

Oct. 11, 1949.

S. A. STAEGE

2,484,473

PAPER MACHINERY

Filed Oct. 11, 1946

3 Sheets-Sheet 1

Fig-2

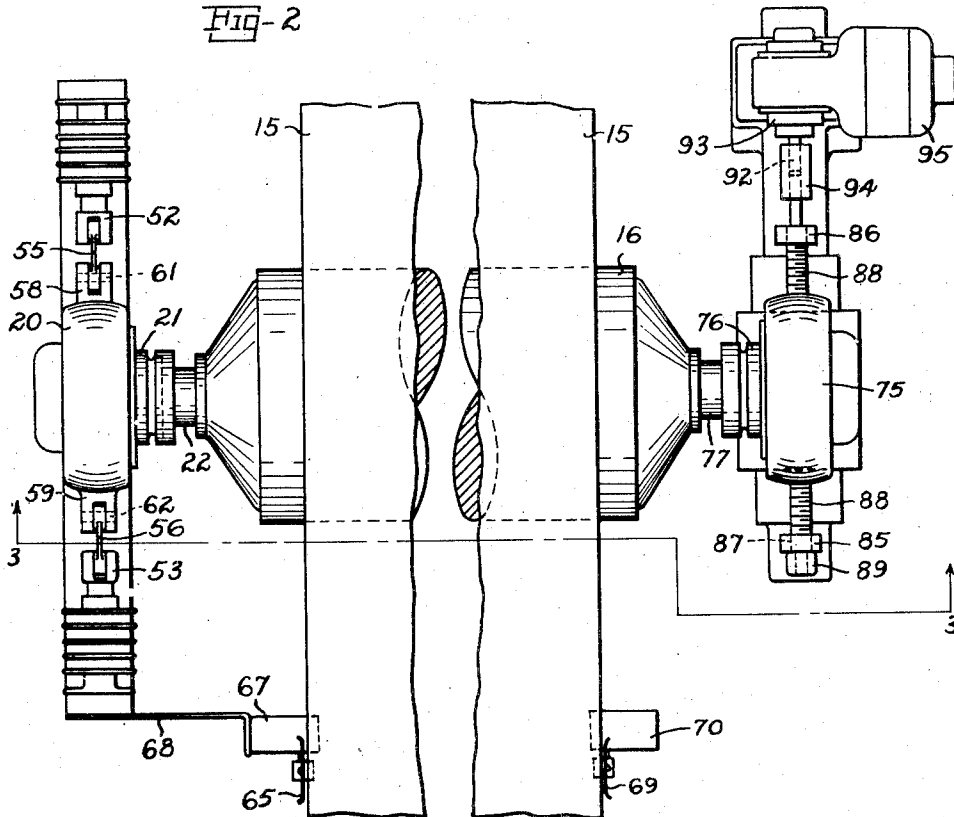


Fig-3

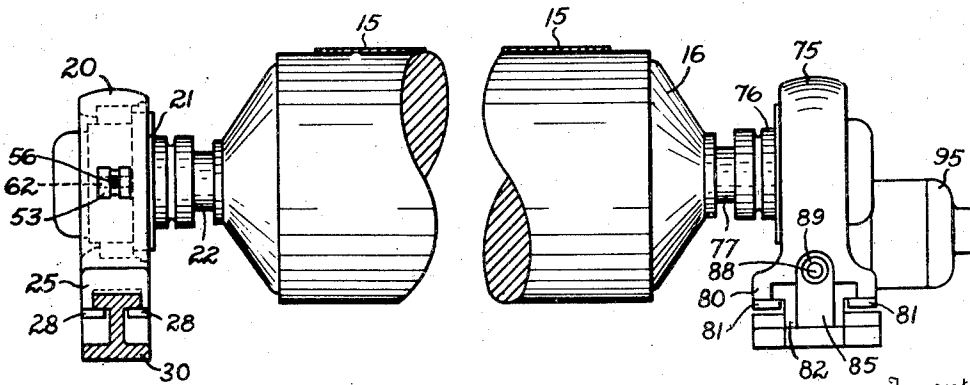
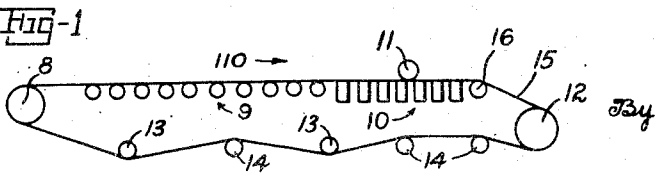


