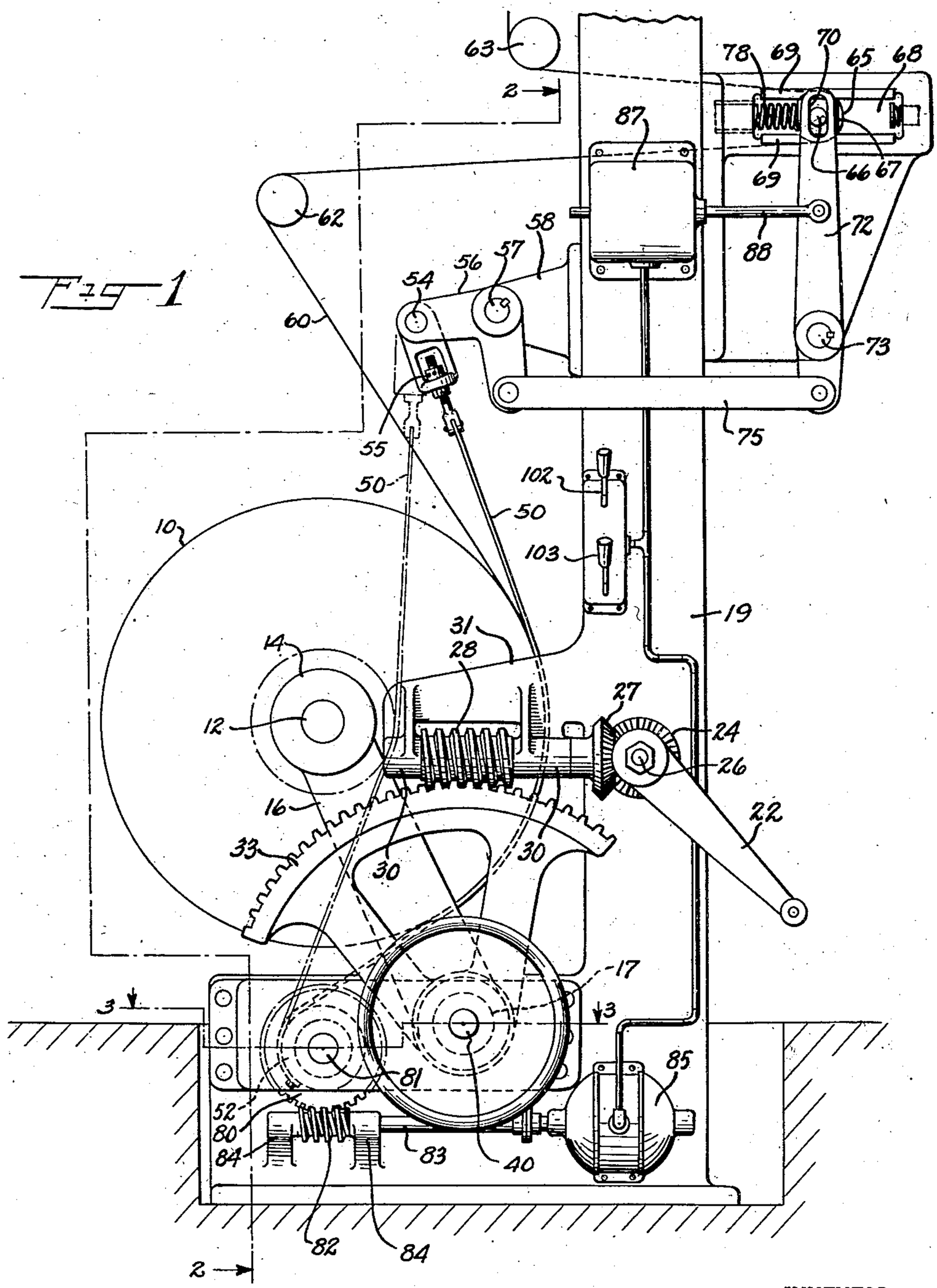
Feb. 14, 1933. H. FANKBONER 1,897,504

WEB CONTROLLING MECHANISM

Filed Dec. 4, 1929 6 Sheets-Sheet 1

Fig 1



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WEB CONTROLLING MECHANISM

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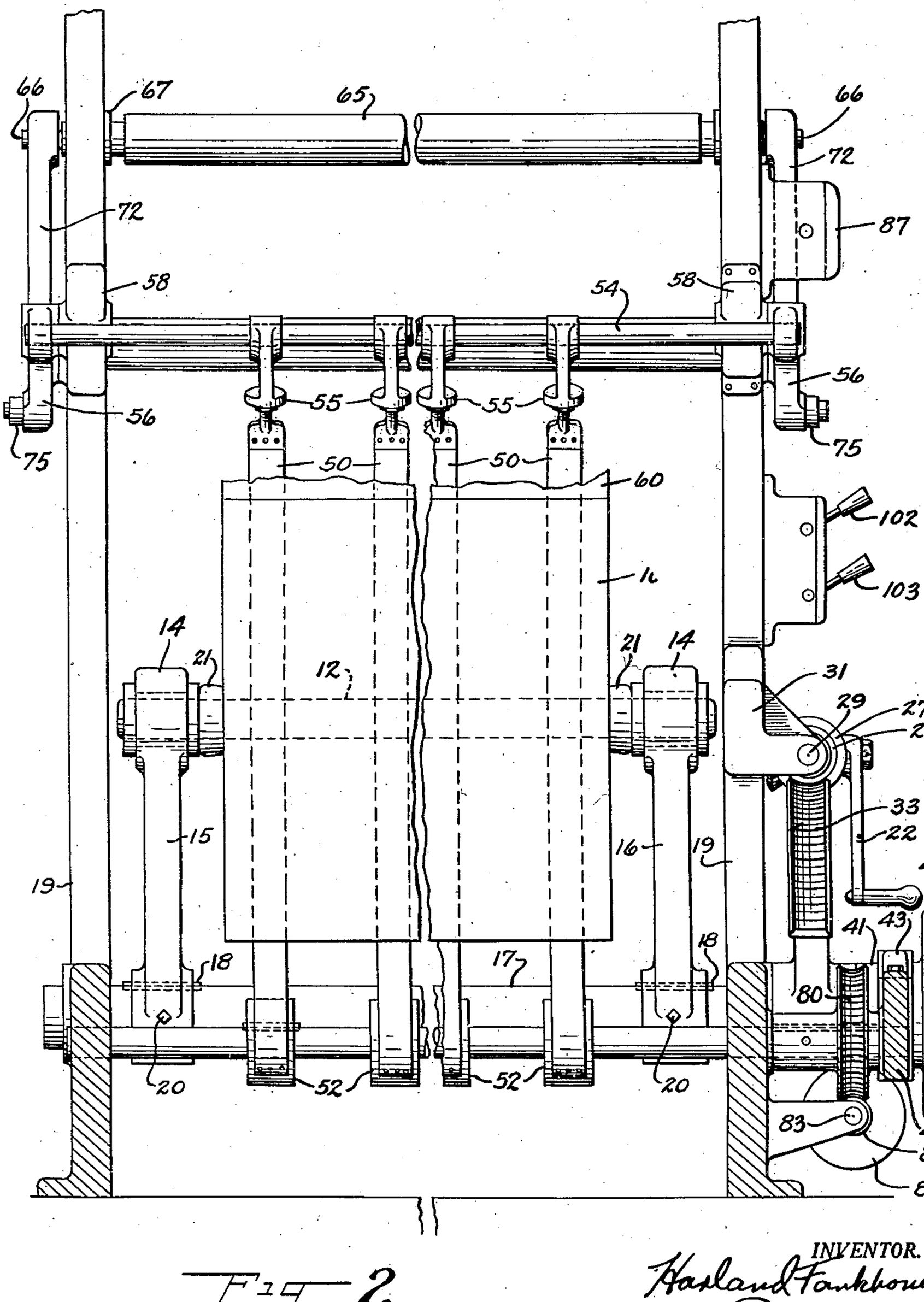

