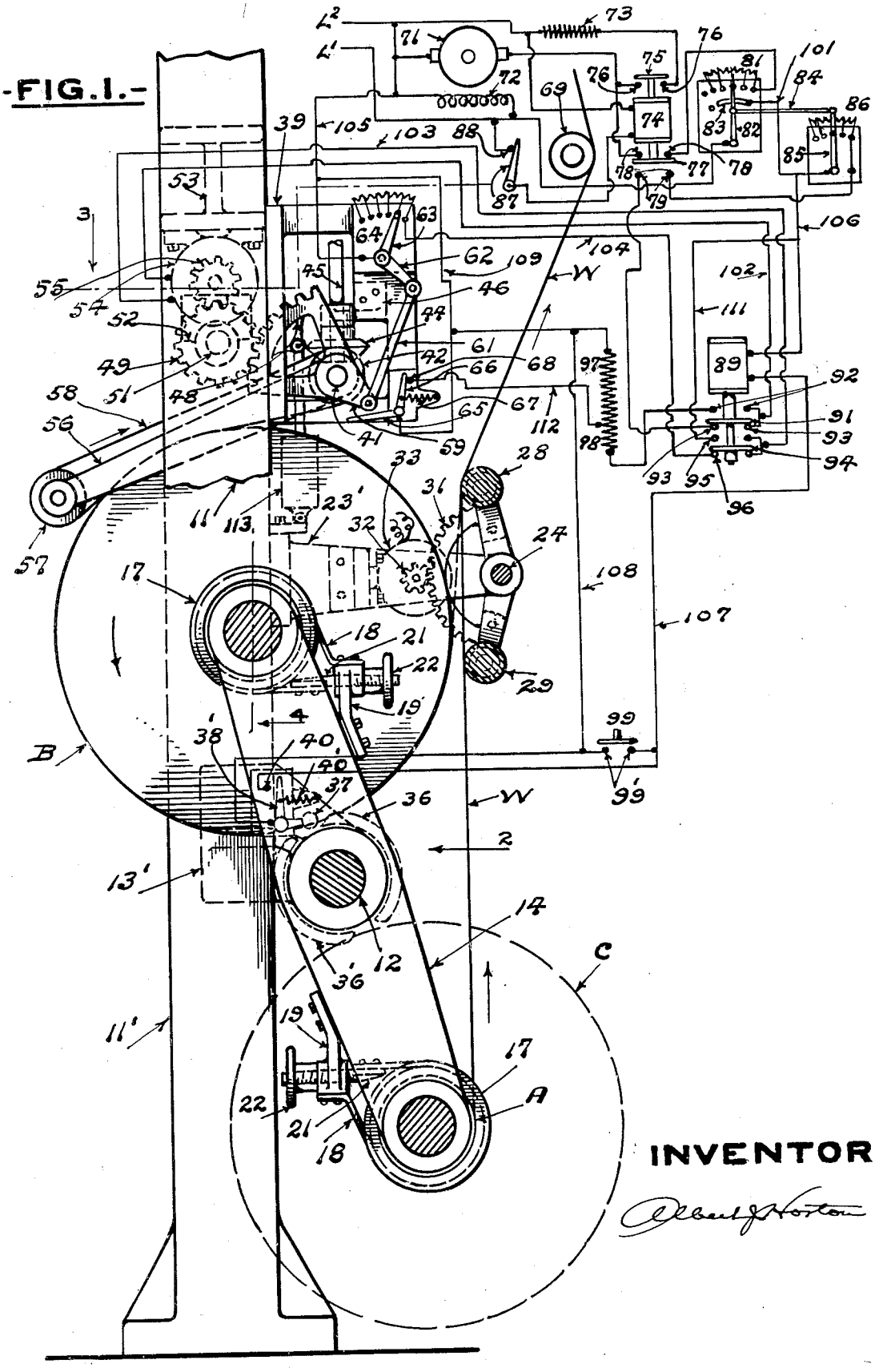
July 17, 1934. A. J. HORTON 1,967,056

WEB SUPPLY MECHANISM FOR PRINTING MACHINES

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-FIG. 1.-



INVENTOR

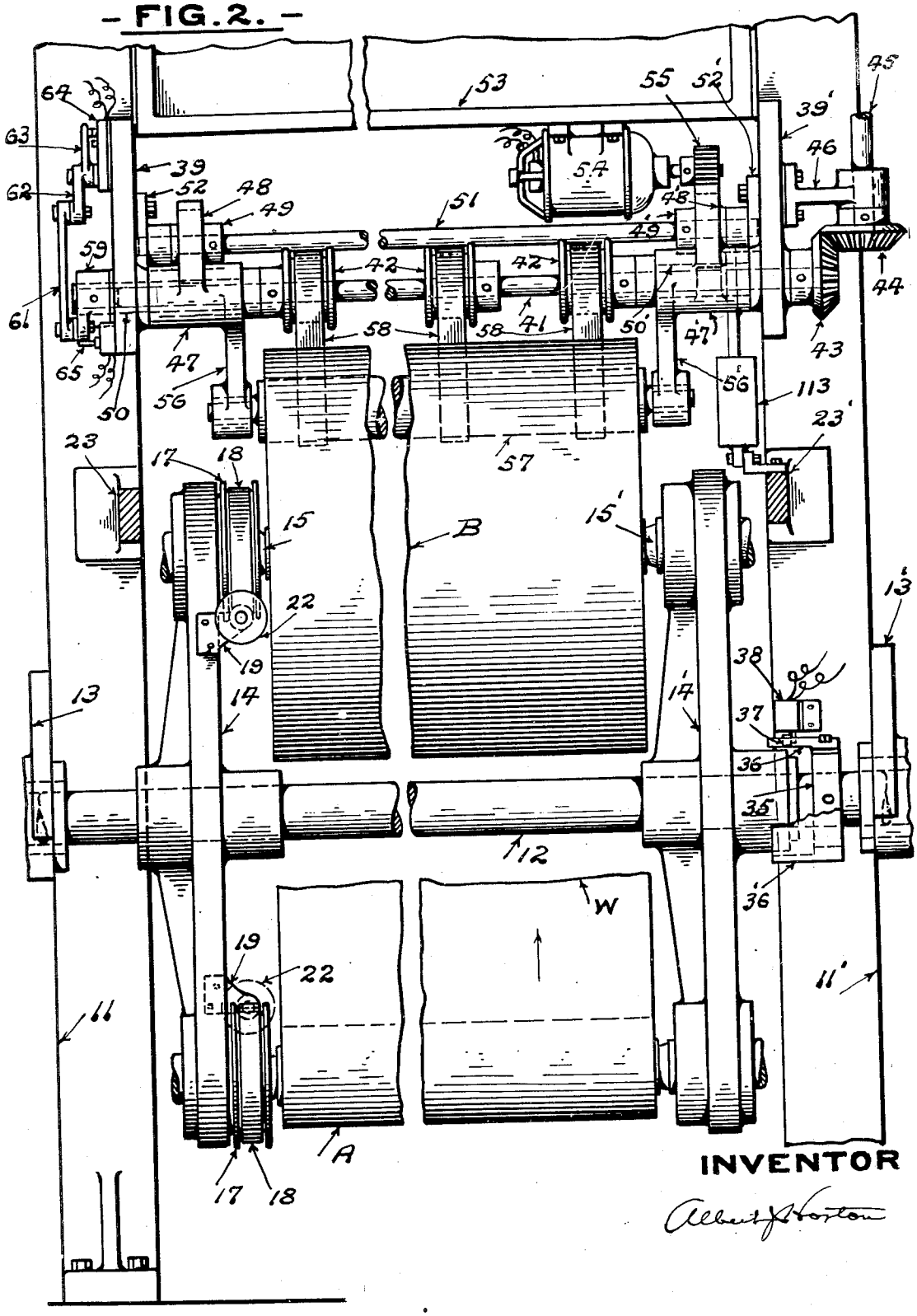
Albert J. Horton

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WEB SUPPLY MECHANISM FOR PRINTING MACHINES

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- FIG. 2. -



INVENTOR

