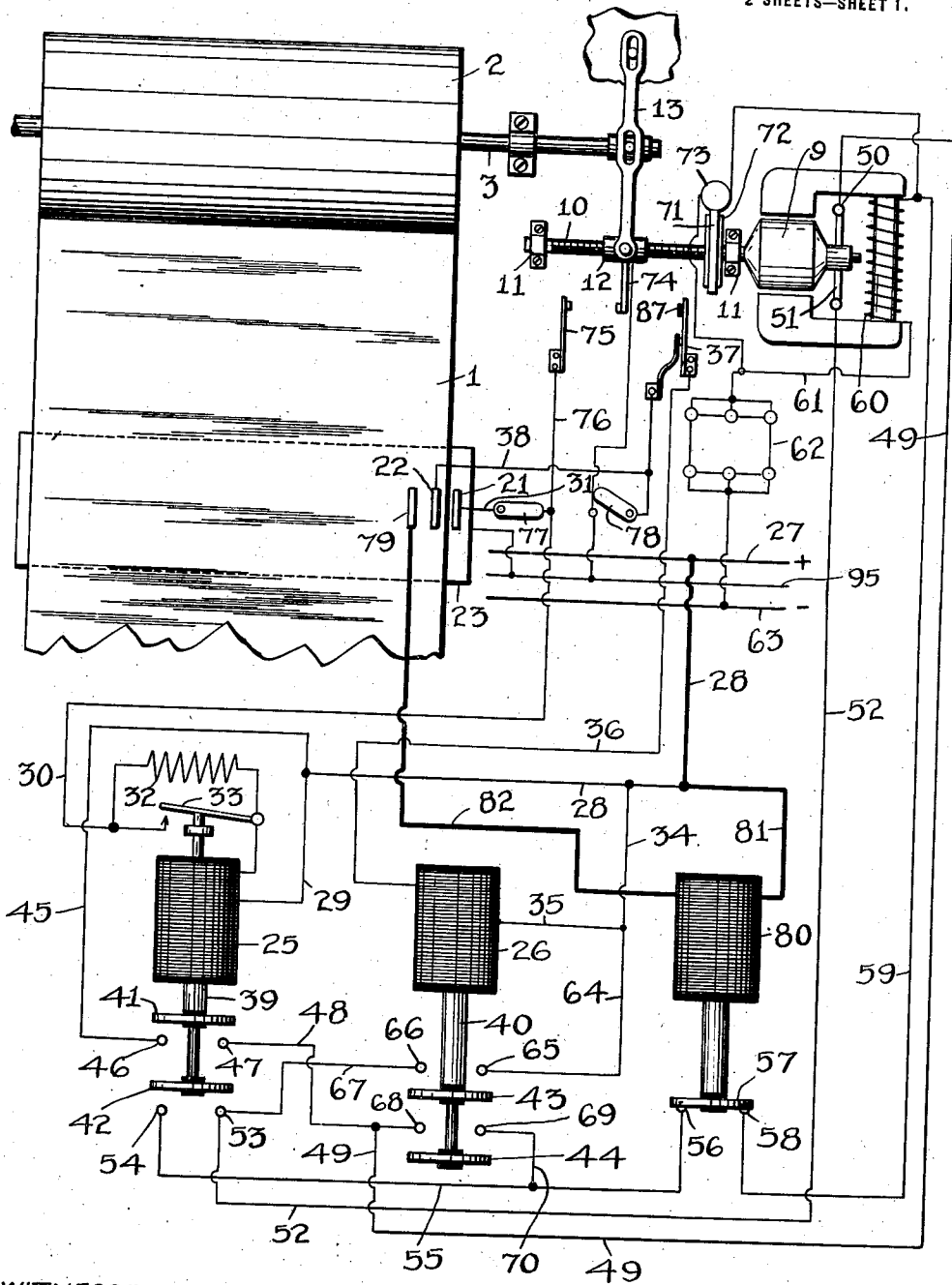


E. P. HOPKINS.
WEB GUIDING MEANS.
APPLICATION FILED FEB. 2, 1916.

1,186,906.

