Sept. 7, 1954 C. W. BIRCH, JR 2,688,176

CLOTH OPENING APPARATUS

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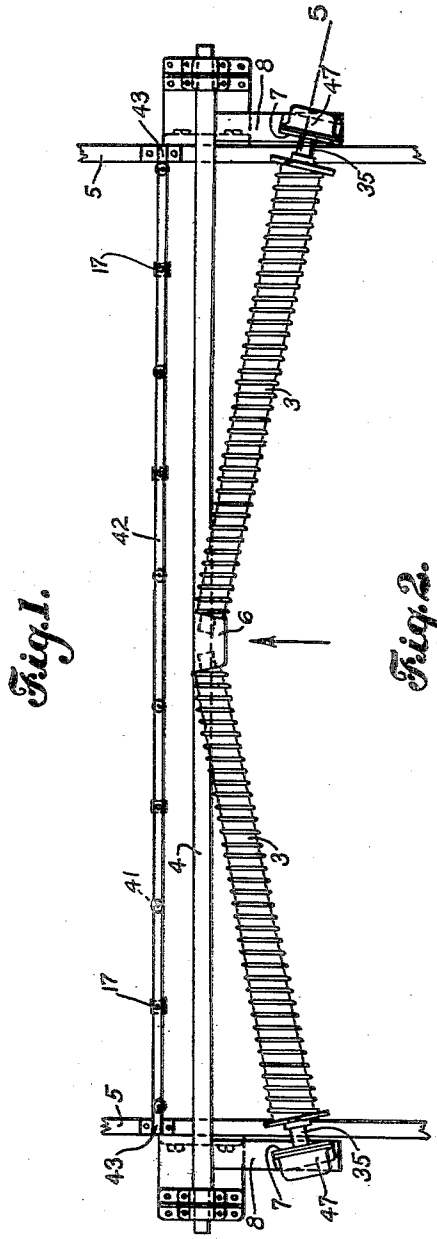


Fig. 1.

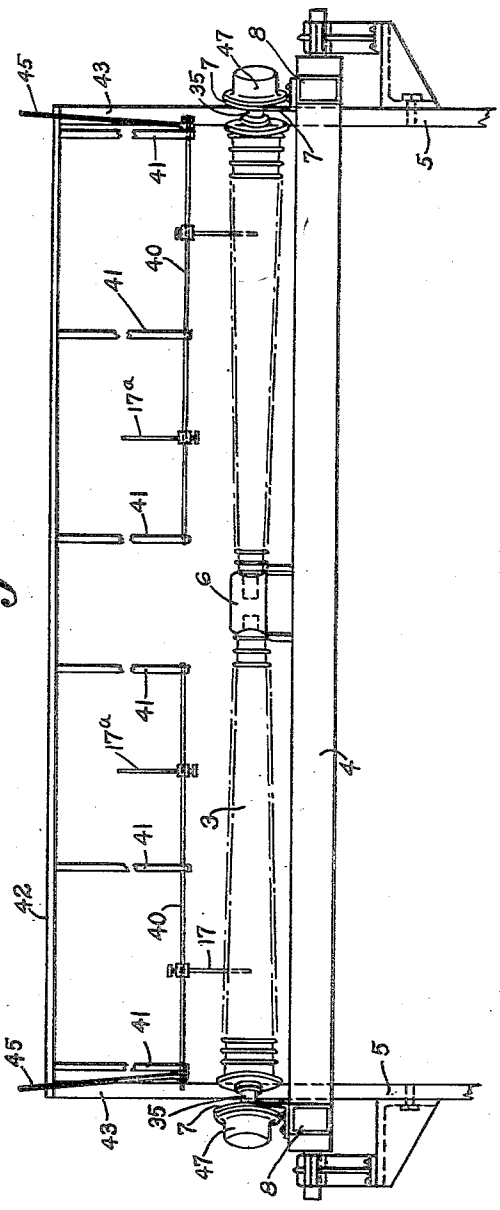


Fig. 2.

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Fig. 3.

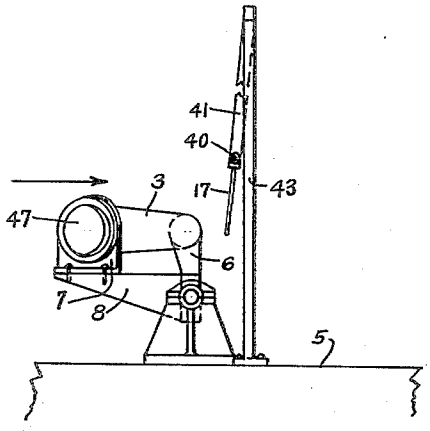


Fig. 5.