Fig-1



Inventor
Stephen A. Staeger

Marshall Babel
Attorneys

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3 Sheets-Sheet 2

Fig-4

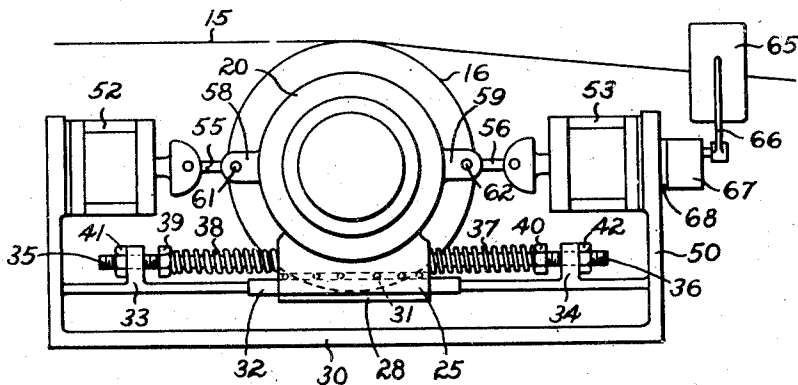


Fig-5

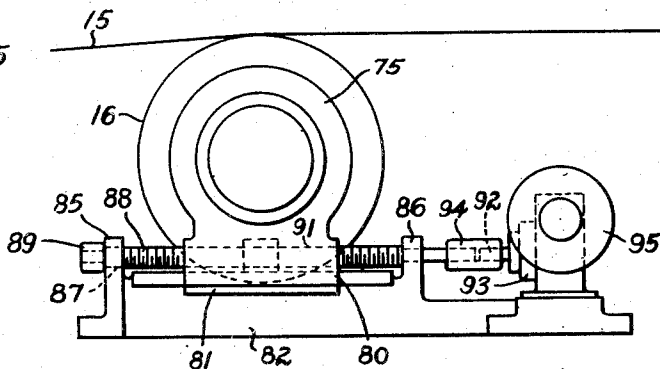


Fig-6

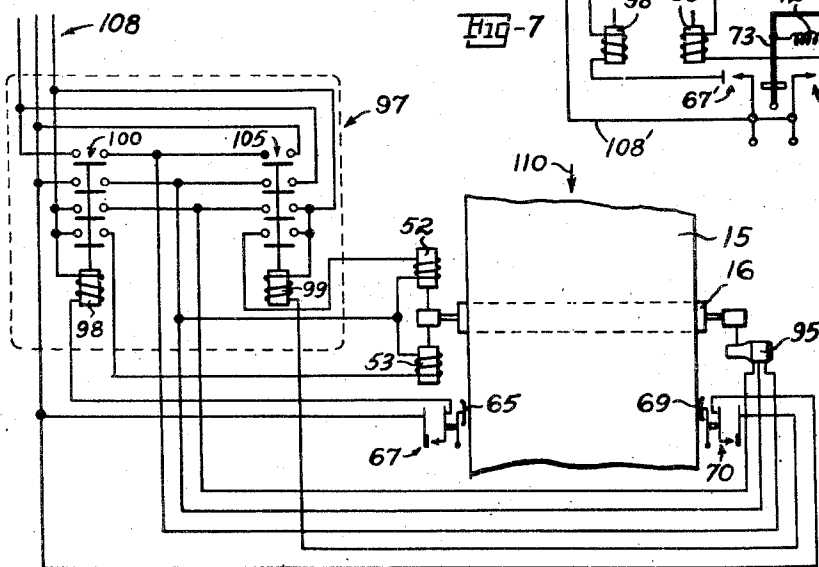
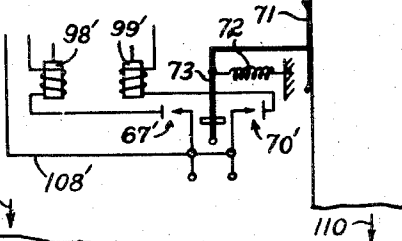


Fig-7



Inventor

Stephen A. Staeger

Marshall B. Biebel
Attorneys

By

Oct. 11, 1949.

S. A. STAEGE

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3 Sheets-Sheet 3

Fig-8

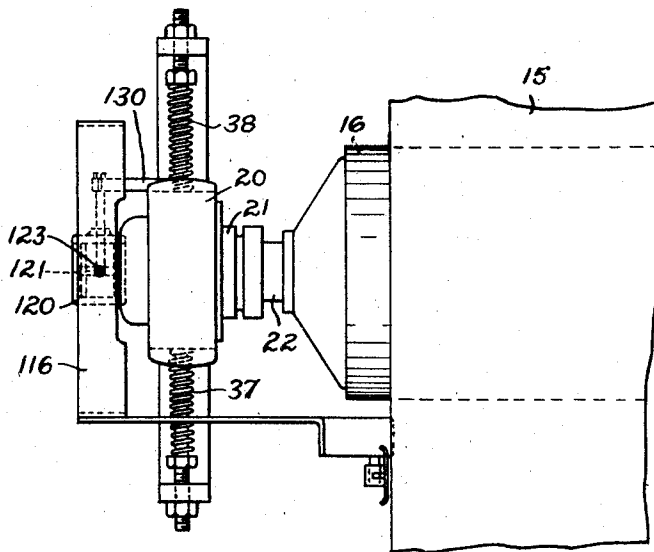


Fig-9

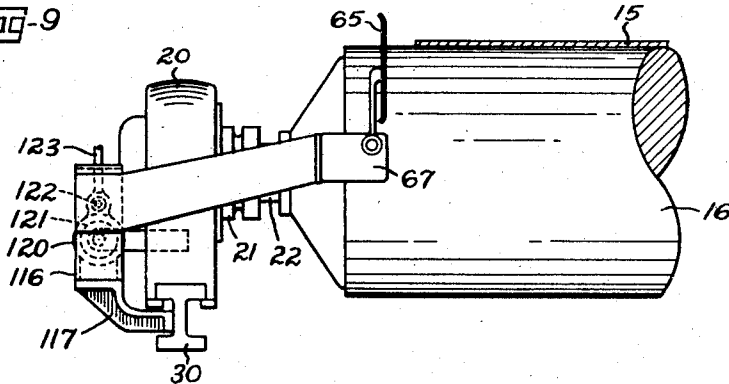
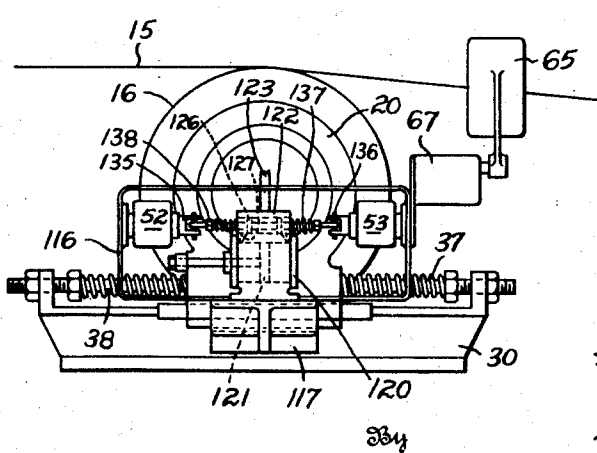