Patented June 13, 1916.
2 SHEETS—SHEET 1.



WITNESSES
Geo. A. Simon
Howard Bruce

Fig. 1

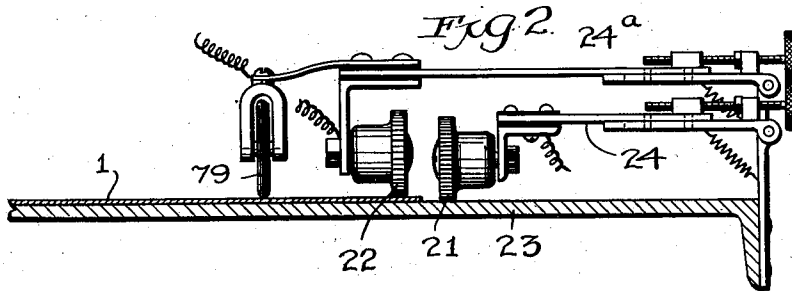
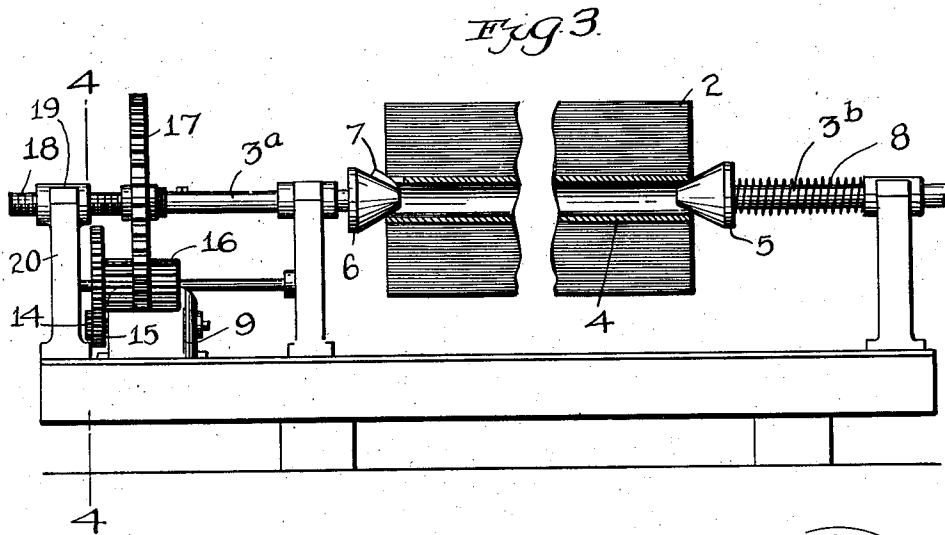
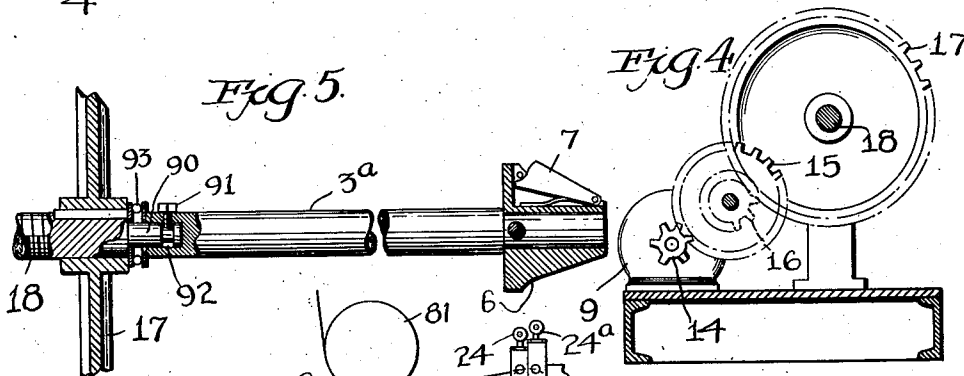
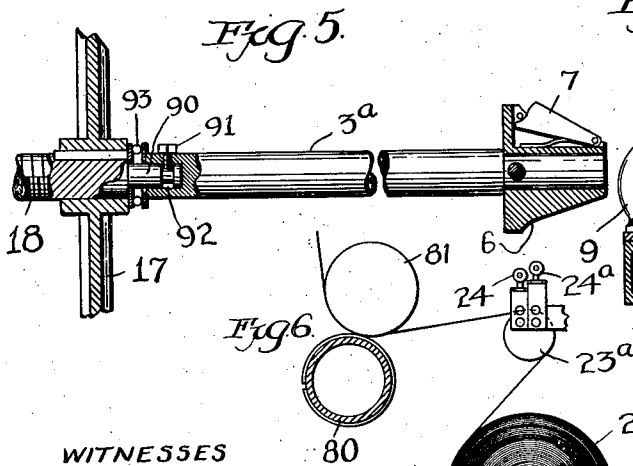
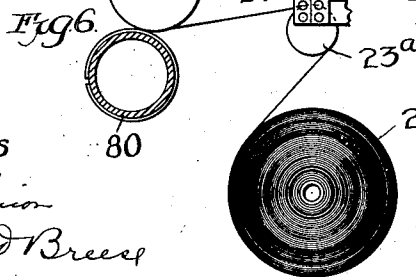
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2 SHEETS—SHEET 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

