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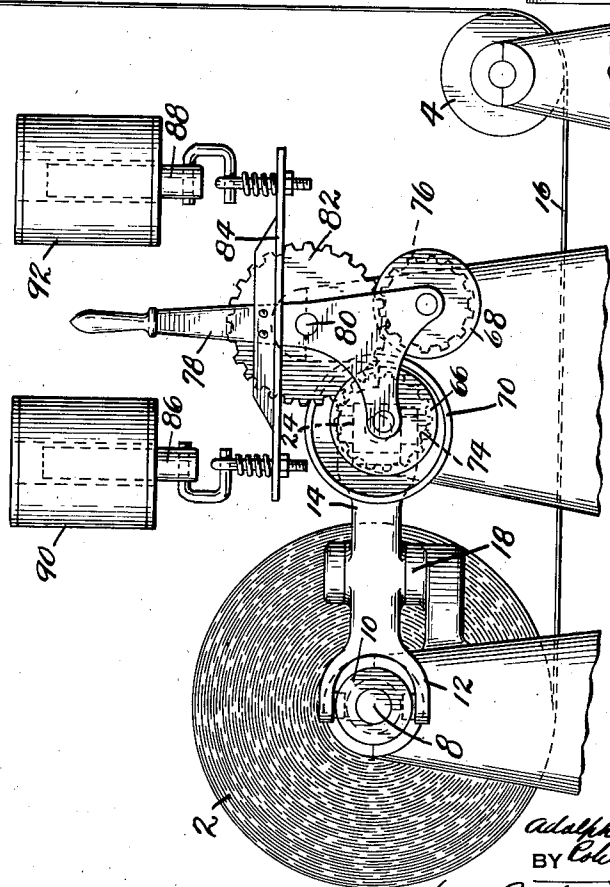
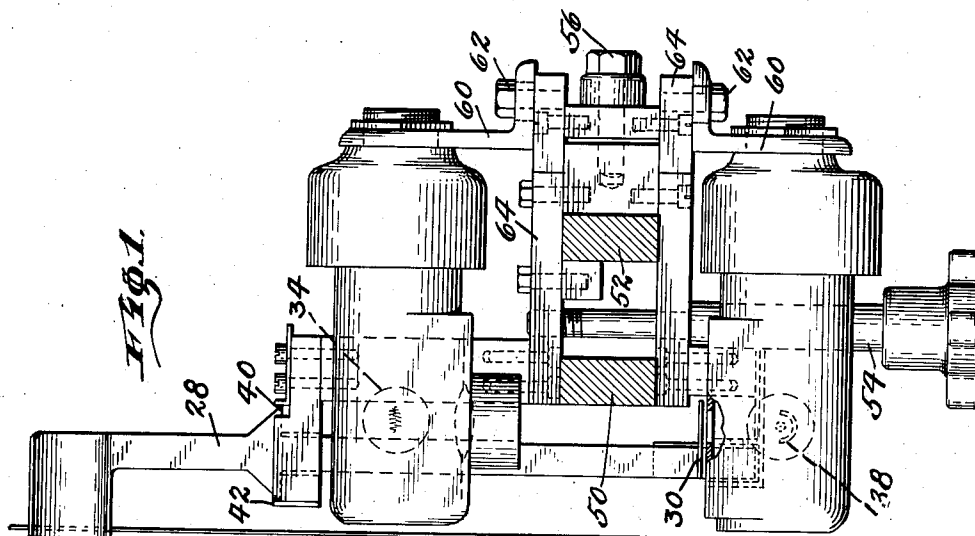
A. POTDEVIN ET AL

2,203,181

WEB HANDLING APPARATUS

Filed July 1, 1938

3 Sheets-Sheet 1



INVENTORS.
Adolph Patterson
BY *Robert L. Richmond*
Kiddle, Richell and Montgomery
ATTORNEYS.

