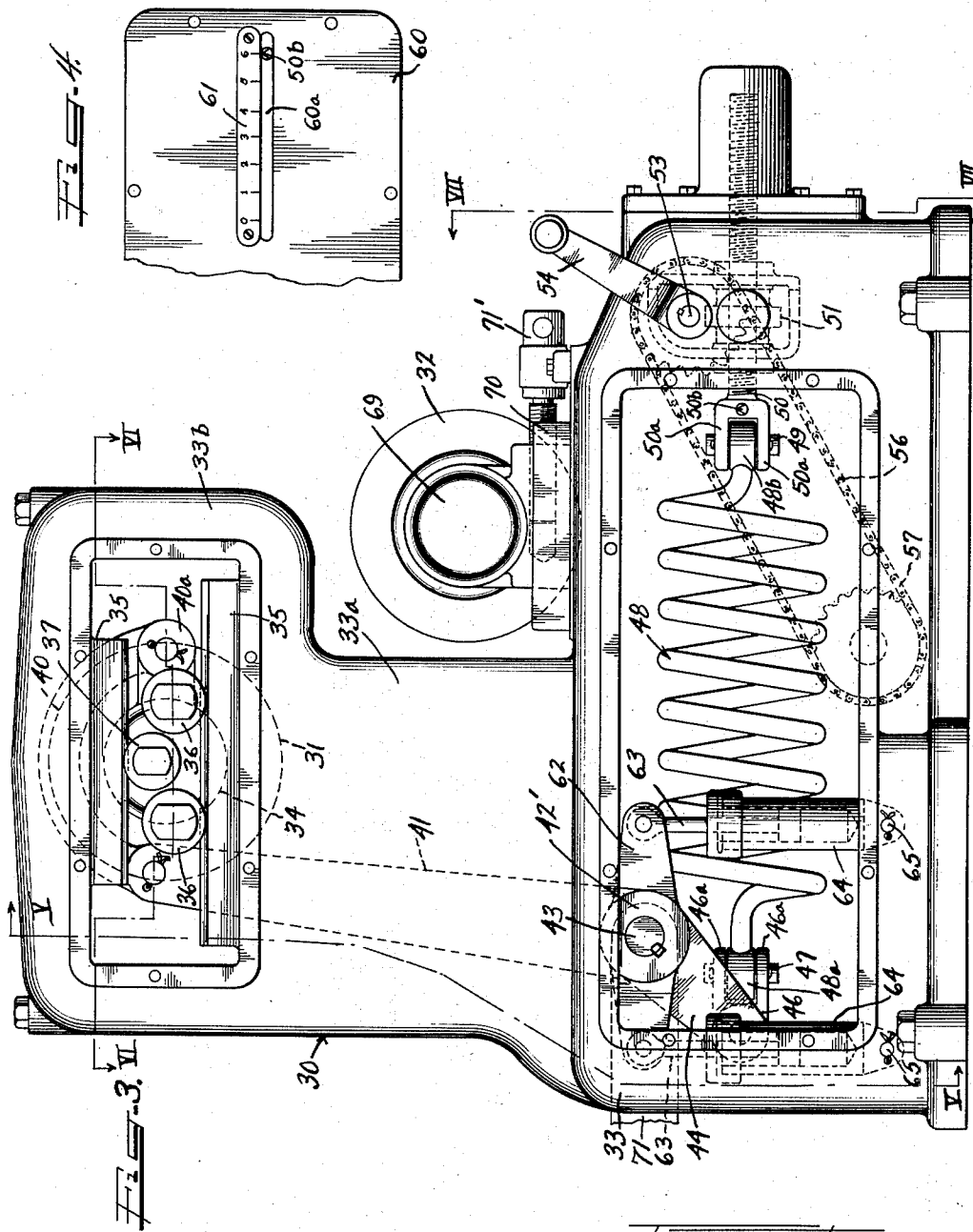
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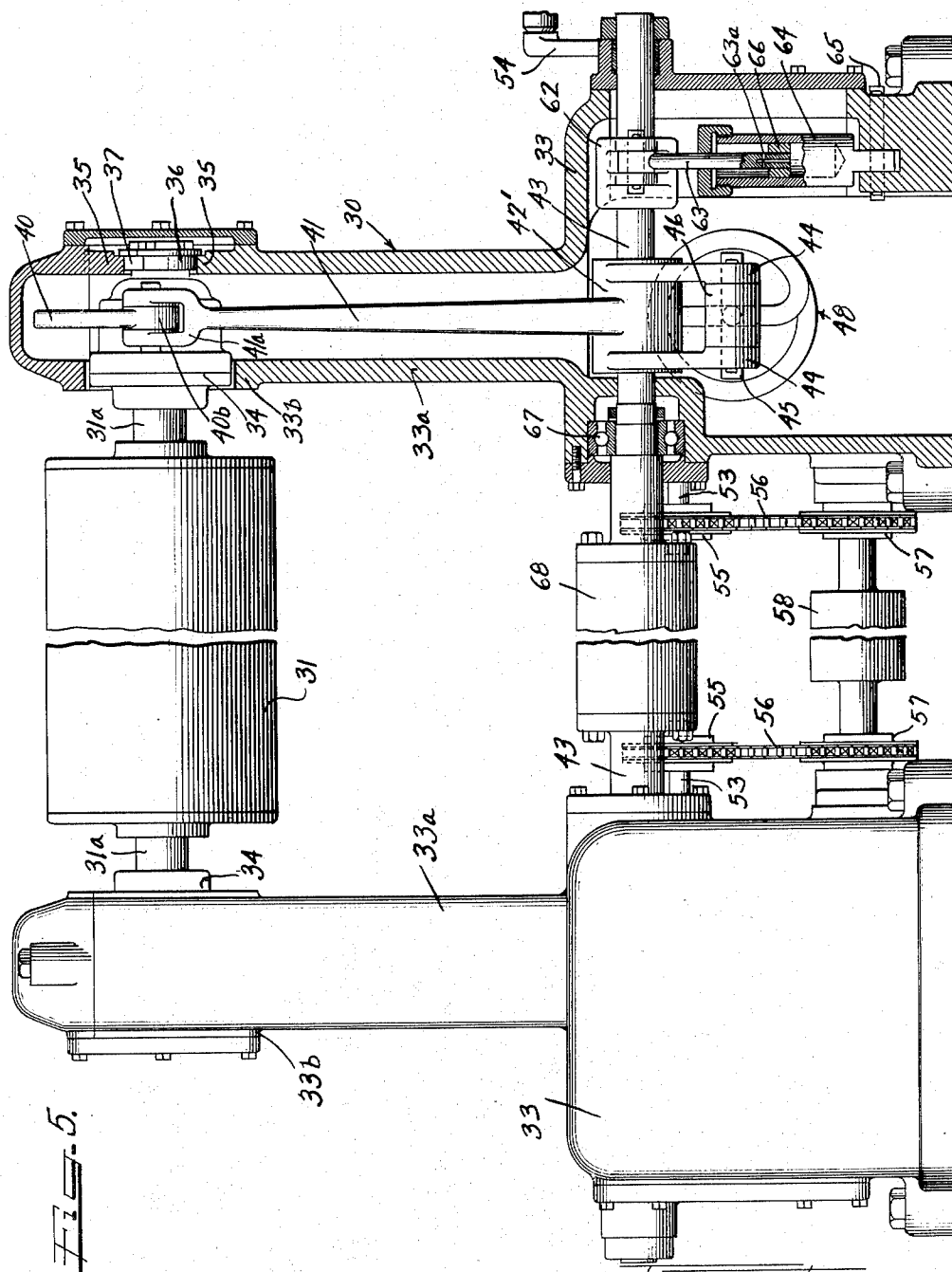
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