April 25, 1939. W. C. WIEKING 2,155,431

WEB ROLL CONTROL MECHANISM FOR PRINTING MACHINES

Filed Dec. 31, 1935 5 Sheets-Sheet 1

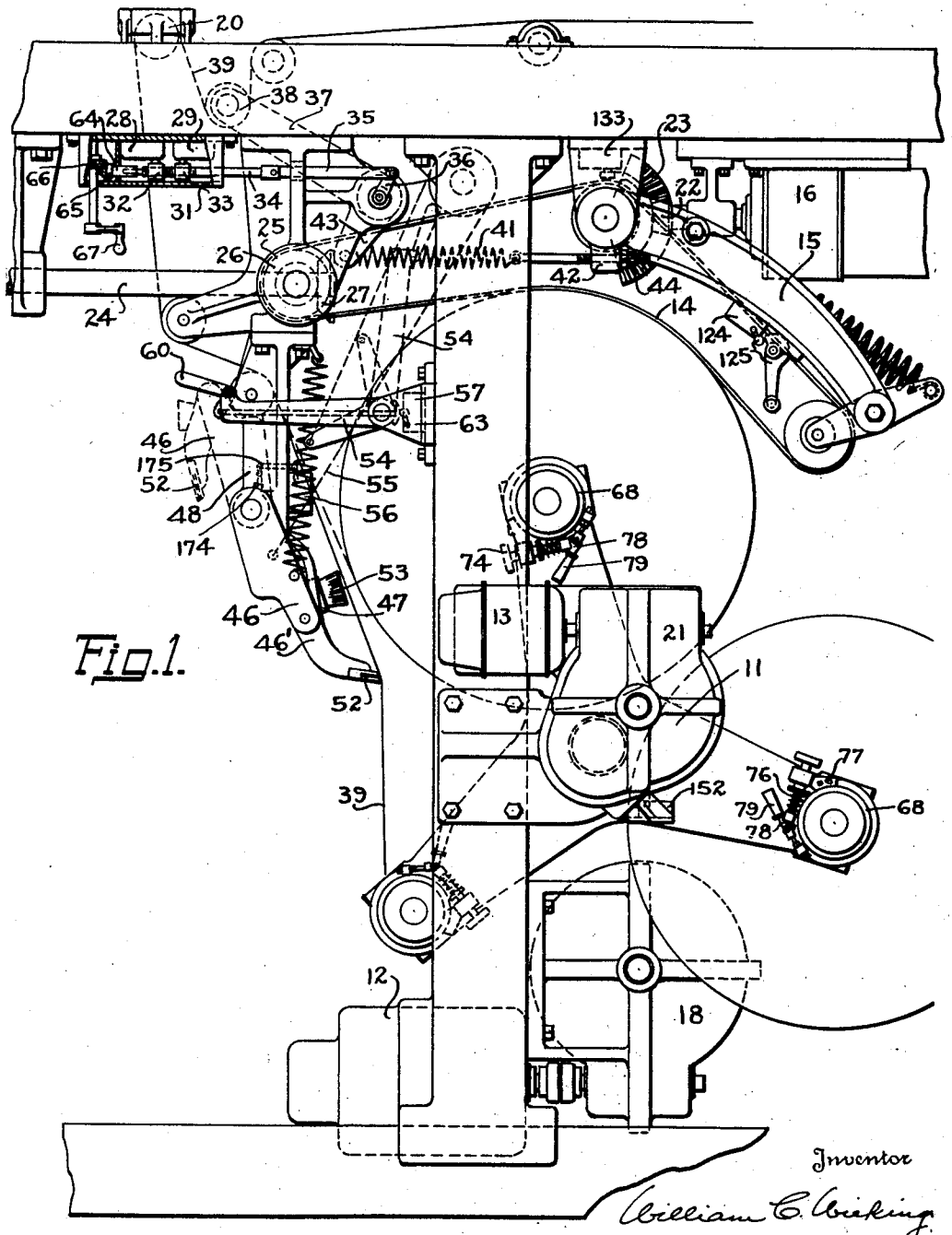


Fig. 1.

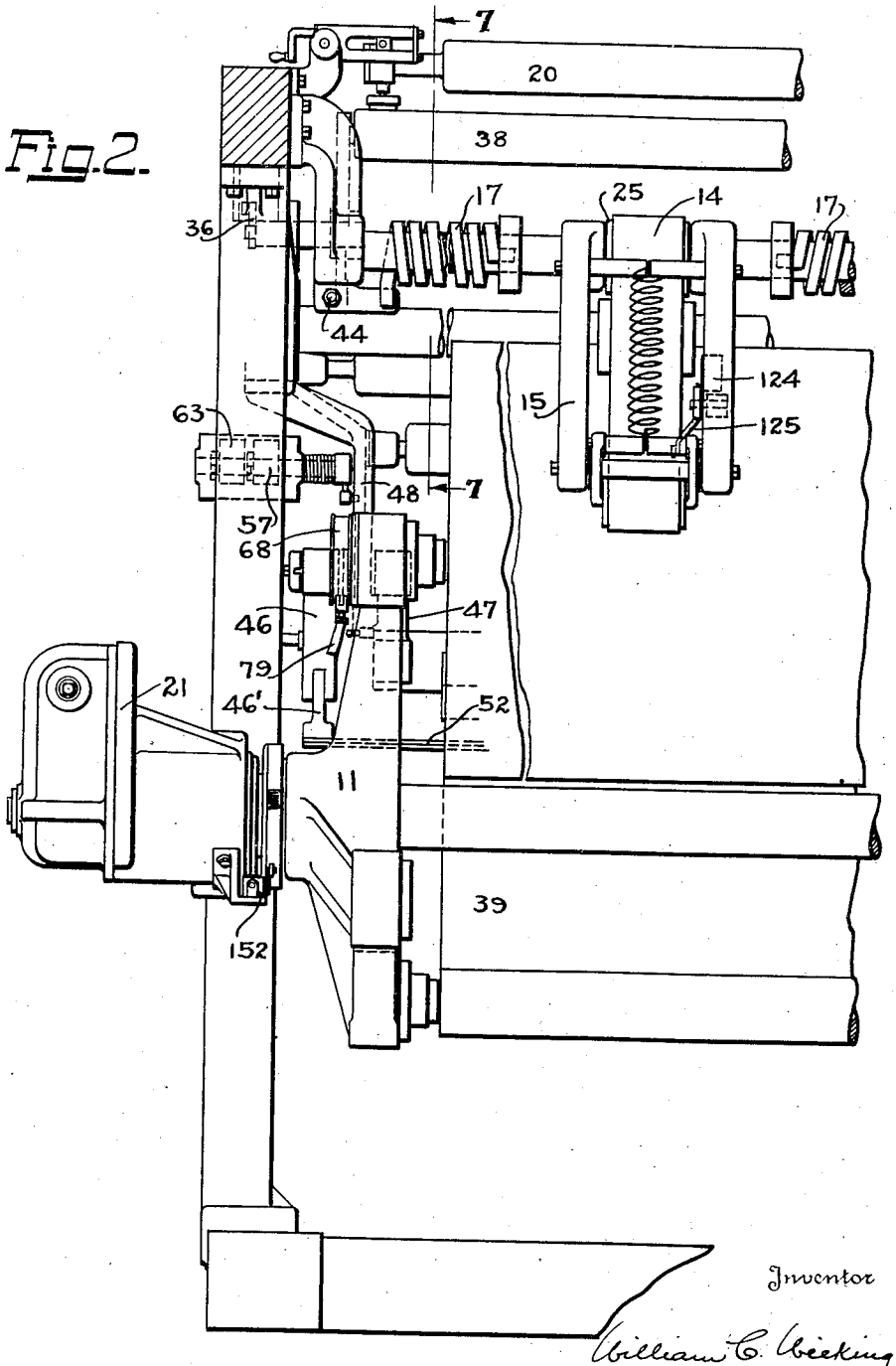
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Fig. 2.