Fig 2

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WEB CONTROLLING MECHANISM

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Fig 5

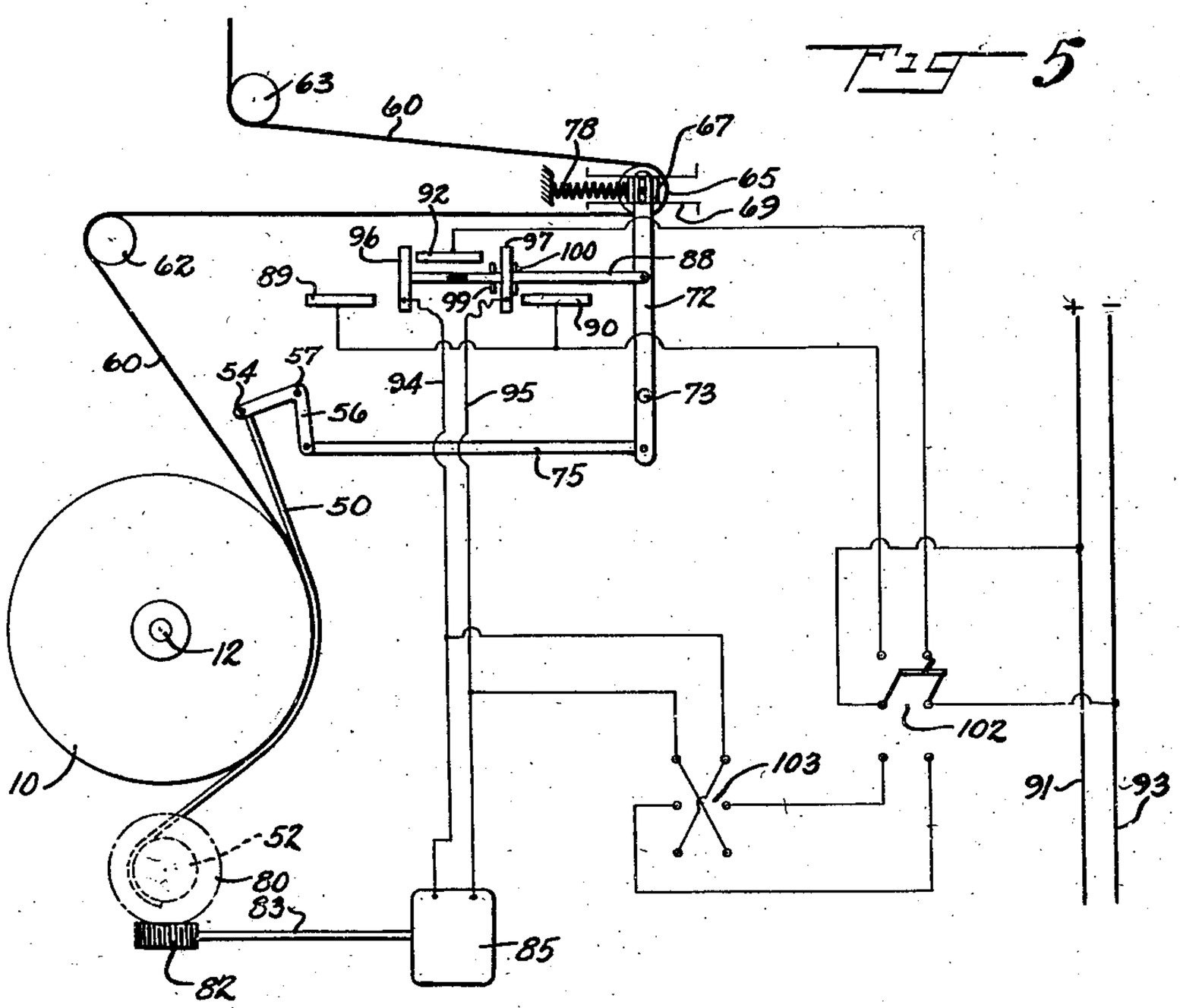


Fig 3

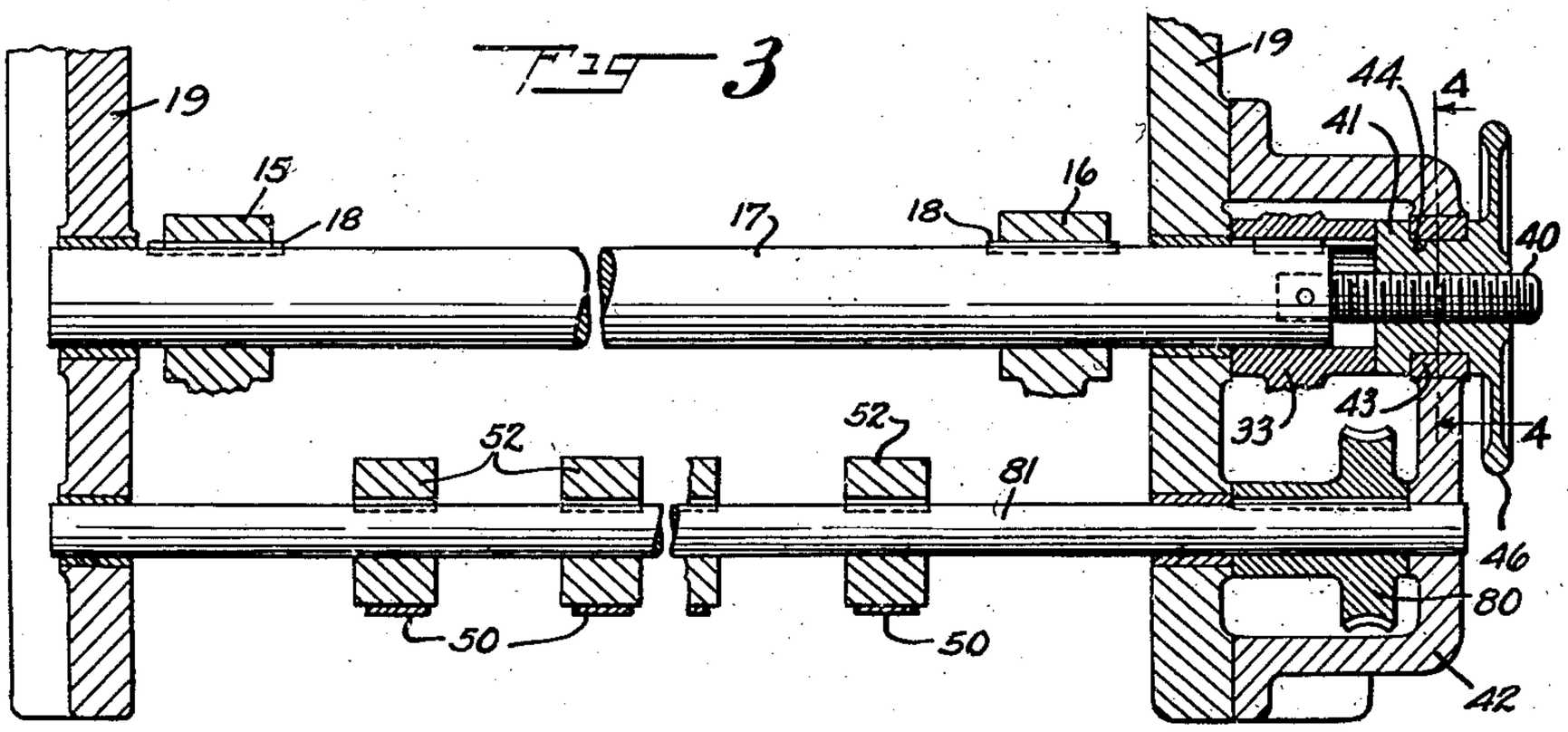
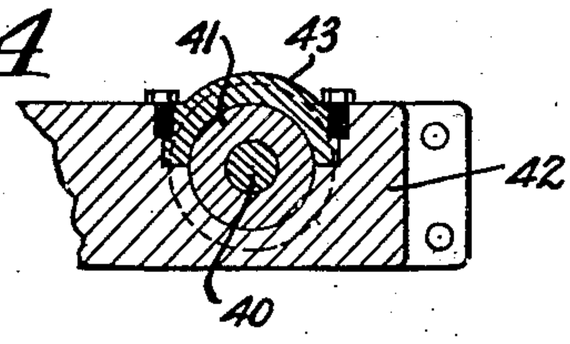