EDWARD P. HOPKINS, OF NEW YORK, N. Y., ASSIGNOR TO PUBLISHERS UTILITIES COMPANY, A CORPORATION OF NEW YORK.

WEB-GUIDING MEANS.

1,186,906.

Specification of Letters Patent.

Patented June 13, 1916.

Application filed February 2, 1916. Serial No. 75,657.

To all whom it may concern:

Be it known that I, EDWARD P. HOPKINS, a citizen of Great Britain, residing in the borough of Manhattan; city, county, and State of New York, have invented certain new and useful Improvements in Web-Guiding Means, of which the following is a specification.

This invention relates to certain improvements in means for regulating the margins of traveling webs, such as the webs of printing presses, for example.

The invention accordingly comprises the novel features herein described and the combinations including the same which are pointed out in the claims.

A particular object is to prevent the web adjusting mechanism being driven to the possible limit of movement in either direction, in which event, for example, the considerable force exerted by the driving means through the reducing connections employed might result in injury to the parts. This condition is avoided by providing means such as limit switches which are operable by a driven part to stop the operation of the driver when the adjusting movement of the mechanism has proceeded to a predetermined limit of safety or convenience in either direction. Thus, where the driver, or more specifically the reversible electric motor of my application is controlled by the web through cooperative contacts, any failure of the web and contacts to deenergize the motor upon the execution of a permissible degree of movement is made good by the positive action of a mechanical part or parts.

Another object is to prevent or stop the operation of the margin-regulating motor in case of the web breaking so as to cause the normally insulated margin-regulating contact to touch the table or underlying contact, or in event of the web being absent for any other reason. To this end an additional contact is provided which bears constantly upon an interior portion of the web, and which when the web is not present closes a circuit operating through a relay to render the motor inoperative. This effect is immediate and minimizes or entirely avoids any purposeless shifting of the adjustments.

Still another object is to provide the regulator with a system of manual control oper-

able in conjunction with the automatic web control. For this purpose hand-operated switches or push-buttons are preferably connected with the control relays of the web contacts in such manner as to cause actuation of these relays in the same sense as the said contacts, but independently thereof, and subject to the same beneficial limitation as to extent of movement which is imposed by the limit switches.

These and other objects and advantages of the invention will become apparent as the specification proceeds.

In the accompanying drawings: Figure 1 is a general diagrammatic view; Fig. 2 shows the table and web in vertical section and the cooperating contact parts in elevation; Fig. 3 is a vertical section taken in the plane of the axis of the web roll showing the web roll support and the adjusting mechanism in elevation; Fig. 4 is a vertical section on the line 4-4 of Fig. 3; Fig. 5 is an enlarged fragmentary sectional elevation of a portion of the web roll support and adjusting means; and Fig. 6 is a diagrammatic view illustrating the invention in relation to the printing couple of a printing press.