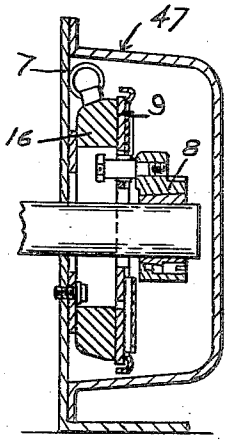
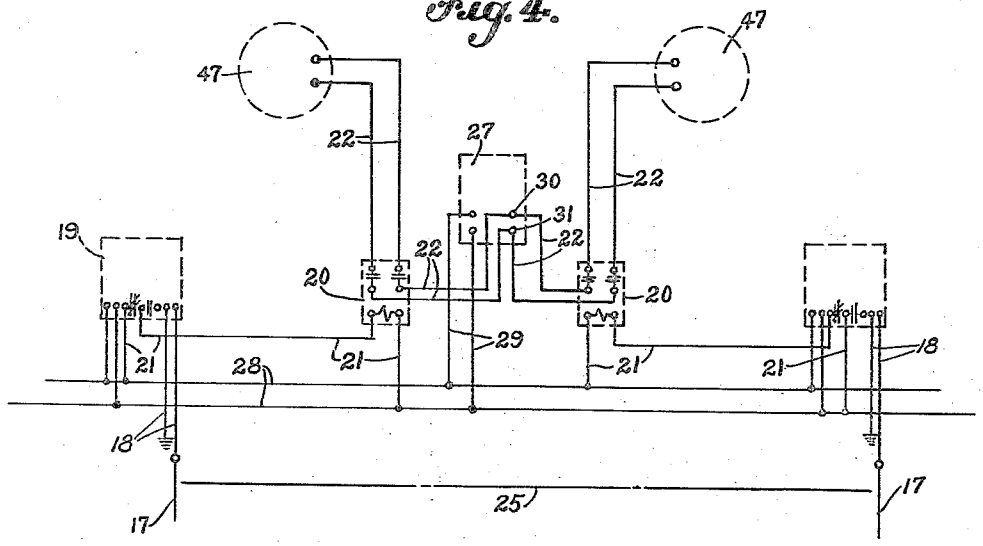


Fig. 4.



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UNITED STATES PATENT OFFICE

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CLOTH OPENING APPARATUS

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4 Claims. (Cl. 26—63)

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This invention relates to a cloth opening or cloth spreading or guiding device such as is used to open and spread out flat a web of wet cloth as it rises from the dye bath to the reel of a dye kettle as the cloth is circulated through the dye bath during the dyeing operation or as the cloth passes to squeeze rolls or to a similar machine, and it relates particularly to that type of cloth spreader and guider which embodies two freely rotatable conical rolls arranged with their axes at an angle to each other and with their smaller ends adjacent each other, over which rolls the wet web to be spread and guided is drawn. The action of the rolls on the web as it is drawn thereover serves to open and spread the web out flat.

A cloth opener or spreader and guider of this type is illustrated in U. S. Patent No. 1,748,275, February 25, 1930, issued to Albert Birch.

During the operation of this type of cloth opener or spreader the web of cloth is likely to move laterally as it travels over the cloth opening or spreading rolls, and to prevent this and to restore the web to its normal central position it has been proposed to provide means for applying a braking action to the roll on the side toward which the web is moving laterally, which results in restoring the cloth to its normal central position. In the above mentioned patent the braking device is a mechanical apparatus which mechanically applies the brake to the roll.

It is one of the objects of my present invention to provide an improved apparatus in which the brake is electrically controlled, the construction being such that if the cloth moves laterally as it is passing over the conical rolls an electrically operated brake will be actuated to apply a braking action on one of the rolls, thereby to restore the cloth to its normal central position.

Another object of the invention is to apply a novel device which includes a feeler adjacent to each edge of wet cloth and means whereby when the cloth moves laterally into engagement with the feeler a control circuit is established through the wet cloth which initiates the operation of the brake to apply the desired braking action to the roll. The said control circuit carriers a weak current with very low amperage, and hence it will not injure the fabric or constitute a danger to persons operating the device.

In order to give an understanding of the invention I have illustrated one embodiment thereof in the accompanying drawings, in which,

Fig. 1 is a plan view of an apparatus embodying the invention, said view showing a portion of the dye kettle on which the opener is mounted;

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Fig. 2 is a side elevation of Fig. 1;

Fig. 3 is an end elevation;

Fig. 4 is a wiring diagram;

Fig. 5 is a section view on the line 5 Fig. 1, illustrating an electrically operated brake for applying the braking action to a roll.