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Fig. 2A

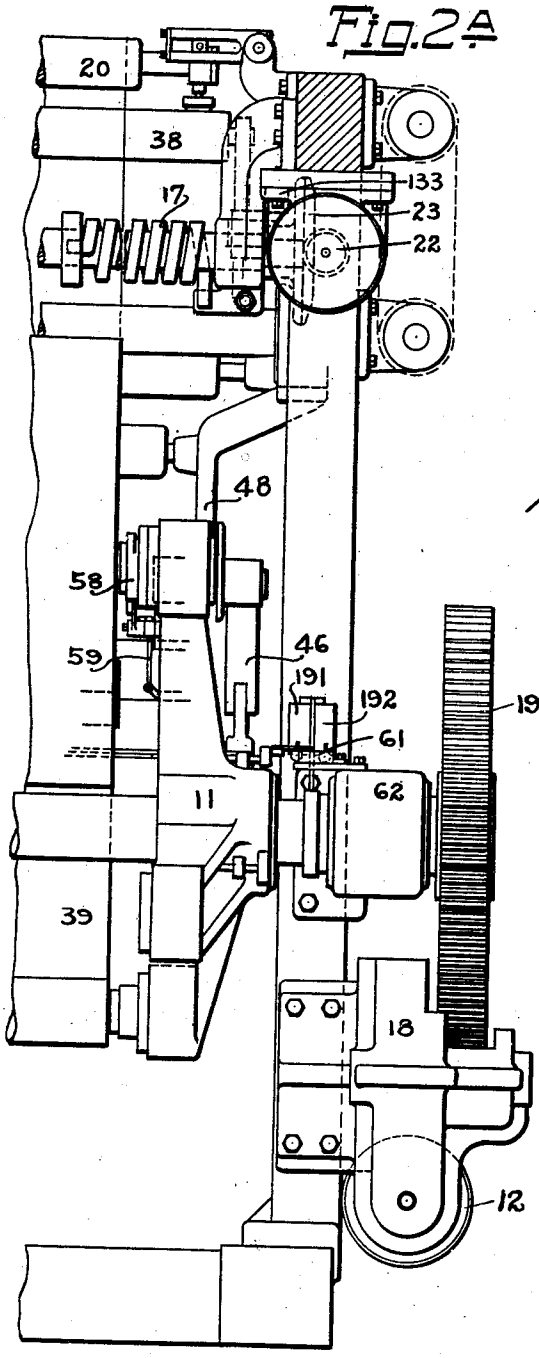


Fig. 3.

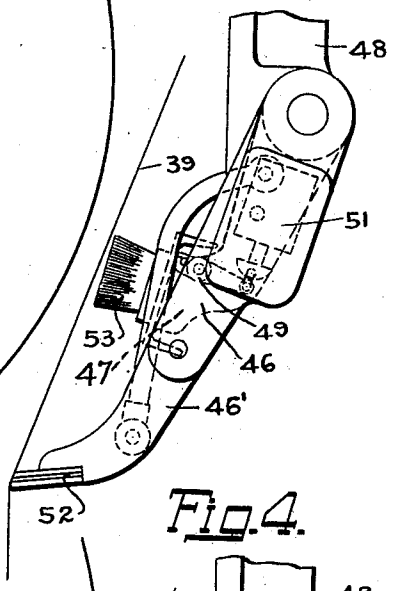
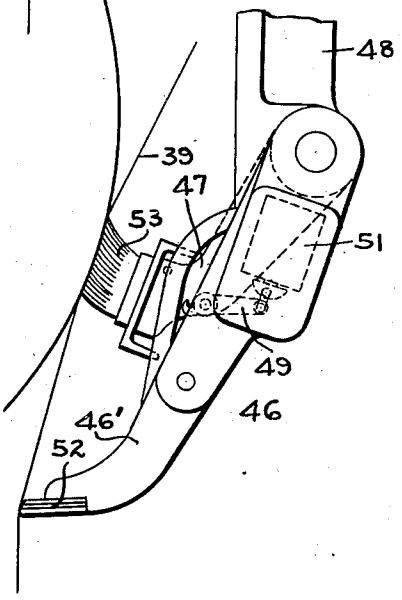


Fig. 4.



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WEB ROLL CONTROL MECHANISM FOR PRINTING MACHINES

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Fig.5.

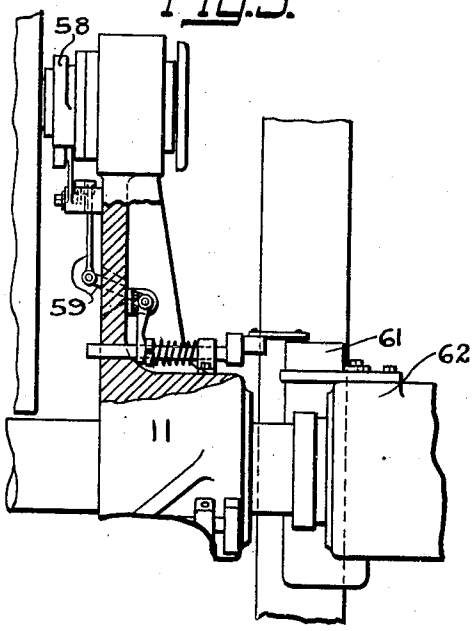


Fig.6.

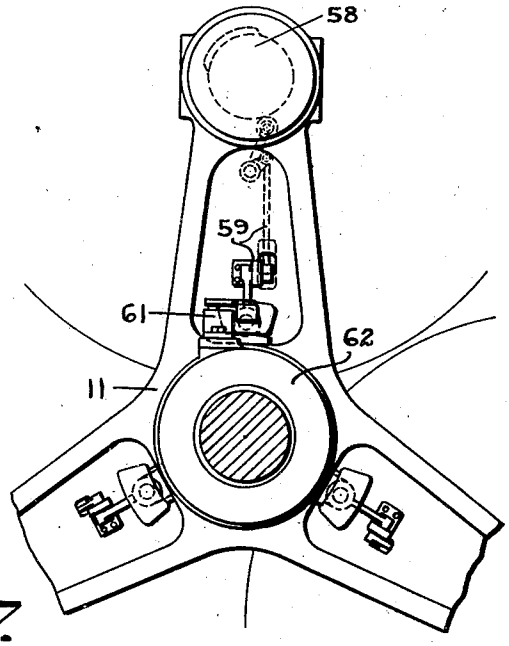


Fig.7.