In the illustrative embodiment the traveling web 1 of a printing press is unrolled from a roll 2, having a spindle support which is designated 3 in the diagrammatic view of Fig. 1. As more particularly shown in Fig. 3 the roll is wound upon a tubular core 4, and the spindle comprises two portions 3^a and 3^b having cones 5 and 6 which engage the opposite ends of the core, a driving connection between the section 3^a and the core being further insured by a key 7 entering a corresponding key-way. The spindle section 3^b is mounted for longitudinal movement away from the roll, so as to permit of the removal of the empty core and the insertion of a fresh roll, and is held to operative position by a spring 8, which presses the cone 5 against the core 4.

The driving means for effecting lateral adjusting of the web preferably comprises a reversible electric motor 9, which acts upon the web through mechanism comprising a motion-reducing and converting train, which in the case of printing presses is most desirably applied to the web roll, through connection with its support. Fig. 1 contains

a simplified illustration of such mechanism, wherein a screw shaft 10 is united to alinement with the armature shaft of the motor and turns without longitudinal movement in journal bearings 11, the screw-threaded portion of this shaft bearing a traveling nut 12, which is connected by a lever of the second order 13 engaging a collar upon the spindle 3. In Figs. 3 and 4 a preferred construction is shown, the same comprising a pinion or small gear 14 on the armature shaft, a large intermediate gear 15 meshed by this pinion, a pinion 16 compounded with the said gear, and another large gear 17 driven by the last-mentioned pinion and fast on a screw shaft 18. This screw is mounted to turn and by reaction to move longitudinally in a stationary nut 19 in a standard 20, and is coupled in alinement with the spindle section 3^a through a connection which permits the spindle to rotate independently of the screw. This is preferably accomplished by reducing the end of the screw shaft, as shown at 90 to enter a socket in the corresponding end of the spindle section, wherein it may turn freely but is held against longitudinal movement by a screw 91 projecting into a circumferential groove 92. A thrust bearing 93 may be interposed between the spindle section 3^a and the shoulder on the screw shaft. The pinion 16 is of sufficient length (or width) to permit of a suitable extent of lateral travel of the gear 15 with the screw 18.

As in the prior application of Glenn S. Williamson, filed March 29, 1915, Serial Number 17,810, the operation of the motor is preferably controlled by electrical contacts 21 and 22 located adjacent the same margin of the web, one inside and one outside of the edge and both adapted to be grounded or connected with the opposite sides of the controlling circuits through the table 23 or underlying contact means. The circuit of the contact 21, which bears directly upon the table unless the paper deviates from a true course in its direction sufficiently to pass beneath it, is normally closed. The circuit of contact 22, which is normally insulated from the table by the web, is normally open. As shown in Fig. 2 the said contacts are preferably in the form of rollers, carried by hinged brackets 24 and 24^a which can be thrown upward away from the table and web. The several parts of the electrical apparatus are shown supplied from a three-wire Edison circuit, but it will be understood that this is non-essential.

The contacts referred to are connected respectively with solenoid relays 25 and 26, operating the one on a normally closed and the other on a normally open circuit. The circuit of contact 21 and relay 25 may be traced in the diagram as follows: from plus main 27, by way of conductors 28 and

29 to the coil of the solenoid, thence by conductors 30 and 31 to contact 21, and thence to the neutral main 95 by way of the table 23. A resistance 32 is preferably inserted in the conductor 30 to reduce the current normally passing through the coil, the same being short-circuited, when the relay is down and is to be energized, by a switch 33, which is opened by the core of the solenoid when the latter is raised. Such resistances and switches, it may be noted, are common in connection with normally energized solenoids. The other control circuit comprises a portion of the conductor 28, conductors 34 and 35, the coil of solenoid 26, conductor 36, normally closed limit switch 37 (hereinafter described), and conductor 38 leading to contact 22, from which the circuit is completed to the neutral wire through the table whenever there is a deviation of the web of such extent and direction as to withdraw it from beneath this roller. It will be perceived, therefore, that the contact 21 and table or common coöperative contact 23 constitute an embodiment of a normally closed switch adapted to be opened by the web, while similarly the contact 22 and table 23 form a normally open switch adapted to be closed by deviation of the web.