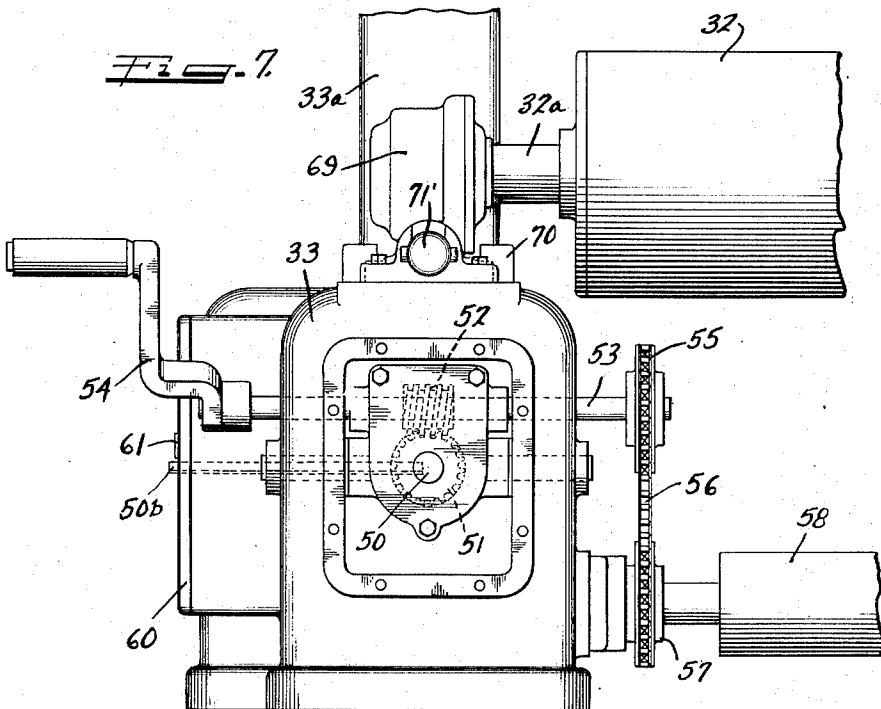
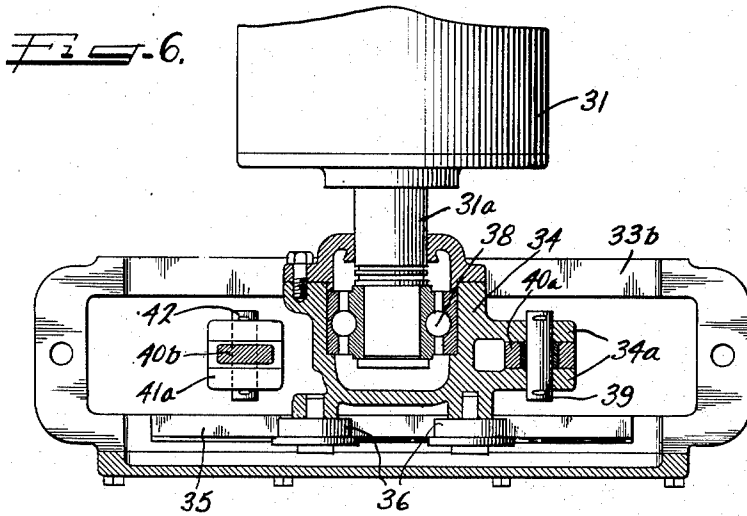
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Filed Jan. 29, 1944