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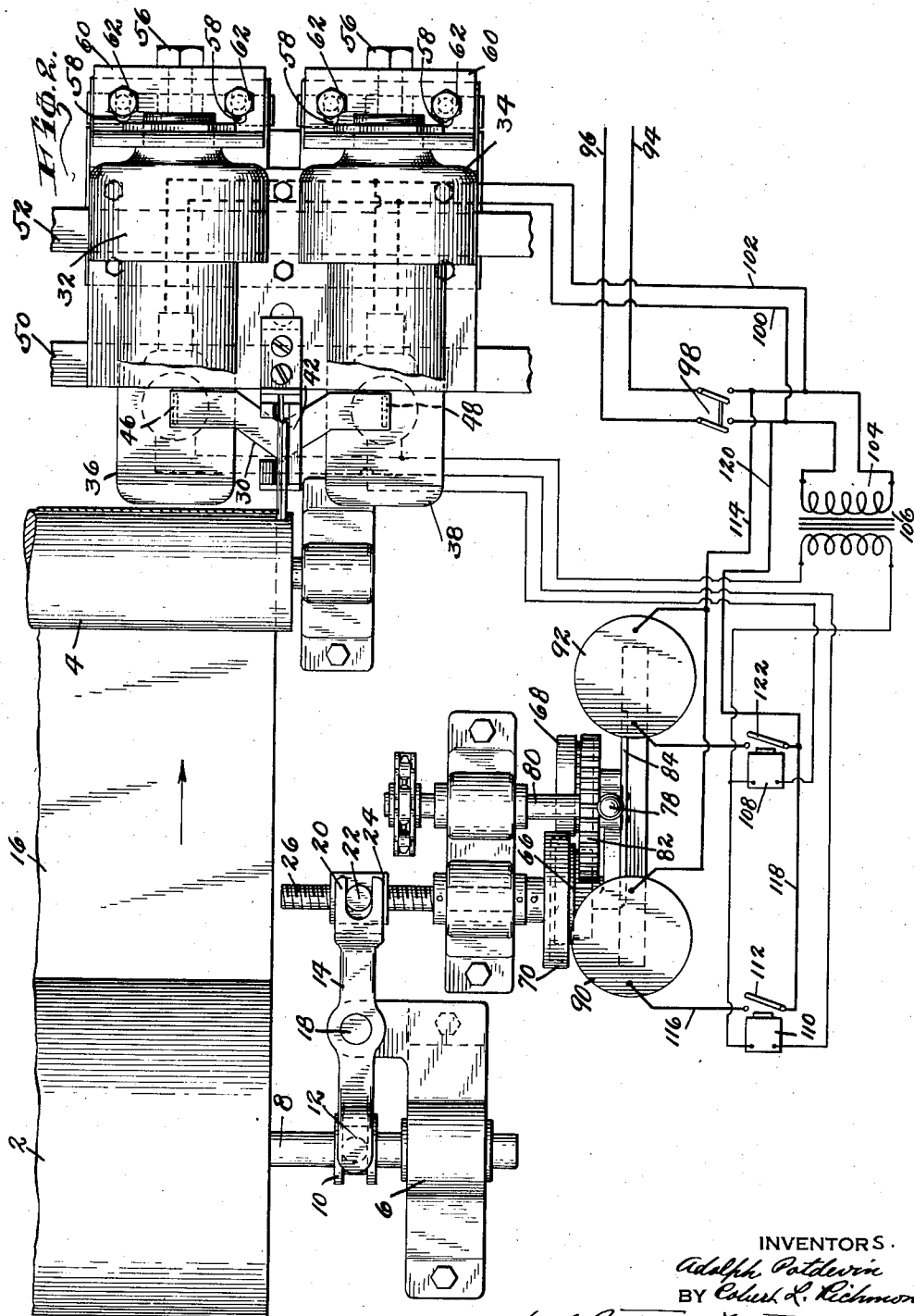
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WEB HANDLING APPARATUS

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3 Sheets-Sheet 2



INVENTORS.

Adolph Potdevin

BY Charles L. Richmond

Kiddle, Rethell and Montgomery
ATTORNEYS.