Albert J. Horton

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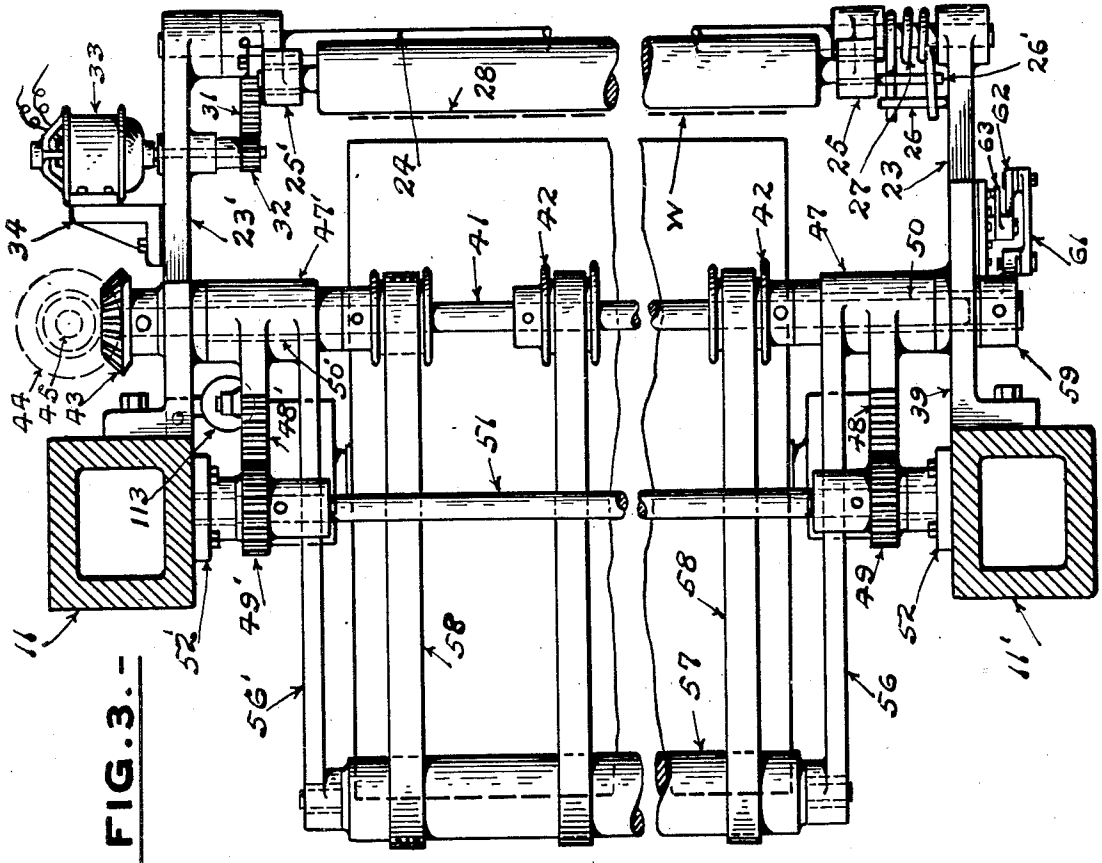


FIG. 3.

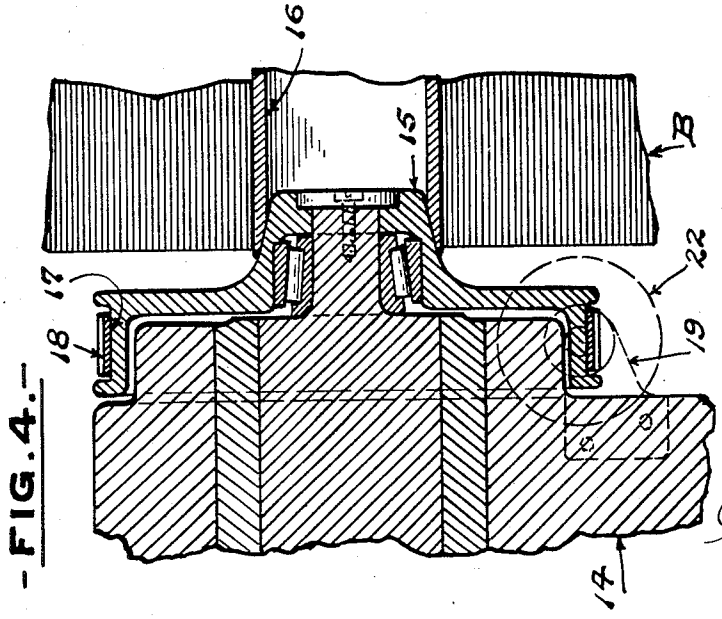


FIG. 4.

INVENTOR

Albert J. Horton

Patented July 17, 1934 1,967,056

UNITED STATES PATENT OFFICE

1,967,056

WEB SUPPLY MECHANISM FOR PRINTING MACHINES

Albert J. Horton, White Plains, N. Y., assignor to R. Hoe & Co., Inc., New York, N. Y., a corporation of New York, Irving Trust Company, receiver

Application January 15, 1932, Serial No. 586,798

16 Claims. (Cl. 242—58)

The present invention relates to web supply mechanism, adapted for use with machines operating upon a web, such as high speed printing machines, with which it is desirable to provide means for continuously feeding a web to the machine and avoiding stops incident to changing the feed of the web from an expiring roll to a replacement roll.

