Dec. 29, 1936. A. J. HORTON 2,066,307

WEB FEEDING MECHANISM

Filed June 7, 1935 2 Sheets-Sheet 1

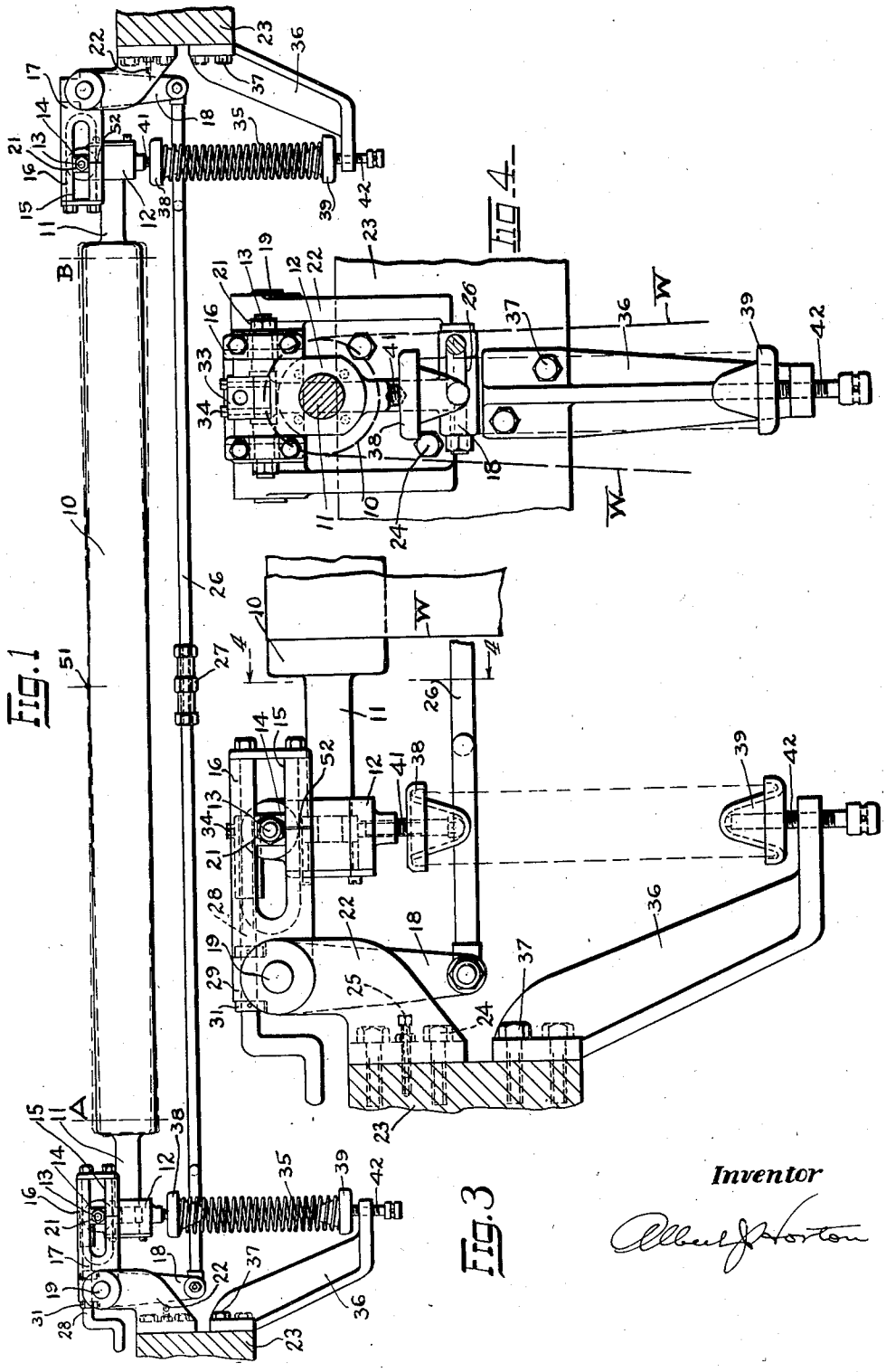

Fig. 1

Fig. 4

Fig. 3

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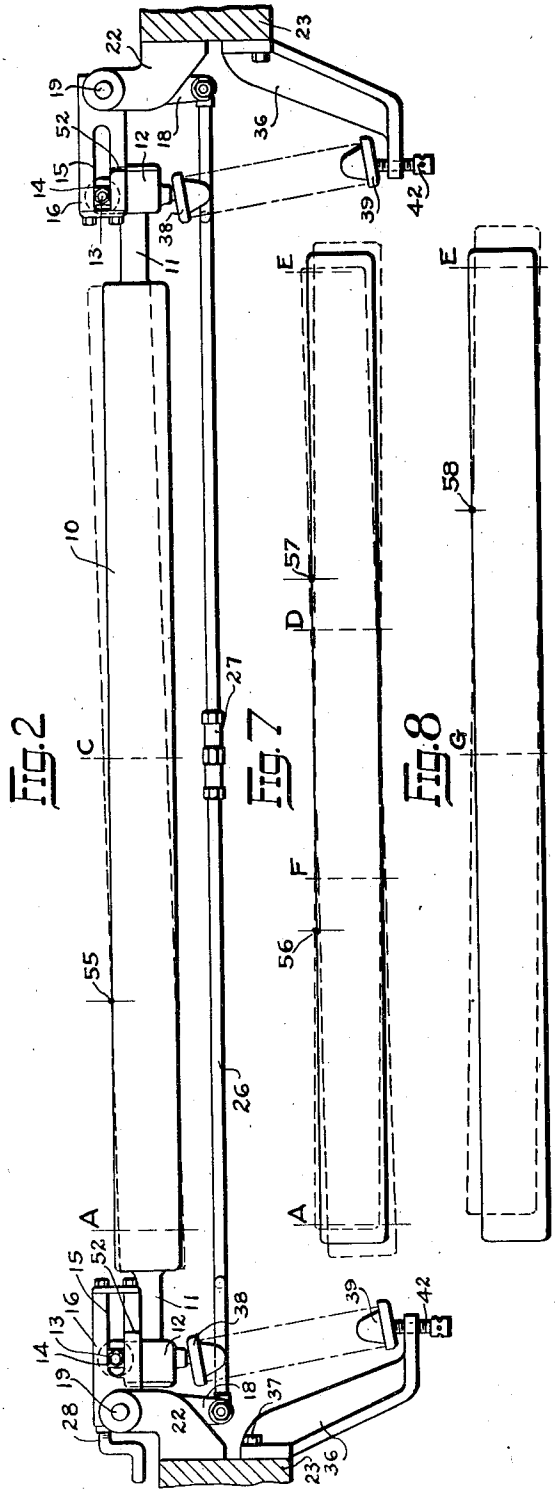

Fig. 2

Fig. 7

Fig. 8

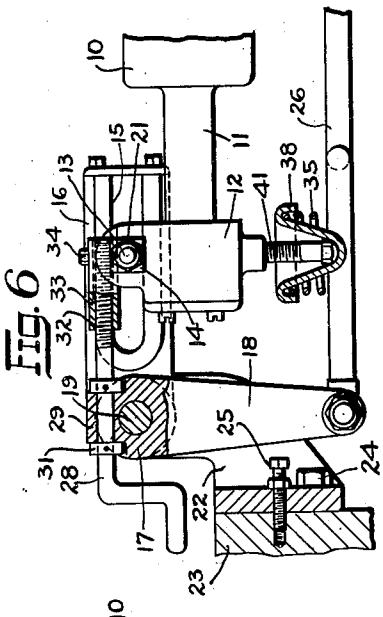

Fig. 6

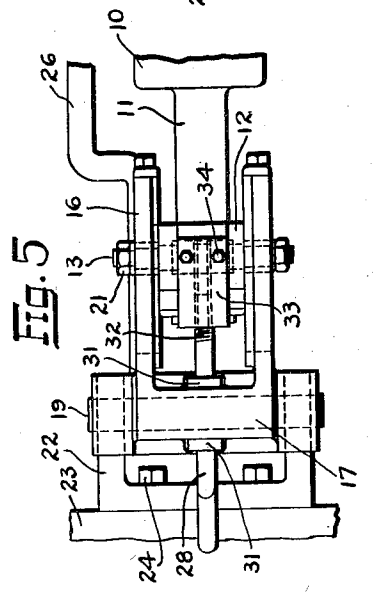

Fig. 5

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UNITED STATES PATENT OFFICE

2,066,307

WEB FEEDING MECHANISM

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Application June 7, 1935, Serial No. 25,389

23 Claims. (Cl. 271—2.1)

This invention relates to printing machines and more particularly to improvements in web tension equalizing mechanisms for printing machines.