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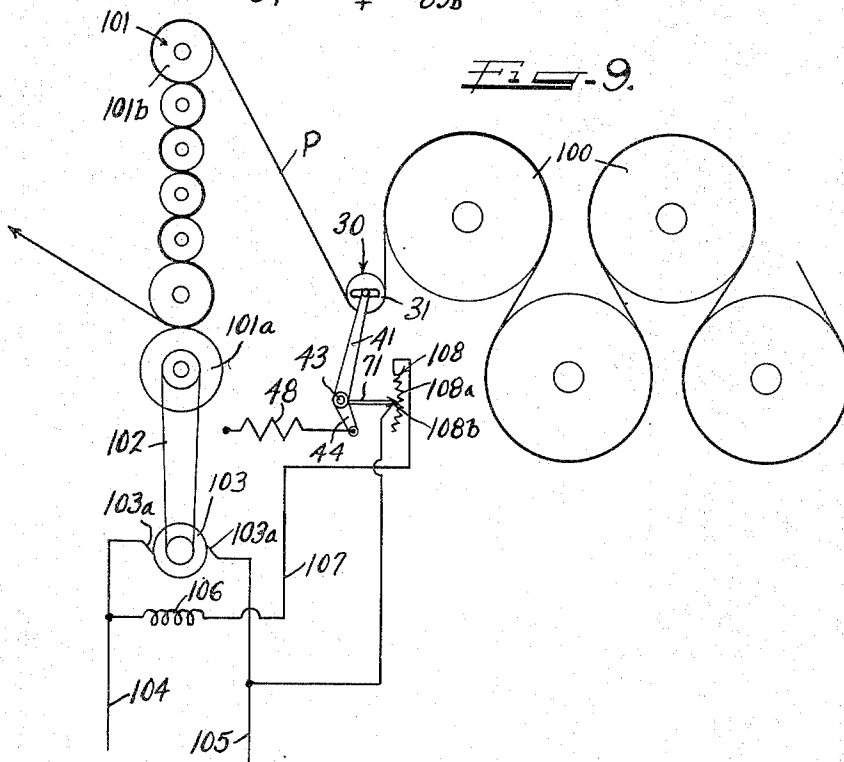
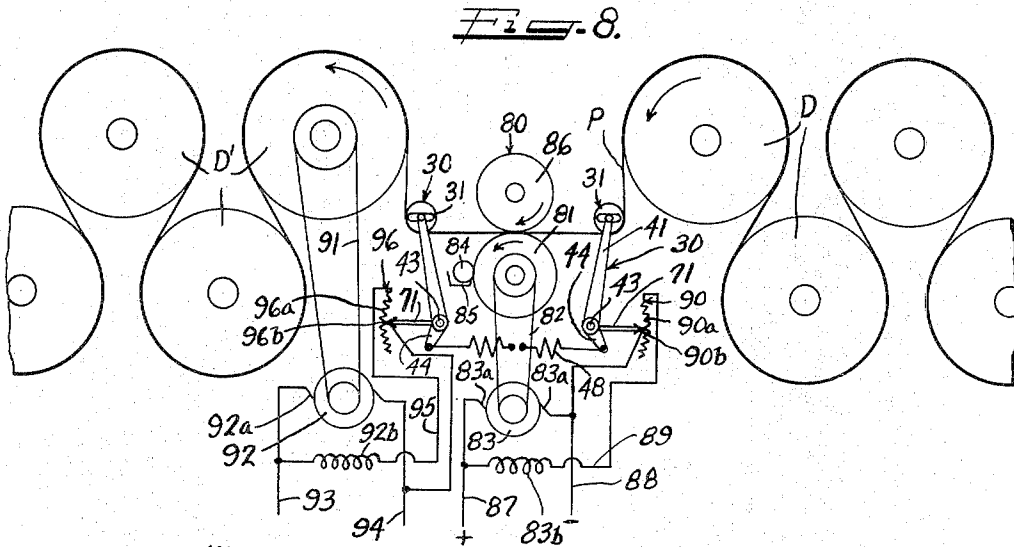
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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,525,600