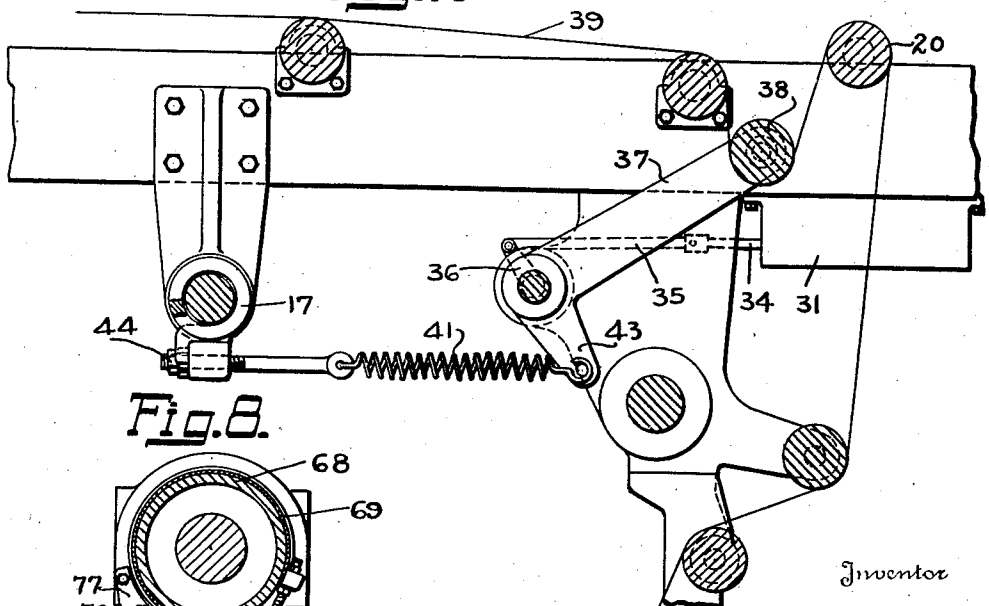
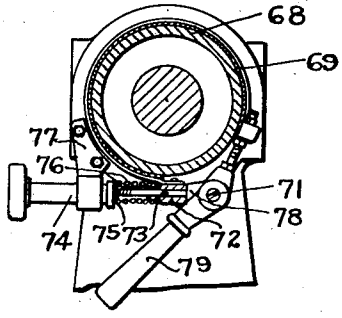


Fig.8.



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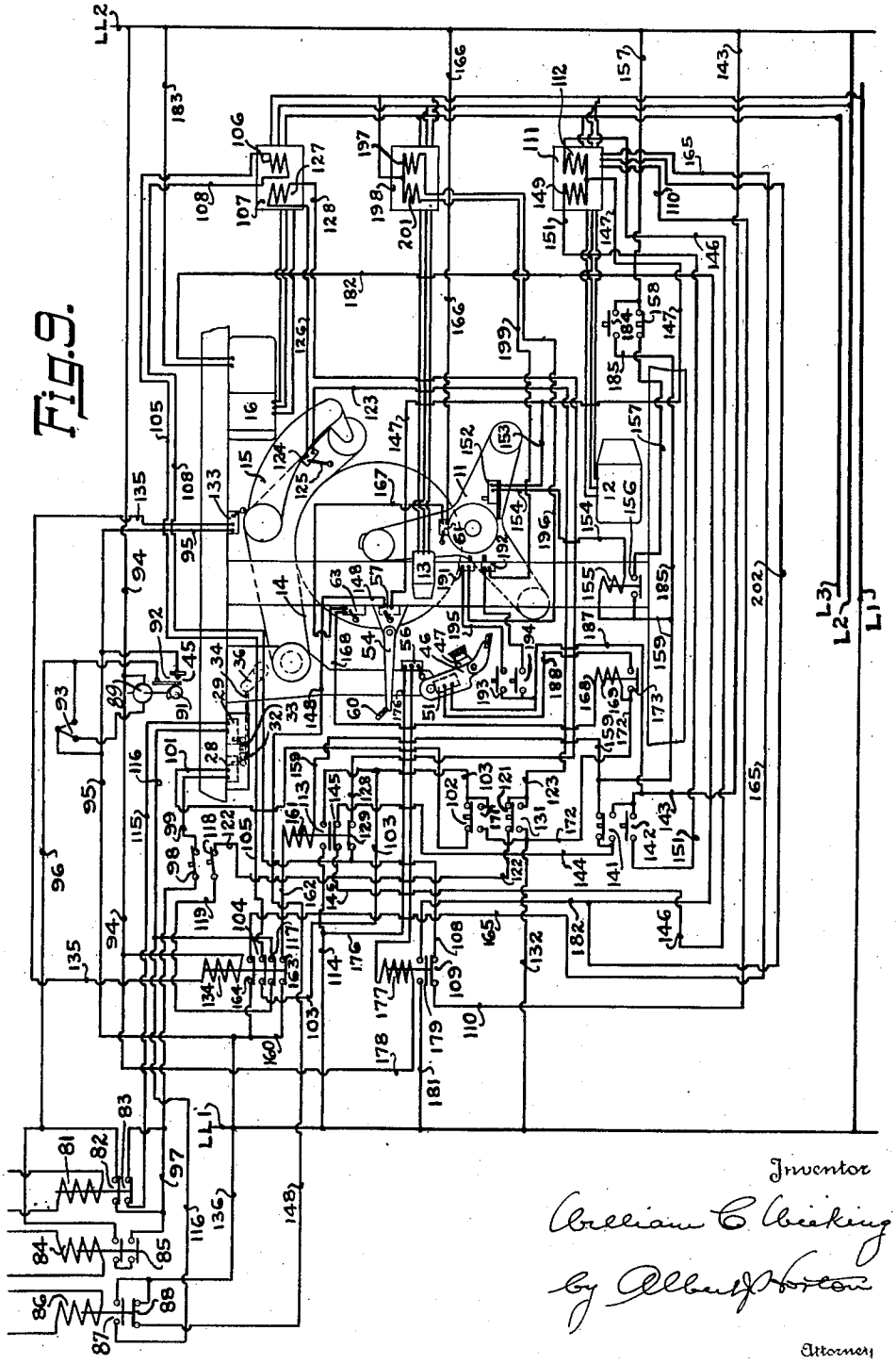
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WEB ROLL CONTROL MECHANISM FOR PRINTING MACHINES

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Fig. 9.



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Patented Apr. 25, 1939 2,155,431

UNITED STATES PATENT OFFICE

2,155,431

WEB ROLL CONTROL MECHANISM FOR PRINTING MACHINES

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Application December 31, 1935, Serial No. 56,883

28 Claims. (Cl. 242—75)

This invention relates to web supply mechanisms for machines such as printing machines adapted for printing newspapers and/or like products that operate upon webs. More especially this invention relates to improvements in web supply mechanisms for use with high speed printing or like machines whereby the continuity of the machine operation and its normal operating speed will not be interfered with when and expiring web roll is replaced by another web roll. The invention also contemplates the inclusion in web supply mechanism of safety and semi-automatic operating features whereby possible dangerous conditions wil be obviated and the operation thereof will be simplified.

Among the various objects of this invention is the provision of an improved web tension control device having as its principal feature, a positive automatic tension adjusting control whereby the web will be maintained at substantially constant and uniform tension during the entire period of machine operation.

Another object is to provide a device for limiting the movements of the web tension device to prevent possible damage to the material on the replacement web roll, while insuring positive and uniform operation thereof.

Still another object is to provide in a printing or like machine, facilities for improved and more efficient operation of the web tensioning device thereof, whereby its operation will be automatically associated, or interlocked, with the operation of the other devices and mechanisms of the machine, to insure efficient and reasonably safe operation thereof.

