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SIDE GUIDE TENSION FOR WEBS

Filed May 11, 1953

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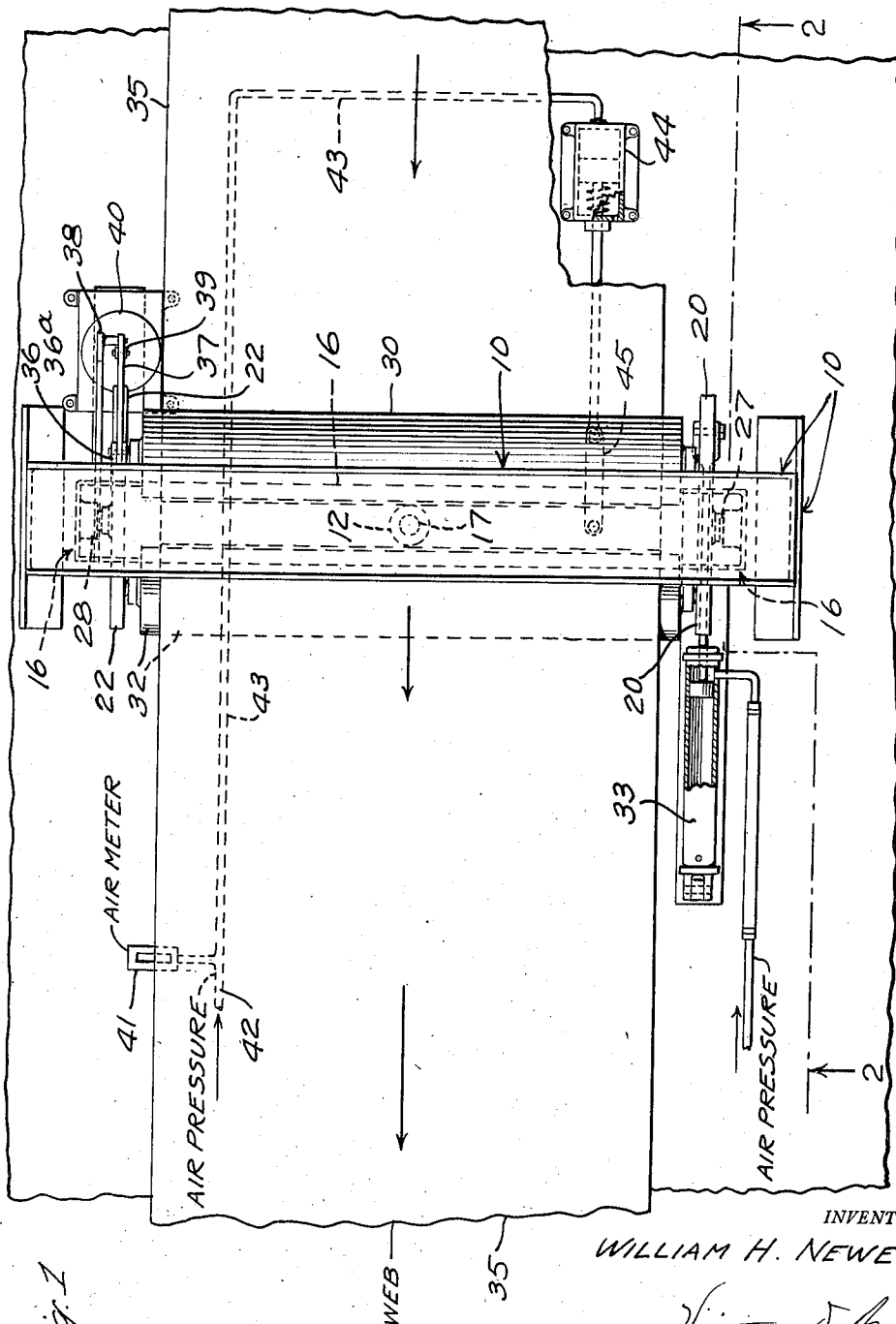