TENSION CONTROL DEVICE

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Application January 29, 1944, Serial No. 520,190

11 Claims. (Cl. 242-75)

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This invention relates to devices for controlling the tension on material, and specifically relates to automatically operated devices for maintaining a desired substantially constant draw tension on paper or the like web material.

The invention will hereinafter be specifically described in connection with paper machinery, but it should be understood that it is not limited to such use, being generally useful in many types of machinery where tension control is desirable.

According to the invention, a web of paper is trained in such a manner around a shiftably mounted spring-loaded roll as to shift the roll in response to changes in tension on the web. This shiftable roll is called a dance roll because its position fluctuates or dances as tension loads thereon change. A mechanism actuated by the dance roll is provided to control the tension on the web, as by varying the brake load on the web, or by controlling relative speeds of machine parts driving the web.

Since movement of the spring loaded dance roll deflects the spring and would change the spring load on the roll, a feature of the invention is the application of spring load to the dance roll through a fulcrum lever arrangement which automatically compensates, through change in lever arm advantage, for the change in load so that, irrespective of its position, the dance roll is always subjected to the substantially same spring load. Thus, movement of the dance roll in a direction to increase the stretch of a coil spring loading it will not result in an increased spring load on the roll because a lever arm linkage transfers spring load to the roll and is arranged to decrease lever advantage in substantially direct proportion to increase in spring load.

Another feature of the invention is the mounting of the dance roll for horizontal movement only, so that roll weight factor is not involved in the movement of the roll.

The lever arm feature and the horizontal roll mounting feature of the invention provide a slack take-up roll assembly which keeps a desired substantially constant tension on a web as selected by the initial setting of spring tension. The selected spring tension can be readily varied without change in operating parts but, once selected, the substantially same spring load is applied to the roll irrespective of the position assumed by the roll in operation.

It is, then, an object of the invention to provide a slack take-up device which keeps a selected substantially constant tension on material such as a web.

A further object of the invention is to provide apparatus wherein fluctuations in tension of web material handled by the apparatus will change the setting of the apparatus to maintain

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substantially constant tension on the material.

A still further object of the invention is to provide a rewinder machine with a very sensitive dance roll assembly for controlling the braking effort applied to an unreeling stand supplying the rewinder.

Another object of the invention is to control the tension in a draw of paper passing between two parts of paper machinery by a spring-pressed shiftable unit which controls relative speeds of the portions of the paper machinery bridged by the draw of paper.

A still further object of the invention is to provide a very sensitive dance roll assembly for paper making machinery which controls electrical means for regulating the speed of the paper machinery.

A still further object of the invention is to provide an automatic brake control for paper machinery actuated by a shiftable dance roll.

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 only, illustrate one embodiment of the invention.

On the drawings:

Figure 1 is a side elevational, somewhat diagrammatic view, of a paper winder and unreeling stand arrangement equipped with a tension control device according to this invention.

Figure 2 is a transverse elevational view, with parts in vertical cross section, taken along the line II-II of Figure 1 and having the middle section thereof broken away.

Figure 3 is a side elevational view of a dance roll assembly according to this invention.

Figure 4 is a fragmentary elevational view of a cover plate for the assembly of Figure 3, illustrating spring tension indicating means.

Figure 5 is a vertical cross-sectional view, with parts in end elevation, taken along the line V-V of Figure 3.

Figure 6 is a horizontal cross-sectional view, with parts in plan, taken along the line VI-VI of Figure 3.

Figure 7 is a vertical cross-sectional view, with parts in end elevation, taken along the line VII-VII of Figure 3.

Figure 8 is a diagrammatic side elevational view of another embodiment of tension control device according to this invention.

Figure 9 is a diagrammatic side elevational view of a further modified form of the invention.

As shown on the drawings:

As shown in Figures 1 and 2, an unreeling stand 10 supplies paper to the tension control unit of this invention. The stand 10 rotatably carries a spool 11 having a supply roll R of paper

P wound thereon. The spool 11 is connected to a shaft 12 through a coupling 13 and this shaft 12 is rotatably mounted in bearings 14 carried by a support 15 in spaced lateral relation from the spool-carrying supports of the reel as best shown in Figure 2. A clutch plate or disk 16 is keyed on the end of the shaft 12 and carries, on the opposed faces thereof, annular flat rings of clutch material 17. A stationary clutch member 18 is fixedly carried by the support 15 for being acted on by one of the rings 17 while a second clutch member 19 is slidably mounted on bolts or studs 20 carried by the support 15 and urged away from the clutch member 18 by means of coiled springs such as 21. The studs 20 also carry a ring member 22 in overlying relation to the clutch member 19 and a cover member 23 is bolted on this ring member 22. A flexible diaphragm 24 is clamped around the periphery thereof between the ring 22 and the cover 23 and acts against a dome portion 19a of the clutch member 19 which projects into the ring 22.

A pipe 25 is threaded into the center of the cover 23 to supply clutch-actuating fluid. Thus, when air or the like is forced through the tube or pipe 25 it acts against the flexible diaphragm 24 to urge the clutch member 19 against the pressure of the springs such as 21 for pressing the clutch material 17 between the members 18 and 19 and thereby imparting frictional resistance to rotation of the shaft 12 and spool 11. Thus the supply of air or other operating fluid to act on the diaphragm 24 will exert braking torque on the reel spool 11, thereby imparting controlled resistance to unwinding of paper P from the roll R.