In machines operating on a web of paper or similar material which is drawn from a roll, it is a general practice to provide a roller supported a short distance away from the web roll and around which the web is passed before it is led to the printing cylinders or other mechanism that may operate upon it. These rollers are usually rotatably supported by bearings carried on springs, so that any difference in tension of the opposite edges of the web may be compensated for. Due to difference in moisture content on the opposite ends of a web roll, it quite frequently happens that the length of a turn of the web at one end of the roll is substantially different from the length of the turn at the other end, but the tensioning roller compensates for this difference and produces a smooth unwrinkled surface on the web as it is fed to the machine.

The spring supported rollers in general use operate satisfactorily when the web is so positioned that the center of the web passes around the roller at a point midway between its ends, but when a narrower web, such as a half width web is positioned near one end of the roller, the tension at the opposite edges of the web cannot be satisfactorily equalized. In applicant's pending application, Serial Number 612,699, filed May 21, 1932, means are shown for overcoming the difficulty mentioned, where it is practical to support the equalizing roller so that it will pivot about one or more transverse vertical axes. Herein is disclosed a similar tension equalizing roller that is pivoted about a plurality of transverse horizontal axes, so that the web may be led to and from it in vertical or nearly vertical planes.

One of the principal objects of this invention is to provide an improved web tension equalizing roller for supporting and directing a web, whereby the tension on the web running thereover will be substantially uniform at each edge and the web will therefore be free from wrinkles.

Another object is to provide in such mechanism, novel supporting means for the roller, which will permit the roller to adapt itself, to efficiently equalize the tension on webs of various widths.

Still another object is to provide in such mechanism novel adjusting means whereby the roller may be disposed to support and equalize the tension on full or fractional width webs as required.

A further object is to provide roller supporting means whereby the roller may be adjusted to swing, during web tension equalizing operation, about various axes disposed transversely to its longitudinal axis and preferably in substantially a vertical plane.

A still further object is to provide in such roller mechanism, means to pivotally support the roller on a transverse axis with the pivot point substantially in line with, or above, the upper peripheral surface of the roller.

It is also an object of the invention to provide a novel roller mechanism of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

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

Figure 1 is a side elevational view of a roller mechanism embodying the features of this invention and arranged to equalize tension on a web of full width;

Figure 2 is a side elevational view of the mechanism shown in Figure 1 but having its parts arranged to equalize tension on a web of substantially one-half width;

Figure 3 is an enlarged view of a portion of the device as shown in Figure 1;

Figure 4 is a sectional view of the device as seen on the line 4 of Figure 3 and in the direction of the arrow;

Figure 5 is a top plan view of the portion of the device shown in Figure 3;

Figure 6 is a view partly in section, similar to Figure 3 with parts broken away to more clearly show the structural details; and

Figures 7 and 8 are diagrammatic views of the roller illustrating the relative amounts of movement of opposite ends of the roller when the same is in operation and disposed to swing about various axes.

The roll mechanism selected to illustrate the features of this invention is one in which the tension equalizing roller is arranged to swing in a vertical plane about various axes disposed sub-

stantially tangential to the upper side of its periphery. The supports for the roller, disposed, in this instance, one at either end thereof, are substantially identical in structure and are adapted to permit longitudinal adjustment of the roller and of the pivot support therefor, whereby the particular transverse axis desired may be readily located and the mechanism adjusted for use with any predetermined width of web. The pivotal support for the roller, in this instance, is arranged with the pivot point thereof substantially in line with the upper peripheral surface of the roller and preferably should be either so disposed or above the said surface to insure sensitiveness in the web tension equalizing operation of the mechanism. To continuously insure comparatively perfect balance of the parts, resilient supporting means, in this instance, compression springs are provided.

The mechanism embodying the features of this invention and which is illustrated in the accompanying drawings, comprises a web supporting roller 10, having its shaft 11 journaled at each end thereof in bearing blocks 12, wherein it is suitably secured against axial movement relatively thereto. The bearing blocks 12 are pivotally supported or hung upon a shaft 13, which is supported at each end thereof in a box 14. The axis of shaft 13, in this instance, is in line with the upper surface of roller 10. Each of the boxes 14 is slidably mounted in a slot 15, formed in each part of a bifurcated arm 16 of a bell crank 17, the other arm 18 of which depends from an end of arm 16 and is disposed at substantially right angles thereto. The shaft 13 extends between the parts of arm 16 and is secured to each box 14 by a nut 21 threaded upon the adjacent end of shaft 13.