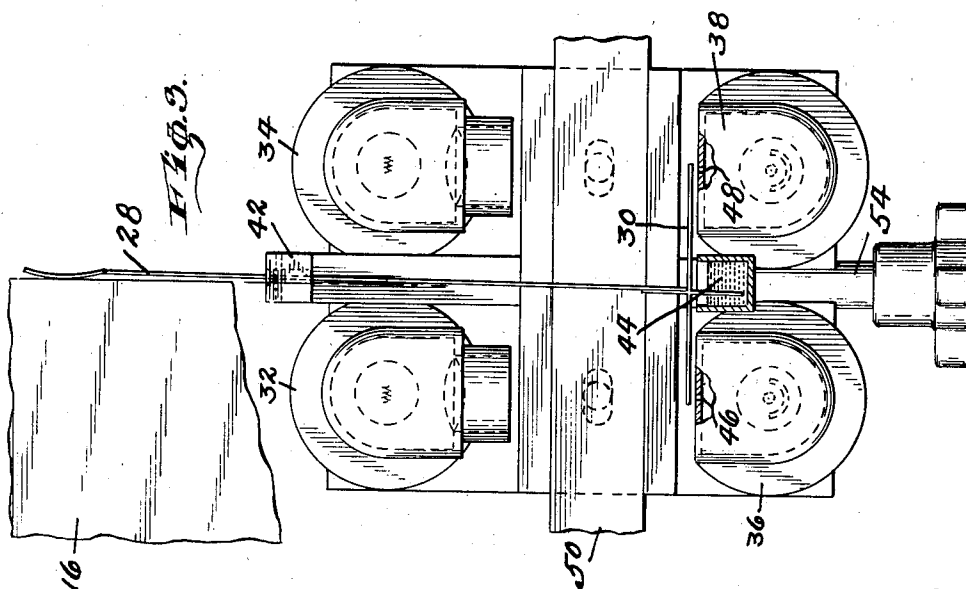
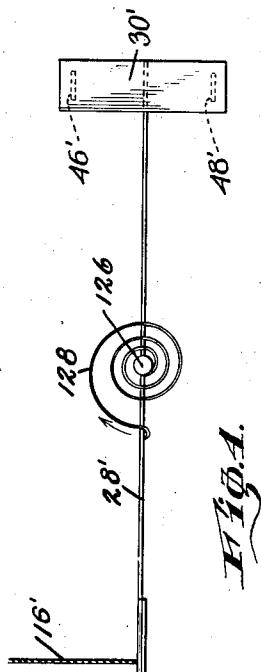
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WEB HANDLING APPARATUS

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3 Sheets-Sheet 3



INVENTORS.
Adolph Potdevin
BY Robert L. Richmond
Little, Beckel and Montgomery
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,203,181

WEB HANDLING APPARATUS

Adolph Potdevin, Garden City, and Robert L. Richmond, Yonkers, N. Y., assignors to Potdevin Machine Company, Brooklyn, N. Y., a corporation of New York

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12 Claims. (Cl. 242-76)

This invention is directed to an improvement in machines for handling materials in the web and has for one of its objects the provision of a construction whereby lateral movement or weaving of the web as the same is passing lengthwise through a machine is automatically corrected. The mechanism of this improved apparatus has distinct advantages over web correcting devices heretofore employed in that the same does not depend for operation on the weight or opacity of the web being controlled nor does it depend for operation on any printing, color, lines, etc., which may be on the web. A photoelectric control is employed with this improved apparatus but as distinguished from controls used heretofore the present apparatus is in effect operated or controlled by the edge of the web.

The present apparatus is adapted for the control of any material which is in the web and the lateral misalignment of which is to be prevented or corrected.

In the accompanying drawings wherein an embodiment of this invention has been illustrated:

Fig. 1 is an elevational view of an embodiment of our invention;

Fig. 2 is a plan view;

Fig. 3 is an elevational view of the photoelectric control shown in Fig. 1, looking from left to right; and

Fig. 4 is a view of a modification.

Referring to the drawings in detail: The web of material is shown at 2 in the form of a supply roll, the web passing from the supply roll about an idler roller 4 and from thence through a machine of any kind, for example, a bag making machine.

As above pointed out, the purpose of this invention is to correct lateral misalignment of the web as it is moving through the machine, and in accordance with our invention this is automatically effected by bodily lateral movement of the supply roller 2 in its bearings 6.