As shown in Figure 1, a receiving device such as a rewinder 26 including a pair of winder drums 27 rotatably supporting and driving a roll R₁ in the nip therebetween receives paper P from the roll R on the unreeling stand 10. A draw of paper is provided between the reel 10 and the rewinder 26.

In order to form a uniform hard roll R₁, the tension in the draw of paper between the reel and the rewinder must be held constant. This control is effected, according to this invention, by regulation of braking effect on the reel spool 11 through control of air flow to the brake on the reel by means of a very sensitive dance roll assembly 30. The braking effort on the spool must decrease as the roll R thereon being unwound decreases in diameter, since the effective radius or torque arm between the brake and the paper leaving the roll decreases.

The dance roll assembly 30 is positioned between the reel 10 and the rewinder 26 and includes a dance roll 31 and a guide roll 32 receiving the paper therearound as it passes from the roll R to the roll R₁.

As shown in Figures 3 and 5, the dance roll assembly 30 includes opposed end frame housings 33 each having an integral upwardly extending hollow post portion 33a carrying, at its upper end, an integral enlarged casing 33b. Each casing 33b has elongated openings in the faces thereof through which a bearing housing 34 projects. The bearing housing 34 is carried in the casing 33b on spaced opposed horizontal tracks 35. The housing 34 has a pair of flanged wheels 36 rotatably mounted thereon riding on the bottom track 35 and a third wheel 37 disposed between the wheels 36 riding on the top track 35. The three wheels mount the bearing housing 34

for horizontal movement and hold it against vertical movement.

As best shown in Figure 6, the bearing housing 34 carries anti-friction bearing elements 38 which rotatably support the axle 31a of the dance roll 31. As shown in Figure 5, the dance roll 31 has an axle 31a projecting from each end thereof into a bearing housing 34 mounted for horizontal movement in a casing 33b. The dance roll 31 is thus carried for rotation about its own axis and for horizontal shifting normal to its axis.

As best shown in Figure 6, each bearing housing 34 has a pair of projecting spaced opposed integral ears 34a carrying a pin 39. An arcuate link member 40 has an eye end 40a swivelly mounted on said pin 39.

The other end of the arcuate link 40 has an eye 40b disposed between the yoked end 41a of a rocker arm 41 and receives a pin 42 therethrough. Thus the link 40 is swivelly mounted between the bearing housing 34 and the arm 41. As shown in Figures 3 and 5, the arm 41 extends through the post portion 33a of the casing 33 and is integral with a sleeve 42' keyed on a rocker shaft 43 which is rotatably mounted in the casing 33.

The sleeve 42' has a pair of opposed dependent fulcrum arms 44 at an angle to the arm 41 receiving a pin 45 therethrough on which is swivelly mounted a sleeve 46 which has opposed yoke arms 46a carrying a pin 47 swivelly mounting and serving as an anchor for one end 48a of a helically coiled spring 48 disposed in the casing 33. The other end 48b of the spring receives a pin 49 therethrough carried by yoke arms 50a of a rod 50. This rod 50 is slidably supported in the casing 33 and is threaded through a worm wheel 51 having a meshed engagement with a worm 52 on a cross shaft 53 rotatably carried by the casing 33 as shown in Figure 7. Rotation of the shaft 53 will move the yoked end 50a of the rod toward and away from the yoked end 46a of the sleeve 46 thereby contracting and stretching the coil spring 48. Thus, the assembly including the rod 50, yoke arms 50a and pin 49 serve as an adjustable anchor for the other end of said helical spring 48.

As shown in Figures 3, 5 and 7, a shaft 53 has a crank 54 keyed on one end thereof at an outer face of the casing 33 and a sprocket gear 55 is keyed on the other end of the rod 53. This sprocket gear 55 receives a chain 56 therearound driving a sprocket 57 on a cross shaft 58.

A similar sprocket 57, chain 56, sprocket 55 and shaft 53 is provided at the other end of the dance roll assembly to adjust the coil spring within the other casing 33. Thus, rotation of the crank 54 will regulate the tension on a pair of coil springs each of which acts on fulcrum arms to rock shafts in the casings 33 and swing elongated arms 41 extending through the casing posts 33a for actuating the links 40 in the casings 33b to shift the dance roll 31. Of course, the dance roll 31, as explained above, is mounted for horizontal movement only and, since the arms 41 are swingably mounted about the shaft, the links 40 are provided so that the swinging motion of the arms 41 will be translated into horizontal motion on the bearings for the dance roll.

As illustrated in Figures 3, 4 and 7, the yoke portion 50a of rod 50 has a triangularly-shaped pin 59b projecting laterally therefrom through a slot 60a in a cover plate 60 for the side face

of the casing 33. A graduated scale 61 is provided on the cover plate 60 to indicate the degree of initial loading of the coil spring 48. This loading can be readily changed by rotation of the crank 54.