Fig. 1

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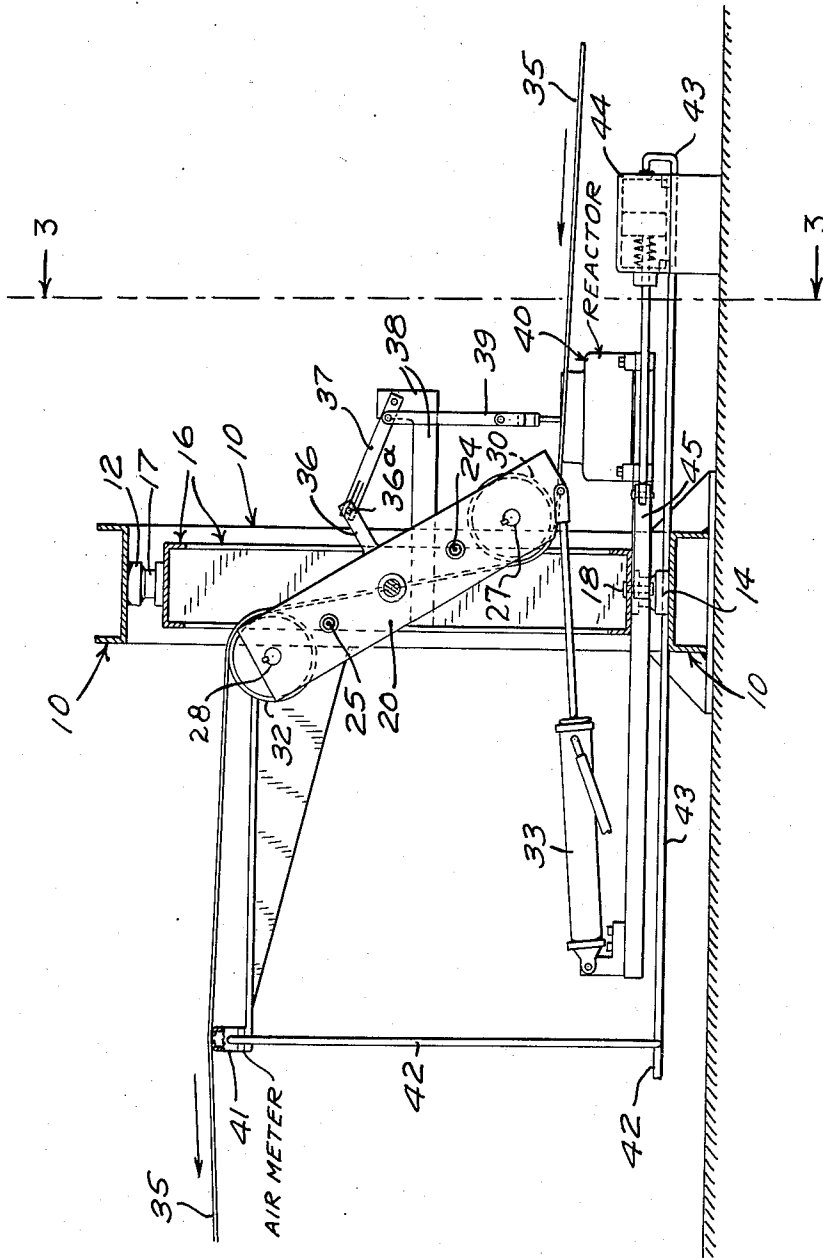
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Fig. 2