The cores 39 and 40 and their contact pieces 41, 42 and 43, 44, of the respective relays, form double pole switches, both of which are normally open and each of which is adapted to close one of two circuits through the motor, these two circuits being adapted to conduct current through the motor armature in reverse directions, the direction of flow through the field remaining the same, so that the motor is caused to run in one direction or the other, dependent upon which relay is actuated. The relay 25, it will be understood, is actuated by the interruption of the circuit through its coil, so that its core and contacts are free to drop, thereby closing one of the motor circuits, which circuit is opened again when the relay is restored to normal, energized condition, through the movement of the web in being shifted back to its true course through the action of the motor-driven mechanism. The relay 26 is actuated by the completing of its circuit, which raises the core 40, thereby closing the other motor circuit, which is opened again by the deenergizing of this solenoid as soon as the deviation of the web causing the action has been corrected.

The motor circuit controlled by relay 25 may be traced as follows: plus main 27, conductors 28 and 45, contact point 46, bridging contact 41, contact point 47, conductors 48, 49, armature brush 50, the coils of the armature, brush 51, conductor 52, contact point 53, bridging contact 42, contact point 54, conductor 55, contact point

56, bridging contact 57 (described herein-after), contact point 58, conductor 59, field coil 60, conductor 61, resistance 62, and thence to the minus main 63. The motor circuit controlled by relay 26 is as follows, starting from the plus main: conductors 28, 34 and 64, contact point 65, bridging contact 43, contact point 66, conductors 67 and 52, armature brush 51, the armature coils, brush 50, conductor 49, contact point 68, bridging contact 44, contact point 69, conductor 70, conductor 55, and thence by way of the bridging contact 57 and the field of the motor to the minus main as before.

From the foregoing it will be understood that as long as the web runs in a substantially definite and correct path, the adjusting motor is at rest, but that a deviation of the web in one direction or the other by changing the condition of one or other of the control circuits will start the motor and set the adjusting mechanism in operation in the proper direction to restore the web to its true course. As soon as this is accomplished, the particular motor circuit which was closed is again opened and the motor stops. In order to prevent overrunning at this time a brake 71 may be provided acting on a drum 72 on the motor shaft, the brake being applied automatically by a spring (not shown) and adapted to be taken off by the motor current acting through a magnet or solenoid 73. In event of both of the solenoids 25 and 26 being in actuated condition at the same time, as the result, for example, by swinging contact 21 away from the web and table, and contact 22 making contact with the table, as when the web has been pulled from beneath it, a short circuit is formed and the motor does not run in either direction, the said short circuit including the field coil 60 and the resistance 62, which latter protects the field from destructive action.

If for any reason the adjusting means should be set in action and not stopped after a permissible extent of movement, it is important to prevent further operation of the driver, in order that the mechanism may not be injured or disconnection of any of the parts ensue. For this reason two limit switches are provided, which are adapted to be operated by a mechanical part or parts driven by the adjusting motor, that is to say, a part other than the web. These switches are not brought into action in the normal operation of the apparatus, but are affected if the movement of the adjusting mechanism in either direction continues beyond the ordinary range and up to a predetermined limit. In the diagrammatic view the part for operating the switches is represented by an extension 74 on the traveling nut 12. The switches as illustrated in this view comprise the nor-

mally closed switch 37 already referred to, and a normally open switch consisting of the stationary contact 75 and the said projection 74, constituting a movable contact. These switches are preferably connected with the control relays 25 and 26, in such manner as to restore the latter to normal condition in event of the failure of the web to do so. The switch 37 is in series with the relay 26 and its normally insulated web contact 22, while the switch 74, 75 is connected in parallel with the contact 21, by a wire 76.