As shown in Figures 3 and 5, the shaft 43 has a horizontal lever 62 secured thereon. Rods 63 are swivelly mounted to the ends of the lever 62 and extend into tubular casings or housings 64 which are pivotally mounted on pins 65 carried by the casing 33. These rods 63 have pistons 66 secured on the ends thereof and slidable in the housing 64. Bleeder passageways 63a are provided through the rods 63 to connect opposite faces of the pistons together through a restricted orifice. The assemblies act as shock absorbers or dashpot dampeners for the shaft 43 to steady the shaft for even rocking and to eliminate bouncing of the roll 30.

As shown in Figure 5, the rock shaft 43 on each side of the assembly 30 extends through a bearing 67 carried by the inner side of the casing 33. The two rock shafts 43 are joined together by a tubular tie shaft 68. Thus the two arms 41, being keyed on their respective rock shafts 43, must tilt as a unit since the rock shafts 43 are tied together. This arrangement prevents cocking of the dance roll 31 in a horizontal plane while the tracks 35 and rollers 36 and 37 prevent cocking of the dance roll in a vertical plane.

As shown in Figures 3 and 7, the roll 32 has axles such as 32a projecting from the ends thereof which are rotatably mounted in bearing housings such as 69 carried on slide or way supports 70 provided on top of the casing 33. Adjusting screws such as 71' move the bearing housings 69 on the slide supports toward and away from the casing portions 33a so as to horizontally adjust the roll 32.

As shown in Figure 1, the paper P from the roll R on the unreeling stand 10 is trained around the dance roll 31, around the guide roll 32, and over a winder drum 27 of the re-winder 26 which drum feeds the paper to the roll R₁. This provides a double loop in the draw of paper between the rolls R and R₁ the size of which is controlled by the position of the dance roll 31. When the springs 48 are set by the hand crank 54 to exert a predetermined pull on the dance roll 31, the spring pull will be resisted by the tension in the draw of the paper between the rolls R and R₁ and, as the tension in this draw varies, the dance roll 31 will dance or move in a horizontal plane. Thus if the draw tension increases, the dance roll 31 is pulled toward the roll R by the paper P, tending to decrease the size of the loop in the draw. Conversely, if the draw tension decreases, the spring 48 pulls the roll 31 toward the roll R₁, thereby increasing the size of the loop in the draw. However, the position assumed by the roll in operation does not change the spring load on the roll since the fulcrum arms 44 automatically compensate for changes in tension on the spring. Thus, as the roll is moved to cause the spring to be further stretched, the effective torque arm between the roll fulcrum shaft 43 and the spring is decreased substantially in direct proportion to the increase in spring pull.

The dance roll is very sensitive to changes in draw tension, being movable through a wide range while effecting only very small movements in the spring 48.

The rock shaft 43 has an arm 71 projecting

therefrom connected through a link 72 with a dumbbell-type piston 73 having spaced opposed heads 73a connected by a connecting rod 73b and slidably mounted in a cylinder 74. This cylinder 74 has a port 75 connected with the pipeline 25 to the brake on the unreeling stand, and a second port 76 connecting the interior of the cylinder with the outside atmosphere. The dumbbell piston 73 slides in the cylinder 74 to seal the port 75 or to connect it with the port 76.

Compressed air is supplied through a pressure reducing valve R. V. 76' at a selected pressure, indicated by a gauge 77, through the pipeline 25 and through a needle regulating valve 78 which is effective to bleed the air at pressures indicated by a gauge 79 to the port 75 of the cylinder 74 and the dumbbell valve 73 either vents the compressed air to the port 76, or seals the port 75 so that the air pressure is applied to the diaphragm 24 of the brake for increasing resistance to rotation of the roll R. When the port 75 is sealed, the brake will be subjected to air pressure determined by the setting of the valve R. V. 76' and there will be no pressure drop across the needle valve. When the port 75 is vented to atmosphere the needle valve will choke off free feeding of the air from the valve R. V. 76' and a pressure drop across the needle valve will occur so that only small amounts of air are bled to the atmosphere thereby eliminating waste.

If the draw tension increases beyond the pull exerted by the spring 48 on the dance roll 31, the dance roll 31 will rock the shaft 43 in a clockwise direction thereby raising the arm 71 and piston 73 to vent air out of the port 76 and decrease the braking torque on the unreeling stand until the draw tension is just very slightly under the spring pull, whereupon the dance roll 31 will be pulled back by the spring 48 thereby rocking the shaft 43 in a counterclockwise direction and causing the piston 73 to seal the port 75.

From the above descriptions it will be clear that the dance roll 31 is subjected to a constant selected spring load and moves when the tension load thereon does not exactly balance this spring load to actuate a valve for controlling a brake on the unreeling stand to maintain a predetermined draw tension in the paper between the rolls R and R₁. The use of a bleeder or needle valve 78 in the air line to the brake prevents loss of appreciable amounts of air when the pipe line 25 is vented through the port 76 since the needle valve throttles air flow but maintains a desired pressure on the diaphragm 24 of the clutch when the port 75 is closed.

The principles of this invention can be applied to the control of draw tension through electrical means such as motors as illustrated in Figures 8 and 9.