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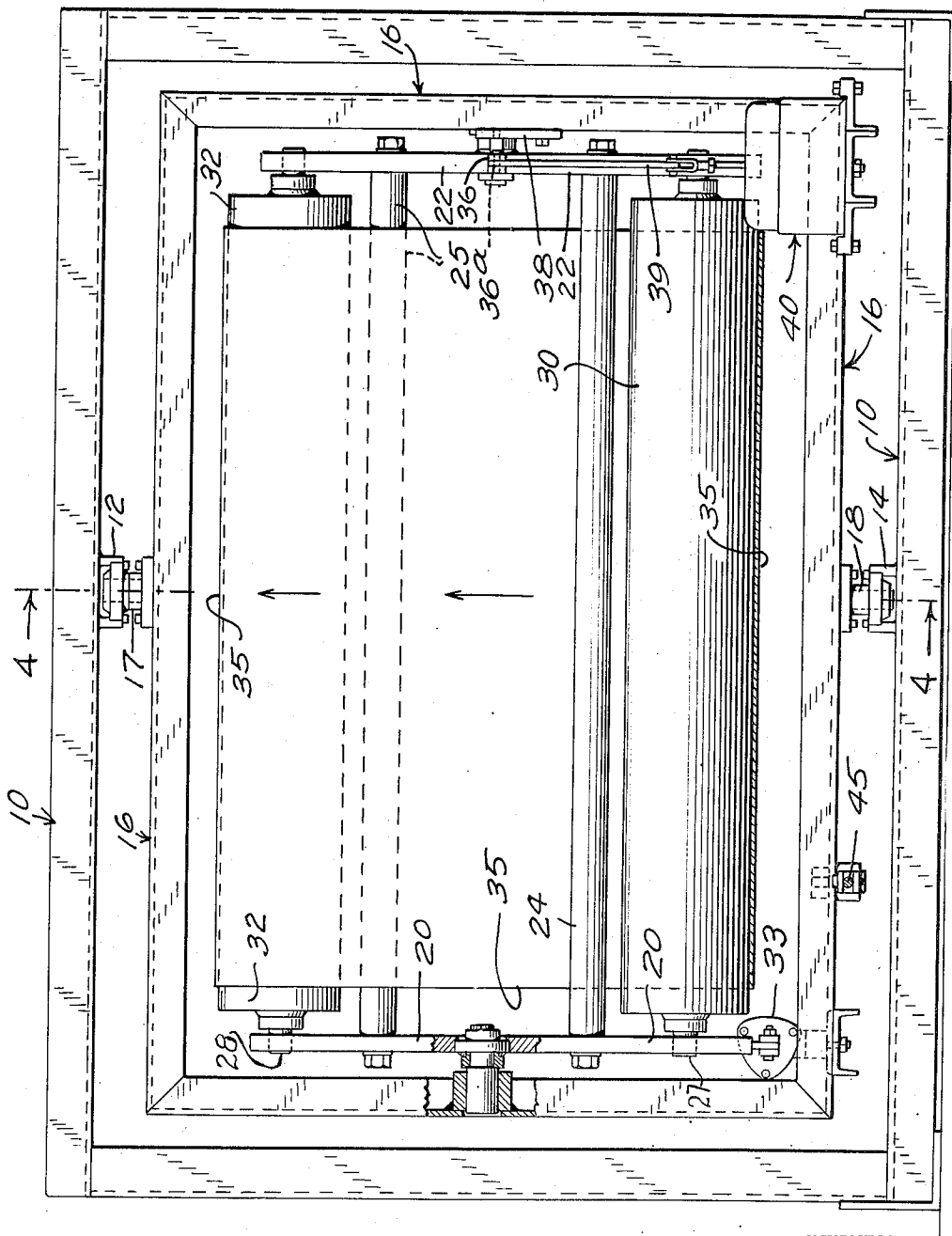


