Dec. 17, 1929. F. TANDEL 1,739,993

MECHANISM FOR GUIDING TRAVELING WEBS

Filed March 29, 1928 2 Sheets-Sheet 1

Fig. 1.

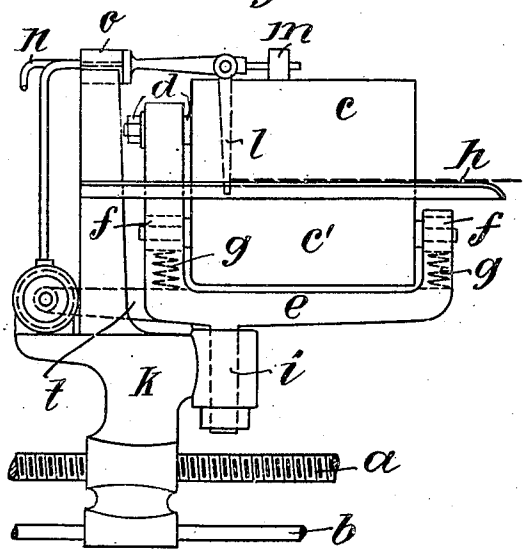


Fig. 2.

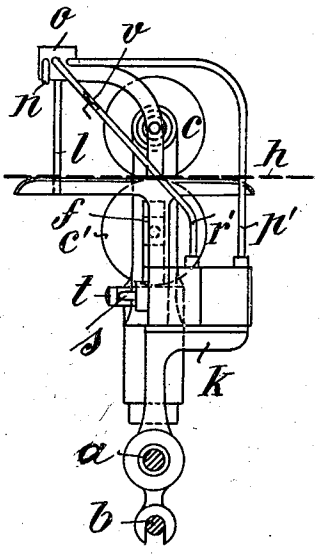


Fig. 9.

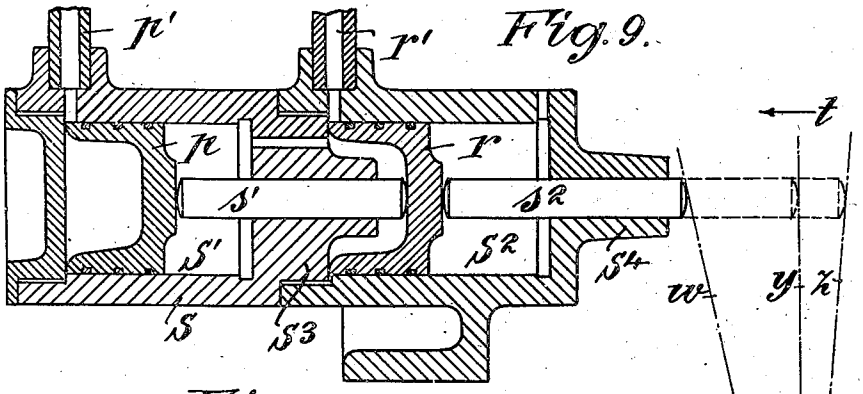
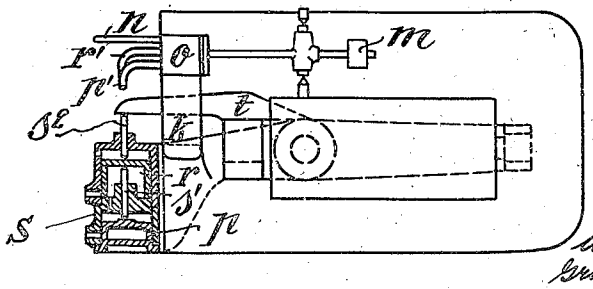


Fig. 3.



Inventor:
Fritz Tandel.
by
Watson, Coit, Morse & Grindle Attorneys

Dec. 17, 1929. F. TANDEL 1,739,993

MECHANISM FOR GUIDING TRAVELING WEBS

Filed March 29, 1928 2 Sheets-Sheet 2

Fig. 6.