Fig 4



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WEB CONTROLLING MECHANISM

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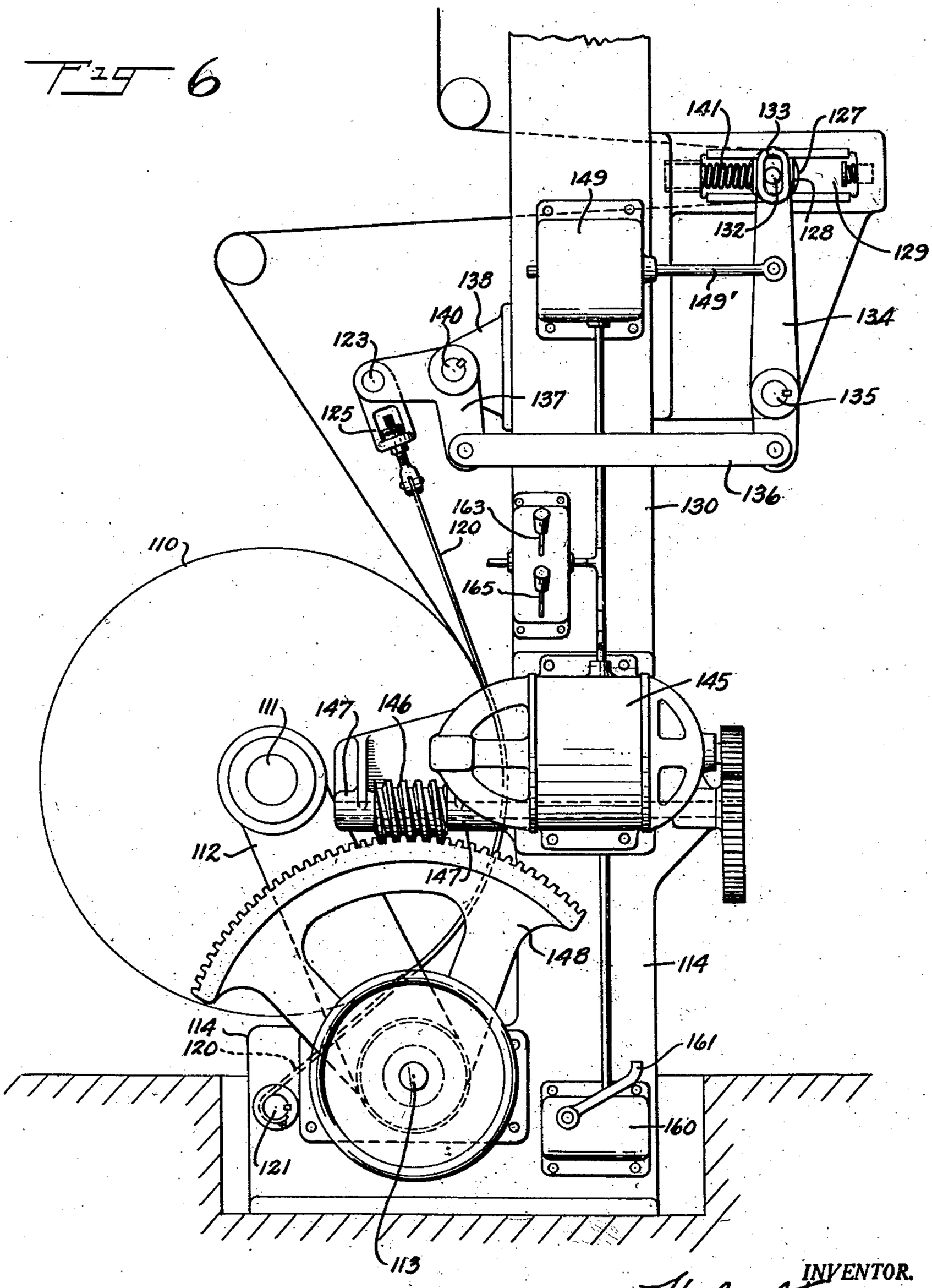
Fig 6