Referring to Figs. 1 and 2, the conical cloth opening and spreading rolls are indicated at 3, each roll being conical and having a plain surface or being provided with an exterior rib which may or may not have a spiral formation. The rolls are arranged with their axes at an angle to each other and with the smaller ends adjacent each other. These rolls are carried by a supporting bar 4 which is mounted on the dye kettle 5, said bar having a central bearing 6 in which the inner smaller ends of the rolls 3 are journaled and having at each end a bearing 7 in which the outer larger ends of the rolls are journaled. Each bearing 7 is shown as mounted on an arm 8 extending laterally from the supporting bar 4.

The rolls 3 are freely rotatable in their bearings as usual in devices of this type, and as the cloth 25 is circulating in the dye kettle during the dyeing operation it passes over the rolls 3 in the direction indicated by the arrows in Figs. 1 and 3.

Each roll has at its outer end an electrically operated brake 47 by which a braking action is applied to the roll when the cloth moves off center. While any suitable electrically operated brake may be employed, I have shown herein such a brake which comprises a hub member 8 mounted on the end of the shaft of the roll 3 and carrying a brake disk member 9 which constitutes an armature for a magnet element 16. The magnet element is stationarily mounted and when it is energized it attracts the armature member 9 and thereby a braking pressure is applied between the stationary magnet and the armature which is transmitted to the roll through the hub 8. The magnet is normally deenergized and the brake is therefore normally in an inoperative condition but it can be rendered operative by energizing the magnet.

In order to provide for operating the brake when the cloth moves laterally to one side or the other, I have provided two feelers 17 which are located one on each side of the cloth adjacent to but out of contact with the edge of the cloth when the latter is in its normal central position.

Each feeler 17 is carried by a rod 40 which is supported in suitable insulated hangers 41 that depend from a supporting bar 42 that extends transversely of the dye kettle and is carried by

suitable posts 43. There is one such rod 40 for each feeler and, as illustrated, each rod 40 is carried by a plurality of suspenders 41, each of which, as stated above, is of insulating material. The feelers 17 are adjustably mounted on the rods 40 so that they can be adjusted transversely of the length of the cloth in accordance with the width thereof. As stated above, each feeler is positioned so that it is located adjacent to but spaced from the corresponding edge of the cloth when the latter is in its central position.

Each feeler 17 is in one side of a control circuit, the other side of which is grounded on the dye kettle. As stated above, each feeler is carried by its supporting rod 40 which is insulated by the suspenders 41 and the end of which rod is electrically connected to a wire connection 45 which forms part of the control circuit 18. This control circuit leads to an electronic relay 19 which in turn controls a magnetic relay 20 through a circuit 21 which is connected to the supply circuit 28. The magnetic relay 20 in turn controls a circuit 22 leading to the corresponding magnetic electrically controlled brake 47. The magnetic relay 20 is normally de-energized and thereby maintains the magnet 16 of the brake de-energized. The electronic relay is of that known type wherein so long as the control circuit 18 is open said relay will maintain the circuit 21 open, thereby maintaining the magnetic relay properly de-energized, and so long as the magnetic relay is de-energized the electrically operated brake will be inoperative.

The electronic relay is also of that known type which is activated by a minute current of a few micro-amperes.

So long as the web of cloth, which is indicated at 25 in Fig. 4, occupies its normal central position each edge thereof is spaced from the corresponding feeler 17. If, however, the cloth moves laterally toward the left in Fig. 4 so that the edge of the cloth contacts the corresponding feeler 17, the control circuit 18 will be closed, the wet cloth constituting the conducting element between the feeler 17 and the roll and dye kettle on which one side of said circuit is grounded.

The closing of this circuit 18 produces a resulting signal which is amplified by an electronic tube amplifier with which the electronic relay is provided, thereby producing a signal of sufficient strength to close the circuit 21 of the magnetic relay 20 thereby activating the latter. The energizing of the magnetic relay results in closing the circuit 22 leading to the brake, and thereby the brake is rendered operative to apply a braking pressure to the left hand roll 3.

The application of the braking pressure to said left hand roll results in causing the cloth to move toward the right back into its central normal position, and as soon as the edge of the cloth moves out of contact with the feeler 17 the control circuit 18 will be immediately opened and the electronic relay will be actuated to open the circuit 21, thus de-energizing the relay 20 which will result in opening the brake circuit 22 thereby de-energizing the magnet 16 and releasing the brake.