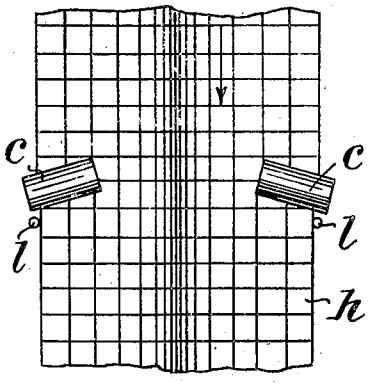


Fig. 4.

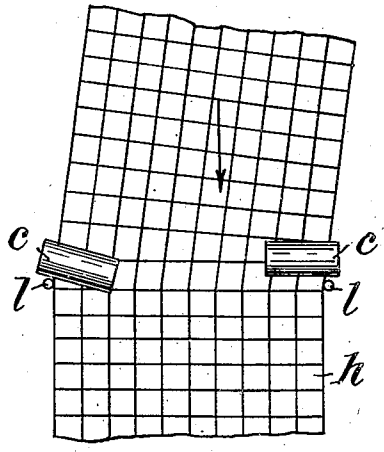


Fig. 4.

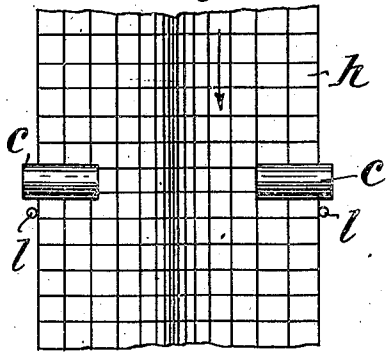


Fig. 5.

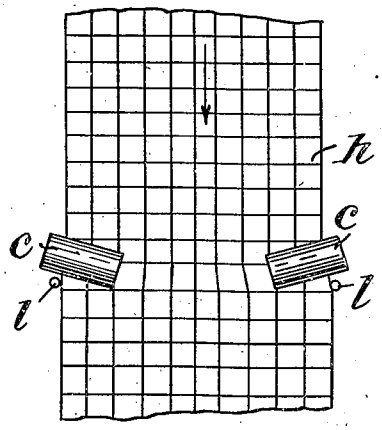
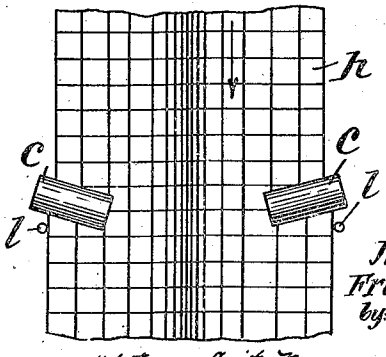


Fig. 8.



Inventor:
Fritz Tandel
by:
Watson, Coit, Morse & Grindle
Attorneys

Patented Dec. 17, 1929 1,739,993

UNITED STATES PATENT OFFICE

FRITZ TANDEL, OF CHEMNITZ, GERMANY, ASSIGNOR TO C. G. HAUBOLD AKTIENGESELLSCHAFT, OF CHEMNITZ, GERMANY, A COMPANY OF GERMANY

MECHANISM FOR GUIDING TRAVELING WEBS

Application filed March 29, 1928, Serial No. 265,695, and in Germany April 11, 1927.

This invention comprises improvements in mechanism for guiding traveling webs and is adapted for the guidance of traveling webs of woven material or the edges thereof. One object of the invention is to avoid opening the bite between guide rolls employed for the guidance of the web or its edges. If stationary obliquely disposed roll pairs are employed and the automatic control is operative intermittently for lifting one roll of a pair to put that pair out of operation, the material, which is stretched laterally due to the oblique disposition of the roll pairs, is momentarily released on that side whilst the rolls on the other side maintain their operation. The result is that the material is drawn into folds and pulled or deflected out of its path. A further object is to adapt the guiding mechanism so that it can be employed for guidance of a web as a whole, or for the guidance of the respective edges of a web. Finally, it is the object of the invention to provide a sensitive mechanism which is simple in its construction, efficient in its operation and fool-proof in its control.