It will be seen from an inspection of the drawings that the shaft 8 of the supply roll is provided with a collar 10 which is fast on the shaft and cooperates with a yoke 12 carried at one end of a lever 14 extending lengthwise of the machine parallel to the path of travel of the web 16 as the same passes from the supply roll 2. The lever 14 is pivoted at 18 on any suitable part of the frame of the machine. The end of the lever opposite to the yoke 12 is bifurcated as shown at 20 to engage pins 22 carried by a nut 24 on a threaded shaft 26, the latter lying parallel to the shaft 8 of the sup-

ply roll. This shaft 26, for clarity of description, will be referred to as a correcting shaft. Obviously, if the shaft 26 is rotated the nut 24 will be caused to move along the shaft, the direction of motion of the nut depending upon the direction of rotation of the shaft so that if, for example, the nut moves outwardly of the shaft 26, as viewed in Fig. 2, the yoke 12 of the lever 14 will be depressed to move the supply roller 2 inwardly, as viewed in the same figure. By the same token, if the correcting shaft 26 is rotated in the opposite direction so that the nut 24 moves inwardly of its shaft, then the supply roller 2 will be moved outwardly. The correcting shaft 26 is normally stationary, but its rotation is effected automatically intermittently, as will be brought out hereinafter.

Adjacent one edge of the traveling web 16 and in position to contact the edge of the web is a mechanical follower 28 carried by a shutter 30 which is adapted to intercept the light rays from light sources 32 and 34, which light rays energize photoelectric units 36 and 38, respectively.

The follower 28 is mounted on a knife edge 40 in the groove of a block 42 and the follower and shutter together provide a T-shaped arrangement. The follower stands vertically and pivots on the knife edge 40 and excessive vibration of the follower and shutter is prevented by damping mechanism 44, shown in Fig. 3. This is merely a container of oil, for instance, into which the lower end of the follower extends.

The follower 28, and hence the shutter 30, is initially so disposed that the follower is not quite vertical, when the web 16 is in correct position, so that if the web weaves to either side of this position the follower 28 will follow it by gravity. For example, in Fig. 3 the web 16 is assumed to be in correct position and it will be seen that the follower 28 is not standing vertically, but that the shutter 30 is in front of the orifices 46 and 48 of the photoelectric cells 36 and 38 so that at this setting the light from light sources 32 and 34 is intercepted and neither cell is activated. It will be appreciated that the ratio between the distance of the point of contact of the follower 28 to pivot edge 40 and the distance of shutter 30 to the pivot edge 40 may be varied so as greatly to vary the relative motion of the shutter to the follower. Thus it will be seen that the sensitivity of the apparatus may be increased or decreased, which is very advantageous where close control is desired.

The entire control unit, that is to say, the light sources 32 and 34 and photoelectric cells 36 and

38 and the shutter, is adjustably mounted on two bars 50 and 52 and held in adjusted position by a clamp screw 54. Likewise we provide for adjustment of one control unit consisting of a light source and a photoelectric cell with respect to the other control unit. That is to say, each control unit is adjustable to the right or left, as viewed in Fig. 3, so as to bring the apertures 46 and 48 of the photoelectric cell into proper position with respect to the shutter 30, the units being held in adjusted position by clamp screw 56.

This also provides for an adjustment of the sensitivity of the apparatus in that with the units set so that the apertures 46 and 48 are well under the shutter 30, the shutter must move a considerable distance before the photoelectric cells respond. On the other hand, by moving the units a greater distance apart, but very slight motion of the shutter is required.

It will be appreciated, furthermore, that inasmuch as the lateral motion of the web can be amplified by proper selection of the follower-shutter ratio, the type of photoelectric cell employed need not be of a very sensitive design or construction and hence is correspondingly cheaper in initial cost.

Lengthwise adjustment of each light source and each photoelectric cell unit is also provided for, the brackets 60 carrying these units being slotted at 58, these slots receiving bolts 62 by which the brackets are bolted to the plates 64 which ride on the rails 50 and 52, the plates 64 constituting the base mountings for all of the units.

