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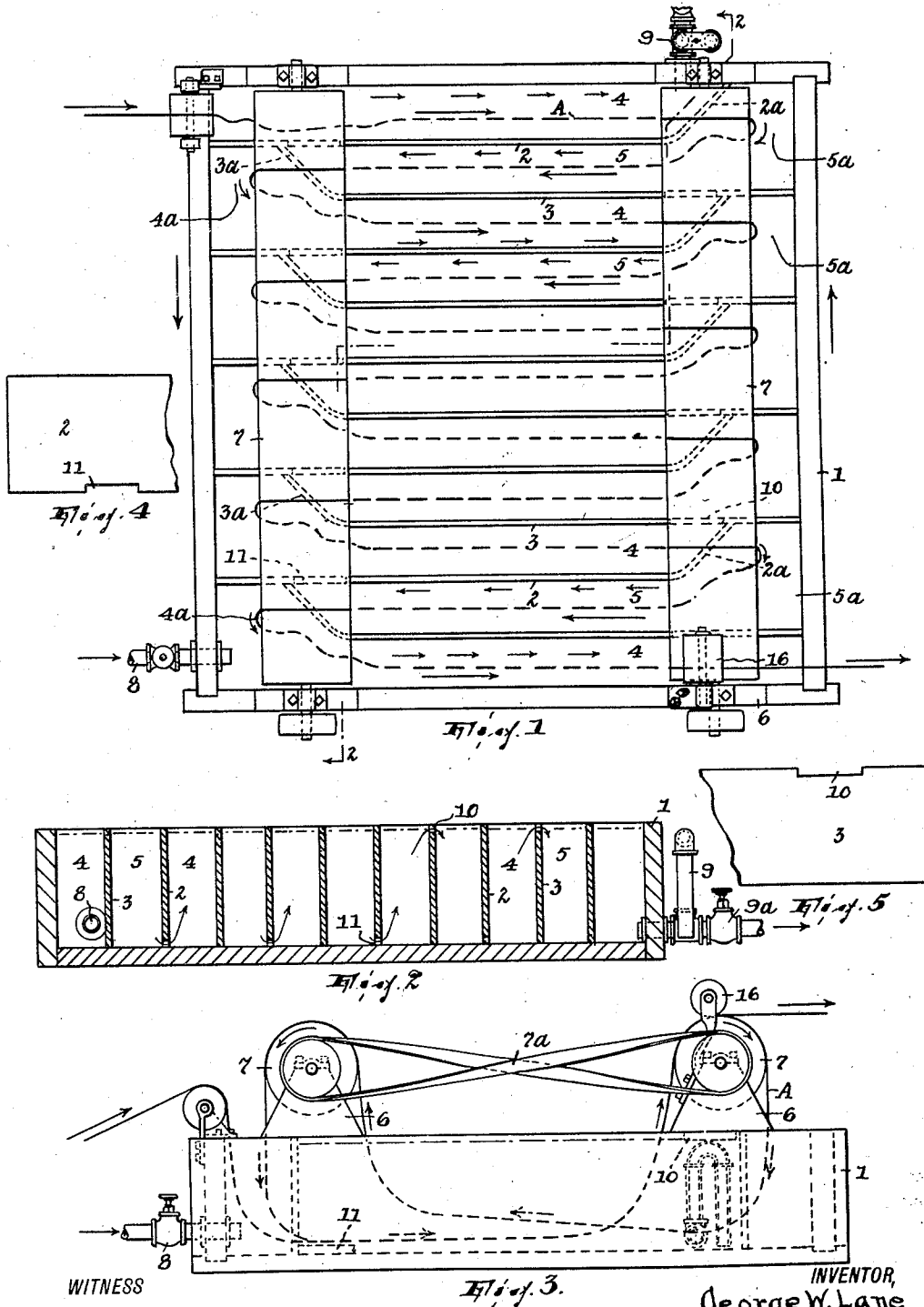
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METHOD AND APPARATUS FOR TREATING FABRICS WITH LIQUID

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WITNESS

Wm. D. Bell

Fig. 3.

