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2,960,963

FABRIC TREATING MACHINE

Filed April 15, 1958

2 Sheets-Sheet 1

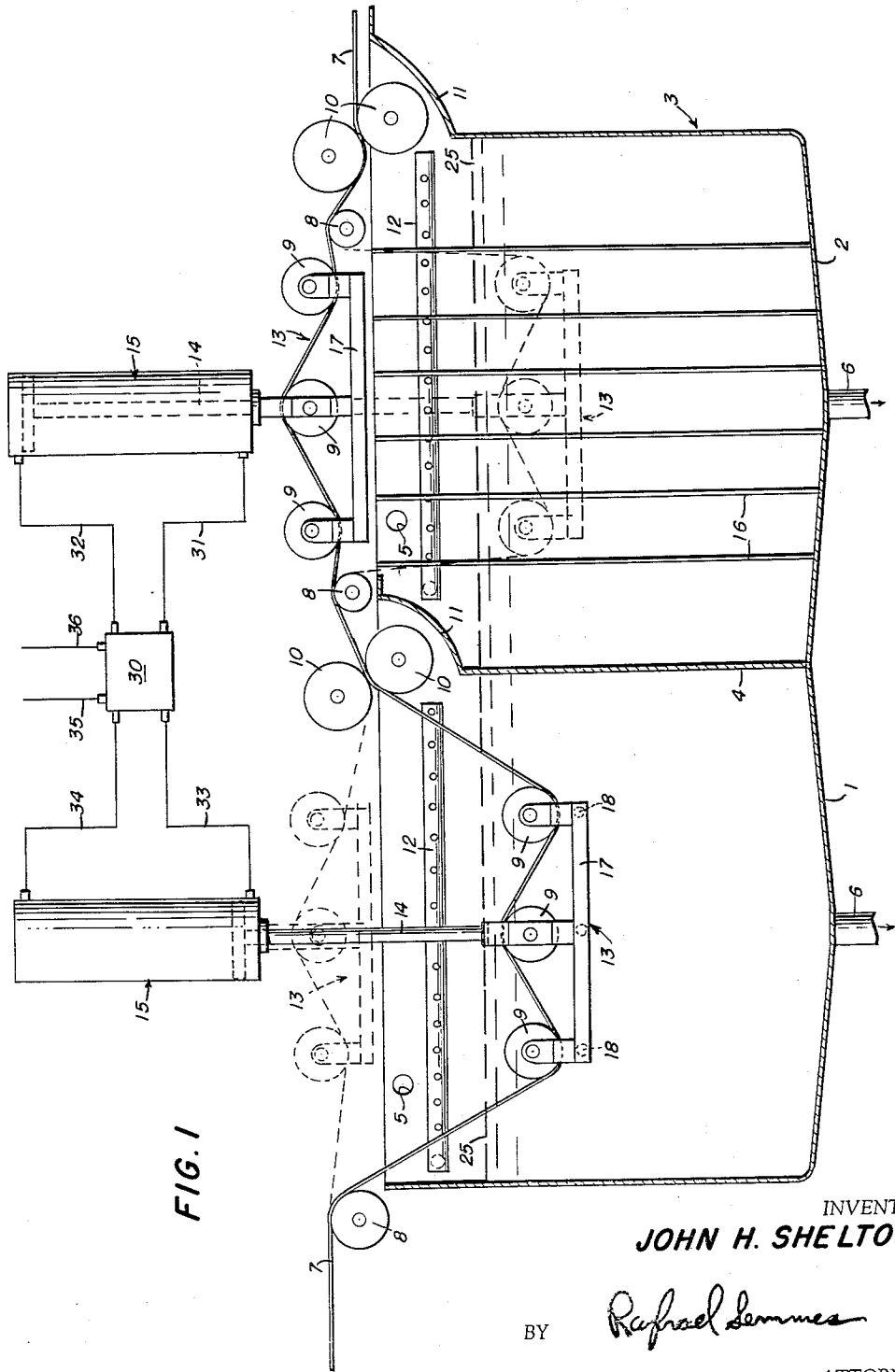


FIG. 1

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2 Sheets-Sheet 2

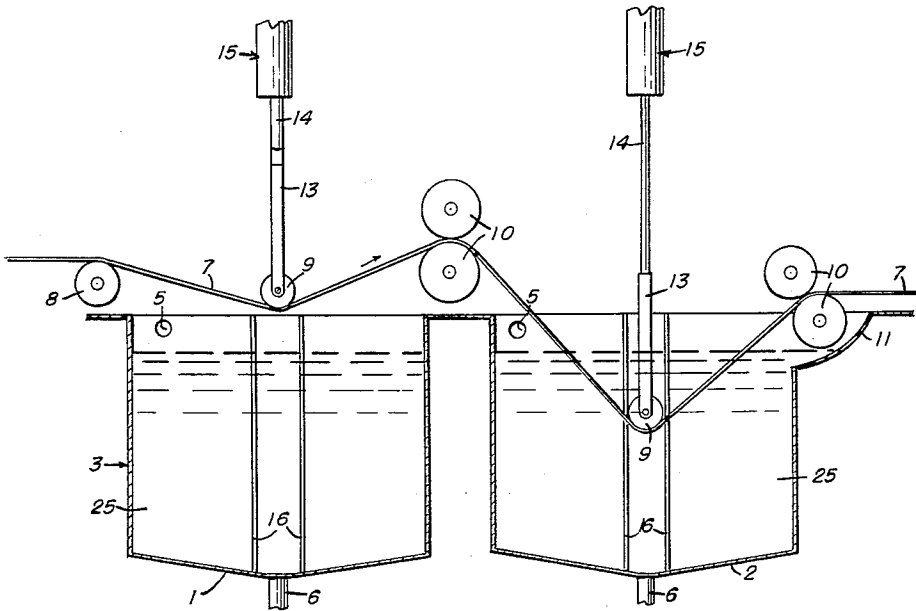


FIG. 2

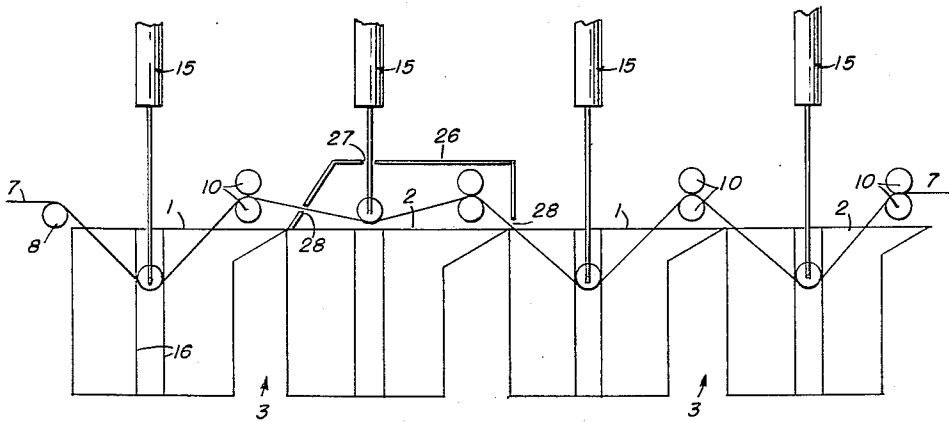


FIG. 3

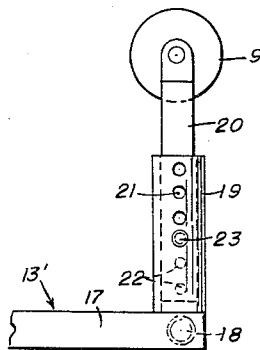


FIG. 4

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FABRIC TREATING MACHINE

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3 Claims. (Cl. 118—419)

This invention relates to the processing of continuously moving webs of flexible materials such as paper, fabric and the like. More particularly, it is concerned with providing a unique method and apparatus for the treatment of continuously moving webs of flexible material, wherein various pieces of processing equipment can be taken out of the material treatment line, or change-overs made in such pieces of equipment without the necessity of stopping or halting the moving web.

At the present time in the treatment or processing of various materials in web form such as paper, fabrics, plastics, etc., it is commonly accepted practice first to fabricate the material in the form of a continuous web, and thereafter to further process the web by passing it through one or more tanks or chambers, wherein the web is impregnated or coated with a particular chemical solution. Thereafter, the web may be passed through a heated chamber for the purpose of drying the coating.

One way in which webs are coated or impregnated is by immersion dipping of the webs in a particular chemical solution or liquor and although the instant invention will be discussed with particular reference to such a web treatment, it will be understood that the instant teachings may also be applied to other analogous processing steps generally used in the fabrication of web materials, such as treatment of the web by gases, heat, cold temperatures, vaporizing, spraying, etc.