As above mentioned, the primary purpose or primary object of the invention is the provision of mechanism whereby the supply roller 2 is automatically moved endwise so that the web will always be properly disposed in the machine with respect to the edges of the web. In this connection, clutch discs 66 and 68 are provided adjacent the inner end of the shaft 26, these discs being adapted to be moved automatically into engagement with the inside or the outside of a rotatable element or drum 70. This drum 70 is rigidly mounted on the correcting shaft 26.

The discs 66 and 68 are fast to gears 74 and 76, respectively, mounted on a pivoted lever 78. Extending parallel to the threaded shaft 26 is a shaft 80 which is constantly rotating, and this shaft carries a gear 82 meshing with the gears 74 and 76. The gears 74 and 76, and hence the discs 66 and 68, are always driven in the same direction. However, inasmuch as the disc 66 is adapted to be brought into engagement with the inside of the drum 70 and the disc 68 is adapted to be brought into engagement with the outside of said drum, it will be apparent that we have provided for driving the drum 70 either clockwise or anti-clockwise, depending upon whether the disc 66 or the disc 68 at any instant is in engagement with the drum surface. The shaft 80, as above noted, is constantly driven in one direction as from any rotating part of the machine so that stopping of the machine will likewise stop the correcting mechanism and correction of the web will be in direct proportion to the speed of the machine.

Secured to the lever 78 is a bar 84 projecting from each side of the lever, the projecting ends of this bar being attached to the armatures 86 and 88 of electromagnets 90 and 92.

It will be appreciated that the lever 78 is normally held in central position, as shown on Fig. 1 of the drawings, and restored to normal position

by springs, for example, in which position of the lever the discs 66 and 68 are of course out of contact with the drum 70 and the correcting shaft 26 is not rotating.

The light sources 32 and 34 for the photoelectric units 36 and 38 receive their current from any suitable source of power by way of conductors 94 and 96, the switch 98 and conductors 100, 102. The power source is also connected to the primary side 104 of a transformer 106. The secondary of the transformer 106 is connected to magnet switches 108 and 110 as well as to the photoelectric cells 38 and 36. The switch 110 controls the circuit of the electromagnet 90 and switch 108 controls the circuit of the electromagnet 92.

Assuming that the paper web 16 is to one side of desired position, that is to say, to one side, either right or left, of the position shown in Fig. 3, it will then be obvious from an inspection of this figure that the aperture 46 or the aperture 48 will be uncovered. We will assume that the web has moved so that aperture 46 is uncovered. With aperture 46 uncovered the cell 36 will be energized from the light source 32 so that the magnet switch 110 will be energized to close the switch arm 112. The magnet 90 will now be energized, current flowing by way of conductor 94, one side of switch 98, conductor 114 through the magnet, conductor 116, switch arm 112, conductors 118, 120, switch 98, conductor 96, to the other side of the line. The magnet 90 being energized its armature 86 will raise the bar 84 to move the lever 78 in a clockwise direction, as viewed in Fig. 1, to carry the disc 68 into engagement with the outside of the drum 70 thereby rotating the drum say, for example, in a counter-clockwise direction, as viewed in Fig. 1 and Fig. 2, which will impart similar rotation to the threaded shaft 26 and the nut 24 carried thereby will move outwardly of said shaft to pivot the lever 14 in a direction to carry the shaft 8 and hence the supply roller 2 toward the observer, as viewed in Fig. 1, thereby restoring the web 16 to its original position, as shown in Fig. 3. This restoration of the paper edge to its original position will pivot the shutter so that the same will again close off the aperture 46. The liquid 44 dampens the movement of the shutter so that it will not tend to move in the opposite direction to uncover the aperture 48 but will cease movement as soon as the paper ceases its side-wise or lateral motion. Of course, when the light from the light source 32 is intercepted by the shutter 30, the cell 36 is no longer active and the switch 110 will open, thereby to open the circuit of the electromagnet 90.

If the web 16 moves to the right, as viewed in Fig. 3, to uncover the aperture 48 of the cell 38 then the circuit will be closed to the switch 108 instead of 110 and this switch will close the switch arm 122 to close the circuit to the electromagnet 92. It will be appreciated that energizing of the electromagnet 92 will raise the opposite end of the bar 84 from that which was raised before and the disc 66 will be carried into engagement with the inside of the drum 70 thereby to rotate the latter in the opposite direction to its original rotation to effect movement of the nut 24 inwardly of the shaft 26 and a corresponding movement of the supply roller 2 outwardly.