As shown in Figure 8, a size press 80 is interposed in a drier section of a paper machine having drier drums D supplying the web of paper P to the press and drums D' receiving the sized paper from the press.

The size press 80 includes a coating roller 81 driven through a belt 82 from an electric motor 83 and receiving coating material as, for example, from a fountain roll 84 immersed in coating material in a vat 85. A top roll 86 cooperates with the coating roll 81 and the web of paper P passes between the rolls 81 and 86. The motor 83 has the armature thereof receiving current through brushes 83a from power lines 87 and 88 respectively and has the field 83b thereof connected at one end to the power line 87 and connected

through a wire 39 to the resistance 98a of a rheostat 98. The horizontally mounted dance roll 31 of a dance roll assembly 33 such as described in connection with Figures 1 to 7 receives thereunder the paper P passing from drier drums D to the size press 80. This dance roll is subjected to a constant spring pressure and is pulled by the spring 48 to create a loop in the draw of paper between the drum 81 and the size press. As tension in the draw of paper increases and decreases, the roll 31 will move horizontally to swing the arm 71 which, instead of being connected to a valve as in Figure 1, is connected to the arm 90b of the rheostat 90 and to the power line 98.

As tension in the draw between the last drum D of the drier drums and the size press 80 increases above the spring load on the roll, the size of the loop in the draw tends to decrease and the dance roll 31 is pulled toward the size press thereby rocking the arm 71 in a counterclockwise direction and subtracting resistance from the field 83b of the motor 83 thereby slowing the motor and thus decreasing the speed of the coating roll 81. As the speed of the coating roll decreases relative to the speed of the last drum D, the draw of paper between the drum D and the press 80 will have less tension therein. Thus the speed relationship between the last drum D and the press 80 is adjusted by the position of the dance roll so that the draw tension between these two parts of the paper machine can be kept substantially at a selected constant as determined by the substantially constant spring load on the dance roll 31.

The first drum D' of the receiving drums is driven through a belt 91 from an electric motor 92 having the armature thereof fed by brushes 92a from power lines 93 and 94 respectively and having the shunt field 92b thereof receiving current from the power line 93 and connected through a wire 95 with the resistance 96a of a second rheostat 96. A second dance roll assembly 30 is provided and has the dance roll 31 thereof acting on the draw of paper between the size press 80 and the first drum D' to form a loop in this draw. Now, as the tension in this draw increases, the dance roll 31 is forced toward the press 80 and the arm 71 is rocked in a clockwise direction to subtract resistance from the field 92b thereby slowing the motor 92 and decreasing the speed of the drums D'. This, of course, decreases tension in the draw of paper between the size press 80 and the first drum D' and permits the spring 48 to pull the dance roll 31 toward the drum D'.

As a result, the two dance roll assemblies 30, by controlling speeds of motors which feed paper, will accurately control the draw tension in the paper as it passes from one part of a paper machine to another part.

Figure 9 illustrates another embodiment of the invention similar to Figure 8, wherein drier or feeder drums 100 supply paper P to a calender stack or receiving device 101 having a lower roll 101a thereof driven through a belt 102 from an electric motor 103. The electric motor 103 has brushes 103a energizing the armature thereof from power lines 104 and 105 respectively and has a shunt field 106 receiving current from the power line 104 and connected through a wire 107 to resistance 108a of a rheostat 108. A dance roll assembly 30 has the horizontally mounted dance roll 31 thereof receiving the paper P thereunder as it passes from the last drier drum 100 to the top roll 101b of the calender stack. The

dance roll receives the paper thereunder and moves in a horizontal plane toward and away from the calender stack 101 to increase and decrease the length of the draw between the last drum 100 and the top calender roll 101b. The arm 71 on the rock shaft 43 of the dance roll assembly actuates the rheostat arm 108b of the rheostat 108 and this arm is connected to the power line 105.

As the tension in the draw of paper increases, the roll 31 is forced toward the calender stack 101 to stretch the spring 48 and rock the arm 71 in a counterclockwise direction for subtracting resistance from the field 106 of the motor thereby slowing down the speed of the motor. Decrease in speed of the motor, of course, slackens the pull on the paper P thereby decreasing the draw tension.

From the above it will be clear that the invention provides a sensitive dance roll or slack take-up assembly for actuating mechanism which controls tension in draws of moving material such as paper and the like. The roll assemblies of this invention are spring loaded under substantially constant selected loads irrespective of the positions assumed by the rolls in operation since the weight components of the rolls are held substantially constant by mounting the rolls for horizontal movement only and since the spring loads are applied to the rolls through fulcrum arms arranged to change in effective torque arm lengths in substantially direct ratios to spring deflections.

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

I claim as my invention:

1. A dance roll construction comprising a pair of spaced opposed hollow end frames, a rock shaft rotatably mounted in each end frame, a helically coiled spring in each end frame acting on the shaft therein to rock the shaft, adjustable anchor means in each end frame for said helically coiled spring, means connecting said adjustable anchor means in each frame for comovement whereby the springs will be simultaneously adjusted, bearing housings mounted for horizontal movement on said end frame, a dance roll rotatably carried by said bearing housings, and levers extending through said end frames connecting the rock shaft with said bearing housings for spring loading the horizontal movement of the dance roll.