Fig-10



Inventor

Stephan A. Staeger

Marshall & Siebel
Attorneys

UNITED STATES PATENT OFFICE

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PAPER MACHINERY

Stephen A. Staage, Hamilton, Ohio, assignor to
The Black-Clawson Company, Hamilton, Ohio,
a corporation of Ohio

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14 Claims. (Cl. 74—241)

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This invention relates to paper making machinery, and more particularly to an automatically operated control for guiding a Fourdrinier wire or felt of a paper making machine to keep such wire or felt running in the proper path.

It is the principal object of the invention to provide an automatically operating control for guiding a wire or felt to maintain its operation in the proper path of travel, which is reliable and relatively fast acting to prevent the wire or felt from running off the guide roll, which does not require delicate or complicated mechanical linkages, economical in operation due to being energized for only short periods of time when a correction is to be applied, and normally de-energized during the period while the wire or felt is running straight in its normal path.

Another object resides in the provision of a control for a paper making machine which automatically operates in response to a movement of the Fourdrinier wire or felt requiring correction, in that such wire or felt is traveling too far from its normal or mid-position toward one end or the other of the guide roll, to apply quickly a corrective movement to the roll and to continue to apply such corrective movement only for as long a period as the need for correction persists.

It is another object to provide such a control which additionally moves the guide roll slowly a limited but retained amount tending to apply a corrective movement to the wire or felt whenever there is a tendency for it to depart too far from its normal path of travel on the roll, such correction as applied to the roll being retained, and if not sufficient to keep the wire or felt running correctly on the rolls being automatically repeated until a complete correction is effected.

Another object resides in the provision in a paper making machine of an automatically operated wire or felt guide control adapted to apply to a guide roll a relatively large but temporary corrective movement independent of the machine speed and other operating conditions, and which also applies a relatively smaller but retained and cumulative correction in the same sense to the guide roll providing for maintaining accurate travel of the wire or felt at all times.

It is also an object to provide such a control in which there is a relatively quick movement of substantial magnitude of one end, for example, the front or forward end of the guide roll to thereby change the transverse direction in which the wire or felt is tending to move with respect to the ends of roll, such forward end of the roll being returned to its initial position as soon as

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the wire or felt has returned to its normal position, and in which there is also a relatively slow or limited movement of the other end of the roll and in the opposite direction that tends to produce a relatively permanent or cumulative corrective effect in the same sense.

A still further object is to provide a guide control of the character described which operates so that if the power source or any part of the regulating system should fail for any reason the guide roll will remain in its normally neutral or mid-position and not be moved therefrom to one extreme position or the other, so that the wire or felt will continue to run true for a period sufficient to permit the operator of the machine to take such steps as necessary to prevent the wire or felt from running off the guide roll.

Other objects and advantages will be apparent from the following description, the appended claims and the accompanying drawings.

In the drawings, which will illustrate preferred embodiments of the invention—

Fig. 1 is a schematic view illustrating the application of the invention to a Fourdrinier wire;

Fig. 2 is a top elevational view broken to show a portion of the Fourdrinier wire or felt traveling over a guide roll of a paper making machine and guide and control means therefor constructed in accordance with the present invention;

Fig. 3 is a front elevational view, broken and partly in section, taken on the line 3—3 of Fig. 2;

Fig. 4 is a side elevational view of the apparatus shown in Fig. 2 as seen from the left hand side thereof;

Fig. 5 is a view similar to Fig. 4 showing the apparatus as seen from the right hand side of Fig. 2;

Fig. 6 is a circuit diagram showing the electrical connections and apparatus in diagrammatic form;

Fig. 7 is a partial diagrammatic view showing the use of a palm and the control circuit associated therewith;

Fig. 8 is a broken top elevational view showing a portion of the Fourdrinier wire or felt traveling over a guide roll of a paper making machine and hydraulically operated means for positioning the roll constructed in accordance with the present invention;

Fig. 9 is a front elevational view of the apparatus shown in Fig. 8; and

Fig. 10 is a side elevational view of the apparatus shown in Fig. 8 as seen from the left hand side thereof.

Referring more particularly to the drawings,

the numeral 15 indicates, in general, a traveling member such as a Fourdrinier wire or felt of a paper making machine which travels over the usual guide rolls one of which is indicated at 16. Thus in Fig. 1, which illustrates a typical application of the invention in connection with a Fourdrinier wire, the guide roll 16 is shown positioned in conjunction with a breast roll 8, the usual table rolls 9 and suction boxes 10, with a dandy roll 11 and a couch roll 12, and the customary wire 13 and tension rolls 14. It will be apparent also that if preferred the guide roll can be located on the return side of the wire 15 rather than in the position shown and the application of this invention would be the same.