According to this invention, rolls of each pair are elastically pressed together to maintain a continuous bite and are mounted on swivels so that they are constantly influenced in one direction about their swivel axes by the drag due to the travel of the web. Fluid pressure means are arranged to be operative for moving respective roll pairs independently about their swivel axes in opposition to the influence of the traveling web, the operation of the fluid pressure means being under control of edge detectors. The roll pairs always retain their grip on the web and as soon as a detector ceases to initiate operation of the fluid pressure means, the roll pairs are restored to a determined position by the drag of the traveling web.

A further part of the invention consists in the provision of auxiliary fluid pressure means which come under the automatic control of the edge detectors so that an enhanced guidance is possible which is useful for the guiding of individual edges of a web. Thus, the guiding mechanism is adapted for the guidance of webs of varying width and may be used, for example, for guiding woven materials into the chains of the Palmer device or width stretching mechanisms with endless chains mounted in front of felt calenders.

In order to enable the invention to be readily understood, reference is made to the accompanying drawings illustrating by way of example one practical construction in accordance with these improvements, in which drawings:

Figure 1 is an elevation of a guide roll device situated at the left hand side of the traveling web when viewing the latter from a position from which the web is traveling.

Figure 2 is an elevation as seen from the left hand side of Figure 1.

Figure 3 is a sectional plan of Figure 1.

Figures 4 and 5 are diagrams illustrating the operation on a traveling web of devices such as are illustrated in Figures 1 to 3 under one phase of control.

Figures 6 to 8 are diagrams illustrating the operation of the said devices on a traveling web, but under another phase of control.

Figure 9 is a longitudinal section to a larger scale of the fluid pressure control motor device seen in Figure 3.

Referring to Figures 1 to 3, a is a lateral adjustment screw and b is a lateral guide rod for the mounting, hereinafter described, of a pair of guide rolls c c^1. The upper roll c is revoluble on a fixedly mounted spindle d whereas the lower roll c^1 is revoluble on a spindle carried in slidable bearings f which are under the influence of springs g tending constantly to press the roll c^1 against the roll c and thereby constantly to maintain a grip on the traveling web h. The spindles of the rolls c c^1 are supported in a swivel bracket e, the swivel pin i, in a bearing in a bracket k, being perpendicular to the axes of the rolls c c^1 and being disposed beneath the outer end portion of such rolls, as will be seen from Figure 1. The bracket k is formed with two bosses, one being perforated and screw threaded internally for the screw a to work in and the other being bored to have a sliding fit on the guide rod b. One of these guide roll devices being situated at each side of the web h, it is clear that they

may be adjusted laterally from or towards one another by the aid of the adjustment screws in order to suit webs of different widths.

The swivel bracket e is fitted with an outwardly extending arm t which is disposed in the path of a sliding rod s^2, the latter being in operative relation with piston devices as hereinafter described. With each pair of rolls c c^1 there is associated a feeler or edge detector l which may be suitably loaded at m and is adapted for following the appropriate edge of the web and detecting any deflection of the latter from the desired line of travel. Pressure fluid from a suitable source is supplied through the pipe connection n to a suitable distributor valve o, which valve is controlled by movements of the detector l. When a detector l is deflected from a normal position by the straying of the appropriate edge of the web from the right line, the valve is opened to admit pressure fluid to two pipes p^1 and r^1. The pipe r^1 is fitted with a cock v which may be turned to a closed position in which passage of pressure fluid through the pipe r^1 is prevented and when the operation is described a description will first be given of a phase of operation in which the cock v is so closed, and then a description of a phase of operation in which the cock v is opened.