It will be seen from the foregoing that our invention provides for automatic control of a web whereby undesired lateral movement of the web is corrected, control being effected by a follower which contacts the edge of the web.

It will be appreciated also, as above set out, that our construction provides for individual adjustment of the photoelectric cells so as to vary the sensitivity of the equipment as desired, so that the equipment is usable in all types of web control work ranging from the most sensitive to merely an approximation.

Another advantage of our construction resides in the fact that we employ means controlled by the edge of the web for controlling the photoelectric units. This is very superior to web controlling devices as used heretofore and wherein the light rays are intercepted by the web being controlled, in that it permits the controlling units to be totally enclosed leaving only the follower exposed. As a consequence not only do the light sources and apertures remain clean, so that no trouble is experienced with differences in light intensity due to dirt accumulating in the light units, but the necessity of cleaning or readjusting the photoelectric cells for changes in light intensity is eliminated.

The shutter has been described and illustrated as provided with a follower which hangs vertically and depends for its movement on gravity. If desired, this shutter mechanism can be arranged to be dependent for operation on a spring instead of gravity. Such a modification has been illustrated in Fig. 4, wherein the shutter and follower are designated 30' and 28', respectively, movable about a pivot 126 by a spring 128. The follower 28' is held by the spring 128 in contact with the edge of the web 16', lateral movement of which is to be controlled.

It will be appreciated that as the paper 16' weaves to one side or the other of desired position the shutter 30' will be moved in the opposite direction, to uncover aperture 46' or 48', as the case may be. This construction can be employed with the same correcting mechanism as described in connection with Figs. 1 to 3 or other suitable mechanism thereby to bring the web back to correct position.

It will be seen from all of the foregoing that the present invention provides an apparatus wherein lateral movement out of normal position of a web which is being continuously advanced lengthwise will be corrected automatically.

It is to be understood that reflected light can be used in conjunction with our improved apparatus, instead of transmitted light, and that other changes may be made in the details of construction and arrangement of parts above described within the purview of our invention.

What we claim is:

1. In web controlling apparatus, the combination of a follower adapted to engage an edge of the web to be controlled, a spring for maintaining the follower in constant engagement with the edge of the web to be controlled, a photoelectric unit, a cooperating light source, and a shutter carried by said follower for controlling the passage of light rays from the light source to the photoelectric unit, and means controlled by the photoelectric unit and operative when the shutter shifts as the web moves laterally out of normal position to restore the web to its initial position.

2. In web controlling apparatus, the combination of a follower engaging an edge of the web to be controlled, a photoelectric unit, a cooperative light source, a shutter adapted normally to intercept light rays from said light source, said shutter being operated by said follower, an electromagnet whose circuit is controlled by the photoelectric unit adapted to be energized when said shutter is moved due to shifting of the web so as no longer to intercept said light rays, a correcting shaft, a drive shaft, and clutch mechanism controlled by said electromagnet, whereby as said electromagnet is energized the clutch mechanism will be thrown in to clutch the drive shaft to the correcting shaft to move the web laterally to its original position.

3. In web controlling apparatus, the combination of a follower adapted to engage the edge of a web to be controlled, a shutter carried by said follower, a photoelectric unit, a light source, the light rays from said light source normally being intercepted by said shutter, a correcting shaft, a drive shaft therefor, and an electrically actuated clutch intermediate said correcting shaft and drive shaft whose circuit is controlled by said photoelectric unit, said clutch engaging when the photoelectric unit is activated by shifting of the said shutter due to lateral shifting of the web so as to permit light rays from the light source to fall upon said photoelectric unit, to effect restoration of the web to its original position.