Fig. 3

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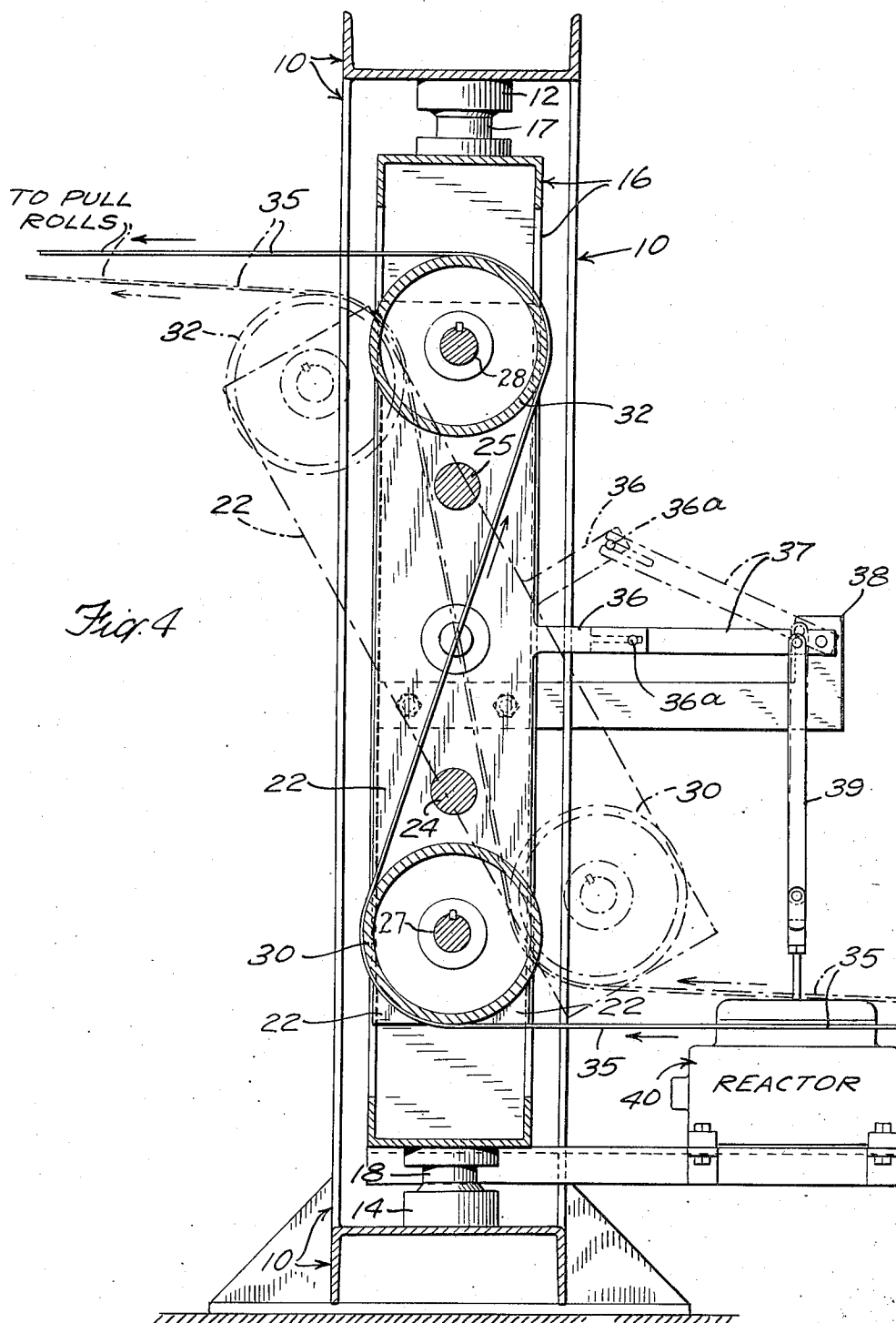
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SIDE GUIDE TENSION FOR WEBS

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2,807,465

SIDE GUIDE TENSION FOR WEBS

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Application May 11, 1953, Serial No. 354,220

5 Claims. (Cl. 271—2.6)

This invention relates to a device for controlling the advance of a continuous web and particularly a web guiding device which centers a web and simultaneously compensates for any excessive tension resulting from the steering control.

This device may be used effectively in impression coating and printing operations wherever lateral registry between the impressing apparatus and a continuously fed web of film or paper is essential. A simple method for achieving this desired registry is to provide a device which is capable of subjecting one or the other marginal portions of the web to stress or tension which causes the web to recenter itself. Mechanisms which depend on tension alone for the lateral control of the web typically involve rather complicated and expensive apparatus for tilting or pivoting guide rolls about an axis in the plane of the web immediately before entering the first of the guides. Not only is the mechanism required for so tilting the guides more complex but substantial stress is needed before the desired centering is accomplished. This invention contemplates a relatively simple device for maintaining registry without producing more stress than the material can withstand under normal conditions. Broadly this is achieved by producing two parallel horizontal guides normally vertically aligned and mounted to pivot about a vertical and horizontal axis. The pivoting of the guides causes the web to shift laterally with respect thereto, the web control mechanism before and in advance of the rolls being stationary.

A normally small tension differential on the marginal portions of the web incidentally arises during the recentering operation of the device. Therefore in conjunction with means for permitting the guides to pivot on axes normal to the planes of the web as it immediately approaches and recedes therefrom are means which permit the same guides to tilt on an axis parallel with these planes. The resulting reduction in tension is further increased by connecting the supports for the guides to a reactor which controls the power delivered to the web driving means.

Automatic means are provided for the detection and correction of undesired drift. Preferably these means are actuated by air pressure which is varied in accordance with the drift of the web over an open air valve the position of which is established in relation to the desired course of travel of the web.

One object of my invention is to provide a device which permits centering of a travelling continuous web without developing under normal circumstances excessive tension thereon.

Another object is to provide a device which permits reduction in web tension should undue stress develop either during normal operation or when centering is being effected.

A further object of the invention is to provide a device of simple and inexpensive construction for controlling the advance of a continuous web by automatic means.