An object of the invention is to provide an improved method and means for controlling and replacing web rolls, that will provide a continuous web feed and will automatically control the rotation of the roll when the machine is decelerated rapidly, the operation of the control being governed by the running speed of the machine and/or by the diameter of the running roll.

Another object of the invention is to provide a web supply mechanism having automatically actuated means adapted to accelerate a replacement roll to the speed of a running web preparatory to changing the feed to the replacement roll and thereafter to control the rotation of the then running roll while the web thereof is being fed to the machine.

It is also an object of the invention to provide a web joining mechanism adapted to bring the running web into contact with the surface of a reserve web roll without changing the length of the web path.

It is also an object of the invention to provide a web supply mechanism of generally improved construction, whereby the device will be simple, durable and relatively 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, it being understood that various changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

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

Figure 1 is a side view partly in outline and partly in section showing a web roll support to which the mechanism comprising the invention is applied, and showing a diagram of electrical connections;

Figure 2 is a front view of the mechanism shown in Figure 1, and as viewed in the direction of arrow 2 of that figure;

Figure 3 is a plan view of the mechanism as seen on the dotted line of Figure 1 and in the direction of arrow 3; and

Figure 4 is an enlarged fragmentary sectional view showing details of one of the web roll supporting cones.

Referring to the drawings, 11 and 11' indicate columns which may support a printing machine or other mechanism, not shown, that is adapted to operate on webs of paper or the like that is drawn from rolls. A shaft is indicated at 12, that is rotatable in bearings formed in brackets 13 and 13', that are secured to the columns 11 and 11'. 14 and 14' indicate arms suitably secured to the shaft 12 and provided with cones 15 and 15', rotatably supported in the arms 14 and 14' in accordance with well known practice. These cones are adapted to engage with cores 16, of web rolls A and B, as shown in the detail view Figure 4. Means that are well known in the art but are omitted in the drawings for the sake of clearness, will be provided for rotating shaft 12 in order to move the web rolls from loading to running and pasting position as will hereinafter be explained. The cones 15, as shown in Figure 4, are extended to form sheaves 17, which are engaged by brake bands 18, each having one end secured to an adjacent bracket 19 suitably fastened to the arm 14, and the other end to a threaded stud 21 that may be engaged by a hand nut 22, rotation of which acts to tighten or loosen the brake band on the sheave.

Brackets 23 and 23' are secured to the columns 11 and 11', and provide bearings for a shaft 24, to which arms 25 and 25' are secured. Pins 26 and 26' are secured respectively to the arm 25 and the bracket 23 and a spring 27 surrounds the shaft 24 and engages with the pins 26 and 26'. It will thus be understood that shaft 24 is spring biased to a definite position to which it will return if moved therefrom by rotating it in either direction.

A guide roller 28 and a pasting roller 29 are supported in the arms 25 and 25' and are thus normally held in the position shown in Figure 1 by the action of the spring 27. A segmental gear 31 is secured to the arm 25' and meshes with a pinion 32, secured to the shaft of a motor 33, mounted upon a bracket 34 which is secured to the bracket 23', the armature shaft of the motor being extended and supported in a bearing formed in the bracket 23'. A collar 35 is secured to the shaft 12 and carries cam members 36 and 36'

which are adapted to engage with a roller 37 on a well known form of electric limit switch 38. This switch may be of any suitable type and for simplicity is shown in diagrammatic form in Figure 1. It includes a contact arm 38' that is normally held disengaged from a contact 40 by means of a spring 40'.

Brackets 39 and 39', best shown in Figures 2 and 3, are secured to the columns 11 and 11' respectively and rotatably support a shaft 41, to which sheaves 42 are fastened by any suitable means. A bevel gear 43 is also secured to the shaft 41 and meshes with a mating gear 44, secured to a shaft 45, that is rotatably supported in bracket 46 secured to the bracket 39'. The shaft 45 may be connected to any suitable rotating member of the machine. Hubs 47 and 47' are loosely mounted on the shaft 41 and carry segmental gears 48 and 48', which mesh with gear wheels 49 and 49', secured to a shaft 51 that is rotatably supported in brackets 52 and 52', fastened to the columns 11 and 11'. Hubs 47 and 47' are provided with bearing bushings 50 and 50' secured thereto which provide bearings for the shaft 41. The bushing 50 is extended through the bracket 39. A cross frame member 53 is secured to the columns 11 and 11' and serves as a support for a torque motor 54, having a pinion 55 which meshes with the gear 49'. The hubs 47 and 47' also carry arms 56 and 56', which rotatably support a roller 57, that in turn supports belts or traction members 58 which pass around the sheaves 42.