The guide roll 16 is journaled at one end thereof in a supporting housing 20 having a bearing structure 21 therein in which the hub portion 22 of the roll is rotatably carried. Integrally joined to the lower part of the supporting housing 20 is a depending casting or flange 25 having feet 28 fastened to its lower edges to position the housing 20 so that it is slidably mounted on the T-shaped rail 30. To facilitate a relatively quick movement of the housing 20 through a substantially long distance in either direction upon the T-rail 30, the housing is supported on bearings 31 contained within a rack 32 attached to the upper part of the T-rail 30.

Also attached to the T-rail 30 are a pair of brackets 33 and 34, one on each end thereof, which are bored and threaded to each receive and rotatably mount the threaded pins 35 and 36. Coiled about the body of these pins are springs 37 and 38 having their inner ends abutting against flange 25, Fig. 4, and their outer ends against the headed nuts 39 and 40. Thus by running up or backing off the nuts 39 and 40 with respect to the brackets 33 and 34 means are provided for adjusting the force exerted by the springs 37 and 38 against the flange 25 which tends to hold this end of the roll 16 in its neutral or mid-position and to return that end of the roll to the same position after it has been to either side thereof. It is to be noted also in connection with the springs 37 and 38 that they are both constructed of sufficient size and weight and adjusted so that when the guide roll 16 is in its neutral or mid-position the springs are substantially fully extended and without compression. This arrangement is preferred, rather than providing for both springs being under partial compression and when the guide roll is in the neutral or mid-position, to provide against a slight amount of friction causing the guide roll to fail to assume the neutral or mid-position.

The outer ends of the pins 35 and 36 have headed nuts 41 and 42 threadably received thereon which can be turned up against or back from the brackets 33 and 34 and thus provide for shortening or lengthening that portion of the pins between the brackets and the flange. This positioning of the inner ends of the pins with respect to the flange can be used as an additional means for controlling the amount of force exerted by the springs 37 and 38 and also to provide adjustable stops which limit the distance which the flange 25 can slide on the T-rail 30.

To provide for automatically and quickly moving one end of the roll 16, as at the hub end 22 for example, to prevent the wire or felt 15 from running off, the solenoids 52 and 53 are provided. These solenoids are positioned on either side of the roll 16 at one end thereof, as shown in Fig. 4, in the supporting frame 50 and have their inner

ends coupled by means of the links 55 and 56 to the housing 20. Bosses 58 and 59 formed as an integral part of the housing project to receive the ends of the links, pins 61 and 62 being inserted through a central bore provided therein to fasten the links.

In order to sense when the wire or felt 15 requires correction of its path of travel, that is when it is tending to run too far to one side or the other and therefore likely to run off and become damaged, a resiliently mounted palm 65 is positioned on one side of the wire or felt 15 by means of the arm 66 which is pivotally mounted at its lower end in connection with a micro-switch 67. This switch in turn is carried by a bracket 68 forming a part of the frame 50. As most clearly shown in Fig. 2, the palm 65 is also mounted so as to be positioned about one half inch away from the edge of the wire or felt 15 when the wire or felt is running straight and in its usual path, and is therefore normally out of contact therewith. Contact of the wire or felt with the palm moves the arm 66 and closes the switch 67. It is to be understood also that the palm 65, micro-switch 67 and solenoid 53 are connected in an electrical circuit as illustrated in Fig. 6. Thus in response to the palm 65 being moved when the edge of the wire or felt, moving in the direction of the arrow 110, comes in contact therewith, the solenoid 53 will be energized and move the outer or forward end of the roll 16 downwardly as shown in Fig. 6, that is in the same direction as the travel of the member 15, thus swinging the roll to an angular position where it is no longer directly transverse of the traveling member 15. Energization of the solenoid produces a rapid movement of the roll, of substantial extent, usually in excess of that required to correct the path of travel of the member 15.

A similarly constructed palm 69 is also positioned on the opposite side of the wire or felt 15 by means of an arm and bracket, not shown, attached to the framework of the machine. The arm is pivotally connected at its lower end to a micro-switch, generally indicated by the reference numeral 70, which is also carried by the same bracket. Palm 69 is mounted similarly to palm 65; that is, so as to be positioned about one half inch away from the other edge of the wire or felt 15 when the wire or felt is running in its normal path, and is thus normally out of contact therewith. Contact of the wire or felt with this palm moves the arm and closes switch 70. The palm 69, switch 70 and solenoid 52 are also connected in an electrical circuit, as illustrated in Fig. 6, so that in response to a movement of the palm 69 caused by the edge of the wire or felt coming in contact therewith the solenoid 52 will be energized and move the outer or forward end of the roll 16 quickly upwardly as shown in Fig. 6, or against the travel of member 15, thus angularly shifting the roll in the opposite direction to that imparted to the end of the roll when the solenoid 53 is energized. It is to be noted also in connection with the positioning of the palms 65 and 69 that they are placed relatively close to the guide roll 16 and spaced therefrom in the direction in which the traveling member is moving.

At the other or back end, the roll 16 is rotatably mounted within a supporting housing 75 which is preferably of circular shape. This housing is provided with a bearing structure 76 in which the hub 77 of the roll is journaled. The lower part of this housing is cast to form a depending flange 80 having feet 81 fastened to its lower edges. These

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feet are adapted to fit around the upper edge of a supporting T-rail 82 to provide a slidable mounting permitting the housing 75 to move in either direction thereon.

A pair of brackets 85 and 86, Fig. 5, are attached to the T-rail 82, one at each end thereof. Bracket 85 has a central bore 87 through which one end of the threaded pin or screw member 88 extends. Referring to Fig. 5, it can be seen that the screw member 88 is rotatably mounted, that portion thereof within the bracket 85 being unthreaded to form a bearing surface. The outer end of screw member 88 is of reduced diameter and has a cap 89 threadedly received thereon. At its inner end the screw member 88 has a portion of reduced diameter forming a shoulder which abuts against the inner edge of bracket 86, and which also provides a bearing support within the bracket.