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WEB CONTROLLING MECHANISM

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Fig 8

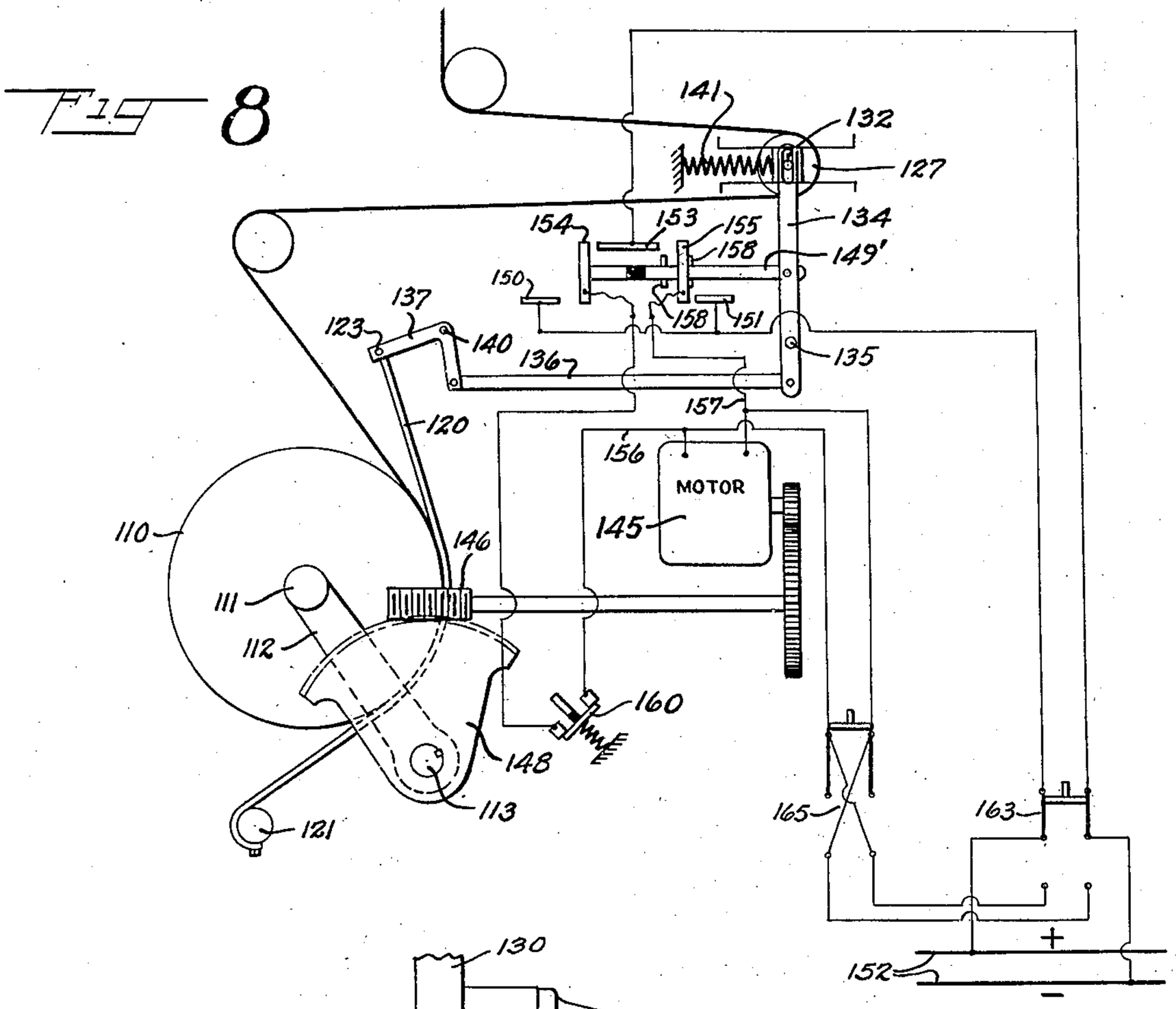
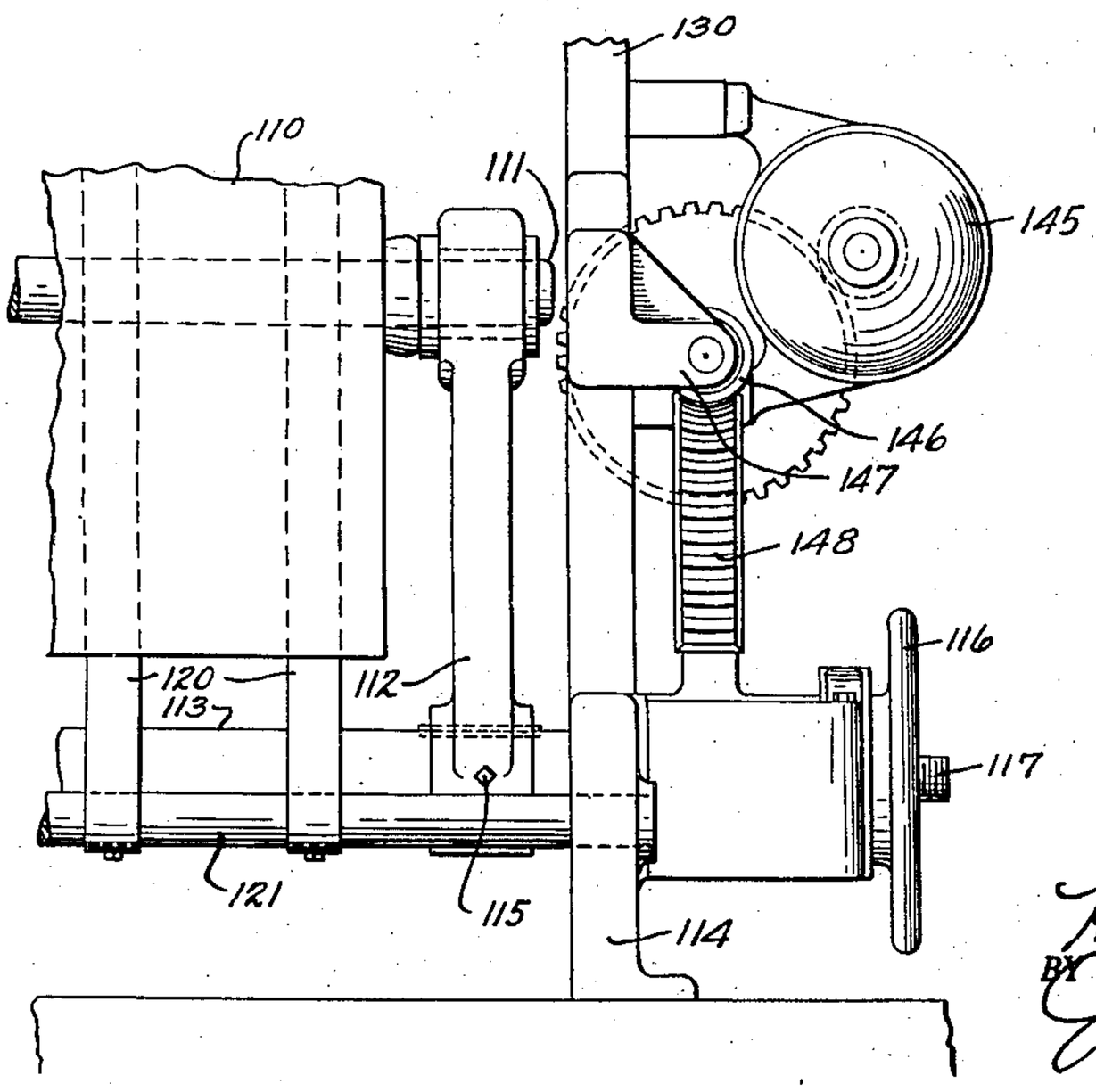


Fig 7



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WEB CONTROLLING MECHANISM

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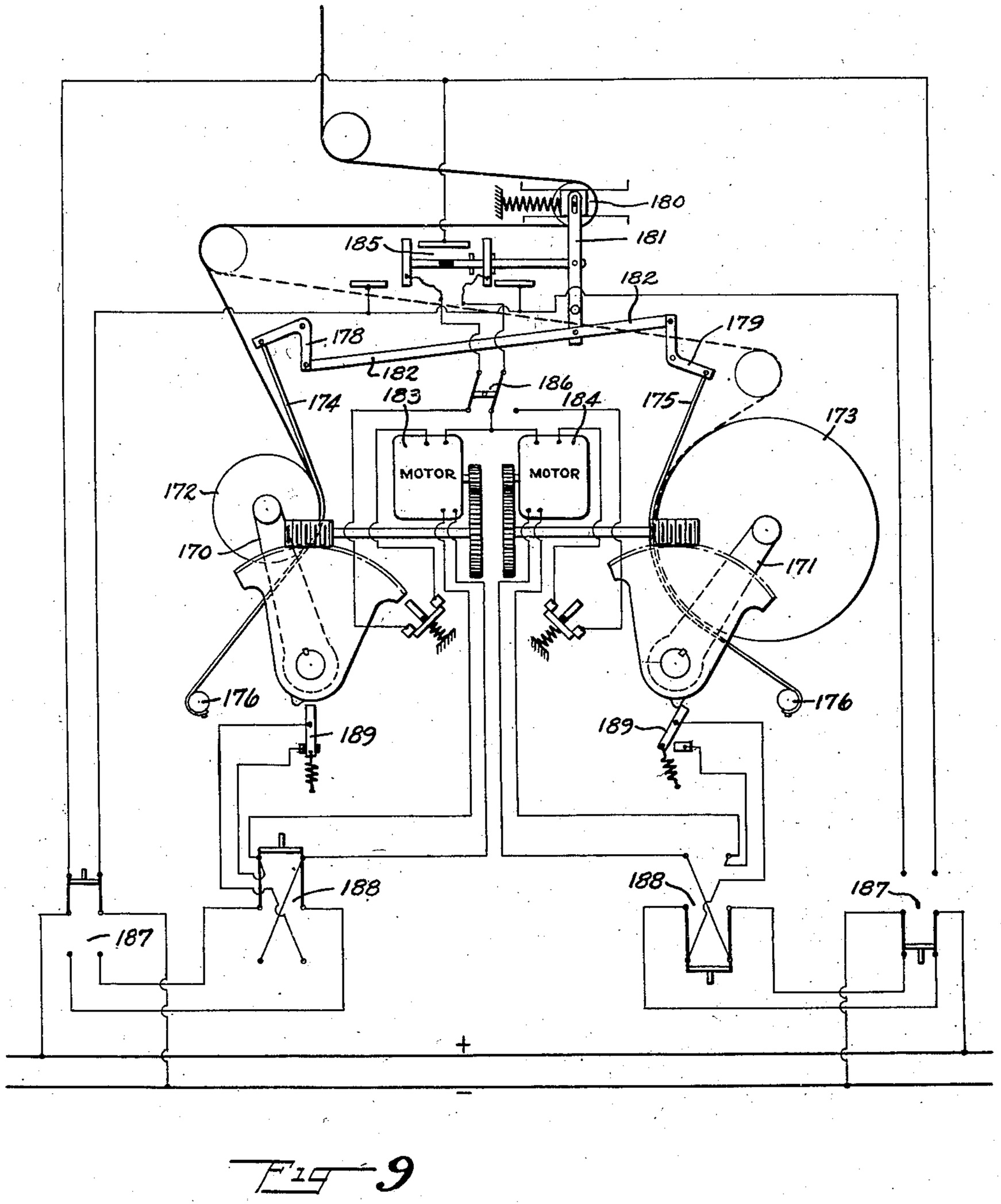

Fig 9

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Patented Feb. 14, 1933 1,897,504

UNITED STATES PATENT OFFICE

HARLAND FANKBONER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE GOSS PRINTING PRESS COMPANY, A CORPORATION OF ILLINOIS

WEB CONTROLLING MECHANISM

Application filed December 4, 1929. Serial No. 411,472.