The arms 56 and 56' are each supported at one end by the shaft 41, but their opposite ends are normally free to descend until the belts 58 rest on the roll B. The weight of the arms and the roller 57 thus causes the belts to be pressed against the roll with sufficient force to provide traction for rotating it.

An arm 59, is secured to the bushing 50 and is pivotally connected to one end of a link 61, the other end of which is pivotally connected to an arm 62, having a contact member 63, adapted to engage with contact points of a rheostat 64. A limit switch, which for clearness is shown in diagrammatic form, comprises an arm 65 adapted to engage with the arm 59 and a contact member 66, normally biased by a spring 67 into engagement with a contact 68.

A web guiding roller 69 is rotatably supported by means not shown, and acts to guide the web W in its path to the machine.

The mechanism comprising the invention is especially adapted for use with a motor operated machine having a controller, the circuits of which are very complicated, but for the sake of clearness, the circuits indicated herein are of elementary form, although to those versed in the art, they will fully disclose a means of operation.

A main driving motor for the machine is indicated at 71 with a field winding 72, and is provided with a dynamic brake resistance 73. A relay having a winding 74 is provided with a contact member 75, which is arranged to bridge contact points 76, and a contact member 77, arranged to alternately bridge contact points 78 and 79. A variable rheostat 81 provides means for regulating the speed of the motor 71 and is provided with a contact arm 82 and a contact 83, the purpose of which will be hereinafter explained. The contact arm 82 is mechanically connected by an insulating bar 84 with an arm 85 of a rheostat 86.

The switch 87 is adapted to engage with a contact 88 to control the starting and stopping of the motor 71.

A relay having a winding 89 is provided with a contact member 91, which engages with contact points 92 and 93 and also a contact member 94 arranged to engage with contact points 95 and 96. A resistance comprising sections 97 and 98 is included in the circuit with the relay contacts, and also a normally open push button shown diagrammatically at 99 and having contacts indicated at 99'.

In operation, the switch 87 will be closed to start the main motor, this being effected by completing the circuit from line L1 through the switch 87, to the solenoid winding 74, and thence to line L2. The solenoid being thus energized, the motor circuit is completed from line L1 to arm 82, rheostat 81, contacts 78, bridged by contact member 77, armature 71 to L2, the motor thus being run at a speed governed by the position of the arm 82 with relation to the rheostat 81. The motor can thus be started or stopped by operation of the switch 87, and when the switch is opened, the contact bar 77 will break the armature circuit at the contact points 78 and simultaneously, a dynamic brake connection will be made from one side of the armature 71, the L2 lead, brake resistance 73, contact points 76 which are bridged by the contact bar 75, and thus back to the armature 71. The shaft 12 which carries the roll supporting arms may be rotated by well known means, not shown, in order to bring the rolls from loading to running and pasting position. Thus, as shown in Figure 1, an exhausting roll is indicated at A with its web W in contact with rollers 29, 28 and 69. A replacement roll is indicated at B in engagement with the belts 58, and it is thus driven at a peripheral speed equivalent to that of the web W. The hand wheel 22 is adjusted to provide the proper tension on the web W which is thus held in contact with the rollers 28 and 29.

At the proper time, the circuit to the motor 33 is closed by means of a switch and connections which have been omitted from the drawings for clearness, and the shaft 24 is rotated clockwise, as seen in Figure 1 until the motor stalls, thus moving the roller 29 toward the replacement roll B and pressing the web W against the surface of the roll. An adhesive having been applied to the end of the web of the replacement roll B, in accordance with the usual practice, when the running web is pressed against the replacement roll, it adheres thereto and carries the replacement web forward to the machine, and the web of the expired roll may then be severed by any convenient means.

It will be noted that when the shaft 24 is turned to bring the web against the replacement roll that the roller 28 is moved backward when the roller 29 is moved forward. Thus, the length of the web path between the expiring roll A and the roller 69 is not altered and there is no tendency to either increase the tension on the web or to decrease it when the web is pressed against the replacement roll.