When the part 74 is moved too far in one direction it bears against an insulating block 87 on one of the terminals of the switch 37, thereby opening the latter. When it is carried too far in the opposite direction it comes into electrical engagement with the contact 75 and thereby connects the relay 25 with neutral wire 95 through the adjusting mechanism. In either event the motor circuit which was closed is immediately opened, and the motor and mechanism come to rest. Such a result is desirable, for example, in event of a breaking or failure of the web, which leaves paper on the table, either between both contacts 21 and 22 and the table, or else out from beneath both contacts. In either event the mechanism would be set in operation and the roll would be shifted as if to correct a deflection in the traveling web, but no responsive movement of the paper on the table would result and consequently the motor would continue to run until the mechanism came to a positive stop with possibility of injury, if it were not for the presence of the limit switches, which supplement the web contacts in their function of stopping the motor. One or other of the limit switches may also come into play in case the paper roll when placed on the spindle is in bad condition, the convolutions having slipped toward one end of the core. In this event the adjusting mechanism would be called upon to produce an excessive movement in one direction or the other in order to bring the web to the proper path, and the failure of the mechanism to act beyond a certain point due to the operation of one or other of the limit switches serves to give notice that the condition of the roll should be corrected. It may be noted that the range of movement which is provided for in the design of the mechanism should be sufficient not only to permit the adjustment of the web but also to allow for a certain variation in the position of the web roll, due to variation in the internal diameters of the cores 4, which, of course, will engage farther in or out on the cone according as the diameter is larger or smaller.

In addition to the automatic control of the web shifting means through the web control switches 21, 23 and 22, 23, manual means

are also provided for causing operation of the reversible motor in one direction or other, as desired. This is useful, for example, for shifting the web roll to one side or the other when a fresh roll is inserted.

For this purpose two manual switches or push buttons 77 and 78 are illustrated. The switch 77 is normally closed and is in series with the normally closed web contact 21 and its relay 25. The switch 78 is normally open and is in series with the relay 26 and in parallel with the web contact 22. The movement of the web shifting mechanism produced by these manual switches is subject to the limiting action of the switches 37 and 74, 75, heretofore described, and for this purpose the switch 77 is in parallel with the switch 74, 75, while the switch 78 is in series with the switch 37. Means are also provided for preventing or stopping operation of the adjusting motor in event of absence of the web on the table or at a suitable point of control. Preferably this point is adjacent the contacts 21 and 22, and in this instance corresponds to an additional roller contact 79 mounted on the same bracket 24^a as the web shifting contact 22. This contact is included with the coil of a relay 80 in a circuit, shown for convenience in heavy lines, which passes from the positive main by conductors 28 and 81 to the said coil, and thence by conductor 82 to the contact 79, which bears on an interior portion of the web, preferably near one margin thereof, but sufficiently far inward to remain insulated during all ordinary web movements. If there is a breakage, however, which removes the paper entirely from the table the circuit of contact 79 is completed, and energizes the relay 80, which lifts the bridging contact 57 included in both motor circuits, with the result that the motor cannot operate or is promptly stopped if in operation at the time.

It will be understood that the showing of circuits, switches, solenoid relays, etc. contained in the drawings is diagrammatic and that the several instrumentalities may be embodied in various forms and may secure their results in various ways.

Fig. 6 illustrates diagrammatically the relation of the invention to the printing couple of a printing press. The web is shown passing from the roll, over a roller 23^a, constituting the equivalent of the table 23 of the other views, and beneath the contacts, designated generally 24 and 24^a, to the couple, comprising a form cylinder 80 and an impression cylinder 81.

What I claim as new is:

1. Means for regulating the margins of a web with relation to the printing couple of a printing press, comprising a reversible electric motor and parts driven thereby; in combination with means coöperative with

the web for controlling said motor, and means for stopping the motor to prevent excessive movement comprising limit switches arranged to be operated by a motor-driven part other than the web.

2. In a margin regulator for regulating the margins of a web with relation to the printing couple of a printing press, the combination of a margin regulating motor, parts operated thereby to shift the web laterally, means for controlling the motor, and means operable by a part other than the web to deenergize said motor upon a predetermined limit being reached in the movement of the motor-operated parts.