2. In a tension control device, a hollow end frame, a rock shaft in said end frame, a helically coiled spring in said end frame, a lever in said end frame keyed on said shaft, means connecting one end of said spring with said lever, a screw rod in said end frame, a worm wheel receiving said screw rod in threaded relation therethrough, a worm in threaded engagement with said wheel, a shaft carrying said worm projecting to the outside of said frame, a crank on the projecting portion of said shaft, and means connecting said screw rod with the other end of said spring whereby rotation of the crank will adjust the spring tension on said rock shaft.

3. A dance roll assembly comprising a dance roll, bearings for the ends of said dance roll, vertically spaced horizontal tracks supporting said bearings for horizontal movement only, a rocker

shaft, rocker arms carried thereby, arcuate links pivotally connected to said bearings and to said rocker arms, and spring loaded means biasing said rocker shaft to spring load said dance roll.

4. A dance roll assembly comprising a dance roll, bearings for the ends of said dance roll, spaced upper and lower wheels carried by said bearings, vertically spaced horizontal tracks against which said wheels bear to confine the movement of said bearings to horizontal movement only, a rocker shaft, rocker arms fixedly carried thereby, arcuate links partially encircling said bearings with their ends pivotally connected to said bearings and to said rocker arms, and spring loaded means acting upon said rocker shaft and through said rocker arms, links and bearings to urge said dance roll in one direction along said tracks.

5. A dance roll assembly, comprising a pair of supporting end frames, a rock shaft rotatably mounted on each end frame, a separate spring for biasing each of said rock shafts, separate adjustable anchor means for said springs supported from said frames, means connecting said anchor means for co-movement whereby said springs will be simultaneously adjusted, bearing housings mounted for horizontal movement on said end frames, a dance roll rotatably carried by said bearing housings, and means connecting said rock shafts with said bearing housings for biasing said dance roll toward movement in one direction under the action of said springs.

6. In a tension control device, a rock shaft, a fulcrum lever fixedly secured to each end of said rock shaft, coiled springs connected at one of their ends to said levers, adjustable anchors connected to the other ends of said springs and provided with threaded portions, worm wheels receiving said threaded portions, worm shafts in mesh with said worm wheels, a crank on the extended end of one of said worm shafts, and means operatively connecting said worm shafts whereby rotation of said crank simultaneously effects a similar adjustment of both of said springs.

7. In a paper machine, a tension control apparatus adapted for maintaining a selected substantially constant tension on a draw of web material between machine parts one of which has a speed control device associated therewith, which comprises a movable dance roll adapted to act on said draw of web material traveling between said machine parts, bearings for the ends of said dance roll, a rocker shaft, rocker arms carried thereby, arcuate links partially encircling said bearings with their ends pivotally connected to said bearings and to said rocker arms, springs acting on said roll, fulcrumed levers acting through said rocker shaft and arms to transmit the spring loads to the roll, said levers being at an angle to said arms to maintain a substantially constant load on the roll irrespective of the position of the roll, means confining movement of the roll to a horizontal path and mechanism actuated by horizontal movements of the roll to regulate relative speeds of the machine parts to hold substantially constant the tension in said draw.

8. A dance roll assembly comprising a dance roll mounted for horizontal movement, bearing housings for said dance roll, lower and upper wheels between which said housings are mounted

for horizontal movement, vertically spaced horizontal tracks against which said wheels ride to limit the movement of said bearing housings to horizontal movement only, a rocker shaft, rocker arms carried by said shaft and link-connected to said housings, a rock lever mounted on said rocker shaft, and dampening means acting on the ends of the rock lever to eliminate bouncing of the roll.

9. A dance roll assembly comprising a dance roll, bearings for said dance roll, a rocker shaft, rocker arms mounted on said rocker shaft, means connecting said shaft and said arms with said bearings, a fulcrum arm depending from said rocker shaft at an angle to said rocker arm, a spring connected at one end to said fulcrum arm and tension regulating means acting on the other end.

10. A dance roll assembly comprising a dance roll, bearings for said dance roll, horizontally spaced upper and lower wheels between which said bearings are mounted, vertically spaced horizontal tracks against which said wheels bear to limit the movement of said bearing housing to horizontal movement only, a rocker shaft, rocker arms carried by said rocker shaft, arcuate links connecting said shaft and arms to said bearings, a rocker lever connected to said rock shaft, dashpots acting on the ends of said rocker lever, fulcrum arms depending from said rock shaft at an angle to said rock arms, springs connected at one end to said fulcrum arms, gear means attached to the other end of each spring for selectively adjusting the tension thereof, and means operatively connecting said gear means whereby adjustment of all of said springs is accomplished simultaneously.

11. In a tension control device having a rock shaft, a pair of rocker arms extending therefrom, fulcrum levers depending from said rock shaft at an angle to said rocker arms, springs connected at one end to said levers, adjustable anchor means connected to the other ends of said springs, shaft means connecting the anchor means for simultaneous adjustment of said springs, a rocker lever fixed on said rock shaft, and dashpots connected to the ends of said rocker lever for even tension control.

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