After the paste is made, the motor 33 is deenergized by opening the switch and the spring 27 acts to return the rollers to their normal position. The core of the expiring roll A is removed from the arms 14 and 14' and replaced by a new roll indicated by the dotted line C.

When the roll B nears exhaustion, the shaft 12 will be rotated to bring the roll B into the position of the roll A, as shown in Figure 1, and the

new roll C will then take the position of the roll B. It will be noted that after the running roll has decreased in diameter, it will be possible to turn the support without its path being obstructed by the roller 29, for when the running roll comes in contact with the roller 29, the roller will be forced backward out of the path of the roll, the spring 27 thus acting to allow the roller 29 to recede, and bringing it back into position again after the web roll has moved beyond it.

The brake bands 18 are adjusted by means of the hand wheels 22 to so control the roll as to provide the requisite tension on the web for satisfactory operation of the machine. The device disclosed herein is adapted for control of rolls, the webs from which are operated upon by machines that operate at high speed, and for such applications, it is necessary to provide additional braking action to check the speed of the roll when the machine is decelerated rapidly, as frequently happens in emergency conditions, and thus avoid unwinding excess material from the roll, it being also necessary to so control the roll that the proper tension will be maintained during the deceleration period.

The belts 58, which have heretofore been described as functioning to accelerate the replacement roll, are also used to control the roll when the machine is decelerated rapidly. This is accomplished by the motor 54 which acts to raise or lower the belts 58 with respect to the roll B as seen in Figure 1.

Assuming that the machine has been running under normal conditions and is to be stopped quickly, the switch 87 is opened, thus de-energizing the solenoid winding 74 and disconnecting the motor armature from the line, and simultaneously bridging the contact points 79 by means of the contact bar 77. This completes a circuit through the armature of motor 54 which may be traced from L1, contact arm 82, contact 83, conductor 101, to contact arm 85, rheostat 86, contacts 79 and 93, conductor 102 to motor 54, thence by conductor 103, contacts 96, conductor 104, rheostat 64, rheostat arm 63, and conductor 105 to L2, this connection acting to rotate the shaft 41 in a counter-clockwise direction until the motor stalls, thus pressing the belts 58 into close engagement with the web roll and causing the speed of the roll to be reduced in synchronism with the reduction in the speed of the machine. It will be understood that even though the motor is stalled it will produce a torque acting to press the belts firmly against the roll.

It will be noted that the circuit just described includes the rheostats 86 and 64. The contact arm of rheostat 86 is connected with the contact arm of rheostat 81 which controls the speed of the main driving motor, thus more or less of the resistance of rheostat 86 is included in the circuit of the motor 54 armature, depending on the speed at which the main motor is operated, and in consequence, when the machine is being operated at high speed, less of the resistance of rheostat 86 is included in the circuit of motor 54, and in consequence, greater pressure is produced on the belts 58, thus producing an increased brake action when the machine is decelerated from high speed.

The contact arm 63 of rheostat 64 being mechanically connected to the hub 47 will be affected by the position of the arms 56 and 56', Thus, when the roll B is of maximum size, as shown in Figure 1, but a small portion of the rheostat 64 will be included in the circuit of the motor armature of motor 54, but as the roll decreases in size, the arm 63 will be moved to include additional sections of rheostat 64 in the circuit and the torque exerted by the armature of the motor 54 will be correspondingly reduced under braking conditions, thus providing means for exerting relatively great braking pressure on the roll when it is of large diameter, and less pressure as the diameter decreases.

Mechanism for raising the belts out of the path of the replacement roll as it is brought to pasting position is provided, and operates by means of rotating the armature of the motor 54 in the reverse direction, thus rotating the shaft 41 clockwise. This action is caused by the operation of the push button 99 which closes contact points 99', the circuit being traced from line L1, arm 82, conductor 106, solenoid winding 89, conductor 107, contacts 99', conductors 108, 109 and 105 to line L2. The solenoid 89 thus being energized, will cause the contact bars 91 and 94 to respectively bridge the contacts 92 and 95, thus setting up a circuit through the armature of the motor 54 in the reverse direction from that previously described, the circuit being from line L1 to arm 82, conductor 106, conductor 111, contacts 95, conductor 103, through the motor 54, thence through conductors 102, contacts 92, resistance 98, conductor 112, contact point 68, switch 66 and conductors 109 and 105 to L2. The shaft 41 is thus turned clockwise to raise the arms 56, and when they have moved sufficiently to provide the necessary clearance for the roll to pass under the roller 57, the arm 59 engages with the arm 65 of the limit switch, moving the contact 66 away from the contact point 68, introducing resistance 97 in series with the motor armature. This resistance may be sufficient to stall the motor, although still maintaining sufficient torque to hold the arms 56 and 56' in the raised position. The hubs of the gears 49 and 49' are extended as shown in Figure 3 and act as stops to positively limit the upward movement of the arms 56 and 56'.