In mounting, the screw member 88 is turned through a centrally positioned and threaded aperture 91 formed within the upper part of flange 80 until its outer end is rotatably supported within the bracket 85, the cap 89 then being screwed on to hold the screw member in position to rotate freely. The end which extends through the bracket 86 also serves as a bearing support and in turn is fastened to shaft 92 of a reduction gearing member 93, by means of the coupling 94, the drive motor being shown at 95.

To provide for moving the housing 75 slowly and to a limited extent in one direction or the other upon the supporting rail 82, to make a retained or relatively permanent and cumulative correction in the position of roll 16 so that the wire or felt 15 will not run off, the screw member 88 which is connected thereto is turned slowly when the motor 95 is energized. For this purpose it is preferred to use a small, fractional horsepower, 3 phase, 60 cycle, reversing motor operating through the high reduction gearing 93 to turn the screw member 88. This motor 95 is connected as shown in Fig. 6 so as to be driven in a direction which will cause the screw member 88 to move the inner or rear end of the roll 16 attached thereto in the opposite direction to the movement imparted to the forward end of the roll when one of the solenoids 52 or 53 is energized.

Thus in response to the traveling member 15 varying from its normal or true running position and contacting one of the palms, the solenoid associated therewith imparts a quick movement of substantial magnitude to one end of the guide roll and in the proper direction to cause a correcting change in the direction in which the wire or felt is then running. This temporary movement of one end of the guide roll is through a fixed but adjustable distance which may be of the order of one inch or thereabouts where the length of the guide roll is of the order of about two hundred inches, the duration of this movement being of the order of about one or two seconds. At the same time this movement is being imparted to the front end of the roll, for example, the reversing motor 95 at the other end of the roll is also energized and slowly turns the screw member 88 which moves the back end of the roll in the opposite direction linearly to that in which the front end is then moving, such movement thus being in the same angular direction for the roll as a whole. The movement of the back end of the roll is of a smaller magnitude and in a direction or sense to supplement the movement applied to the front end, and in the example given may be of the order of approximately .001 inch per second.

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In order to provide for reversing the leads of the motor 95 to secure its operation in the proper directions depending upon which one of the switches 67 or 70 has been energized, a three-phase reversing magnetic switch generally indicated by the numeral 97 in Fig. 6 is employed. This switch is provided with two operating coils or solenoids 98 and 99 which, when energized, are adapted to close the multiple contacts 100 and 105 respectively, which selectively control energization of the solenoids and the reversing motor from the power source 108. Thus when, for example, the palm 65 is moved and closes the micro-switch 67, the coil 98 is energized and causes one set of contacts 100 to be actuated and complete the circuits between the power source, the solenoid 52, and the motor 95 for operation in one direction, producing a relatively large temporary change as well as the relatively small retained change for each cycle of operation of the control. It will be evident without detailed tracing of the circuits that a corresponding operation results when the opposite palm is actuated by the traveling member moving toward it, i. e., in the opposite direction from its normal path of travel, and upon being so actuated, provides for energizing the opposite solenoid, producing a quick relatively large movement of the guide roll in the opposite direction, as well as resulting in the energizing of motor 95 in the reverse direction to produce the relatively small retained movement of the roll, also in the opposite direction. It will be understood that these cycles may take place repeatedly in the same direction if the correction first applied is not sufficient, or may take place intermittently and from time to time in opposite directions as may be required to maintain the traveling member operating continuously in its normal path of travel.

Thus in operation, and assuming the traveling member 15 to remain in its normal path of travel out of contact with both palms 65 and 69, the position of guide roll 16 is not changed, and it remains in its generally transverse position as indicated. Assuming the member 15 to be traveling in the direction of the arrow 110 (Fig. 6), and that it begins to shift its path of travel toward the forward side of the machine or toward the left as shown in Fig. 6, then it will engage palm 65 and close switch 67. Immediately upon closing, switch 67 energizes relay 98 which closes its multiple contacts 100, thereby energizing solenoid 52. Thereupon solenoid 52 attracts its armature and this results in a swinging or arcuate travel of the forward or left-hand end of roll 16 in the downward or counter-clockwise direction as illustrated in Fig. 6, causing it to assume a new angular relation with respect to the traveling member 15.

Although the remaining guide and supporting rolls over which the member 15 is traveling have not been altered, this shift in the relation of guide roll 16 results in causing the traveling member to move transversely, in the direction to return to its normal path of travel. It will be evident that the extent of this transverse motion of the traveling member is directly related to the angular shift in position of roll 16. Since this movement occurs rapidly and to a substantial extent, the tendency for the traveling member to leave its normal path of travel is promptly checked, and overcome. In most cases the extent of such movement is greater than that required to produce the necessary effect, and the

traveling member 15 therefore returns to its neutral position almost immediately.

When the traveling member is again in its normal path of travel it will leave palm 65, de-energizing the relay 98 and solenoid 53, the springs 37, 38 then restoring the forward end of the roll to its initial position.

In the meantime, the closing of switch contacts 100 has likewise energized reversing motor 95, and during the time that such contacts were closed, motor 95 was operated to produce a relatively slow and limited shift in the inner or rear end of roll 16. This shift occurred in the direction to move the inner or right-hand end of the roll 16 upwardly as shown in Fig. 6, this movement being similarly in counterclockwise direction for the roll as a whole and thus supplementing the shift in the roll produced by solenoid 53, although the actual extent of the movement was much less.