The electronic relay and also the magnetic relay are commercial devices which are available on the market and their construction and operation are well known to those familiar with the electrical art.

Since the magnetic brake requires the use of a direct current, I have provided a rectifier for converting the A. C. current in the supply line 28 to D. C. for use in the brake circuit 22. This rectifier may be of any commercial type and is indicated at 27. The wiring diagram, Fig. 4, shows the rectifier as connected to the A. C. supply line 28 through circuit connections 29, and said rectifier is provided with the usual output terminals 30, 31 for the D. C. current and through which said current is supplied to the brake circuits 22 as illustrated in Fig. 4.

In order that the device may be used for opening webs of cloth of widely varying widths, I have provided each rod 40 with a plurality of feelers 17 and 17a, each of which can be adjusted longitudinally of the rod, and each of which can be turned about the rod either into a depending operative position as shown by the feelers 17, or into an upstanding inoperative position as shown by the feelers 17a. When the web of cloth is relatively wide the feelers 17 will be used and these will be adjusted to the proper position for the cloth being operated on.

For a narrow web of cloth the feelers 17 will be swung up into an upright inoperative position, and the feelers 17a will be swung downwardly into an operative position and will thereby be ready to function for closing the circuit 18 when the cloth moves laterally from its normal central position.

In either case, the wet cloth constitutes part of the control circuit when the latter is closed by the contact of the edge of the cloth with a feeler.

An advantage of this construction is that the control circuit may be closed, thereby initiating the operation of the electrically operated brake without causing any distortion in the web of cloth, because a simple light contact of the cloth edge with the feeler will be sufficient to close the control circuit 18.

A further advantage is that the electronic relay is rendered operative by a very weak current in the control circuit 18; in fact, as stated above, a current of a few micro-amperes is sufficient for this purpose. This very weak current does not have any deleterious effect on either the wet cloth or dye liquor, or the dye kettle, nor does it constitute a hazard for the operator of the machine.

While I have illustrated herein an electric brake for the rolls 3 which is so constructed that the brake is non-operative when its magnet is de-energized and is rendered operative when its magnet is energized, yet the invention would not be departed from if an electric brake of that known type were used in which the braking action is obtained through the use of springs and the brake is rendered inoperative by magnetic means. The use of such a brake would merely involve the use of a magnetic relay which would normally hold the brake circuit 22 closed but would open said circuit when the electronic relay is activated by the closing of the control circuit 18.

Both types of electric brake are well known and are in common use, and also magnetic relays suitable for each type of brake are well known commercial articles.

I claim:

1. A device for opening or spreading and guiding a web of wet cloth comprising a pair of conical rolls over which the wet cloth passes, means for mounting said rolls for free rotation with their axes at an angle to each other and with their smaller ends adjacent each other, a feeler at each edge of the cloth, means for supporting each feeler close to but out of contact with the

edge of the cloth when the latter is in its normal central position, a control circuit for each feeler having one side connected thereto and the other side grounded on the corresponding roll, whereby each control circuit is an open circuit so long as the cloth is out of contact with the feeler, but becomes closed through the wet cloth when the latter moves laterally out of its normal central position into contact with the feeler, and means initiated by the closing of either control circuit through the wet cloth to apply a braking action to the corresponding roll thereby to cause the cloth to be shifted laterally back into its central position.

2. A device for opening a web of wet cloth as defined in claim 1 and which includes means to release the brake when the control circuit is broken by the disengagement of the cloth from the feeler.

3. A device for opening a web of wet cloth as defined in claim 1 and which includes an electronic relay connected to each control circuit and responsive to a current therein of a few microamperes for rendering the corresponding brake operative.

4. A device for opening a traveling web of wet cloth comprising a pair of conical rolls over which the wet cloth passes, means mounting said rolls for free rotation with their axes at an angle to each other and with their smaller ends adjacent each other, a feeler at each edge of the cloth, means supporting each feeler close to but out of contact with the edge of the cloth when the

latter is in its normal central position, a control circuit for each feeler having one side connected thereto and the other side grounded on the corresponding roll, whereby each control circuit is an open circuit so long as the cloth is out of contact with the feeler, but becomes closed through the wet cloth when the latter moves laterally out of its normal central position into contact with the feeler, an electric brake for each roll, a brake-controlling circuit through which each brake is operated, a magnetic relay controlling each brake circuit, an electronic relay operatively connected to each magnetic relay and responsive to a weak current in the control circuit when the latter is closed through the wet cloth to render the magnetic relay operative and thereby actuate the brake.

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