It will be understood that the push button 99 is normally open and must be closed by the operator. In practice, this circuit would be interconnected with the controller of a motor used to rotate the shaft 12, these circuits being omitted from the drawings for the sake of clearness, as they form no part of the present invention.

Assuming the shaft 12 to be suitably rotated to bring a replacement roll into the position of the roll B in Figure 1, the push button 99 or an equivalent circuit would be closed to raise the belts 58 as the roll B is moved toward the pasting position. The cam 36' would be brought into engagement with the roller 37 which operates the switch arm 38', bringing it into contact with the contact point 40, thus completing a circuit which parallels the circuit of the push button 99 and maintains the circuit through the solenoid winding 89 even though the circuit through the push button 99 is opened. Energy is thus supplied to the armature of the motor 54 until such time as the roller 37 meets a gap between the cams 36 and 36' when the switch arm 38' will open the circuit to the contact 40, thus de-energizing the solenoid winding 89 and interrupting the circuit through the armature of the motor 54. The belts will then be allowed to descend and bear on the roll B, as shown in Figure 1, the descent being checked by a dash pot indicated at 113.

From the foregoing description, it will be seen that a mechanism has been provided whereby

a replacement web roll may be rotated and accelerated to the speed of the web running from an expiring web roll, the web of the replacement roll may then be joined to the expiring web, and when the machine is stopped, means are provided for causing the web roll accelerating mechanism to control the deceleration of the roll in synchronism with the deceleration of the machine, this action being governed by the running speed of the machine and also by the diameter of the running roll.

What I claim is:

1. In a web supply mechanism for a machine operating upon a web, a rotatable support for a plurality of web rolls, a traction member adapted to rotate a web roll to accelerate it to the speed of a running web, and means acting with maximum force at the moment of application, to press the traction member firmly against the roll with which it is engaged when the machine is decelerated rapidly.

2. In a web supply mechanism for a machine operating upon a web, a driven traction member pressed against a web roll to accelerate it to the speed of a running web, and means to press the traction member against the roll with additional pressure when the machine is decelerated rapidly; said means acting to apply the additional pressure with maximum force at the moment of application.

3. In a web supply mechanism for a machine operating upon a web, a driven traction member adapted to rotate a web roll and accelerate it to the speed of a running web, and means to press the traction member against the roll with a pressure governed by the speed of the machine, to prevent the unwinding of excess web when the machine is decelerated rapidly.

4. In a web supply mechanism for a machine operating upon a web, a driven traction member adapted to rotate a web roll and accelerate it to the speed of a running web, and means to press the traction member against the roll when a web is being fed therefrom, with a variable pressure governed by the diameter of the roll, to prevent the unwinding of excess web when the machine is decelerated rapidlly; said means acting to apply the pressure with uniform force during the deceleration period.

5. In a web supply mechanism for a machine operating upon a web, a driven traction member adapted to rotate a web roll and accelerate it to the speed of a running web, and means to press the traction member against the roll when a web is being fed therefrom, with a variable pressure governed by the speed of the machine and the diameter of the roll, to prevent the unwinding of excess web when the machine is decelerated rapidly.

6. In a web supply mechanism for a machine operating upon a web, a support for a plurality of web rolls, a driven traction member adapted to rotate a replacement web roll and accelerate it to the speed of a running web, means controllable by movement of the support to raise the traction member to permit moving the replacement roll to pasting position and to lower the traction member into contact with the replacement roll to accelerate it.

7. In a web supply mechanism for a printing machine, a support for a web roll, a belt driven by the machine and adapted to engage the periphery of the roll to rotate it at substantially the web speed of the machine, a brake acting to resist rotation of the roll when it is being unwound and thereby provide normal running web tension, means to press the belt into firm engagement with the roll when the machine is decelerated to resist the momentum of the roll, and means for automatically regulating the belt pressure from a relatively high pressure when the machine is decelerated from a high running speed, to a relatively lower pressure when the machine is decelerated from a slower running speed.