Upon return of the traveling member to its normal path, and the consequent de-energization of relay 98, the motor 95 is de-energized but the shift in the position of the inner end of the roll is retained. Thus although the major shift of the forward end of the roll is no longer present, a minor shift of the inner end of the roll, in the same sense, is retained, and this is utilized to produce a continuing or cumulative correction in the path of travel of the member 15. Thus it will be apparent that the initial correction takes place rapidly to prevent displacement of the traveling member and to assure that an adequate and prompt correction will be made as soon as it departs from its normal path of travel, while a small continuing change is likewise produced in conjunction with the major temporary change.

It will also be evident without further analysis that a similar control will be exercised in the opposite direction when the traveling member engages palm 69 and it will thus be evident that the system provides for a highly satisfactory relation of the path of travel of the member 15 to correct promptly any deviation, and to avoid unnecessary overtravel or hunting.

There is shown in Fig. 7 a partial diagrammatic view of a single palm and the control circuit associated therewith for sensing when the traveling member 15 requires correction of its path of travel. With this construction, only a single palm 71 is required which is pivotally mounted at its lower end and positioned so as to ride against one edge of the traveling member 15 at all times. A spring 72, fastened at one end to an arm 73 of the palm 71 and at the other end to the frame work of the machine, is provided to hold the palm in contact with the traveling member 15 at all times.

Micro-switches 67' and 70' are placed one on each side and adjacent the lower end of the arm 73, so that movement of the palm 71 to either the right or left, as viewed in Fig. 7, will cause the arm 73 to come in contact with one of these switches to close it. These switches, which are normally open, are connected to the solenoids 98' and 99' respectively by separate leads as shown and utilize a common lead to the power source 108'. The solenoids 98' and 99' are connected to selectively close the multiple contacts 100 and 105 of the reversing switch 97 as shown in Fig. 6.

In all other respects the circuit connections and the operating characteristics thereof are the same as described above in connection with Fig. 6.

It will be readily apparent from this description that the apparatus and circuits described

in connection with Fig. 7 thus operate in a similar manner to that previously described in connection with Fig. 6.

It is to be noted that in the event of a power failure for any reason the roll 16 will not be affected thereby and will remain in its normal or mid-position so that the wire or felt 15 will continue to run true until something causes it to run one way or the other. Such movement, however, will be so slow as to afford the operator of the machine sufficient time to make such changes as necessary to prevent the wire or felt from running off the roll and being damaged.

In the event the present invention is to be used in connection with large paper machines wherein the guide roll may be too heavy to be moved directly by the solenoids, as above described, without using excessively large solenoids, it is preferred to have the solenoids operate a pilot valve controlling a pneumatic or hydraulically operated system connected to move the guide roll in response thereto. A fluid pressure (pneumatic or hydraulic) operated system of this kind is illustrated in Figs. 8, 9 and 10 mounted within a framework, generally indicated by the reference numeral 116, supported on an arm 117 integrally joined to the T-rail 30. This framework supports the fluid pressure system comprising a cylinder 120 having a slidably mounted piston 121 mounted therein and the pilot valve chamber 122, all constructed in accordance with the usual practice. Also in accordance with the general practice a supply of operating fluid is admitted to the chamber 122 through the pipe 123 from a circulating supply system not shown, discharge therefrom being through valves communicating to exhaust or back to the main supply in the usual manner.

Within the chamber 122 is slidably mounted a small control piston 126 adapted to alternately open and close the ports 127 in the underside of the chamber communicating with the cylinder 120 to provide for a controlled flow of operating fluid to move the piston 121. As shown most clearly in Fig. 8 piston 121 has an arm 130 bolted to its outer end which in turn is directly connected to move the guide roll 16 in opposite directions upon the T-rail 30 as previously described. It will be readily apparent from Fig. 10 that operating fluid can thus be admitted on either one side or the other of the piston 121 and cause it to move in response thereto in a desired direction depending upon which of the ports 127 is uncovered.

The control piston 126 as shown in Fig. 10 has its outer ends directly connected by means of the links 135 with the inner ends of the solenoids 52 and 53, removable pins 136 being provided at one end to connect the links to the solenoids and a threaded connection 138 being provided at the other end to connect with the ends of the piston which are threaded to engage therewith. Coiled springs 137, positioned about the outer ends of the piston and abutting against the outside of chamber 122 at one end and at the other end against the nuts forming part of the threaded connection 138, are provided to facilitate a rapid return of the control piston 126 to its neutral or mid-point, whenever the solenoids are not energized, and which provides for the operating fluid to discharge from the exhaust ports within cylinder 20. Piston 121 is then free to return to its neutral or mid-position and springs 37 and 38 immediately return the guide roll to its normal or mid-position.

Operation of the guide mechanism when the pneumatic or hydraulically operated means are used in conjunction with the solenoids to move the guide roll is otherwise similar to the operation described in connection with the machine wherein the solenoids 52 and 53 were directly connected to move one end of the roll 16. The motor 95 and screw member 88 also function in the same manner as this instance as before to apply a corrective movement to the guide roll.

It will be apparent that in operation as soon as the wire or felt has returned to its normal or mid-position the solenoid acting to hold the front end of the roll at its shifted position with respect to the wire or felt will be de-energized. As the palm is no longer in contact with the edge of the wire or felt, the circuit connecting the solenoid to the main power source is open and the heavy springs 37 and 38 then return the front end of the roll to its normal or mid-position. However the shift at the opposite end of the roll is not temporary but is retained and thus the guide roll is now at a slightly different angle, this being a retained or relatively permanent correction. If such retained correction is not enough, the wire or felt will again contact the same palm and repeat the action, thus temporarily correcting and at the same time adding increments of additional correction until the motor 95 has turned the screw member 88 sufficiently to adjust the roll to a position which will cause the wire to run true.

