April 18, 1961 J. GAINO 2,979,933

SYSTEM FOR TREATING A CONTINUOUSLY MOVING FLEXIBLE WEB

Filed June 16, 1959

FIG. 1.

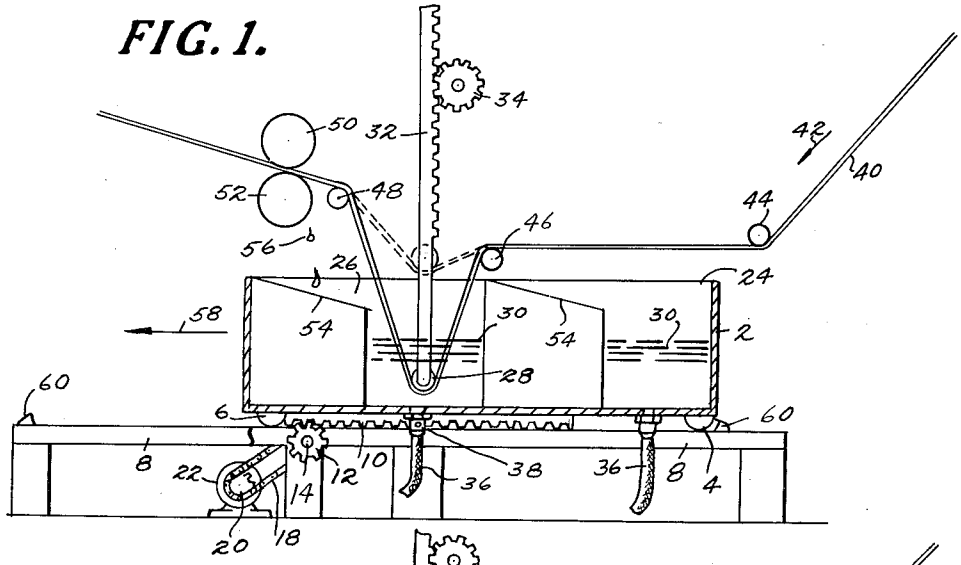


FIG. 2.

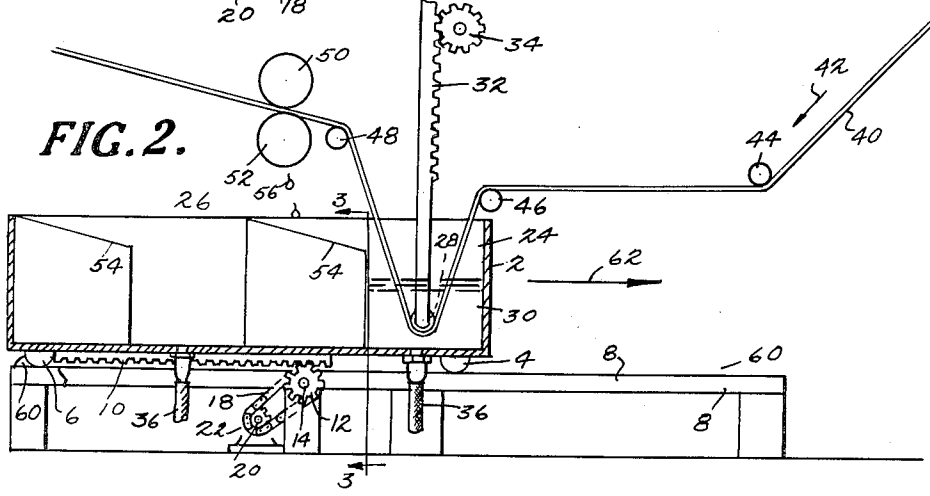
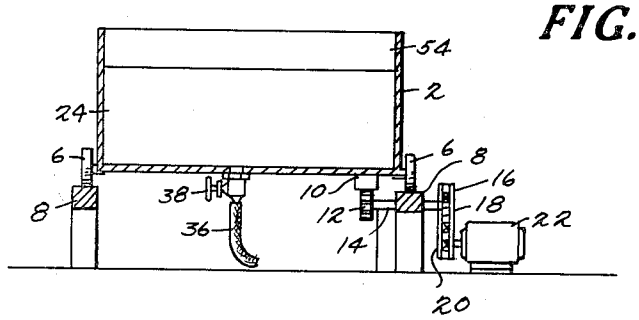


FIG. 3.