This invention relates to novel and improved web controlling mechanism and more particularly to mechanism for automatically controlling the tension of a web as it is drawn from a web roll and fed to a web using machine, such as a printing press.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, construction, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:

Fig. 1 is a side elevation of an illustrative embodiment of the invention;

Fig. 2 is a front elevation of the mechanism shown in Fig. 1 and looking from the left of Fig. 1;

Fig. 3 is a fragmentary detail horizontal section taken on the line 3—3 of Fig. 1;

Fig. 4 is a detailed fragmentary section taken on the line 4—4 of Fig. 3;

Fig. 5 is a diagram illustrating the electrical connections of the mechanism shown in Fig. 1;

Fig. 6 is a side elevation of mechanism illustrating a modified form of the invention;

Fig. 7 is a fragmentary front elevation of a portion of the mechanism shown in Fig. 6;

Fig. 8 is a diagram showing the electrical connections of the mechanism illustrated in Fig. 6; and

Fig. 9 is a diagrammatic side elevation of a further modification for use in connection with a plurality of web rolls.

The present invention has for its object the provision of a web tension controlling mechanism by which the tension of the web, as it is drawn from the web roll and fed to the web using machine, such as a printing press, can be accurately and continuously controlled, and maintained substantially constant.

The present invention also provides a web controlling mechanism by which the web tension is controlled by a braking force preferably applied directly to the periphery of the web roll, the braking force applied to the periphery of the web being instantly responsive to the tension of the web and constantly controlled by the tension of the web as it is fed from the web roll to the printing press or other web using machine.

A further object of the invention is the provision of a web controlling mechanism by which the braking force applied to the web roll can be sufficiently increased to quickly stop the rotation of the web roll, in the event that the web breaks, or the printing press is brought to a stop, thereby dissipating the momentum of the web roll and preventing the unrolling of large quantities of the web.

According to the present preferred embodiment of the invention, the web roll, from which the web of paper or similar material is fed to the printing press or other web using machine, is rotatably supported adjacent to the web using machine and rotates with the periphery of the web roll in contact with a stationary friction member, such as a flexible belt, causing a drag on the surface of the web roll and producing the necessary web tension. Means are also preferably provided for varying the pressure with which the friction member is pressed against the periphery of the web roll, and as embodied there is provided a pilot roller, suitably connected with the friction member and placed between the web roll and the web using machine and around which the web is looped as it is fed from the web roll to the printing press or other web using machine, so that variations in the tension of the web cause corresponding variations in the position of the pilot roller, the movement of which is transmitted to the friction members to vary their pressure against the periphery of the

web roll and thereby control the tension of the web.

Means are also preferably provided for automatically maintaining the flexible belts or other friction members in engagement with the periphery of the web roll, so that as the web roll wears down during the operation of the web using machine the flexible belts will continue to exert the web roll braking force. In one of the present embodiments, one end of the flexible friction belts is attached to a rotatable roller connected with a motor to rotate the roller winding up or unwinding the belts from the roller, the movement of the motor, and consequently of the roller and belts, being controlled by the tension of the web as it is fed to the web using machine. Means are also provided for controlling the movement of the motor-driven roller, so that abrupt or abnormal changes in the tension of the web will operate the motor driven roller to decrease the web tension in case the web tension becomes too great, or will operate to quickly increase the web tension in case the web breaks, or the web using machine is stopped. Means are also preferably provided for preventing the belt controlling motor being brought into operation by small changes in the tension of the web, thereby preventing "hunting" of the motor and providing a more stable system than would otherwise be the case.

Means are also preferably provided for manually controlling the operation of the motor to permit the mechanism to be readily brought to any desired position or adjustment, and for manually positioning the web roll in starting position. Preferably, and as embodied, means are provided whereby the pressure exerted by the friction members on the web roll is automatically limited and can never exceed a predetermined value, thereby preventing excessive operation of the belt controlling motor and consequent injury to the mechanism.

According to a modified embodiment of the invention, means are provided for minutely and continuously controlling the tension of the web, as it is fed from the web roll to the printing press, by means of a pilot roller directly connected with the friction members engaging the periphery of the web roll, and other means are provided for automatically moving the web roll toward and away from the friction members to vary the force with which it is pressed against the friction members, thereby maintaining the web roll in engagement with the friction members, maintaining the braking force and the web tension substantially constant under normal operating conditions, at the same time providing for relatively large variations in the braking force to compensate for abnormal operation conditions.

Preferably, and as embodied, the automatic movement of the web roll is controlled by the tension of the web, through the medium of the pilot roller, and means are provided for quickly increasing the braking force applied to the periphery of the web roll to stop the rotation of the web roll in case the web breaks or the web using machine is brought to a stop. Other means are provided for manually controlling the position of the web roll, for initially positioning the web roll supporting members, and for moving them from their position at the time a web roll is exhausted to their position for the reception of a new web roll, and means are preferably provided for automatically limiting the movement of the web roll for preventing its movement beyond predetermined positions.

In this modified embodiment of the invention, means are provided whereby the braking force is automatically limited and only a predetermined amount of pressure can be exerted between the friction members and the web roll.

The present invention, although principally shown for use in connection with a single web roll, can be easily adapted for use in connection with a plurality of web rolls to control the braking force applied to the web rolls and the tension of the web as it is alternatively drawn from one of the plurality of web rolls.

The remaining objects and features will be set out later in connection with the detailed description, and it will be understood that the foregoing and also the following description is explanatory and examplary and is not restrictive of the invention.

Referring now in detail to the present preferred embodiment of the invention as illustrated by Figures 1 to 5 of the accompanying drawings, a web roll of paper or other similar material for supplying the printing press or other web using machine, is provided and may be of the desired width, either "four pages" wide or of fractional width, dependent on the product to be produced by the printing press. Web roll 10 is rotatably supported adjacent to and preferably parallel with the printing cylinders of the printing press by means of shaft 12, passing through the axial aperture of the web roll, and rotatably journalled at either end in bearings 14 formed at the upper ends of web roll supporting arms 15 and 16 mounted on supporting shaft 17 extending transversely of the web using machine. Web roll supporting arms 15 and 16 are preferably slidably keyed to supporting shaft 17 by means of keys 18. Supporting shaft 17, extending transversely of the press frame, is rotatably mounted near its ends in the side frames 19 of the printing press or other web using machine and the web roll supporting arms 15 and 16 are re-

leasably held in the desired relation with respect to the side frames of the press and axially of the shaft 17 by means of set screws 20, which releasably clamp the lower ends of the web roll supporting arms to the supporting shaft 17. When fractional width web rolls are employed either or both web roll supporting arms 15 and 16 can be moved closer together to accommodate the fractional width web rolls and to position these rolls at the desired place relative to the side frames 19 and the printing cylinders of the press. Preferably the web roll supporting arms are so positioned axially of their supporting shaft that the distance between them is only slightly more than sufficient to accommodate the width of the web rolls and the bungs 21 at either end of the web roll, thereby preventing endwise movement of the web roll as it rotates.

For raising and lowering the web roll 10, as it is rotatably supported by means of the web roll supporting arms 15 and 16 and supporting shaft 17, there is provided a hand crank 22 rotatably mounted at the outer side of upright 19 of the side frame of the press and fastened to bevel gear 24 by means of stub shaft 26. Bevel gear 24 meshes with a second bevel gear 27, connected with worm 28 by means of shaft 29 rotatably journalled on the side frame 19 of the press by means of bearings 30 formed in the laterally extending bracket 31. Worm 28 meshes with worm gear segment 33 keyed to supporting shaft 17 and concentric therewith, and as hand crank 22 is moved, worm 28 and worm gear 33 are driven to raise or lower the web roll supporting arms 15 and 16 as well as the web roll rotatably supported thereby.