A further object is to provide in a web supply mechanism, having in its structure a web tensioning device, a web joining device and a web join timing device, and electrically operated controls, whereby the operations of the various devices will be closely associated and interlocked to insure a maximum of safety and efficiency in the operation of the entire mechanism.

It is also an object of this invention to provide a web supply mechanism of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a side view of a web supply mechanism for a printing or like machine and embodying the features of this invention;

Figures 2 and 2A comprise a front view of the web supply mechanism shown in Figure 1;

Figures 3 and 4 are enlarged views of a part of the web joining device of the web supply mechanism showing the parts in different positions of operation;

Figures 5 and 6 illustrate a form of timing device for controlling the operation of the web joining device shown in the above figures;

Figure 7 is a partial section on line 7—7 of Figure 2 showing parts of the web tensioning device affected by the features of this invention;

Figure 8 is an enlarged view of an auxiliary tension device used in association with the features of this invention; and

Figure 9 is a diagram of the electrical circuits connecting the various devices and including the controls therefor together with a schematic showing of a side view of the web supply mechanism.

The web supply mechanism illustrated in the above noted drawings includes a web roll supporting device or reel 11, which is adapted to be rotated to position the web rolls supported thereby into desired positions by an electric motor 12, and to be moved axially to adjust and align the web margins by an electric motor 13. A web roll rotating means forming part of the web tensioning device of this invention includes a roll contacting belt 14, which is movable toward and away from the roll by a swingable arm 15, an electric motor 16 being provided for this purpose. Coiled springs 17 (Figures 2 and 2A) are arranged to counteract the weight of the arms 15, the motor 16 being actuated to vary the engagement of the belt 14 with the web roll. The motor 16 is of a type wherein a speed reducing means is directly associated therewith, and which is provided with an electrically operated brake device. A detailed description of the structure and operation of the above mentioned devices will be found in an application Serial Number 700,652, filed December 2, 1933.

The above mentioned application also shows and describes a web tensioning device and controls therefor, and a web joining device with its control and timing device, both of which are similar in operation to that shown herein but somewhat different in structure. Either form of these devices may have the features of this invention associated therewith with equally efficient re-

sults, the forms shown herein being of a more improved structure and therefore preferred. The particular form of web joining device shown herein is disclosed and described in detail in an application Serial Number 33,814, filed July 30, 1935, now Patent Number 2,090,296 of August 17, 1937, and the web equalizer device illustrated as having a tiltable roller 20 included in its structure is disclosed and described more in detail in an application Serial Number 25,389, filed June 7, 1935, now Patent Number 2,066,307 of December 29, 1936.

The reel rotating motor 12, through suitable reduction gear connections disposed in casing 18, drives a gear 19, which is connected to the shaft of the reel 11. The motor 12, as will be described hereinafter, is suitably controlled in its rotative movements whereby it will dispose web rolls supported thereby in operable position and will be inoperative to rotate the reel during certain periods of the machine operation when other devices are in operation. The motor 13 is suitably connected to the reel shaft through reduction gear in casing 21 to adjust the reel 11 axially to move the web running from a supported roll, either to one side or the other to properly align or space its margin with respect to the matter to be printed thereon. This margin adjusting motor is controlled by suitable electrical devices to be hereinafter described.

The motor 16, through its associated reduction gearing, is adapted, by being drivingly connected to the belt arm 15 through a bevel pinion 22 and gear segment 23, to swing the belt arm to increase or decrease the wrap of the belt 14 around the web roll engaged thereby, and thereby increase or decrease the tension on the web being fed therefrom. Suitable controls, including mechanically operated electrical controls are provided, as will be described hereinafter, for efficiently controlling the operation of the motor 16 and to cause operation of the same in association with the operation of the other devices, whereby a replacement web roll can be substituted for an expiring web roll in an expeditious and efficient manner. The belt 14 carried by the arm 15 is driven somewhat slower than, but substantially in synchronism with the peripheral speed of the cylinders of the printing machine by a driven shaft 2', which is drivingly connected to a pulley 25, over which the belt 14 is reeved, by bevel gears 26 and 27.

The above mentioned controls for the motor 16 include, a pair of electrical switches 28 and 29 disposed in a casting 31 and adapted to be respectively operated by switch operating members 32 and 33 (Figure 1). The members 32 and 33 are adjustably mounted on a reciprocable operating rod 34, connected by a link 35 to a lever arm 36. The arm 36 is secured to and swingable with, an arm 37, upon the end of which a roller 38 is mounted. The roller 38 is disposed in a loop of the running web 39 and is supported thereby to swing the arm 37 when variations in the tension of the web 39 cause the loop thereof to lengthen or shorten, the tension of the spring 41 being set to provide the desired normal operating tension on the web 39 by actuation of nuts 44, which are subsequently tightened to prevent unauthorized or accidental tension changes during machine operation. Variations in web tension are compensated for by movement of the arm 37 which, through the instrumentality of the arm 36, the link 35 and the operating rod 34 will cause the proper switch 28 or 29 to be closed to actuate the motor 16 in the proper direction to either raise or lower the arm 15, and therefore either increase or decrease the wrap, and consequent action of the belt 14, upon the running web roll.

During normal machine operation the running web is pulled through the machine at a surface speed substantially equal to the peripheral speed of the printing cylinder, the belt 14 acting upon the web roll to slightly retard its rotation whereby a slight tension is imposed upon the web. The web tension is apt to vary slightly, due to various conditions, such as, stretching of the web and differences in web texture. Another of these conditions is due to the reduction in the diameter of the roll, as the web is removed therefrom, whereby the wrap of the belt 14 thereon is decreased causing a decrease in web tension. As the roll reduces in diameter and the web tension decreases, the web loop in which the roller 38 is disposed lengthens, causing the arm 37 to swing, whereby the rod 34 is moved. Continued movement of the rod 34 in this direction eventually causes it to actuate the "more tension" switch 29 whereupon the motor 16 immediately operates to lower the arm 15 and cause increase wrap of the belt 14 about the web roll.

To prevent the arm from being swung too great a degree whenever either of the switches 28 or 29 is operated, whereby a hunting action may be set up, this invention provides a regulating device shown diagrammatically in Figure 9, whereby the energization of the motor 16 is by timed impulses, rather than by a continuously closed circuit. A motor driven cam controlled switch 45 is herein provided for this purpose and is connected into the electrical circuit of the switches 28 and 29 as will be hereinafter described. Due to the necessity for quickly stopping the machine in emergencies, the belt arm 15 must be quickly moved downwardly toward the web roll by operation of the motor 16 and may cause possible damage to the roll or breakage of the web. To prevent the arm 15 from swinging downwardly too far during such an operation, a movement limit switch is provided to open the circuit and stop the operation of the motor 16 as will be hereinafter described.

The device for joining the web of a replacement roll with the web of an expiring web roll herein consists in a pair of arms 46 and 47 pivotally mounted to a support 48 and being detachably connected together by a catch 49 releasable by an electrically operable solenoid 51. An arm 46' which is pivotally connected to the arm 46, carries web severing means generally comprising a knife operably supported in a holder 52, and the arm 47 carries a web deflecting brush 53 which, when the arm 47 is released from the arm 46, may be moved, to press the running web from the expiring web roll onto the replacement roll to join the webs thereof, by means of an arm 54, which is connected to the brush arm 47 by a cable or chain 55. Provision is made by this invention to prevent operation of the reel rotating motor 12 and to prevent operation of the web tensioning motor 16 when the arms 46 and 47 are in web joining position, and during their operation to join the webs, to prevent possible damage should the reel be inadvertently rotated during such operations. The means for preventing operation of the above reel and web tension motors comprises switches 56 and 57 respectively (Figures 1 and 9), operable by movements of the arms 47 and 54 into operable posi-

tion, which switches are connected into the respective motor control circuits as will be described hereinafter.