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United States Patent Office 2,979,933
Patented Apr. 18, 1961

2,979,933

SYSTEM FOR TREATING A CONTINUOUSLY MOVING FLEXIBLE WEB

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Filed June 16, 1959, Ser. No. 820,780

2 Claims. (Cl. 68—22)

The present invention relates to the treatment of continuously moving webs of paper, fabric or like flexible material wherein the material is passed through one or more baths containing the treating agent. More particularly, the invention is concerned with a means for treating, e.g., dyeing, a continuously moving web of flexible material, wherein certain elements of the treating equipment may be taken out of service without the necessity of stopping the movement of the web with the resultant saving of time, expense and inconvenience.

In the conventional treatment of material in continuous web form, such as fabrics, paper and plastics, the web is usually passed through one or more tanks, wherein it is impregnated, coated or otherwise treated with treating liquid, e.g., dye liquor or the like. Immersion rolls are generally used to bring the web material into more effective contact with the treating liquid. When, however, it is desired to change the treating liquid or to wash the tanks, it is necessary both to discontinue movement of the web and the operation of other associated equipment until the necessary changes have been made. This is undesirable for a number of reasons. For example, discontinuance of operations may require the web to be left in a particular solution, e.g., a dyebath longer than desirable thus resulting in uneven treatment and a product of poorer quality.

It is the principal object of the present invention to effectively overcome the above-mentioned difficulties in the treatment of flexible material in web form. Another object of the invention is to provide a novel treating means permitting the continuous treatment of web material under circumstances where it has previously been necessary to discontinue operations.

A more specific object of the invention is the provision of a novel treating apparatus comprising a plurality of horizontally movable compartments each adapted to contain a solution for treating a continuously moving web, associated with vertically movable immersion roll means which may be moved into and out of operation from one compartment to another without stopping the web or otherwise interfering with the treatment in question.

Other objects of the invention will become apparent from the following detailed description of one embodiment of the invention as illustrated in the accompanying drawings wherein:

Figure 1 is a vertical sectional view taken longitudinally through the treating compartments showing the various aspects of the invention;

Figure 2 is a sectional view similar to Figure 1 showing the treating compartments in a different position; and

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 2.

Referring more specifically to the drawings, the numeral 2 represents a pad pan or like multicompartment tank. This pan may be mounted by means of wheels 4 and 6 on spaced parallel essentially horizontal rails 8. Pad pan 2 may be moved along the rails by appropriate

means, e.g., rack 10 and pinion 12. Desirably, the rack 10 is secured to the bottom of pan 2 and the pinion 12 is carried on a shaft 14 which may extend through the adjacent rail 8. As shown in Figure 3, the outer end of the shaft 14 may be provided with a chain gear 16 connected by a chain 18 to a similar gear 20 fixed to a reversible motor 22. In this way, motion may be transmitted from the motor to the gear 12 which in turn cooperates with rack 10 to move pan 2 to and from the positions shown in Figures 1 and 2. While an electric motor has been shown as the preferred type of power means, it will be understood that any other suitable power means may be used to move the pan 2 back and forth, along the rails for the purposes herein described.

As shown in Figures 1 and 2, the pan 2 is divided into two compartments 24 and 26, either of which may be moved by the motor 22 as heretofore described, into a position directly below an immersion roll 28. The latter may be supported by suitable rack means 32 and is adapted to be moved vertically into or out of the treating solution 30 in compartments 24 and 26 by the cooperation of gear 34 with rack means 32. As will be appreciated, gear 34 may be supported in any suitable manner above the pan 2. In order to drain compartments 24 and 26, each may be provided with a drain tube 36 with an appropriate control valve 38.

Referring again to Figures 1 and 2, a continuously moving web of flexible material 40 such as fabric, paper or the like is advanced in the direction indicated by the arrow 42. The web is first passed under an idler roll 44, then over idler roll 46 and thereafter under the immersion roll 28. From the immersion roll 28, the web 40 may be passed over another idler roll 48 and then between the squeeze rolls 50 and 52 where excess solution is squeezed from the web. Squeeze rolls 50 and 52 are so positioned that they, dependent upon the compartment being used, are located above one of the inclined plates 54, the latter being located at one side of each of the compartments 24 and 26 for the purpose of receiving solution drippings 56 from the squeeze rolls 50 and 52. In this way, any excess solution removed by the squeeze rolls is returned to the appropriate compartment.