Preferably, means are provided for registering the web drawn from the web roll with the web using machine, and in the present embodiment, means are provided for axially moving the web roll supporting arms in unison from one side of press frame toward the other. In the illustrative embodiment, one end of the supporting shaft 17 is provided with a screw threaded extension 40, axially alined therewith, and threadedly engaging a collar 41 rotatably mounted in housing 42 at the side of the press frame, the collar being held against axial movement by means of an annular member 43, rigid with respect to the side frame 19 and engaging a groove 44 in the collar 41. Supporting shaft 17 is slidably keyed to the segmental worm gear 33, and the segment is held against axial movement by means of the outside of the side frame 19 and the inner face of collar 41, between which the hub of the segmental worm gear 33 is closely fitted. At its outer end, collar 41 is provided with an integral hand wheel 46 by which collar 41 can be easily turned to pull the supporting shaft towards the collar, or to push the shaft away from the collar, thereby effecting the desired axial movement of the web roll and registering the web with the printing cylinders of the press, as desired.

The tension on the web is created by the application of a braking force to the web roll as the web is unrolled and fed to the web-using machine, and in the illustrative embodiment, means are provided for pressing against and frictionally engaging the periphery of the web roll, and these means preferably comprise a plurality of flexible belts supported adjacent to and pressed into contact with the periphery of the web roll, the tension of the web being determined by the pressure with which they are pressed against the web roll. As embodied, there is provided a plurality, (preferably one for each page width of the web) of relatively narrow spaced-apart flexible belts 50, which may be conveniently formed of leather, textile fabric or thin strips of metal, extending transversely of the axis of the web roll and attached at their lower ends to an anchoring support located beneath the web roll, and at their upper ends to a movable support, the points of attachment of the flexible belts and the axis of the web roll preferably lying in substantially a straight line, so that the flexible belts can be stretched into contact with the periphery of even the smallest stub of a web roll.

In the preferred embodiment, the lower ends of the flexible belts are attached to rollers 52, and the upper ends of the belt are attached to shaft 54 by means of individual turnbuckles 55, thereby permitting the effective length of all the belts to be equalized so each will engage the periphery of the web roll with equal pressure. Shaft 54, to which the upper ends of the flexible belts are attached, is supported at its ends by bell cranks 56, rigidly secured in fixed relation to each other on shaft 57 journalled in brackets 58 extending from the upright members 19 at either side of the press frame.

Means are provided for automatically and continuously varying the pressure with which the friction members are pressed into contact with the periphery of the web rolls and for automatically controlling this pressure in accordance with the tension of the web as it is fed from the web roll to the printing press or other web using machine to keep the tension constant under normal operation conditions, and as embodied, the web 60 from the web roll 10 is passed over guide rollers 62 and 63, as it is fed to the printing press, and forms a loop around a pilot roller 65, between the web roll and the printing press, the pilot roller being movable in accordance with changes in the tension of the web and transmitting its motion directly to friction members 50 engaging the periphery of the

web roll to vary their pressure against the web roll. Pilot roller 65, mounted on shaft 66, is rotatably journalled by this shaft in bearing blocks 67 which are slidably mounted in the slideway 68 formed by parallel rails 69 extending from the upright portion 19 of the press frame and transversely of the pilot roller. The ends of the pilot roller shaft 66 extend slightly beyond the bearing blocks 67 and are engaged by the elongated slots 70 formed at the upper ends of levers 72 which are securely keyed to the ends of shaft 73 journalled at the side of uprights 19, to hold the levers in fixed relation to each other for simultaneous and uniform movement, thereby preventing either end of the pilot roller 65 from moving to a different extent than the other end of the roller. Pilot roller 65 is connected with the flexible belt supporting shaft 54, and the movements of the pilot roller are transmitted to the belts 50 by means of links 75 pivotally connected with and extending between the lower ends of the levers 72 and the depending portions of the bell cranks 56.

For normally positioning the pilot roller, and for opposing the tension of the web as it passes around the pilot roller, there is preferably provided a relatively long compression spring 78 at each end of the pilot roller 65 and held in place between one end of each slideway 68 and the bearing block 67 of the corresponding end of the pilot roller. As the tension on the web is increased, spring 78 is compressed and a diminution in the tension of the web permits the springs to move the pilot roller 65 in the opposite direction. In Figures 1 and 5, the pilot roller is normally moved to the left by the tension of the web and against the compression of spring 78 as it passes from the web roll to the printing press, the position of the pilot roller being always determined by the balancing of the web tension against the compression spring. A movement to the left of the pilot roller 65 results in a lowering of the upper ends of the flexible belts 50 and a corresponding decrease in the braking force applied to the periphery of the web, and a movement to the right of the pilot roller similarly causes an increase in the pressure between the flexible belts and the periphery of the web roll.

Means are provided for maintaining the friction members, or flexible belts in operative contact with the periphery of the web roll and pressing thereagainst so that they will respond to the movements of the pilot roller to automatically vary the tension of the web under abnormal conditions, or to automatically maintain the tension of the web substantially constant under normal operating conditions. These means are also operative to produce relatively large changes in the braking force to meet the needs of abnormal operating conditions, such as arise when the web is broken. As embodied, the lower ends of the flexible belts 50 are securely fastened to the periphery of rollers 52 rotatably mounted directly underneath the web roll and are adapted to be wound on and unwound from the web roll by the turning thereof. Rollers 52 are mounted on shaft 81 one end of which is securely fastened to worm gear 80 meshing with worm 82, rotatably supported on shaft 83, journalled in brackets 84, and driven by a reversible motor 85, connected directly therewith. This operation of motor 85 is controlled by the tension of the web as it is drawn from the web roll, and preferably through the medium of pilot roller 65. In the present embodiment, pilot roller 65 is connected with a reversing switch 87 by means of switch actuating rod 88, pivotally connected with the lever 72, and as pilot roller is moved by the action of the compression springs 78, or by the tension of the web, the switch actuating rod 88 is similarly moved back and forth to move the motor switch 87 to circuit closing, opening or reversing position.

Motor controlling switch 87 may be of any convenient and suitable form, and is shown as comprising a pair of spaced contacts 89 and 90 connected to one side of the power line 91, and a third contact 92, intermediate the first two, and connected to the other side 93 of the power line. The two leads 94 and 95 to the reversible motor are connected to contacts 96 and 97 movable by rod 88 and are adapted to contact with contact 89 and contact 92 or 92 and 90 respectively, thereby determining the direction of rotation of the motor. Contacts 89, 90 and 92 are suitably spaced so that they will normally be out of contact with movable contacts 96 and 97. As pilot roller 65 is moved to the left (Figures 1 and 5), motor 85 is driven to unwind the ends of flexible belts 50 from rollers 52, and as the tension slackens and spring 78 moves pilot roller 65 to the right, motor 85 is reversely operated to wind up the lower ends of the flexible belts on the rollers, thereby increasing the pressure exerted between flexible belts 50 and the periphery of the web roll 10, and pulling pilot roller 65 back to its normal position and moving the contacts 96 and 97 to open circuit position.

To reduce the frequency of operation of the motor, and prevent "hunting", by rendering the motor controlling switch less sensitive to small changes in the web tension, movable contact 97 is loosely mounted with respect to switch actuating rod 88, and can slide on rod 88 between pins 99 and 100. In this manner, pilot roller 65 is free to move a considerable distance without changing the operative relation of contacts 97 and 90, or 97 and 92, and when the motor is energized, it is held on until pilot roller 65, and the length of flexible belts 50, have been moved somewhat more than is necessary, the excess

change being taken care of by suitable movement of the pilot roller. Specifically, as pilot roller 65 moves to the left to slacken the tension of the web, contact 97 is moved into contact with contact 92 by means of pin 100, thereby energizing the motor 85, and the motor continues to unwind the lower ends of flexible belts 50 until the web is sufficiently slackened to allow the pilot roller to move to the right a sufficient distance to cause pin 99 to move contact 97 away from contact 92. This tends to more stable operation and allows small changes in web tension to be compensated for by the pilot roller acting alone and directly on the belts, reserving the operation of the motor for larger changes in web tension, and for movement of the belts to keep them in contact with the periphery of the web roll as the roll is worn down.