The operation of the web joining mechanism is under the control of a timing cam (Figure 5) mounted to rotate with the replacement web roll and operable through a system of levers and links 59 to actuate a switch 61 mounted upon a reel supporting bracket 62. The switch 61 is closed by the cam 58, when an adhesive covered area on the web of the replacement roll is in proper position relative to the web deflecting brush 53 (Figure 3), to permit actuation of the solenoid 51 by a switch 63 (Figures 1 and 2), operated by a trip handle 60 during the movement of the arm 54 to press the brush 53 to deflect the web of the expiring web roll against the replacement roll. The switch 63 is so arranged that in conjunction with switch 61, it acts to energize a relay which in turn energizes the solenoid 51 to release the catch 49, (Figure 3) the circuit of which arrangement will be described hereinafter.

Provision is also included to manually adjust the operating members 32 and 33 to vary the actuation of the switches 28 and 29 thereby. The operating rod 34, upon which the members 32 and 33 are threadedly mounted, extends into a sleeve 64 having a bevel gear 65 secured thereto which is in mesh with a bevel gear 66, secured to which is a handle 67. The connection between the rod 34 and the sleeve 64 is such as to permit sliding movement of the rod 34 axially with respect to the sleeve 64 while insuring rotation of the rod with the sleeve. It is obvious that the manually rotatable handle 67 may be replaced by an electric motor having reduction gearing associated therewith to permit a remote control of the members 32 and 33 if such is desired.

Provision is included whereby tension may be applied to the running web when the web roll is moved, by rotation of the reel 11, out of engagement with the belt 14 in preparation for making a web join. Each roll supporting shaft is provided with a brake drum 68 (Figure 8) about which is a brake band 69. One end of the band 69 is secured to a stud 71 threaded into the reel arm supporting the roll and the other end of the band is secured to a block 72 slidably mounted upon a rod 73. The rod 73 is threadedly secured to an adjusting handle 74 having an abutment 75 thereon. A spring 76 is disposed between the abutment 75 and the block 72 to urge the block away from the abutment and grippingly bind the band 69 to the brake drum 68, the abutment 75 being supported by a bracket 77 secured to the reel arm. A manually swingable cam member 78 is pivoted upon the stud 71 and is operable to cam the block 72 along the rod 73 to release the band from the brake drum. A handle 79 is provided to swing the cam member 78.

With particular reference to Figure 9, the normal operation of the web tension device when the machine is in operation, is controlled by the tension on the running web operating through the switches 28 and 29 by means of the swingable arm 36. Substantially constant and uniform tension will be imposed upon the running web 39 by the belt 14, by action of the motor 16 under control of the switches 28 and 29, and the cam operated impulse switch 45. During the normal operation of the machine, the web joining arms 46, 46' and 47 are folded back and the arm 54 is in a raised position, as indicated in dotted lines in Figure 1.

Assuming that the machine is in operation, coil 81, which is in the main motor circuit of the machine, is energized, closing switches 82 and 83. The web threading motor, used when threading the web through the machine at the start, is now not in operation and therefore the coil 84 is not energized and switch 85 is open. The emergency or red button stop, provided to stop the machine when an emergency arises, is also open, whereby the coil 86 is not energized, and a switch 87 controlled thereby, is open, while a switch 88 is closed. The operating arm 54 and the arms 46, 46' and 47 are in raised position, as shown in dotted lines in Figure 1, and the running web 39 is being taken from the roll being engaged and controlled by the belt 14 as indicated by dash lines in Figure 1. The motor 89, driving the impulse relay 45 is running, whereby, through operation of cam 91, the switch blades 92 are being intermittently engaged and disengaged. The motor 89 is controlled by a switch 93 which through conductor 94 leading from a line wire LL2, connects it to a line wire LL1 through a conductor 95.

Intermittently closing of the switch blades 92 of the switch 45, one of which is connected to the line wire LL1 by conductor 95, completes a circuit through a conductor 96 to the closed switch 82 and through a conductor 97 to a closed snap switch 98. From the switch 98, the circuit continues through a conductor 99 to one lead of the "less tension" limit switch 28, the other lead of which, through a conductor 101, is connected with a normally closed push button switch 102. From the switch 102, through a conductor 103, the circuit continues through a coil control switch 104 and a conductor 105 to a "less tension" control coil 106 in the tension motor (16) control box 107.

From the coil 106 the circuit continues through a conductor 108 to a coil controlled closed switch 109 and then through a conductor 110 into the reel motor (12) control box 111, where, through normally closed forward rotative controls (not shown) but which are operable by energization through a coil 112, the coil 106 is connected with the line wire LL2. The "less tension" coil 106 is adapted to actuate suitable controls in box 107 to cause the motor 16 to operate to raise the arm 15 when the switch 28 is closed by the member 32, by movement imposed thereon by the raising of the arm 37 due to shortening of the web loop in which the roller 38, on the arm 37, is disposed.

The "less tension" coil 106 may also be energized to raise the arm 15 by the closing of the normally open push button switch 171, one contact of which is connected to the line LL1 through a conductor 132. From the other contact of the switch 171 the circuit continues through the conductor 103, the coil control switch 104, the conductor 105, the coil 106, the conductor 108, the normally closed switch 109, the conductor 110, and thence through the control box 111 to the line LL2 as above described.

The closing of the switch 45 also completes a circuit from line wire LL1 through the conductor 95 through the contacts 92 of switch 45 and through the conductor 96 and the closed switch 82 to the closed switch 83 which is connected to the "more tension" limit switch 29, by a conductor 115. From the switch 29, a conductor 116 leads to the open switch 87 controlled by the emergency coil 86 and also to a coil switch 117, the other side of which is connected to a terminal of another snap switch 118, by a conductor 119. The other terminal of the switch 118 is connected

to a push button switch 121 by a conductor 122 from which a conductor 123 leads to a normally "closed down arm" limit switch 124 secured to the arm 15 and arranged to be open by engagement of its actuating arm 125 with the web roll or the portion of the belt 14 engaging the roll. From the switch 124 the circuit continues through a conductor 126, to a "more tension" coil 127, disposed in the motor control box 107, to actuate suitable controls therein and cause the motor 16 to operate to lower the arm 15 when the limit switch 29 is closed, by the member 33 under movement imposed thereon by the lowering of the arm 37, due to elongation of the web loop in which the roller is disposed.

From the coil 127, the circuit continues through a conductor 128 to a coil controlled normally closed switch 129 and then through the conductor 108 to the switch 109, whereupon it is connected to the line LL2 as in the case of the less tension circuit described above. The "more tension" coil 127 may also be energized to operate the motor 16 to lower the arm 15 by the actuation of a push button switch 131 to connect the conductor 123 directly with the line wire LL1 through the conductor 132. The upward movement of the arm 15 is limited by a limit switch 133 disposed to be actuated by the arm 15 when it reaches its predetermined limit of upward movement. The switch 133 is normally closed and is opened by the arm 15 to open the circuit from the line LL1 through conductor 95 to a coil 134 through a conductor 135, the other terminal of which is connected to the line wire LL2 by a connection with the conductor 94. Deenergization of the coil 134 opens the above mentioned switches 104 and 117 controlling the tension motor control coils 106 and 127 respectively, thus preventing the automatic operation of the motor 16 until the switch 133 is again closed by the lowering of the arm 15 by actuation of the push button switch 131.