8. In a web supply mechanism for a printing machine, a rotatable support for a running web roll and a replacement web roll, a belt driven by the machine and adapted to engage the periphery of the replacement roll to rotate it at substantially the web speed of the machine, means for holding the belt raised as the replacement roll is moved to running position, means operated by rotation of the support for releasing the belt when the replacement roll reaches running position, a brake acting to resist rotation of the roll when it is being unwound and thereby provide normal running web tension, means to press the belt into firm engagement with the roll when the machine is decelerated to resist the momentum of the roll, and means for automatically regulating the belt pressure to apply a relatively high pressure to a large diameter roll and less pressure to a smaller roll.

9. In a web supply mechanism for a printing machine, a support for a web roll, a belt driven by the machine and adapted to engage the periphery of the roll to rotate it at substantially the web speed of the machine, a brake acting to resist rotation of the roll when it is being unwound and thereby provide normal running web tension, means to press the belt into firm engagement with the roll when the machine is decelerated to resist the momentum of the roll, means for automatically graduating the belt pressure from a relatively high pressure when the machine is decelerated from a high running speed, to a relatively lower pressure when the machine is decelerated from a slower running speed, and means for automatically graduating the belt pressure to apply a relatively high pressure to a large diameter roll to less pressure to a smaller roll.

10. In a web supply mechanism for a printing machine having a motor and controller, a support adapted to hold a web roll and advance it from loading position to running position, a belt supported on rotating elements driven by the machine, and adapted to engage the periphery of the roll to rotate it at substantially the web speed of the machine, a reversible electric motor, and control mechanism for said reversible motor adapted to energize the motor for rotation in one direction to raise the belt while the roll is being advanced to running position and for rotation in the opposite direction to press the belt against the roll; said control mechanism being interconnected with the controller.

11. In a web supply mechanism, a support adapted to hold a web roll and advance it from loading position to running position, a belt supported on rotating elements driven by the machine, and adapted to engage the periphery of the roll to rotate it at substantially the web speed of the machine, a reversible electric motor, and control mechanism for said motor adapted to energize the motor for rotation in one direction to raise the belt while the roll is being advanced to running position and for rotation in the opposite direction to press the belt against the roll; said control mechanism being arranged to automatically vary the torque of the motor and there-

by exert a relatively heavy belt pressure on a large diameter roll and to exert a lighter pressure to a smaller diameter roll.

12. In a web supply mechanism, a support adapted to hold a web roll and advance it from loading position to running position, a belt supported on rotating elements driven by the machine, and adapted to engage the periphery of the roll to rotate it at substantially the web speed of the machine, a reversible electric motor, and control mechanism for said motor adapted to energize it for rotation in one direction to raise the belt while the roll is being advanced to running position and for rotation in the opposite direction to press the belt against the roll; said control mechanism being arranged to automatically vary the torque of the motor and thereby exert a relatively heavy belt pressure when the machine is decelerated from a high running speed and a lighter pressure when the machine is decelerated from a slower running speed.

13. In a web supply mechanism, a support for an expiring web roll and a replacement roll, a guide roller to which the web from the expiring roll runs, and a web shifting mechanism adapted to press the web of the expiring roll against the periphery of the replacement roll; said web shifting mechanism having engaging surfaces simultaneously engaging the web at two separate points and simultaneously movable whereby no substantial change is made in the length of the web path.

14. In a web supply mechanism, a support for an expiring web roll and a replacement roll, a guide roller to which the web from the expiring roll runs, and a web shifting mechanism adapted to press the web of the expiring roll against the periphery of the replacement roll without materially altering the length of the web path; said web shifting mechanism including two members simultaneously engaging the web one of which is moved away from the replacement roll when the other member is moved toward the roll.

15. In a web supply mechanism, a support for an expiring web roll and a replacement roll, a guide roller to which the web from the expiring roll runs, and web guiding means comprising two rollers engaging the web of the expiring roll and simultaneously movable to bring it against the periphery of the replacement roll without substantially changing the tension of the web.

16. In a web supply mechanism, a support for an expiring web roll and a replacement roll, a guide roller to which the web from the expiring roll runs, and web guiding means having two members engaging the web and supported to move simultaneously, whereby when one member is moved to press the web against the replacement roll the other member is moved in a direction away from the web and the length of the web path is substantially unchanged.

ALBERT J. HORTON.