Referring to Figure 9, the pipes p^1 and r^1 are connected with a cylinder S divided into two piston chambers S^1 S^2 by an internal partition S^3. A piston p called the main piston works in the chamber S^1 and a piston r called the auxiliary piston works in the chamber S^2. The pipe p^1 connects the space at the back of the main piston p with the valve o and the pipe r^1 connects the space at the back of the auxiliary piston r with the said valve, the rear end of the piston chamber S^2 being in communication with the front end of the piston chamber S^1 by means of a port formed in the partition S^3 and the front end of the piston chamber S^2 being in communication with the atmosphere through a port seen in Figure 9. A rod s^1 slidable in a bore in the partition S^3 is adapted for transmitting movement from one piston to the other and the rod s^2 above mentioned rests against the piston r. It will be observed from Figures 3 and 9 that the stroke of the piston r is greater than that of the piston p. In fact, in Figure 3, the main piston p has made its full working stroke and although it has, through the rod s^1, pushed the auxiliary piston r out to a similar extent, there is still room for the piston r to make a further stroke movement before reaching the end of its cylinder.

Figures 4 and 5 show diagrammatically how the roller devices operate to guide a web which is stretched laterally as the result of passing through such guide rolls. Figure 5 illustrates the normal position of the parts when the web is running through truly in the direction of the arrow. As will be seen, the rolls c c^1 are set obliquely to the run of the web, this being due to the fact that the rolls c c^1 constantly grip the web and are free, under the drag of the web, to turn about their swivel i Figure 1 to the angle shown in Figure 5, this angle of swivelling being limited by the arm t coming against the rod s^2 as a stop, this rod being then in engagement with the auxiliary piston r which is at the rear end of its cylinder as shown in Fig. 9. This rearward position of the piston r is also shared by the piston p owing to the intervening rod s^1, as will be apparent. The oblique forward setting of the rolls results in the web being stretched laterally towards each side as shown in Figure 5, in which figure the feelers or detectors l are indicated at respective sides of the web h. If any irregularity occurs in the run of the web, and assuming that a right hand divergence takes place as indicated in Figure 4, the right hand detector will be affected and will operate the distributor valve o on the right hand side. This valve thereupon admits pressure fluid to the pipes p^1 and r^1 but, as stated above, the cock v in the pipe r^1 is closed in this phase of control so that pressure fluid can pass only by way of pipe p^1 to the space behind the main piston p. The pressure moves the main piston p to the right hand in Figure 9, the intervening rod s^1 imparting this same movement to the auxiliary piston r which in turn moves the rod s^2 outwards. This is the position of the parts seen in Figure 3, in which, as already mentioned, the auxiliary piston r has not reached the end of its stroke which is greater than that of the main piston p. In the movement just described, the arm t resting against the rod s^2 is moved from the position w, Figure 9, to the intermediate position y, the angle of turning about its swivel pin i being such as to turn the corresponding rolls c c^1 from the aforesaid oblique position to the position at right angles to the run of the web as illustrated at the right hand side of Figure 4. This modified setting of the rolls has the effect of rectifying the run of the web and when such rectification has been effected the right hand feeler l will cease to be influenced and will permit the distributor valve o to cut off admission to the piston chamber S^1, the latter being then exhausted of its pressure fluid. The drag of the web on the right hand rolls then returns these latter about their swivel to the oblique position shown in Figure 5. Thus, the pneumatic control only functions when the web diverges to the right hand or to the left hand and the complete control is obtained by a combination of the effects due to the drag of the web and the

counter operation of the pneumatic or fluid pressure motor.