By the provision of the above controls the tension on the running web 39 will be automatically maintained within efficient operating limits and due to the intermittent circuit closing action of the switch 45 the various more and less tension adjustments of the arm 15 will be in gradual intermittent steps instead of in one complete movement, which due to the momentum and other conditions would tend to cause a so-called hunting action, whereby, the switches 28 and 29 would alternately act in an attempt to equalize the tension to the desired amount. By controlling the action of these switches by the switch 45, the mechanism between the steps of adjustment will come to rest and the momentum etc., of the moving parts will be prevented from interfering with the smooth operation desired.

By being in the circuit with the switch 87 controlled by the emergency operated coil 86, the "more tension" coil 127 will be energized to apply a braking action to the roll through the lowering of the arm 15 to prevent it from over running when the machine is stopped in an emergency, the switch connecting the conductors 116 with the LL1 through a conductor 136. The stopping of the machine causes deenergization of the coil 81 and the consequent opening of switches 82 and 83 prevents the operation of the more and less tension switches 28 and 29.

As stated above, the control arm 54 is in raised position, whereby the switch 57 is normally closed, permitting the operation of the motor 12 to rotate the reel 11, forwardly, by a push button switch 141 or, reversely, by a push button switch 142. The switch 141, when actuated, closes the circuit constituted by a conductor 143 from the line wire LL2, a conductor 144 leading to a switch 145 and from there, through a conductor 146 to the forward movement control coil 112 in the reel motor control box 111. From the coil 112 the circuit continues through a conductor 147 through the switch 57, through a conductor 148, to the switch 88 controlled by coil 86. The switch 88 is connected to the line LL1 through the conductor 136.

The reverse movement push button switch 142, when actuated, connects a reverse control coil 149 in box 111, through a conductor 151 with the line wire LL2 by the use of the conductor 143. From the coil 149 the circuit traverses the same path as does the forward control circuit leaving the box by a conductor 147. By passing through the switch 57, which is normally closed when the arm 54 is in inoperative position, the respective reel motor circuits above described are under its control, thus insuring that when the arm 54 is lowered in preparation of making a web join and the switch 57 is thereby opened, due to the engagement of a suitable projection on the arm, no rotation of the reel is permitted. This interlocking feature prevents possible damage to the roll or the breaking of possibly interfering parts.

Preparatory to joining the running web 39 to the web of a replacement web roll, the belt arm 15 is raised and the reel 11 rotated, to position the replacement roll into web joining position. These operations are accomplished, substantially automatically, by the closing of a push button switch 184. The closing of the switch 184 energizes swich controlling coils 155 and 161. One contact of the switch 184 is connected by a conductor 157 to line wire LL2, the other contact being connected by a conductor 185 through a conductor 159 to the coil 161. From the coil 161, the circuit continues through a conductor 162 and a switch 163, controlled by the coil 134 to the line wire LL1.

Conductor 159, which is in connection with the line LL2 as described above, also leads to the coil 155, from which, a conductor 154 leads to a normally closed switch 152. From the switch 152 the circuit continues through conductor 153 and conductor 147, to the normally closed switch 57, from which a conductor 148 leads to the closed switch 88 which is connected to the line LL1 by the conductor 136.

Energization of the coil 161 will close the switch 113 whereby the arm 15 will be raised by motor 16 and open switch 145 whereby the reel motor 12 is prevented from operating. One contact of the switch 113 is connected to the line LL1 by the conductor 114 and the other contact thereof is connected by a conductor 103 to a switch 104, controlled by the coil 134. From the switch 104 the circuit continues through conductor 105 to the coil 106, from which a conductor 108 connects with a switch 109 which is connected to line LL2 by a conductor 110 through box 111. Energization of coil 106 actuates motor 16 to raise the arm 15 to the limit of its upward movement whereupon the switch 133 is opened deenergizing the coil 134.

Deenergization of the coil 134 will open the switches 104 and 163 whereby the motor 16 and upward movement of the arm 15 will be stopped, and the reel motor 12 started to rotate the reel 11 to dispose the replacement web roll into web joining position. The deenergization of the coil 134 will open a switch 164 whereby a circuit from

line LL1 to the switch 164 and leading therefrom through a conductor 165 into the control box 111 and from the box 111 through a conductor 202 and the conductor 182 to the release coil of the motor brake will be opened whereby the brake will act to hold the motor 16 against rotation and thereby the arm 15 in its up position. The motor 12 is started when the switch 163 is opened, due to the deenergization of the coil 161 whereby the switch 145 is closed to complete a circuit through the forward rotating coil 112, which circuit includes conductor 157 from line LL2 to the closed switch 158 and to the closed switch 156, the switch 156 having been closed by energization of the coil 155 when switch 184 is actuated. From the switch 156, the circuit continues through conductor 159, closed switch 141, conductor 144, switch 145, conductor 146, to the coil 112, from which a conductor 147 leads to the closed switch 57, from which the conductor 148, switch 88, and conductor 136 lead to the line LL1. When the reel 11 has rotated sufficiently to dispose the replacement roll in proper position, the limit switch 152 is opened, whereby the switch 156 opens due to the deenergization of the coil 155, controlled by the switch 152, and the motor 12 stops. The web rolls are now in the position shown in Figure 1, the web 39 is running from the expiring web roll and the replacement web roll is in position to have the web 39 secured to the web thereof.

The next operation is to lower the arms 46, 46' and 47 into pre-web joining position as shown in full lines in Figure 1, from the folded dotted position, and to press the holder 52 against the web 39 to dispose it into pre-joining position in respect to the replacement roll, by swinging downwardly the arms 54 into the position as shown in full lines in Figure 1 from its upwardly disposed dotted position. The swinging of the arm 54 downwardly opens the switch 57, as above described, preventing operation of the reel rotating in either direction, and the lowering of arms 46 and 47 into the pre-web joining position closes the switch 56. Closing of the switch 56 energizes a coil 177, one terminal of which is connected to the line LL2 by a conductor 178 and the conductor 94, the other terminal of which is connected to the switch 56, which, by a conductor 176 and the conductor 114, is connected to the line LL1. The switch 56 is closed by the engagement of a stud 174 on the brush arm 47, with the switch actuating lever system 175, which is arranged to hold the switch 56 closed until the brush arm is further moved by the arm 54 to make the web join. After a web join is made, the stud 174 passes by the lever system 175 without closing the switch 56 due to a swinging lever included in the lever system.

Energization of the coil 177 opens the normally closed switch 109 whereby the automatic tension circuits above described are opened preventing operation of the web tension mechanism and closes a switch 179 whereby the release coil in the brake of the motor 16 is energized to release the brake and permit the arm 15 to come down from its up position and engage the replacement roll to rotate and accelerate it to substantially the speed of the running web 39. Closing of the switch 179 connects the line LL1 through conductor 181 and conductor 182 with the motor brake which is connected to the line LL2 by a conductor 183.