As embodied, the above-described mechanism also provides for automatically stopping the operation of the motor 85, after it has increased the pressure between the friction members 50 and the periphery of the web roll a predetermined amount, thereby preventing the building up of a too great pressure which might result in damage to the mechanism. This function of the apparatus is particularly desirable inasmuch as it allows the web roll to be stopped very rapidly when the web breaks, and at the same time limits the operation of belt controlling motor 85 by the pressure exerted by the belts. With the present form of the mechanism, a break in the web allows spring 78 to throw the pilot roller to the right, connecting contacts 96 and 92 and contacts 97 and 90, thereby energizing the motor to wind up the lower end of the belts and increase the braking force applied to web roll 10. At the same time, the upper end of the friction belts is pulled upward by bell-cranks 56 to increase the braking force tending to stop the rotation of the web roll, and this combined action quickly stops the rotation of the web roll. As motor 85 continues to rotate, the flexible belts 50 are wound up on rollers 52, and when the pressure between them and web roll 10 exceeds a predetermined amount, flexible belts 50 pull down on bell crank 56 and move pilot roller 65 to the left, thereby opening the motor circuit and preventing further increase in the belt tension.

Manually operable means are provided for controlling the belt tensioning motor, permitting the flexible belts to be wound or unwound on the roller independently of the operation of the pilot roller, this portion of the mechanism finding its principal use in connection with the initial setting of the flexible belts during the replacement of an exhausted web roll with a new web roll. In the present embodiment, there is provided a manually operable double-pole double-throw switch 102 by which the pilot roller controlled switch 87 can be cut out of the motor circuit and the power fed directly to motor 85, the direction of rotation of the motor being controlled by the manually operable reversing switch 103. Preferably, and as shown, the manually operable switches 102 and 103 are mounted on the side frame 23 of the press where they can be conveniently reached by the operator during the web roll replenishing operations.

Figures 6 to 8 illustrate a modified embodiment of the invention in which the web roll is automatically raised and lowered to vary the pressure exerted by the flexible belts against the periphery of the web roll, and the flexible belts are preferably controlled only by the pilot roller acting directly on one end of the flexible belts.

In this embodiment of the invention, the web roll 110 is rotatably supported at one end of the press frame by means of web roll shaft 111 rotatably journalled in the web roll supporting arms 112, slidably keyed to the supporting shaft 113, which, in turn, is rotatably mounted in the side frames 114 of the printing press, or other web-using machine. Supporting arms 112 are releasably held in their adjusted position by means of set screws 115 which can be released to allow the arms 112 to be moved axially of supporting shaft 113 to accommodate web rolls of different widths. A hand wheel 116, cooperating with suitable threaded means 117, similar to that already described in connection with the foregoing modification, is also provided for laterally registering the web with the printing cylinders of the printing press as the web is fed from the web roll.

For tensioning the web as it is fed from the web roll to the printing press or other web-using machine, there are provided a plurality of spaced apart friction members, such as flexible belts 120 engageable with the periphery of the web roll 110 and securely fastened at their lower ends to the anchor shaft 121 located directly beneath the web roll. At their upper ends, flexible belts 120 are individually fastened to shaft 123, extending across the machine and between side frames 114, by means of turn buckles 125, which allow the flexible belts to be individually adjusted to equalize their length and the pressure with which each presses against the periphery of the web roll.

For continuously and minutely controlling the pressure exerted by the flexible belts against the web roll in accordance with the tension of the web and thereby rendering the tension of the web substantially constant, the flexible belts 120, are directly connected with pilot roller 127 for movement thereby. Pilot roller 127 is rotatably journalled at its ends in bearing blocks 128 slidable along slideway 129 extending outwardly from the upright 130 of the press frame 114, and the ends of the roller shaft 132 fit within the slot 133 at

the upper end of either lever 134 keyed to and pivotally mounted by shaft 135 extending transversely of the press frame.

Links 136 are pivotally connected with the lower ends of levers 134 and extend to and are pivotally connected with the lower ends of bell cranks 137, keyed to and pivotally mounted in brackets 138 on the side frames of the press by means of shaft 140. Bell cranks 137, at their outer ends, carry the flexible belt-supporting shaft 123 and raise or lower the upper ends of flexible belts 120 in accordance with the movement of pilot roller 127. For opposing the action of the web tension, as the web passes around the pilot roller in going to the printing press or other web-using machine, there are provided compression springs 141 fastened in the slideways 129, between the bearing blocks 128 and the ends of the slideways adjacent to the press frame 130, thereby normally tending to move pilot roller 127 to the right, while the tension of the web tends to move the pilot roller to the left.

Means are provided for normally maintaining the web roll in contact with the flexible belts and pressing against the flexible belts with sufficient force to effect the necessary and desired braking action on the web roll, and, as embodied, there is provided a web roll controlling motor 145 geared to worm 146 and mounted on the upright 130 of the press frame. Worm 146 is rotatably journalled in bearings 147 attached to the side frame of the press and meshes with a segmental worm gear 148 keyed to the supporting shaft 113 on which the web roll is supported by arms 112, and as motor 145 rotates, arms 112 and the web roll are raised or lowered, dependent on the direction of rotation of the motor.

Means are provided for controlling the rotation of the web roll controlling motor 145, to raise the web roll 110 as the roll wears down and thereby keep the web roll in contact with the flexible belts 120, or for lowering the web roll to slacken the tension on the web, should it become too great. As embodied, there is provided a motor controlling and reversing switch 149 directly connected to pilot roller 127 by switch actuating rod 149′, and movable thereby to close or open the motor circuit or to reverse the motor in accordance with the web tension. This motor controlling and reversing switch may be generally the same as that previously described in connection with Figure 5, and preferably comprises a pair of spaced apart contacts 150, 151 connected with one side of the power line 152, a third contact 153 connected with the other side of the power line 152, and a pair of movable contacts 154 and 155 connected with the motor leads 156 and 157 and movable into and out of contact with contacts 150, 151 and 153, to open, close or reverse the motor circuit. For preventing the operation of the motor with undue frequency, and for rendering the motor switch less sensitive, one of the movable contacts (155) is preferably loosely and slidably mounted with respect to the actuating rod 149 and moved by pins 158, as previously described.

As with the previously described modification, motor 145 is self-controlling and in case of a break in the web, causing a sudden movement of the pilot roller to the right, the motor will operate to raise the web roll and increase the pressure between the web roll and flexible belts 120, and on further operation, will exert a downward pull on bell cranks 137 until the pilot roller has been sufficiently moved to the left to open the motor circuit and stop the motor.

For limiting the upward movement of the web roll and for preventing the web roll being moved beyond a predetermined upright position, a cut out switch is provided in the motor circuit, adapted to be actuated by any movement of the web roll beyond a predetermined point. As embodied, there is provided a switch 160, in series with the motor circuit, and mounted on the side frame 114 of the press and having a pivoted actuating arm 161 extending into the path of the segmental worm gear 148 and adapted to contact therewith on excessive movement of the gear. By this construction, it is impossible for the motor to be energized whenever arm 161 is moved from its normal closed-circuit position.

As in the previously-described embodiment, means are provided for manually controlling and reversing the operation of the web roll positioning motor 145, and with the present embodiment, there is provided a double throw switch 163 in the motor circuit, by which pilot roller-operated switch 148 can be thrown out of circuit, and the power can be transmitted directly to motor 145, through reversing switch 165.

The present invention is readily adapted for use in connection with the tension control of a plurality of optionally usable web roll supports, to control the tension of the web as it is fed from one or the other of the web rolls. Figure 9 shows diagrammatically the general type of web tension control mechanism as applied to a web roll support for a pair of web rolls, the web being fed alternatively from one or the other of the web rolls.

As embodied, there are provided a pair of web roll supports 170 and 171 of the general type illustrated in Figures 6 to 8, these web roll supports being arranged adjacent to and parallel with each other, and each being adapted to rotatably support a web roll 172 and 173 of full or partial width.