During this immersion treatment, the web materials are generally passed through a range or battery of tanks containing the requisite chemical solutions by means of immersion rolls. Whenever it is desired to modify the chemical solution or to clean the tanks or to add new chemicals, it has been the practice to bring the moving web to a complete halt and to stop all of the equipment in the line until the necessary changes have been made. In addition to labor and machine losses which are substantial, the quality of the product is deleteriously affected by frequent machine stops. An example of this operation as relates to a textile finishing plant would be one where a certain yardage of a given style of fabric is being impregnated with a particular formula of chemical ingredients. At its completion, the necessity of changing the chemical formulation arises. Ordinarily, this would be done by either stopping the machines in the line with the cloth still standing in hot equipment, or by allowing the end of the fabric to run so that it will continue on through the line.

The aforesaid problems are effectively overcome by the instant invention, which generally contemplates arranging the immersion or other processing tanks for the coating or impregnation of various web materials in tandem. Thus, whenever the solution in one of the tandem tanks must be strengthened, modified, or removed, such as for the purpose of cleaning the tank, the web may be raised out of such a tank and lowered in the adjacent tank containing the same solution without at the same time requiring the halting of the otherwise continuous

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movement of the web material and shutting down of the entire operation.

Accordingly, it is a primary object of this invention to provide a novel battery or tandem arrangement for tanks in a web processing line, whereby removal, change-overs, or various modifications in the chemical solutions in the tanks may be conveniently effected without the necessity of halting the otherwise continuous movement of web materials through the processing line.

It is a further object of this invention to provide in combination with a unique battery or tandem arrangement for solution treatment tanks in a web processing line, novel means for raising and lowering a moving web of material from and into the individual tanks and into and out of contact with the chemical solutions without the necessity of halting the otherwise continuous movement of the web material through the processing line.

It is a further object of this invention to provide a novel method for interchangeably processing a continuously advancing web of material at different points in a processing line without interrupting its normal continuous movement through the line.

Other objects and advantages of the instant invention will become more apparent from a review of the following detailed description when taken in conjunction with the appended drawings where:

Figure 1 is a sectional view of several web treatment tanks disposed in a close tandem arrangement;

Figure 2 is a sectional view of various tandem arrangements for web treatment tanks similar to Figure 1, wherein the web is exposed to only a single immersion in each tank;

Figure 3 is a schematic view of a typical arrangement for a plurality of tandem web treatment tanks; and

Figure 4 is an enlarged, end elevational view of one immersion roller used in the tandem immersion roller assembly shown in Figure 1, wherein the roller is adjustably disposed on the saddle or cradle frame for the rollers.

With further reference to the drawings and in particular to Figure 1, the novel immersion tank assembly of the instant invention is generally comprised of several tanks 1 and 2 which make up a complete tank unit 3. In the case of where the tank unit 3 is made from a single vessel, the individual tanks 1 and 2 are separated from each other by a wall 4. Each tank is provided with its own inlet pipe 5 and outlet pipe 6 which are disposed in lines controlled by suitable quick acting valves (not shown). The web material 7 may be a textile fabric which is being impregnated with a chemical solution 25, a web of paper or plastic material. It is fed to the individual tanks 1 and 2 through the medium of one or more idler rollers 8 and immersion rolls 9. Located adjacent the exit end of each of the tanks is a pair of squeeze rolls 10 for draining excess material on the web 7 back into a tank. Rolls 8 are mounted adjacent the entry end of the tank and squeeze rolls 10 are mounted over the drain portion 11 of the tanks by suitable means (not shown). A perforated manifold type pipe 12 may also be disposed about the top of each tank for the purpose of injecting cleaning fluids into the tanks.

Depending upon the amount of time the web 7 is to be immersed in any given tank, the immersion rolls 9 may be either of the single type shown in Figures 2 and 3 or of the plural type shown in Figure 1. Any suitable means well known in the art may be used to lower the immersion rolls 9 along with the web 7 into the individual tanks. For example, in Figure 1 a simple cradle assembly 13 secured to the end of piston rod 14 of the piston and cylinder assembly 15 may be used. The ends of the immersion rolls may also be so arranged on the

cradle and the cradle so constructed that the rolls 9 will be disposed in suitable channel shaped guideways 16 in the tanks as they move up and down in the tanks.