It will thus be evident in connection with the operation of this device that when the wire or felt is running straight in its normal position the switches of the electrical system are open, the solenoids are not energized, there is no operating pressure in the cylinders and the motor which applies the slow motion adjustment to the guide roll is not running, thus providing for economical operation and low maintenance costs.

While the apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form, and that changes can be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A control for maintaining a traveling member in a predetermined desired path of travel comprising a guide roll extending generally transversely of said path of travel and in running contact with said traveling member, means for adjustably mounting said guide roll to vary its angular relation to said traveling member to correct the path of travel of said member, means for sensing a departure of said traveling member from its normal path of travel, means controlled by said sensing means for effecting a substantial temporary movement of said guide roll in the angular direction to correct the path of travel of said member during the time said sensing means is actuated, and additional means controlled by said sensing means for producing a small retained movement of said guide roll in the same angular direction.

2. A control for maintaining a traveling member in a predetermined desired path of travel comprising a guide roll extending generally transversely of said path of travel and in running contact with said traveling member, means for adjustably mounting said guide roll to vary its angular relation to said traveling member to correct the path of travel of said member, means for sensing a departure of said traveling member

from its normal path of travel, means operable upon actuation of said sensing means for effecting a rapid movement of said roll of substantial extent in the angular direction to apply a correction to the path of travel of said member, means operable upon return of said traveling member to its normal path of travel for reversing said substantial movement of said roll, and additional means operable upon actuation of said sensing means for effecting a retained relatively small movement of said roll in the same angular direction as that produced by said substantial movement.

3. A control for maintaining a traveling member in a predetermined desired path of travel comprising a guide roll extending generally transversely of said path of travel and in running contact with said traveling member, means for mounting said guide roll for swinging movement to vary its angular relation to said traveling member to correct the path of travel of said member, means for sensing a departure of said traveling member from its normal path of travel, means operable upon actuation of said sensing means for effecting a rapid movement of said roll of substantial extent in the angular direction to apply a correction to the path of travel of said member, additional means also operable upon actuation of said sensing means for effecting a relatively small movement of said roll in the same angular direction, and means operable upon return of said traveling member to its said normal path of travel for reversing said rapid movement of substantial extent while retaining said small correcting movement.

4. In a paper making machine having a guide roll and a traveling member for carrying a paper web supported on said guide roll, guide means for maintaining said traveling member in a normal path of travel comprising means positioned on each side of said traveling member for sensing when said traveling member deviates from its normal path of travel, means responsive to said sensing means and adapted to be energized upon deviation of said traveling member from its normal path of travel and operatively connected to provide for moving said guide roll to vary the angular relation between said roll and said traveling member a relatively large amount in response to a deviation of said traveling member to apply a quick correction in the direction in which said traveling member is moving, means for returning said guide roll to its normal position when said moving means is de-energized, and means also responsive to said sensing means for similarly moving said guide roll a relatively small amount to a new retained position.

5. In a paper making machine having a guide roll and a traveling member for carrying a paper web supported on said guide roll, guide means for maintaining said traveling member in a normal path of travel comprising means positioned on each side of said traveling member for sensing when said traveling member deviates from its normal path of travel, means responsive to said sensing means and adapted to be energized upon deviation of said traveling member from its normal path of travel and operatively connected to provide for moving one end of said guide roll to vary the angular relation between said roll and said traveling member a relatively large amount in response to a deviation of traveling member to apply a quick correction in the direction in which said traveling member is moving, means for returning said end of the guide roll to its normal position when said

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moving means is de-energized, and means also responsive to said sensing means for moving the other end of said guide roll in the opposite direction a relatively small amount to a new retained position for that end of said guide roll.

6. In a paper making machine having a guide roll and a traveling member for carrying a paper web supported on said guide roll, guide means for changing the direction in which said traveling member is moving when it tends to deviate from its normal path of travel comprising electrically operated means positioned adjacent said traveling member for sensing when said member deviates from its normal path of travel, electrically controlled means responsive to said sensing means and adapted to be energized upon deviation of said member from its normal path of travel and operatively connected to provide for moving one end of said guide roll to vary its angular relation to said traveling member a relatively large amount in response to a deviation of said member to apply a quick correction in the direction in which said member is traveling, means for returning said end of the guide roll to its normal position when said moving means is de-energized, and electrically controlled means also responsive to said sensing means for moving the other end of said guide roll in the opposite direction a relatively small amount to a new retained position for that end of said guide roll.

7. In a paper making machine having a guide roll and a traveling member for carrying a paper web supported on said guide roll, guide means for maintaining said traveling member in a normal path of travel comprising means positioned adjacent said traveling member for sensing when said member deviates from its normal path of travel, fluid operated means responsive to said sensing means and adapted to be motivated upon deviation of said member from its normal path of travel and operatively connected to provide for moving one end of said guide roll to vary its angular relation to said traveling member a relatively large amount in response to a deviation of said member to apply a quick correction in the direction in which said member is traveling and to provide for returning said end of the guide roll to its normal position when said traveling member returns to its normal path of travel, and means also responsive to said sensing means for moving the other end of said guide roll in the opposite direction a relatively small amount to a new retained position for that end of said guide roll.