4. In web controlling apparatus, the combination of a correcting shaft, a nut adapted to traverse said shaft, as the shaft is rotated, a lever having one end operatively connected to said nut, a supply roll shaft operatively connected to the other end of said lever, whereby as said lever is pivoted by movement of said nut the supply roll shaft will be shifted lengthwise to effect lateral shifting of the web to be controlled, a drive for said correcting shaft, intermediate clutching mechanism for selectively clutching the correcting shaft to the said drive, and a photoelectric control for said clutching mechanism, said photoelectric control in turn comprising a follower engaging the edge of the web, and a shutter attached to the follower for controlling operation of the photoelectric control.

5. In web controlling apparatus, the combination of a correcting shaft for shifting the web laterally, a drive for said correcting shaft, clutching mechanism intermediate said shaft and drive, said clutching mechanism comprising a normally stationary drum carried by the correcting shaft and a pair of discs constantly rotated by said drive, a photoelectric control for said clutch for selectively effecting engagement of the discs with either the inside or the outside of said drum, whereby as the web moves laterally to an abnormal position it is automatically restored to initial position, a follower constantly in engagement with the edge of the web, and a shutter carried thereby for controlling the operation of the photoelectric control.

6. In web controlling apparatus, the combination of means for selectively shifting a traveling web laterally, and means for controlling said shifting mechanism, comprising a pair of light sources and a pair of cooperating photoelectric units, a follower constantly engaging the edge of the web, and a shutter carried by said follower for controlling the passage of light rays from the light sources to the photoelectric units.

7. In web controlling apparatus, the combination of means for selectively shifting a traveling web laterally, and means for controlling said shifting mechanism comprising a pair of independently adjustable light sources and a pair of independently adjustable photoelectric units, a shutter intermediate the light sources and said photoelectric units, and a follower carrying said

shutter and adapted to contact the edge of the web to be controlled.

8. In web controlling apparatus, the combination of a correcting shaft, a drive therefor, clutching mechanism intermediate the shaft and drive, a pair of electromagnets for selectively actuating said clutching mechanism to rotate the correcting shaft in either direction, thereby selectively to shift the web laterally, a pair of photoelectric units controlling the circuits of said electromagnets, a follower constantly engaging the edge of the web and a shutter carried thereby for selectively controlling the admission of light rays to said photoelectric units.

9. In web controlling apparatus, the combination of a correcting shaft, a drive therefor, clutching mechanism intermediate the shaft and drive, a pair of electromagnets for selectively engaging said clutching mechanism to effect rotation of the correcting shaft in either direction, thereby selectively to shift the web laterally, a pair of photoelectric units controlling the circuits of said electromagnets, respectively, a shutter controlled by the edge of the web for selectively controlling the admission of light rays to said photoelectric units, and damping means for said shutter.

10. In a device for maintaining the lateral edge of a continuously advancing web in substantially constant alignment, photoelectric control means comprising in combination an elongated follower, pivoted intermediate its ends, a shutter carried at the lower end of said follower, a pair of photoelectric units disposed in spaced relation beneath said shutter, a light source for each of said units, said follower being so set that the upper end thereof will always be maintained by gravity

in contact with the lateral edge of the web so long as the said shutter is in position to intercept the light rays passing from said light sources to said photoelectric units.

11. In a device for maintaining the lateral edge of a continuously advancing web in substantially constant alignment, photoelectric control means comprising in combination an elongated follower having a knife edge pivotal mount intermediate its ends, a shutter carried at one end of the follower, a pair of photoelectric units disposed in spaced relation and a light source for each of said units, said shutter being disposed between the units and light sources, the follower being so disposed that the end opposite the shutter will always be maintained by gravity in contact with the lateral edge of the web so long as the shutter is in position to intercept the light rays passing from said light sources to said photoelectric units.

12. In web controlling apparatus, the combination of a correcting shaft adapted to shift the web laterally as the web is moving longitudinally, a drive for the correcting shaft, intermediate clutch mechanism adapted when in one position to drive the correcting shaft in one direction to effect corresponding lateral shifting of the web and when in another position to drive the correcting shaft in the opposite direction to shift the web laterally correspondingly, a photoelectric control for said clutch, said control comprising a pivoted follower constantly engaging one edge of the web, and a shutter attached to the follower for controlling the operation of the photoelectric control.

ADOLPH POTDEVIN.
ROBERT L. RICHMOND.