As shown in Figure 1, the web 40 is thoroughly immersed as it is continuously moved in the direction indicated by the arrow 42 and the solid lines, through the solution 30 of compartment 26 and then through the squeeze rolls 50 and 52. During this time the compartment 24 is kept idle and may be suitably serviced, e.g., drained, washed and otherwise made ready for a new solution without discontinuing the treatment of the web. When it is desired to treat the web with a different solution than that in compartment 26, or to clean or otherwise service this compartment, the immersion roll 28 may be raised by the cooperating rack 32 and the pinion 34 to the position indicated in dotted lines in Figure 1. As shown by the broken lines, this allows the web to move entirely out of the compartment 26 and above the pan 2. At this stage, movement of the web may be discontinued or, if desired, the web may continue to move over rollers 46 and 48 without treatment. Meanwhile, the pan 2 may be moved in the direction of the arrow 58 (Figure 1) to the position shown in Figure 2 where the immersion roll 28 is located directly over treating compartment 24. Immersion roll 28 may then be lowered by reverse movement of the rack 32 and the pinion 34 into compartment 24 and the solution 30 contained therein for further treatment of the web. Since compartment 26 is now free of the web and the immersion roll, it may be drained, washed, and/or otherwise made ready for another treatment as desired without in any way interfering with the treatment of the web in compartment 24. As will be appreciated, movement of the pan from one

position to the other may be accomplished quickly, e.g., in about five to eight seconds, depending upon the motor 22 and the cooperating chain and gear arrangements. If desired, movement of pan 2 may be suitably limited so as to insure proper positioning of the compartments by appropriate stops 60 fixed to the rails 8. As will be recognized, when it is desired to again use compartment 26, the pan may be moved in the direction indicated by the arrow 62 in Figure 2 back to the position shown in Figure 1.

It will be recognized that various modifications may be made in the invention as described above. Thus, for example, while only one immersion roll 28 has been described, two or more of such rolls may be used to effect the desired treatment. Similarly, in lieu of the rack and gear arrangements shown for moving the immersion roll and the pad pan, other appropriate means may be utilized to obtain the desired movement of the roll or rolls and/or pad pan. Additionally, more than two treating compartments may be included and these compartments need not be integrally united, as shown, provided one compartment is movable into treating position when the other or others are moved out of operative position.

The invention herein described is of particular importance in the dyeing of cloth or the like where marked irregularities in color and shade develop if the material being dyed is left standing in the dye bath while repairs or changes are being made in the system. However, other liquid treatments of cloth or like web material, e.g., cleaning, scouring, etc., are also contemplated.

The scope of the invention is set forth in the following claims.

What is claimed is:

1. A system for treating a continuously moving flexible web comprising immersion roll means mounted for movement in a substantially vertical direction between a lower web treating position and a raised non-treating position, spaced rolls as the sole essential means for supporting and continuously moving a web of flexible material below said immersion means for engagement therewith whereby said web may be raised and lowered between non-treating and web-treating positions; an elongated fixed frame and a treating pan including at least

two web treating compartments movable on said frame lengthwise of said webs and in an essentially horizontal plane beneath said immersion means when said means is in its raised non-treating position, each of said compartments being adapted to receive said immersion means when the latter is lowered into web treating position, said compartments being so spaced that, when one of said compartments is moved into treating position and receives said immersion means, the other compartment is free from said immersion means in non-treating position directly beneath an adjoining section of said webs, a pair of squeeze rolls disposed above said compartments between which said web passes after leaving one of said compartments to remove excess treating solution, and means on said pan and between said compartments cooperatively disposed relative to said squeeze rolls to return excess treating solution to its respective compartment, said last mentioned means comprising an inclined plate positioned along the upper edge of a transverse wall of each compartment, said plate being positioned directly below said squeeze rolls when said immersion roll means is in the respective compartment to drain excess treating fluid falling from said squeeze rolls back into the compartment.

2. The system as set forth in claim 1 wherein said immersion roll means and said pan are moved by rack and pinion means.

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