8. In a paper making machine having a guide roll and a traveling member for carrying a paper web supported on said guide roll, guide means for maintaining said traveling member in a normal path of travel comprising means positioned on each side of said member for sensing when said member deviates from its normal path of travel, means responsive to said sensing means and adapted to be energized upon deviation of said member from its normal path of travel and operatively connected to provide for moving one end of said guide roll to vary its angular relation to said traveling member a relatively large amount in response to a deviation of said member to apply a quick correction in the direction in which said member is traveling, retractible means connected to provide for returning said end of the guide roll to its normal position when said moving means is de-energized, and means also responsive to said sensing means for moving the other end of said guide roll a relatively small amount to a new retained position for that end of said guide roll

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which differs from its former position in the direction tending to return said traveling member to its normal path of travel.

9. In a paper making machine having a guide roll and a traveling member for carrying a paper web supported on said guide roll, guide means for maintaining said traveling member in a normal path of travel comprising means positioned on each side of said member for sensing when said member deviates from its normal path of travel, means responsive to said sensing means and adapted to be energized upon deviation of said member from its normal path of travel and operatively connected to provide for moving one end of said guide roll to vary its angular relation to said traveling member a relatively large amount in response to a deviation of said member to apply a quick correction in the direction in which said member is traveling, springs connected to provide for returning said end of the guide roll to its normal position when said moving means is de-energized, and means also responsive to said sensing means for moving the other end of said guide roll in the opposite direction a relatively small amount to a new retained position for that end of said guide roll which differs from its former position in the direction tending to return said traveling member to its normal path of travel.

10. In a paper making machine having a guide roll and a wire for carrying a paper web movably supported on said guide roll, guide means for maintaining said wire in a normal path of travel comprising a switch positioned on each side of said wire and out of contact therewith when said wire is traveling in a substantially straight path adapted to be closed and complete an electrical circuit when said wire deviates a predetermined amount from its normal path of travel, electrically operated means responsive to the closing of one of said switches and operatively connected to said guide roll to provide for moving one end of said guide roll to vary its angular relation to said wire a relatively large amount in response to a movement of said wire closing one of said switches, retractible means connected to provide for returning said end of the guide roll to its normal position when said closed switch is opened, and additional means also electrically operated in response to the closing of said one of said switches for moving said guide roll a relatively small amount to a new retained position for said guide roll which differs from its former position in the direction tending to return said wire to its normal path of travel.

11. In a paper making machine, a guide roll having its supporting ends slidably mounted, a wire for carrying a paper web movably supported on said guide roll, and guide means adapted to keep said wire moving in a substantially straight path through the machine comprising an electrical circuit, a pair of normally open switches connected in said circuit and positioned one on each side of said wire so that when the edge of said wire comes in contact with one of said switches the circuit is closed, a pair of solenoids operatively connected in said circuit and to said guide roll to provide for moving said guide roll to vary its angular relation to said wire a relatively large amount in response to the closing of said circuit, means operatively connected to return said guide roll to its original position whenever both of said solenoids are de-energized, and electrically operated means also connected in said circuit to respond when said circuit is closed to move said guide roll angularly

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a relatively small amount to a new retained position which differs from its former position in the direction tending to return said wire to its normal path of travel.

12. In a paper making machine, a guide roll having its supporting ends adjustably mounted, a traveling member for carrying a paper web movably supported on said guide roll, and guide means adapted to keep said traveling member moving in a substantially normal path through the machine comprising a pair of control means positioned one on each side of said traveling member for selectively closing an electrical circuit when said traveling member comes in contact therewith, fluid operated means connected to operate in response to the closing of said circuit for moving said guide roll quickly a relatively large amount from a normal position in response to the closing of said circuit and to return said guide roll to its said normal position upon the opening of said circuit, and additional electrically operated means connected in said circuit to respond when said circuit is closed to move said guide roll to a new retained position to vary its angular relation to said traveling member a relatively small amount which tends to return the path of travel of said traveling member to said normal path through the machine.

13. In a paper making machine having a guide roll, a traveling member for carrying a paper web supported on said guide roll, and guide means for maintaining said traveling member in a normal path of travel comprising means positioned relatively close to said guide roll and spaced therefrom in the direction in which said traveling member is moving for sensing when said traveling member deviates from its normal path of travel, means responsive to said sensing means and adapted to be energized upon deviation of said traveling member from its normal path of travel and operatively connected to provide for moving said guide roll to vary the angular relation between said roll and said traveling member a relatively large amount in response to a deviation of said traveling member to apply a quick correction in the direction in which said traveling member is moving, means for returning

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said guide roll to its normal position when said moving means is de-energized, and means also responsive to said sensing means for similarly moving said guide roll a relatively small amount to a new retained position.

14. In a paper making machine, a guide roll having its supporting ends adjustably mounted, a traveling member for carrying a paper web movably supported on said guide roll, and guide means adapted to keep said traveling member moving in a substantially normal path through the machine comprising a pair of control means positioned relatively close to said guide roll and spaced therefrom in the direction in which said traveling member is moving, said pair of control means also being positioned one on each side of said traveling member for selectively closing an electrical circuit when said traveling member comes in contact therewith, electrically operated means responsive to the closing of said circuit operatively connected to provide for moving said guide roll quickly from a normal position to vary its angular relation to said traveling member a relatively large amount in response to the closing of said circuit, means for returning said guide roll to its said normal position upon the opening of said circuit, and additional electrically operated means connected in said circuit to respond when said circuit is closed to move said guide roll to a new retained position to vary its angular relation to said traveling member a relatively small amount which tends to return the path of travel of said traveling member to said normal path through the machine.

STEPHEN A. STAEGE.

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The following references are of record in the file of this patent:

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