3. In a margin regulator, the combination of a margin regulating motor, mechanism operable thereby to shift the web laterally, means for controlling the motor, and means operable by said mechanism at a predetermined limit of movement to deenergize the motor and apply a brake thereto.

4. In a margin regulator, the combination of a normally stationary reversible electric motor, mechanism operable thereby to shift a web laterally, controlling means for causing the motor to run in either direction, and limit switches operable by said mechanism to deenergize the motor so as to prevent excessive movement of the web shifting mechanism.

5. In a margin regulator for regulating the margins of a web with relation to the printing couple of a printing press, the combination of electrically operated means for lateral adjustment of a web in opposite lateral directions, contacts coöperative with the web for causing operation of said means, and means comprising limit switches controlled by the web adjusting means for preventing excessive movement thereof.

6. In a margin regulator for regulating the margins of a web with relation to the printing couple of a printing press, mechanism for effecting lateral adjustment of a web in opposite directions, means coöperative with the web for causing operation of said mechanism, and limit switches coöperative with said mechanism to prevent excessive movement thereof.

7. In a margin regulator, the combination with a web, of an electric motor and a motion reducing and converting train for adjusting the web laterally, web contacts and circuits for causing said motor to run in either direction, and limit switches operable at predetermined points in relation to the movement of the adjusting train to prevent over-driving thereof.

8. In a margin regulator, a reversible electric motor, screw mechanism operated by said motor for shifting the web laterally, and controlling means whereby said motor is normally stationary and is caused to run in one direction or the other by lateral de-

viations of the web, in combination with means comprising limit switches adapted to be operated by said screw mechanism to stop the motor to prevent excessive movement of the mechanism in either direction.

9. A margin regulator, comprising an electric motor and circuits for energizing the same to run in opposite directions, web shifting mechanism operated by the motor, relay circuits for controlling the motor circuits, means for changing the normal condition of the relay circuits so as to cause the motor to run in one direction or the other, and means for restoring said control circuits to normal condition to prevent excessive movement of said web shifting mechanism.

10. A margin regulator, comprising an electric motor, web shifting mechanism operated thereby, electro-magnetic devices for controlling the motor, web-operated means for changing the condition of one or other of said devices in response to lateral deviations of the web, and means adapted to be operated by the web-shifting mechanism in event of over-travel thereof to restore the electro-magnetic device responsible for such movement to normal condition.

11. In a margin regulator for regulating the margins of a web with relation to the printing couple of a printing press, the combination of an electric motor, web-shifting mechanism operable thereby, a web-controlled circuit containing a relay for controlling said motor, and a limit switch operable by the web-shifting mechanism and connected with said relay whereby the motor is deenergized at a predetermined limit of movement of the web shifting mechanism.

12. In a margin regulator, the combination of web-shifting mechanism, electrical means for operating the same, a normally closed control circuit containing a relay and a switch adapted to be opened by deviation of the web, and a normally open limit switch in parallel with said web-operated switch and adapted to be closed by said web-shifting mechanism at a predetermined point in the movement of the latter.

13. In a margin regulator for regulating the margins of a web with relation to the printing couple of a printing press, the combination of web-shifting mechanism, electrical means for operating the same, a normally open control circuit containing a relay and a switch adapted to be closed by deviation of the web, and a normally closed limit switch in series with said web-operated switch and adapted to be opened by said web-shifting mechanism at a predetermined point in the movement thereof.

14. In a margin regulator for regulating the margins of a web with relation to the printing couple of a printing press, web-shifting mechanism, an electric motor for operating said web-shifting mechanism, cir-

cuits for energizing said motor to run in opposite directions, web contacts located adjacent the same margin of the web, control circuits connected with said contacts, one being normally open and the other normally closed, relays in said control circuits for controlling the motor circuits, and limit switches operable by said web-shifting mechanism at predetermined points in the movement thereof.

15. In apparatus for regulating the margins of a traveling web, means for effecting lateral adjustment of the web, and control means cooperative with the web to cause the adjustment means to be energized to shift the web in one direction or the other automatically, combined with means also cooperative with the web and normally in touch therewith for preventing energizing of said adjustment means in the absence of the web.