The bell crank 17 is swingably mounted by a shaft 19, at the jointure of arms 16 and 18 thereof, to a supporting bracket 22 secured to a stationary part, in this instance a rail 23, of the printing machine, by bolts 24. An adjustable stop screw 25 is provided and is disposed to be engaged by arm 18 to limit and control the amount of swinging movement of the bell crank 17. A tie rod 26 is provided and secured at each end, to the free ends of arms 18 of each of the bell cranks 17 to insure equal movement thereof and is adjustable in length by means of a threaded coupling 27, herein disposed substantially central between its ends. The rod 26 is herein horizontally offset along its central portion to avoid contact with the web W running over roller 10.

As hereinbefore mentioned, the roller 10, with its bearing blocks 12, is adjustably slidable longitudinally with respect to its axis, in either direction, and it is guided in such movement by the cooperation of the boxes 14 with the surfaces defining slots 15 of bell crank arms 16. Such movement in either direction, may be imparted to roller 10 and its associated parts by means of a manually operable feed screw 28 rotatably supported in a lug 29 of the bell crank 17 and secured against axial movement relatively thereto by collars 31. The threaded end 32, of screw 28, screws into a threaded block 33 secured to shaft 13 by screws 34. Only one feed screw 28 and block 33 is required and herein it is shown in connection with the left hand bell crank 17.

To compensate for the weight of roller 10 and its associated mechanism and to balance the same, compression springs 35 are provided. One spring is herein disposed at each end of the device between the bearing block 12 and the lower end of a bracket 36 secured by bolts 37 to rail 23. The springs are supported at each end by cups 38 and 39, which are pivotally engaged by spring tension adjusting screws 41 and 42 respectively, which, in turn, are threadingly secured to block 12 and bracket 36 respectively. Manipulation of screws 41 or 42 permits sensitive adjustment of the tension of sprngs 35 to substantially counteract the weight of the roller 10 and its associated mechanism.

The arrangement whereby the roller is supported on the bell crank levers allows it to swing about a transverse axis, and by adjusting the roller longitudinally, by means of the screw 28 the position of the axis may be shifted to bring it at the center of a web running at the center or near either end of the roll.

This is accomplished by moving the pivotal points from which the roller is hung (herein the shafts 13) into predetermined axial position whereby to accommodate the particular width of web to be run. For instance, as shown in Figure 1, the parts of the mechanism are positioned to run a full width web extending, say between points A and B, and the unevennesses therein are compensated for, by a swinging movement of the mechanism about pivot points 19. This in effect permits the swinging of roller 10 about a fulcrum point midway between its ends, for instance, at point 51, (Figure 1), the amount of movement at each end of the roller being equal. To indicate the proper setting of parts in this position, an indicating mark may be made, as at 52, on bell crank arm 16 (Figure 3) to coincide with another mark on box 14.

Movement of the roller with its associated parts, (herein the bearing blocks 12, shafts 13, and boxes 14), either to the right or to the left in Figure 1, will operate to shift the fulcrum point 51 to various positions along the roller, and various widths of webs may be run and similar results will be obtained, the fulcrum point for the roller, in each instance, being disposed substantially at or in alignment with the center of the web running thereover.

In Figure 2 is illustrated the setting of the parts, to the left of the position shown in Figure 1, to a point where a one-half width web positioned at an off center portion, herein near the left end of the roll is accommodated. The fulcrum point for the swinging movement of the roller, in this instance, is indicated at 55, and it will be noted that from this point as a center the swinging movement is equal along each edge of the web being run, the width of web being indicated as being disposed between points A and C.

The effect of running a three-quarter width web is indicated in Figure 7 wherein the web will lie between points A and D at the left hand end of the roller or between points E and F at the right hand end of the roller, the roller swinging about fulcrum points 56 or 57 respectively. In Figure 8, a one-half width web is indicated as extending between points E and G, whereby the fulcrum point for the roller will be at 58.

In all of the above instances, the tension applied to the web by the roller is uniform over its entire width from edge to edge and therefore an automatically operating web tension equalizing mechanism is provided which is simple in structure and readily adjustable to webs of different widths.