Other objects of the invention will be apparent from

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the following specification and the accompanying drawings forming a part thereof, wherein:

Fig. 1 is a plan of an embodiment of the invention;

Fig. 2 is a side elevation of same;

Fig. 3 is a rear elevation on enlarged scale on the line 3—3 of Fig. 2; and

Fig. 4 is a section on the line 4—4 of Fig. 3 on further enlarged scale.

Referring to the drawings the rectangular member 10 supports the operative elements constituting the preferred embodiment of the invention. The top cross piece of this member has mounted on its underside a bearing holder 12. The bottom cross piece of the member 10 has a similar bearing holder 14. Frame member 16 is also rectangular in shape and is pivotally supported on top and bottom stub shafts 17 and 18 which are axially mounted on the top and bottom cross pieces of member 16. The stub shafts are journaled in the bearing holders 12 and 14.

Side bars 20 and 22 are journaled in the end pieces of member 16 to tilt or rotate on a horizontal axis. Braces 24 and 25 are attached to the side bars and extend between them so that they may be rotated together. Mounted in the end portions of side bars 20 and 22 are fixed shafts 27 and 28 which axially support guides 30 and 32 respectively. The guides 30 and 32 are keyed to their respective shafts to prevent rotation. The guides are cylindrical in shape to reduce the danger of tearing as the web advances over them.

Sufficient resistance is offered by tension cylinder 33 the piston of which is connected to the side bar 20 to prevent tilting unless excessive tension develops on the web in which event the relative position of the guides is off the vertical as shown in Figs. 2 and 4. Mechanism is provided in association with the side bars for reducing the speed of the pull rollers (not shown) which cause the web 35 to advance through the device. On the right hand side bar is centrally and rigidly mounted a projection member 36 having a pin 36a mounted on its free end. A small connection 37 is pivotally connected to a supporting member 38 mounted on the member 16. The free end of pivot connection 37 has a slot adapted to receive the pin 36a and permit a sliding engagement of the pin in the slot. Close to the pivotal point of connection 37 there is pivotally connected thereto a vertically disposed link 39 which carries at its bottom end the core of short stroke reactor 40, which is mounted for pivotal movement with the frame 16. The reactor is in the power circuit for the driving mechanism which operates the pull rolls. By partially withdrawing the core from the field the inductance of this circuit is increased and the power delivered to the driving mechanism for the pull rollers is reduced. It can thus be seen that when excessive tension develops on the web as a result of the side guide control operation or for any other reason the desired speed reduction and lessening of tension is accomplished.

According to this invention registry is maintained without producing more stress than the web material can withstand under normal conditions. This is achieved by parallel horizontal guides 30 and 35 normally vertically aligned and mounted to pivot with frame member 16 about a vertical axis and with side bars 20 and 22 about a horizontal axis. The web passes under guide 30 and over guide 32. When the guides are in a position exactly perpendicular to the direction of movement of the web, the alignment of the sheet will not be changed. However, when the guides are inclined in one direction or the other by pivoting of frame 16 along the vertical axis in bearings 12 and 14, the web is caused to follow the angle of inclination of the guides and to be offset in the direction of inclination. It will be clear that by changing the angle of inclination of the guides from the line

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of path of travel of the web, the web can be controlled so that the portion thereof beyond the guides follows a predetermined path notwithstanding lateral variations in the position of the portion in advance of the guides. In the same manner, when the web gets off-center, by subjecting one or other marginal portion of the web to stress or tension it is caused to recenter itself, assisted by the air pressure meter 41 and cylinder 44.

Because of the novel means provided for maintaining the web correctly centered, it is not contemplated that under normal conditions excessive tension will be placed on the web to cause the side bars and guides to tilt. It has been found that only a very slight increase in tension on one side of the web or the other occurs when the guides are pivoted in planes parallel to the original course of travel. If the increase in stress on the web resulting from the pivotal movement of the frame member 16 proves excessive however the consequent tilting of the side bars slows the web drive and reduces the tension. Should excessive web tension develop during otherwise normal operation, the device of course provides effective means for compensation.

As soon as it is visually detected that the web has drifted, it is possible to manually pivot the frame member 16 to cause the web to recenter itself. But air pressure means are provided in the preferred form of the invention for detecting drift and making the desired compensation. Electric eye or other means are also obviously adaptable to detect any undesired shift in the line of web travel. As shown, however, an air meter 41 is provided under one edge of the web which partially covers a slot in the meter during normal web travel. Air is admitted under pressure to the slot through air tubing 42 from a constant source which also supplies air under pressure to the tension cylinder 33 for the purpose of resisting the tendency of the guide rolls to tilt under normal conditions.