The web join is now made by pressing downwardly upon the arm 54 and actuating the trip handle 60 thereon, to close the switch 63. The closing of the switch 63, as above described, causes the release of the arm 47 from the arm 46 whereby the brush 53 presses the running web against the replacement roll. This operation is timed by the cam 58, which through the lever mechanism 59, on each reel arm, actuates the normally open switch 61 on the reel support, to close the circuit from the line LL2, through a conductor 166, to a conductor 167, leading from the switch 61 to the switch 63. From the switch 63 the circuit continues through a conductor 168, to one terminal of a coil 169, the other terminal of which is connected to the line LL1 through a conductor 172 and the conductor 132. The coil 169, when energized, closes a normally open switch 173 to energize the solenoid 51 and releases the arm 47 from the arm 46 and permits it to swing toward the replacement roll.

When the arm 47 is moved toward the roll after its release from the arm 46 the switch 56 is opened, whereby the coil 177 is deenergized to open the switch 179, and close the switch 109. Closing of the switch 109 immediately places the automatic web tension mechanism controls in operation, to control the tension on the web now running from the replacement roll. The arms 46, 46', 47 and 54 are now moved back into their respective up positions, as shown in dotted lines in Figure 1, whereby the switch 57 closes thereby permitting rotation of the reel motor 12 by actuation of the push button switches 141 and 142, if desired.

The axial movement of the reel by the margin motor 13 is controlled by limit switches 191 and 192, which are actuated by members on the reel to stop the operation of the motor when the determined movement of the reel is reached. Push button switches are provided for operating the motor 13. For instance, push button switch 193 when closed connects the line LL2, through the conductors 143, and 187, with the limit switch 191 by a conductor 195, from the switch 191, through a conductor 196. The circuit continues to a motor direction control coil 197 in a control box 198 and then to line LL1. Likewise, switch 194 from the conductor 187, leads to switch 192, from which a conductor 199 leads to the other motor rotation direction coil 201 and thence to line LL1.

Provision is made whereby when the machine is stopped by actuation of a remotely disposed switch (not shown), which closes a circuit to energize the emergency stop coil 86, the switch 87 is closed and the motor 16 is operated to lower the arm 15 and thereby cause the belt 14 to apply a braking action upon the web roll to prevent over running of its web. The amount of such arm movement is limited by the limit switch 124 and this movement, in this instance, is not under the control of the cam controlled switch 45. The switch 87 closes a circuit from the line LL1 through the conductor 136 to the conductor 116 to the switch 117. From the switch 117 the circuit continues through conductor 119, switch 118, conductor 122, switch 121, conductor 123, switch 124, conductor 126, to coil 127. From the coil 127, through conductor 128 to switch 129, conductor 108, switch 109, and conductor 110 the circuit is completed to line wire LL2 in box 111. This circuit arrangement by-passes the switch 45 and causes immediate stopping of the roll rotation whenever the machine is stopped in an emergency,

the limit switch 124 opening when the arm 15 has reached its predetermined down limit to stop the motor 16 by opening the above circuit.

All of the motor control boxes 107, 111, and 198 are connected with power lines L1, L2, and L3 and the motors 12, 13 and 16 are connected by suitable conductors to the controls in the respective box. Suitable controls (not shown) are provided in control box 107 whereby whenever coils 106 and 127 are energized to operate the motor 16 the brake controlling the same will be released.

The principal features of this invention, whereby increased safety and efficiency of operation is obtained include, the impulse relay or cam operated switch 45, the operation of which, as above described, insures a smooth maintenance of the desired web tension; and the down limit switch 124 whereby the belt arm 15 is prevented from striking the web roll to damage the same.

Other features are, the push button and up limit switch combination including, the switches 171 and 133 whereby the belt arm 15 may be raised to facilitate threading of the web into the machine, and held there, should an emergency stop occur while such an operation is being performed; a push button and down limit switch combination including the switches 131 and 124 for bringing the belt arm 15 down when desired; and the provision of controls whereby when the arm 15 is in up-safe position, rotation of the reel 11 is possible without the arm 15 being permitted to descend except by actuation of the push button switch 131.

The provision of means to automatically raise the belt arm 15 to move the belt 14 out of the way when a replacement roll is being disposed in web joining position by the rotation of the reel 11, prevents strains being imposed upon the web of the roll, while it is being brought into such position whereby possible fracture of, or damage to, the same might result. Other features are, the provision of the switch 88 whereby the reel connot be rotated when the machine is stopped due to an emergency; and the brush arm interlock including, the switch 56 whereby the reel is inoperative when the brush arm 47 or its controlling arm 54 is swung down into web pre-joined position.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, and it will be further understood that each and every novel feature and combination present in or possessed by the mechanism herein disclosed forms a part of the invention included in this application.

What I claim is:

1. In a web supply mechanism, a web tensioning device including a movable web roll engaging member, an electric motor for moving said member, electrical controls for said motor, web engaging means affected by web tension for actuating said controls to cause the motor to move the member to vary the engagement of the member with the roll and thereby compensate for variations in web tension, and an electrical device operable to permit only intermittent operation of said controls.

2. In a web supply mechanism, a web tensioning device including a movable web roll engaging member, an electric motor for moving said member, an electrical control for said motor to operate it to increase the engagement of the member on the roll to provide more web tension, an electrical control for said motor to operate it to lessen the engagement of the member on the roll to provide less tension, web engaging means affected by the tension of a web running from the roll to actuate said controls, and an electrical device operable to permit only intermittent operation of both controls.

3. In a web supply mechanism, a web tensioning device including a movable web roll engaging member, an electric motor for moving said member, an electrical control for said motor to operate it to increase the engagement of the member on the roll to provide more web tension, an electrical control for said motor to operate it to lessen the engagement of the member on the roll to provide less tension, web engaging means affected by web tension for actuating said controls, and an electrical device comprising a constantly operating intermittent circuit closing switch to limit the action of said controls.

4. In a web supply mechanism, a web tensioning device including a movable web roll engaging member, means to move said member, a swingable arm movable by variations in web tension, means actuated by movements of said arm to control said member moving means to compensate for web tension variations, and means to control the operation of said member moving means to cause it to operate in intermittent steps.

5. In a web supply mechanism, a web roll supporting member, a running belt adapted to engage the roll on said member to rotate the same, a swingable arm supporting said belt, intermittently operable electrical means to move said arm to vary the engagement of said belt upon the roll, means affected by the tension of the web running from the roll to control said electrical arm moving means, and electrical means controlling said arm moving means to limit the movement of said arm toward the roll on said supporting member.

6. In a web supply mechanism, a web roll supporting member, a running belt adapted to engage the roll on said member to rotate the same, a swingable arm supporting said belt, intermittently operable electrical means to move said arm to vary the engagement of said belt upon the roll, an electrical control for said arm moving means to raise said belt out of engagement with the roll on said reel, and an electrical control to limit the amount of such movement.

7. In combination with a machine adapted to operate upon a web, a web roll supporting reel, electrical means to rotate said reel, mechanism movable into operative position for joining the web of a roll supported on said reel with a web running into said machine, electrical means for controlling said web joining mechanism, a web tensioning device, electrical means for controlling said tensioning device, electrical interlocking means between the controls for said mechanism and said device, to cause said web tensioning device to be inoperative when said web joining mechanism is in operation, and electrical interlocking means, between said reel rotating means and said web joining mechanism control means, to cause said reel rotating means to be inoperative when said web joining mechanism is in operative position.