16. In apparatus for regulating the margins of a traveling web with relation to the printing couple of a printing press, electrical means for effecting lateral adjustment of the web, and means cooperative with the web for controlling the said electrical means, combined with additional means cooperative with the web to prevent said electrical means being energized in event of the absence of the web.

17. In apparatus for regulating the margins of a traveling web, a reversible electric motor and thereby driven mechanism for shifting the web laterally, and control circuits and contacts cooperative with the web to cause said motor to run in one direction or the other in event of deviation of the web from a true course, combined with additional contact means normally bearing on the web and a circuit controlled thereby to prevent the supply of current to said motor in event of the absence of the web.

18. In apparatus for regulating the margins of a traveling web with relation to the printing couple of a printing press, a reversible electric motor and thereby driven mechanism for shifting the web laterally, and control circuits and contacts cooperative with the web to cause said motor to run in one direction or the other in event of deviation of the web from a true course, combined with a circuit containing a relay for rendering the said motor inoperative, and additional contact means normally bearing on the paper and controlling said circuit.

19. In apparatus for regulating the margins of a traveling web, means comprising a reversible electric motor for shifting the web laterally, and controlling means comprising contacts cooperative with the marginal portion of the web, combined with a contact positioned to bear constantly upon the web inwardly of the marginal portion,

and means controlled by said contact for opening a break in the motor circuit in event of absence of the web.

20. In apparatus for regulating the margins of a traveling web, a reversible electric motor connected to shift the web laterally, and relays and therewith electrically connected contacts for causing said motor to run in one direction or the other automatically, said contacts being located adjacent the same margin of the web, one normally outside and the other normally inside the edge and their corresponding relays operating, respectively, on a normally closed and a normally open circuit, combined with an additional relay and connected contact for preventing operation of the motor in the absence of the web, the last-mentioned contact normally bearing on an interior portion of the web and its relay operating on an open circuit.

21. In apparatus for regulating the margins of a traveling web, the combination of a reversible electric motor, mechanism operable thereby to shift the web laterally, means coöperative with the web for causing said motor to run in one direction or the other in event of deviation of the web from a true course and for causing the motor to stop when the web is restored to its proper path, means comprising limit switches operable by said mechanism to deenergize the motor in event of failure of the web and coöperative contacts to stop the motor within predetermined limits of movement of the web shifting mechanism, and additional means coöperative with the web to prevent operation of the motor in event of the absence of the web.

22. Means for regulating the margins of a web, comprising, in combination, a reversible electric motor and therewith connected mechanism for adjusting the web laterally, control means including contacts coöperative with the web for causing the motor to run in one direction or the other upon deviation of the web and to deenergize the motor when the web is restored to its proper

path, and braking means also controlled by said means to prevent over-running of the web-adjusting mechanism upon deenergizing of the motor.

23. Means for regulating the margins of traveling webs, comprising, in combination, a single reversible electric motor comprising a field and rotary armature for adjusting the web laterally, automatic means coöperative with the web for causing said motor to run in opposite directions, and manual circuit controlling devices also operable to cause the motor to run in either direction.

24. Means for regulating the margins of traveling webs, comprising, in combination, a single reversible electric motor comprising a field and rotary armature, mechanism connected with said rotary armature to adjust the web laterally, relays for causing the motor to run in opposite directions, contacts coöperative with the web to control said relays, and manual switches connected with the said relays and operable to cause actuation thereof in the same sense as and independently of the web contacts.

25. Means for regulating the margins of traveling webs, a reversible web-shifting electric motor, relays for controlling said motor, one operating on a normally open and the other on a normally closed circuit, contacts connected with said relays and located adjacent the same margin of the web, one being inside and the other outside the edge when the web runs true, a normally operable circuit closer connected with the normally deenergized relay in parallel with the inside web contact, and a manually operated circuit breaker connected in series with the other relay and its outside web contact.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWARD P. HOPKINS.

Witnesses:

W. J. BISSING,
E. GREENBERGER.