It is obvious that the means for mounting an equalizing roller, as herein disclosed, may be so altered that the roller will pivot about a trans-

verse vertical axis in case it is desired to run the web to and from the roller in substantially or approximately horizontal planes; in which case the shafts 19 would be supported with their axes in a vertical plane and the springs 35 can be omitted.

Furthermore, the pivot point of the roller may be positioned above the upper surface of the roller as hereinbefore mentioned, to as great an extent as desired, by increasing the distance between the axis of the roller and the axes of the shafts 13. When this distance is increased beyond that shown in the drawings, a caster effect is produced which is considered advantageous under some circumstances.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the claims rather than to the foregoing description to indicate the scope of the invention.

What I claim is:

1. In a printing machine, the combination of a web guiding roller, a supporting device for said roller adjustable to position said roller to permit it to swing about any one of a plurality of transverse axes spaced apart longitudinally along, and disposed substantially in line with, the surface of said roller, and means to adjust said supporting device.

2. In a printing machine, the combination of a web guiding roller, a supporting device for said roller adjustable to position said roller to permit it to freely swing in a vertical plane about any one of a plurality of axially spaced apart transverse axes, and means to adjust said supporting device.

3. In a printing machine, the combination of a web guiding roller, a supporting device for said roller adjustable to position said roller to permit it to swing in a vertical plane about any one of a plurality of axially spaced apart transverse axes, and means to maintain said roller substantially in balanced condition.

4. In a printing machine, the combination of a web-guiding roller, a supporting device for said roller, and means to adjust the said supporting device to dispose the axis of said roller in position to swing about any one of a plurality of points spaced apart longitudinally along, and disposed substantially above the longitudinal axis of, said roller.

5. In a printing machine, the combination of a web guiding roller, a supporting device for said roller adjustable to position said roller to permit it to freely swing about any one of a plurality of transverse axes spaced apart longitudinally along said roller, each of said axes being disposed substantially in line with the upper surface of said roller, and resilient means tending to maintain said roller in balanced condition about the transverse axis selected.

6. In a web tension equalizing roller mechanism, a web guiding roller, and a supporting device for said roller adjustable to selectively dispose said roller in a plurality of positions to permit it to swing about any one of a plurality of longitudinally spaced apart transverse axes, said roller being pivotally mounted to said supporting device, with its surface substantially in line with the center of its pivotal connection with said supporting means.

7. In a web tension equalizing roller mechanism, a roller, means to pivotally support said roller with its longitudinal axis below the pivot point of its connection with said supporting means, for swinging movement transverse to its longitudinal axis, means to adjust said supporting means axially with respect to said roller, and means to swingably support said roller supporting means to permit swinging movement of said roller about an axis disposed transversely to the longitudinal axis of said roller.

8. In a web tension equalizing roller mechanism, a roller, means to pivotally support said roller with its longitudinal axis below the pivot point of its connection with said supporting means for swinging movement transverse to its longitudinal axis, means to swingably support said roller supporting means to permit swinging movement of said roller about an axis disposed transverse to the longitudinal axis of said roller, and means to adjust said roller supporting means to dispose said roller in position to selectively swing about a plurality of axes disposed transverse to its longitudinal axis.

9. In a printing machine, a roller supporting mechanism, comprising a bearing member for the roller shaft, oscillating means to support said bearing member, and means to move said bearing member along said oscillating means axially with respect to the roller shaft.

10. In a printing machine, a web guide roller, a roller supporting mechanism, comprising a bearing member for the roller, means for supporting said bearing member to swing in a vertical plane on an axis transverse to the axis of the roller, and means to move said bearing member relatively to said supporting means therefor, axially with respect to the roller.

11. In a printing machine, roller supporting mechanism, comprising a bearing member for the roller, substantially vertically swingable means for supporting said bearing member, means to move said bearing member relatively to said supporting means therefor axially with respect to the roller, and resilient means tending to maintain said roller level.

12. In a printing machine, roller supporting mechanism, comprising a bearing member for the roller, means to support said bearing member, said means being mounted for swinging movement on an axis transverse to the longitudinal axis of the roller, and means to move said bearing member along said supporting means therefor transversely to the axis of the swinging movement of said supporting means.

13. In a printing machine, a web guiding roller, roller supporting mechanism, comprising a bearing member for said roller, a shaft to pivotally support said bearing member, said shaft being mounted for swinging movement on an axis disposed above and transverse to said axis of the roller, and means to move said shaft longitudinally with respect to said roller.