In some cases, it is not so much the guidance of the web as a whole that is desired, as the guidance individually of the two edges of the web. Thus, for example, in the case of a web of slack material the edges must be guided individually as there can be no lateral tensioning. In Figures 6 to 8 the guidance of a slack web is illustrated, the slackness in the web being indicated by a closing up of some of the longitudinal shading lines. For this phase of control, the cock v on the pipe r^1 is opened so as to make the auxiliary piston r operative under automatic control. In the normal running of the web, the brackets e are moved, by adjustment of the screw a, to a position in which the detectors l are maintained in contact with the web for normally admitting pressure fluid through the pipe p^1 to the piston p to maintain the latter, the rod s^1, the piston r and the rod s^2 in the operative position already described in which the arm t lies on the line y Figure 9 so that the rolls c c^1 are at right angles to the run of the web as shown in Figure 7. Thus, the web traveling in the direction of the arrow is tending constantly to turn the rolls about the swivels to the forwardly directed oblique position seen in Figure 8 but is prevented from so doing by the counter action of the main pistons p. In the event of one or both edges of the web spreading outwards the appropriate detector or detectors l will be influenced and will operate the distributor valve or valves o. Admission of pressure fluid then takes place to the chamber S^2 behind the auxiliary piston r. The latter is then moved through the remaining part of its stroke so that the rod s^2 is shifted from the intermediate position to the extreme outer position seen in dotted lines in Figure 9 and the arm t is moved through an additional angle on to the line z. This means that the rolls c c^1 are turned backwards to the rearwardly extending oblique position seen in Figure 6, in which position they will exercise a rectifying influence and guide the spreading edges inwardly of the web. This action of the auxiliary piston r is performed, of course, against the turning effect due to the drag of the web on the rolls so that when the detectors cease to detect any spreading and the admission to the auxiliary piston r is cut off, the action of the web will be effective for returning the rolls to the position in Figure 7 and the arm t to the position y in Figure 9, the auxiliary piston r then again occupying its intermediate position. In the event of the web being unduly narrowed or contracted laterally on one side or the other or on both sides, the appropriate detector or detectors will operate to cut off pressure fluid admission to the main piston p so that the drag of the web on the rolls c c^1 will then bring them into a forwardly extending oblique position shown in Figure 8, the arm t being brought on to the line w, and the main and auxiliary pistons p r being then at the rear ends of their respective cylinders, as will now be readily understood. When the web has regained its normal width, the detectors will again operate the valve o to admit pressure fluid to the piston p and the conditions represented in Figure 7 will be restored by the piston p against the action of the traveling web. It will be apparent that a lateral adjustment of the roll pairs suitable for the performance of the second phase of control will be possible by the aid of the adjustment screws.

The lower roll c^1 of a pair may be covered with rubber and the spring pressure on such rolls produces a grip on the web which is sufficient for the performance of the functions hereinbefore described. Oblique flutings on the rolls are not advisable and are unnecessary.

Edge guidance by the aid of both main and auxiliary pistons may be adopted in the case of webs of uneven width or with irregular edges or the like, these being examples of cases in which it frequently happens that the material diverges very far outwards with undesirable results.

I claim:—

1. Guide mechanism for a traveling web comprising roll pairs mounted on swivels and disposed for engagement with respective edges of the web, elastic pressure means constantly active on the rolls of said pairs to maintain a continuous bite whereby travel of said web constantly influences the position of said roll pairs in one direction around their swivel axes, fluid pressure means operative on said swivels in opposition to the influence of said web travel, and detector controls for said fluid pressure means substantially as set forth.

2. Guide mechanism for a traveling web comprising roll pairs mounted on swivels and disposed for engagement with respective edges of the web, elastic pressure means constantly active on the rolls of said pairs to maintain a continuous bite whereby travel of said web constantly influences the position of said roll pairs in one direction around their swivel axes, a stepwise-acting fluid pressure means operative on said swivels in opposition to the influence of said web travel, and detector controls for said fluid pressure means substantially as set forth.

3. Guide mechanism for a traveling web comprising roll pairs mounted on swivels and disposed for engagement with respective edges of the web, elastic pressure means constantly active on the rolls of said pairs to maintain a continuous bite whereby travel of said web constantly influences the position of said roll pairs in one direction around

their swivel axes, a two-stage fluid pressure means operative on said swivels in opposition to the influence of said web travel, and detector controls for said fluid pressure means substantially as set forth.