For tensioning the web, as it is drawn from one of the web rolls, there are provided friction members, such as flexible belts 174 and 175, engaging the periphery of each of the

web rolls, the lower ends of these belts being securely fastened to a fixed support as at 176. The upper ends of the flexible belts are connected to bell cranks 178, and 179, which in turn are connected with the pilot roller 180 by means of pivoted lever 181 and link 182 to control the tension of the belts and the braking action on the web rolls in accordance with the tension on the web. For raising and lowering web rolls 172 and 173, there are provided motors 183 and 184 geared therewith and controlled by pilot roller-controlled switch 185 in the manner more fully pointed out above. For connecting either of the two motors with pilot roller controlled switch 185 and to provide the automatic control for the motor associated with the web roll from which the web is being drawn, there is provided a manually operable switch 186, in circuit with each of the motors and with the switch, and adapted to alternately connect switch 185 with either motor. Duplicate manually operable controlling and reversing switches 187 and 188 are provided, one for each motor, and can be operated to manually control the movement of the web rolls, or web roll supports 170 and 171 to bring them to the desired position. For automatically limiting the downward movement of the web roll by motor 183 or 184 there is provided a series switch 189 opened by extreme downward movement of the web roll supporting arms. After switch 189 has opened to stop motor 183 or 184 the manual switch can be thrown open and on closing switch 187, the web roll will be raised into contact with the flexible belts 174 or 175.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a web roll support, a web roll engaging friction member, a pilot roller connected to one end of the friction member and means for variably pressing the belt against the web roll and controlled by the pilot roller for maintaining the web tension constant including motor means for moving the web roll with respect to the friction member to maintain the web roll in engagement with the friction member.

2. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction belt engageable with the periphery of the web roll, a pilot roller connected to one end of the friction member and means, connected to the other end of the friction member, controlled by the pilot roller for variably pressing the belt against the web roll to maintain the web tension constant.

3. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction belt engageable with the periphery of the web roll a pilot roller connected to one end of the friction member and means controlled by the pilot roller for moving the web roll with respect to the belt.

4. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a friction belt engageable with the web roll, a pilot roller connected with the belt, a motor connected to the other end of the belt to press the belt against the web roll, means for controlling the motor by the roller, whereby the tension is controlled by the pilot roller.

5. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a friction belt engaging the periphery of the web roll to tension the web, motor means directly connected to said belt for relatively moving the belt and roll to press the belt against the roll and a pilot roller for variably pressing the belt against the web roll in accordance with the tension of the web to maintain the tension constant.

6. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a friction belt engaging the periphery of the web roll, a pilot roller moved by changes in the tension of the web, motor means controlled by the pilot roller for relatively moving the web roll into contact with the belt and a direct mechanical connection between the belt and pilot roller for variably pressing the belt against the web roll to maintain the tension constant.

7. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a friction member engaging the periphery of the web roll, a pilot roller movable in accordance with the web tension, means for progressively moving the friction member to maintain it in contact with the web roll as the web roll wears down, means for variably pressing the friction member against the web roll and directly controlled by the pilot roller to maintain the tension constant.

8. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a pilot roller, a friction belt engaging the periphery of the web roll and connected at one end to the pilot roller, and means connected to the other end of the belt and controlled by the pilot roller for variably pressing the belt against the web roll.

9. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, an intermittently energized motor for variably pressing the belt against the web roll and for

maintaining the web roll in engagement with the belt, and means operable to prevent the motor pressing the belt too tightly against the web roll.

10. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, an intermittently energized motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, and manually controlled means for energizing the motor to vary the relative position of the web roll and the friction belt.

11. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, an intermittently energized motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, a pilot roller controlling the motor, and manually controlled means for energizing the motor to vary the relative position of the web roll and the friction belt.

12. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, an intermittently energized motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, a pilot roller and means connecting the pilot roller and the belt for variably pressing the belt against the web roll to maintain the web tension constant.

13. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, a motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, a pilot roller controlling the motor, means connecting the pilot roller and the belt for variably pressing the belt against the web roll to maintain the web tension constant, and means operable to prevent the motor pressing the belt too tightly against the web roll.

14. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, a motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, a pilot roller controlling the motor, means connecting the pilot roller and the belt for variably pressing the belt against the web roll to maintain the web tension constant, and manually controlled means for energizing the motor to vary the relative position of the web roll and the friction belt.

15. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, a motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, a pilot roller, means connecting the pilot roller and the belt for variably pressing the belt against the web roll to maintain the web tension constant, and means for preventing operation of the motor with undue frequency.

16. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, a motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, a pilot roller controlling the motor, means connecting the pilot roller and the belt for variably pressing the belt against the web roll to maintain the web tension constant, means operable to prevent the motor pressing the belt too tightly against the web roll, and manually controlled means for energizing the motor to vary the relative position of the web roll and the friction belt.

17. In a mechanism for tensioning the web as it is drawn from a web roll, the combination of a stationary friction member engageable with the periphery of the web roll, a motor for variably pressing the belt against the web roll and for maintaining the web roll in engagement with the belt, a pilot roller controlling the motor, means connecting the pilot roller and the belt for variably pressing the belt against the web roll to maintain the web tension constant, means operable to prevent the motor pressing the belt too tightly against the web roll, manually controlled means for energizing the motor to vary the relative position of the web roll and the friction belt, and means for preventing operation of the motor with undue frequency.

18. In a web controlling mechanism, a web roll support, a friction belt to bear against the web roll and tension the web, a pilot roller moved by the web as the web is drawn from the web roll, a motor connected with the friction belt and controlled by the pilot roller and adapted to be energized on changes in web tension to move the belts and means directly connecting the pilot roller and belt to maintain the web tension substantially constant.

19. Web tension and controlling means including in combination means for rotatably supporting a rotatable web roll, friction belts engaging the periphery of the web roll to tension the web drawn therefrom, a pilot roller connected to one end of the friction belts and a motor controlled by the pilot roller and connected to the other end of the belts, said pilot roller and motor cooperating to maintain the belts in contact with the pe-

riphery of the web roll and to maintain the web tension constant.

20. Web tension and controlling means including in combination means for rotatably supporting a rotatable web roll, friction belts engaging the periphery of the web roll to tension the web drawn therefrom, a pilot roller connected to one end of the friction belts, a motor controlled by the pilot roller and connected to the other end of the belts, and manual means for controlling the motor.

21. Web tension and controlling means including in combination means for rotatably supporting a rotatable web roll, friction belts engaging the periphery of the web roll to tension the web drawn therefrom, a pilot roller connected to one end of the friction belts, a motor connected to the other end of the friction belts and means controlled by the pilot roller for intermittently energizing the motor to maintain the belts in contact with the web roll while the pilot roller maintains the web tension constant.

22. Web tension and controlling means including in combination means for rotatably supporting a rotatable web roll, friction belts engaging the periphery of the web roll to tension the web drawn therefrom, a pilot roller connected to one end of the friction belts, a motor connected to the other end of the friction belts, means controlled by the pilot roller for intermittently energizing the motor to maintain the belts in contact with the web roll and means for manually controlling the operation of the motor.

23. Web tension controlling means including in combination means for rotatably supporting a web roll, friction belts engaging the periphery of the web roll to tension the web drawn therefrom, a pilot roller connected to one end of the friction belts to vary the pressure between the belts and the web roll to maintain the tension constant and means controlled by the pilot roller for variably positioning the web roll to maintain the friction belts in contact with the web roll.

24. Web tension controlling means including in combination means for rotatably supporting a web roll, friction belts engaging the periphery of the web roll to tension the web drawn therefrom, a pilot roller connected to one end of the friction belts, means controlled by the pilot roller for variably positioning the web roll to maintain the friction belts in contact with the web roll, and manually controlled means for energizing the motor to slacken the belts.

25. Web tension controlling means including in combination means for rotatably supporting a web roll, friction belts engaging the periphery of the web roll to tension the web drawn therefrom, a pilot roller connected to one end of the friction belts, means for variably positioning the web roll and means controlled by the pilot roller for intermittently energizing the web roll positioning means, whereby the belts are maintained in contact with the web roll and the web tension is maintained constant.

In testimony whereof, I have signed my name to this specification.

HARLAND FANKBONER.