14. In a device of the type described, a roller, and means to support said roller, comprising a fixed part, a part pivoted to said fixed part and normally extending therefrom substantially parallel to the axis of said roller, and a part connecting said roller with said pivoted part and being slidably mounted thereon for movement in directions substantially parallel to the axis of said roller.

15. In a device of the type described, a roller, and means to support said roller, comprising a fixed part, a part pivoted to said fixed part, a part

connecting said roller with said pivoted part, said connecting part being pivoted to said pivoted part for swinging movement on an axis disposed transverse to, and being slidable thereon in directions substantially parallel to, the axis of said roller.

16. In a device of the type described, a roller, and means to support said roller, comprising a fixed part, a part pivoted to said fixed part, a part connecting said roller with said pivoted part, said connecting part being pivoted to said pivoted part for swinging movement on an axis disposed transverse to, and being slidable thereon in directions substantially parallel to, the axis of said roller, the pivot point between said connecting part and said pivoted part being disposed above the axis of said roller.

17. In a machine to receive a running web, the combination of, a roller over which the web runs, bearings for and disposed at each end of said roller, a member pivoted above the axis of said roller and supporting each of said bearings, a rockable part slidably supporting each of said members, means to connect said parts together to insure rocking movement thereof in unison, and means to slidably adjust said members relatively to the said supporting parts whereby one end of said roller will be swung a greater amount than the other, when said parts are rocked.

18. In a device for equalizing the tension on both edges of a web being fed into a machine operating thereon, in combination, a roller adapted to have a web running over an off center portion thereof, a supporting device for rotatably supporting said roller and being adjustable to permit the end of said roller that is adjacent the off center portion thereof and has the web running thereover, to move a lesser amount than the other end of said roller, to swing said roller on a transverse axis disposed above the roller axis, and means to adjust said device.

19. In a device for equalizing the tension on both edges of a web being fed into a machine operating thereon, in combination, a roller adapted to have a web running over an off center portion thereof, a bearing for each end of said roller, a support to which each bearing is pivoted and which is swingable about the pivot point thereof, the pivot point being spaced from the axis of said roller, a swingable member upon which each of said supports is slidably mounted for movement axially with respect to said roller, means connecting said members to insure swinging movement thereof in unison, and means to slidably adjust said supports on said members.

20. In a mechanism for equalizing the tension in a web being fed into a machine operating thereon, the combination of a roller over which the web runs, a supporting device for said roller adjustable to position said roller to permit it to swing about any one of a plurality of longitudinally spaced apart transverse axes each spaced radially from the longitudinal axis of said roller and substantially in alignment with the center of the web running over said roller, and means to adjust said device.

21. In a machine operating upon a web, a web guiding roller, a movable bearing for rotatably supporting each end of said roller, means for constraining said bearings to insure simultaneous movement, in a vertical plane, of each bearing in a direction opposite to the movement of the other, means to adjust said constraining means to permit said roller to swing about a transverse axis substantially in alignment with the center of a web running over one portion of said roller and to adjust said constraining means to permit said roller to swing about another transverse axis substantially in alignment with the center of a web running over a different portion of said roller, to equalize the tension on opposite edges of the web in each instance.

22. In a machine operating upon a web, a web guiding roller, a movable bearing for rotatably supporting each end of said roller, means for constraining said bearings to insure simultaneous movement, in a vertical plane, of each bearing in a direction opposite to the movement of the other, means to adjust said constraining means to permit said roller to swing about a transverse axis substantially in alignment with the center of a web running over one portion of said roller and to adjust said constraining means to permit said roller to swing about another transverse axis substantially in alignment with the center of a web running over a different portion of said roller, to equalize the tension on opposite edges of the web in each instance, and supporting means for said bearings arranged to substantially balance the roller when it is swung on either transverse axis.

23. In a machine operating upon a web, a web guiding roller, a movable member supporting each end of said roller for swinging movement about a pivot point radially spaced from the axis of said roller, means for connecting said members to insure simultaneous movement of each in a direction opposite to the movement of the other, means to adjust said members to permit said roller to freely swing about a transverse axis substantially in alignment with the center of a web running over one portion of said roller, and to adjust said members to permit said roller to freely swing about another transverse axis substantially in alignment with the center of a web running over a different portion of said roller, and means other than said members, arranged to support and to substantially balance the roller when it is swung on either transverse axis.

ALBERT J. HORTON.