8. In combination with a machine adapted to operate upon a web and to be stopped in an emergency, a web roll supporting reel, an electrical motor to rotate said reel, electrical controls

for said motor, and electrical interlocking means to prevent operation of said reel rotating motor controls, when said machine is stopped in an emergency.

9. In combination with a machine adapted to operate upon a web and to be stopped in an emergency, a web roll supporting reel, an electrical motor to rotate said reel, electrical controls for said motor, web tensioning means including an electrical motor, a swinging arm, adapted to be moved by said motor to apply more tension to a web, electrical controls for said motor, and electrical interlocking means to prevent the operation of said reel rotating motor controls and to cause said arm moving motor controls to operate to apply more tension to the web when said machine is stopped in an emergency.

10. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotating web roll, to control the speed of rotation thereof, means controlled by the tension of the web running from the roll, to vary the effect of said control member, and means to limit the movement of said control member in either direction.

11. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotating web roll, to control the speed of rotation thereof, intermittently operable means controlled by the tension of the web running from the roll, to vary the effect of said control member, and means to limit the movement of said control member in its movement into engagement with the roll.

12. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotatable web roll, to control the speed of rotation thereof, means to move said member out of roll engaging position, a roll support, means to move said roll support to position the supported roll in operative position, and an interlocking control to insure operation of said member moving means before said roll supporting means operates.

13. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotatable web roll, to control the speed of rotation thereof, means to move said member out of roll engaging position, a roll support, means to move said roll support, to position the supported roll in operative position, an interlocking control, to insure operation of said member moving means before said roll supporting means operates, and another control to prevent operation of said member moving means, while said roll supporting means is operating.

14. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotatable web roll, to control the speed of rotation thereof, means to move said member out of roll engaging position, a roll support, means to move said roll support, to position the supported roll in operative positon, an interlocking control to insure the operation of said member moving means before said roll supporting means operates, and means to move said member into engagement with the roll after the same has been positioned by said roll support.

15. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotatable web roll, to control the speed of rotation thereof, means to move said member out of roll engaging position, a roll support, means to move said roll support, to position the supported roll in operative position, an interlocking control to insure the operation of said member moving means before said roll supporting means operates, means to move said member into engagement with the roll after the same has been positioned by said roll support, and interlocking means to stop and prevent further movement of said roll support when said member is in roll engaged position.

16. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotatable web roll, to control the speed of rotation thereof, means to move said member out of roll engaging position, a roll support, means to move said roll support, to position the supported roll in operative position, means to press a running web against the web roll on said support, an interlocking control to insure operation of said member moving means before said roll supporting means operates, means to move said member into engagement with the roll after the same has been positioned by said roll support, and interlocking means to prevent movement of said roll support, while said web pressing means is operated.

17. In a web supply mechanism, a web tensioning device including a control member movable into and out of engagement with a rotatable web roll, to control the speed of rotation thereof, means to move said member out of roll engaging position, a roll support, means to move said roll support, to position the supported roll in operative position, means to press a running web against the web roll on said support, an interlocking control to insure operation of said member moving means before said roll supporting means operates, means to move said member into engagement with the roll, after the same has been positioned by said roll support, interlocking means to prevent movement of said roll support and said web tensioning device, while said web pressing means is operating, and means to release said interlocking means after operation of said web pressing means, to permit operation of said web tensioning device.

18. In a web supply mechanism having means to support a web roll, a web tension controlling device including an electric motor, a web roll engaging member actuated by said motor to vary web tension, a control for said motor, means affected by the tension of the web for actuating said control, and an intermittently actuated switch to control said motor control and permit only intermittent operation of said motor when the control is actuated by said means.

19. In a web supply mechanism, a web roll carrying reel adapted to carry a replacement roll, electrical means to rotate said reel to position the replacement roll relatively to a running web, means to support a replacement roll engaging and rotating device and being movable toward and away from the roll, electrical means to move said device support, and electrical interlocking controls between said reel rotating means and said support moving means to actuate the latter and move said device support away from the roll before said reel rotating means is operated.

20. In combination with a machine adapted to operate upon a web, a web roll supporting reel, electrical means to rotate said reel, mechanism movable into operative position for joining the webs of a roll supported on said reel with a web running into said machine, electrical means for controlling said web joining mechanism, a web

tensioning device movable toward and into engagement with the supported roll, electrical means for controlling said tensioning device, electrical interlocking means between said mechanism and said device controls to cause said web tensioning device to be inoperative when said web joining mechanism is in operation, and means to limit the movement of said web tensioning means toward the supported roll.

21. In a web supply mechanism, a web tensioning device including a member movable into and out of engagement with a rotatable web roll to control the speed of rotation thereof, means to actuate said member, means to support the web roll, said roll supporting means being movable to dispose the roll in operative position, means to move said roll supporting means, means to control the operation of said member actuating means and said roll support moving means, to prevent the operation of one while the other is operating, and means to limit the movement of said member into engagement with the roll.

22. In a web supply mechanism having means to support a rotatable web roll, a web tensioning device including braking means acting on the supported roll, an electric motor for actuating said braking means, electrical controls for said motor, web tension controlled means for actuating said controls and causing the motor to actuate said braking means to vary its action on the web roll and compensate for variations in web tension, and an intermittently operating switch in circuit with said controls to cause step by step operation of said braking means while it is being actuated by said motor.

23. In a web supply mechanism having means to support a rotatable web roll from which a web is running, braking means adapted to act upon a supported roll, electrically operated means to actuate said braking means to vary its braking action on the roll, means adapted to be actuated by changes in tension of the running web to control said electrically operated means, and means in control of said control means to cause intermittent action of said braking means as it is being actuated by said electrically operated means.

24. In a web supply mechanism, a web roll supporting member, a brake mechanism having a movable part in engagement with the roll on said member to effect a braking action thereon, means to move said part, intermittently operable means to control said part moving means to vary the braking effect of said braking mechanism upon the roll, and means affected by the tension of a web running from the roll to control said intermittently operable means.

25. In a web supply mechanism, a web tensioning device including a brake mechanism having a movable part in engagement with a rotating web roll to effect a braking action thereon, means to move said part, intermittently operable means controlled by the tension of the web running from the roll to control said part moving means to vary the braking effect of said braking mechanism upon the roll, and means to limit the movement of said braking mechanism part.

26. In a web supply mechanism having means to rotatably support a web roll from which a running web is fed to a machine, a web tension device including a floating roller running in a loop of the web and movable in response to variations in web tension, a member engaging the periphery of the web roll, electrically operated means operably connected to the floating roller and arranged to vary the pressure of the member on the roll when the position of the floating roller is changed, and means in the control circuit of said electrically operated means to cause intermittent operation thereof as it operates, to vary the pressure of the member on the roll by successive steps.

27. In a web supply mechanism, a web tensioning device including a member adapted to frictionally engage the periphery of a rotating web roll to apply a braking action thereto, means to move said member to increase its frictional engagement with the periphery of the roll, means controlled by the tension of the web running from the roll to cause operation of said member moving means to move said member to increase its frictional engagement with the roll, and other means to cause the member to move in a series of successive steps.

28. In a web supply mechanism, a web tensioning device including a member adapted to frictionally engage the periphery of a rotating web roll to apply a braking action thereto, means to move said member to decrease its frictional engagement with the periphery of the roll, means controlled by the tension of the web running from the roll to cause operation of said member moving means to move said member to decrease its frictional engagement with the roll, and other means to cause the member to move in a series of successive steps.

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