A branch air tube 43 connects guide cylinder 44 to tube 42 leading to the air meter. The piston of cylinder 44 has a spring backed head and is pivotally connected to the left hand side of frame member 16 by means of link 45 the end of which is permitted to move in an arc on the frame member 16 its other end being pivoted on its connection with the piston.

When the web is correctly centered with respect to the air meter 41 there is sufficient pressure on the piston head in cylinder 44 to balance the force of the backing spring. Any shifting of the web will result in a variance in the air pressure and the piston and its connections will be actuated accordingly. If the frame member 16 is caused to pivot in a clockwise direction because the web has drifted to the right, the web will obviously shift back to the left with respect to the frame member. This in turn varies the air pressure in the guide control cylinder in the opposite sense thus causing the frame to pivot back to its original position. It may be expected, of course, that a drift to the left will be corrected by movements of the frame member in a counterclockwise rotation to recenter the web.

It is understood that modifications may be effected in the embodiments of the invention, which is described and illustrated, without departing in principle from the scope of the invention.

What is claimed is:

1. A side guide and tension control device for a travelling web comprising a frame member, means for pivotally supporting said frame member on its vertical axis, side bars, means for pivotally supporting said side bars within said frame member on their horizontal axis, two parallel guides locked against rotation and carried by said side bars in normally vertical alignment, means for pivoting said frame member on its vertical axis in accordance with a lateral shift of the web outside the device whereby

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the line of advance of the web is altered in direction as desired and means actuated by movement of said guides out of normal vertical alignment for controlling the rate of advance of the web.

2. A side guide and tension control device for a travelling web as defined in claim 1 wherein the means for pivoting the frame member comprises an air pressure source, an air meter in pneumatic connection with said air source and positioned in the path of one edge of the web, a guide cylinder in pneumatic connection with said air meter the piston of said cylinder being pivotally connected to the frame member.

3. A side guide and tension control device for a travelling web as defined in claim 1 wherein the means for controlling the rate of advance of the web comprises a short stroke reactor having a movable core in mechanical connection with the side bars whereby the core is withdrawn partially from the magnetic field of the reactor when the side bars are caused to tilt from their normally vertical position by excessive tension on the web.

4. A side guide and tension control device for a travelling web as defined in claim 1 further characterized in that said frame member is generally rectangular and pivotally supported at the center of its top and bottom, said side bars are movable together and are pivotally supported within the sides of the rectangular frame member, the two parallel guides are supported by the opposite ends of said side bars, said side bars and guides are normally maintained in vertical alignment by an air tension cylinder mounted for movement with the frame member and the piston of said cylinder is in mechanical connection with one of said side bars.

5. A side guide and tension control device for a travelling web comprising a generally rectangular frame member pivotally supported at the center of its top and bottom, a pair of side bars movable together and pivotally supported within the sides of the rectangular frame member on their horizontal axis, two parallel cylindrical guides locked against rotation and carried by the ends of said side bars in normally vertical alignment; means for pivoting the frame member on its vertical axis in accordance with a lateral shift of the web whereby the line of advance of the web is altered as desired, said means comprising an air pressure source, an air meter in pneumatic connection with said air source and positioned in the path of one edge of the web, a guide cylinder in pneumatic connection with said air meter, the piston of said cylinder being pivotally connected to the frame member; means actuated by movement of said guides out of normal vertical alignment for controlling the rate of advance of the web, said means comprising a short stroke reactor having a movable core in mechanical connection with the side bars whereby the core is withdrawn partially from the magnetic field of the reactor when the side bars are caused to tilt from their normally vertical position by excessive tension on the web.

References Cited in the file of this patent

UNITED STATES PATENTS

1,594,395	Weston	Aug. 3, 1926
1,615,415	Tandel	Jan. 25, 1927
1,634,984	Dickhaut	July 5, 1927
1,958,692	Besal et al.	May 15, 1934
1,982,685	Muller	Dec. 4, 1934
2,116,586	Stoller	May 10, 1938
2,331,030	King	Oct. 5, 1943
2,480,781	Simpson	Aug. 30, 1949
2,491,636	Amos	Dec. 20, 1949
2,539,131	Gunderson et al.	Jan. 23, 1951
2,605,101	Lessmann	July 29, 1952
2,662,767	Dourdeville	Dec. 15, 1953