4. Guide mechanism for a traveling web comprising swivelling roll pairs operative on respective edges with a continuous resilient bite thereon and constantly influenced about their swivel axes towards a forwardly inclined position by the drag of said web due to its travel, movable stops adapted for arresting said roll pairs in a pre-determined position of angular advance, fluid pressure means operative upon said stops in opposition to the influence of said web, and edge-detector controls operative upon said fluid pressure means substantially as set forth.

5. Guide mechanism for a traveling web comprising swivelling roll pairs operative on respective edges with a continuous resilient bite thereon and constantly influenced about their swivel axes towards a forwardly inclined position by the drag of said web due to its travel, movable stops adapted for arresting said roll pairs in a pre-determined position of angular advance, duplex fluid pressure means operative stepwise upon said stops in opposition to the influence of said web, and edge detector controls operative upon said fluid pressure means substantially as set forth.

6. Guide mechanism for a traveling web comprising swivelling roll pairs operative on respective edges with a continuous resilient bite thereon and constantly influenced about their swivel axes towards a forwardly inclined position by the drag of said web due to its travel, movable stops adapted for arresting said roll pairs in a pre-determined position of angular advance, principal and auxiliary fluid pressure means operative stepwise upon said stops in opposition to the influence of said web, edge detector controls operative upon said fluid pressure means, and manual controls operative upon said auxiliary fluid pressure means substantially as set forth.

7. Guide mechanism for a traveling web comprising two roll pairs disposed at respective edges of the web, swivel supports for said roll pairs, elastic means in said supports constantly operative for maintaining a pressure bite in said roll pairs, piston devices normally active as stops to limits the angle of swivelling of said supports in the forward direction under the drag of the web upon their roll pairs, fluid pressure controls operative for admitting pressure fluid to said pistons for swivelling said supports in the rearward direction, and edge detectors operative upon said fluid pressure controls substantially as set forth.

8. Guide mechanism for a traveling web comprising two roll pairs disposed at respective edges of the web, swivel supports for said roll pairs, elastic means in said supports constantly operative for maintaining a pressure bite in said roll pairs, movable stops normally active to limit the angle of swivelling of said supports in the forward direction under the drag of the web upon their roll pairs, principal and auxiliary pistons operative upon each of said stops, fluid pressure controls operative for admitting pressure fluid to said pistons for swivelling said supports stepwise in the rearward direction, and edge detectors operative upon said fluid pressure controls substantially as set forth.

9. Guide mechanism for a traveling web comprising two roll pairs disposed at respective edges of the web, swivel supports for said roll pairs, elastic means in said supports constantly active for maintaining a pressure bite in said roll pairs, movable stops normally active to limit the angle of swivelling of said supports in the forward direction under the drag of the web upon the roll pairs, tandem pistons operative upon each of said stops, fluid pressure controls operative for admitting pressure fluid to said pistons for swivelling said supports in the rearward direction, manual controls for cutting out one piston of each tandem set, and edge detectors operative upon said fluid pressure controls substantially as set forth.

10. Guide mechanism for a traveling web comprising two swivelling pressure roll pairs disposed at respective edges of the web and adapted for maintaining a continuous bite on the web, stops to limit the forward swivelling of said roll pairs under the influence of the traveling web, fluid pressure motor devices active in stages for producing rearward swivelling of said roll pairs in opposition to the influence of the web, automatic edge detector control operative for governing the operation of said motor devices, and manual control means operative for cutting out one of the stages of said motor devices substantially as set forth.

11. Guide mechanism for a traveling web comprising two swivelling pressure roll pairs disposed at respective edges of the web and adapted for maintaining a continuous bite on the web, stop rods normally active to limit forward swivelling of said roll pairs under the influence of the traveling web, piston devices in operative relation with said stop rods, fluid pressure controls for said pistons, and automatic edge detectors operative on said controls for admitting pressure fluid to said pistons whereby the latter become operative for advancing said stop rods and producing rearward swivelling of said roll pairs substantially as set forth.

FRITZ TANDEL.