In the case of the cradle assembly 13 shown in Figure 1, several immersion rolls 9 may be secured thereto. Each of these rolls may also be independently adjustable on the cradle assembly as indicated in Figure 4. It is to be understood, of course, that if desired, the middle roll of the three rolls on the cradle assembly as shown in Figure 4 may be permanently affixed to the top of the tank so that it does not move up and down with the cradle assembly. In this instance the cradle 13' may comprise a series of horizontal bars 17 and 18 which form a horizontal frame. Secured to bars 17 are a pair of spaced upstanding pipes 19, within which are telescopically mounted journal bearing members 20. A roll 9 is secured to the top ends of members 20 by means well known in the art. Pipes 19 and journal members 20 in turn may be provided with a series of openings 21 and 22, which can be aligned. When aligned, a pin 23 may be thrust through the openings and roll 9 will then be permanently fixed in the adjusted position desired. The web material 7 is threaded about the immersion rolls, squeeze rolls and guide rolls as it passes through the several tanks.

The piston and cylinder assemblies of adjacent tanks 1 and 2 may also be interconnected by a suitable valve means such as is shown somewhat diagrammatically in Figure 1. Thus, when the immersion rolls 9 in one tank are lowered, the immersion rolls in another tank will be automatically raised. This is accomplished as follows: The right-hand piston and cylinder assembly 15 shown in Figure 1 or that disposed over tank 2 is connected to valve 30 by lines 31 and 32, while the left-hand piston and cylinder assembly 15 is connected to valve 30 by lines 33 and 34. Valve 30 is connected to a suitable hydraulic fluid source through entry line 35 and exit line 36. Valve 30 may be a solenoid controlled valve which during the shifting of the spool therein in one direction will connect line 35 with lines 31 and 34 and lines 32 and 33 with line 36. Upon the shifting of the spool in the valve 30 in the opposite direction, lines 33 and 32 will be connected with line 35 and lines 31 and 34 with line 36.

The tandem arrangement of the tanks 1 and 2 may be utilized in a wide variety of ways. For example, tanks 1 and 2 may both be filled with the same chemical solution. The web material 7, however, is caused to pass through only one of these tanks at any given time, such as tank 1. When a change-over of the solution in tank 1 is desired, all the operator has to do is to quickly raise the immersion rolls 9 and web 7 in tank 1 as indicated in Figure 1 while at the same time lowering the immersion rolls 9 and web 7 in tank 2. In this way, the forward movement of the web 7 may continue and the fluid in tank 1 emptied through the drain pipe 6 in tank 1. The tank 1 may then be cleaned and refilled with a different solution preparatory to the next processing operation, and without halting the present processing of web material.

Although the use of twin or tandem tanks located in close proximity to each other provides for a wide variety of uses for each tank, the main advantage of such arrangement is that no stoppage of the web in a processing line is needed to clean the individual tanks, to replenish

the chemical solutions therein, or to change the solutions of the tanks completely. When a series of twin or tandem tanks are employed such as is disclosed in Figure 3, the overall efficiency of the operation will be considerably enhanced. As indicated schematically in Figure 3, the tanks may also be closed by a suitable, slidable or hinged hood 26 which is then provided with suitable openings 27 for the piston rod 14 and openings 28 for the advancing web 7 in the event the tanks are to serve as vaporizing chambers or the like.

An advantageous embodiment of the invention has been shown and described. It is obvious that various changes and modifications may be made therein without departing from the spirit and scope thereof as defined by the appended claims.

I claim:

1. A system for the treatment of a continuously advancing web, comprising at least two solution-containing tanks arranged in tandem, means for continuously advancing a taut web to be treated, across said tanks, a vertically shiftable immersion roller associated with each tank in operative engagement with said advancing web, means for shifting said immersion rollers vertically into and out of said tanks, and means for synchronizing the direction and degree of the shifting movement, to move alternate immersion rollers in opposite directions and to maintain a constant tension on the web.

2. A system for the treatment of a continuously advancing web, comprising at least two solution-containing tanks arranged in tandem, a series of aligned supporting rollers arranged at spaced intervals above said tanks, means for continuously advancing a taut web to be treated, over said supporting rollers, a vertically shiftable immersion roller associated with each tank in operative engagement with portions of said advancing web, between said spaced supporting rollers, means for shifting said immersion rollers vertically into and out of said tanks, and means for synchronizing the direction and degree of the shifting movement, to move alternate immersion rollers in opposite directions and to maintain a constant tension on the web.

3. A system for the treatment of a continuously advancing web, comprising at least two solution-containing tanks arranged in tandem, means for continuously advancing a taut web to be treated across said tanks, a vertically shiftable cradle member associated with each tank, a plurality of immersion rollers carried by each cradle member in operative engagement with said advancing web, means for shifting said cradle members and immersion rollers vertically into and out of said tanks, and means for synchronizing the direction and degree of the shifting movement, to move alternate cradle members in opposite directions and to maintain a constant tension on the web.

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