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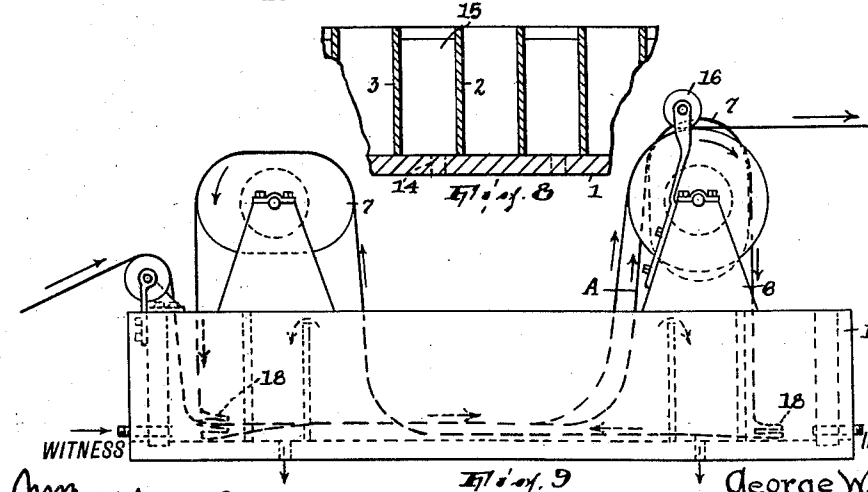
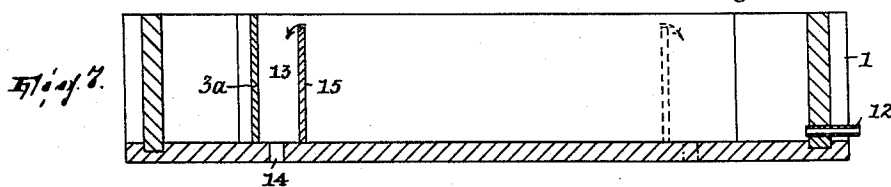
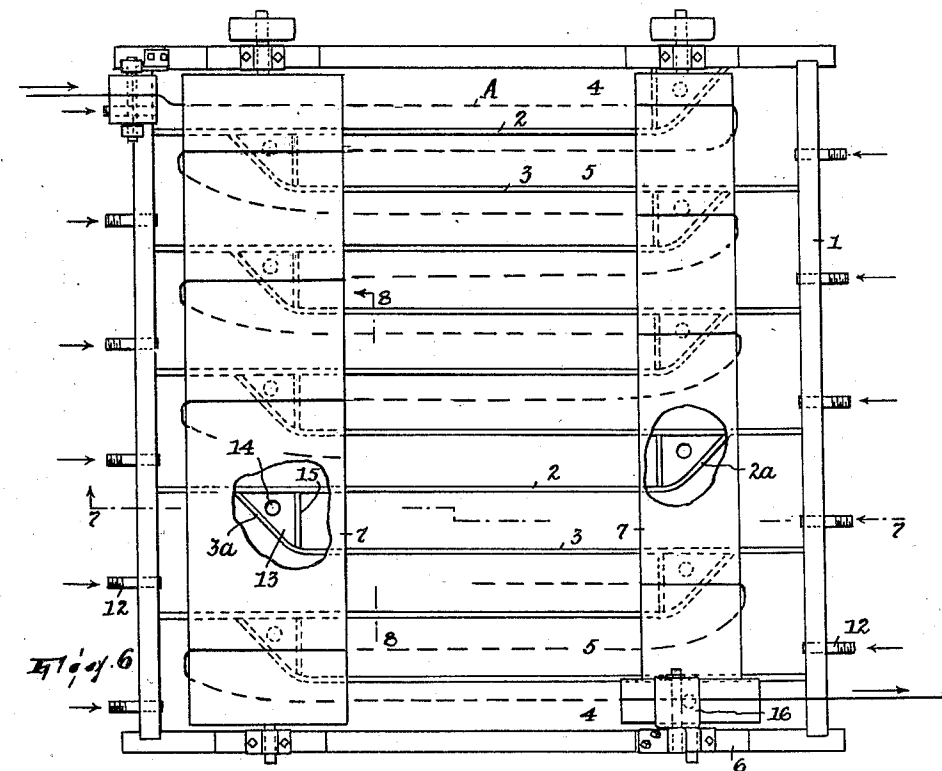
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2 Sheets-Sheet 2



WITNESS

Fig. 9

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UNITED STATES PATENT OFFICE

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METHOD AND APPARATUS FOR TREATING FABRICS WITH LIQUID

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This invention relates to apparatus for passing fabrics in rope form or other lengthy textile materials lengthwise through dye or other liquid, and especially apparatus of this class in which the material is repeatedly passed through the liquid, the progress of the repetition being transversely of the direction of each pass. Among the objects at which I aim are that the travel of the material, arranged in a horizontal succession of coils, shall be lengthwise of itself successively through separate compartments and always from one to the next without interference by their separating wall or partition and with the minimum of rubbing contact; that if flow of the liquid be allowed through each compartment and from one to the next such flow through any one compartment shall be lengthwise of the goods and, as preferred, in the direction of travel of the material there-through, thus to avoid disturbance and possible snarling or congestion; and that the flow from compartment to compartment shall nevertheless be oppositely to the direction of progress of the material from compartment to compartment, whereby, for example in washing, the unwashed goods shall enter the soiled liquid first but in leaving leave the clean liquid.

In the drawing,

Fig. 1 is a plan of one form of apparatus embodying the invention;

Fig. 2 is a section on line 2—2, Fig. 1;

Fig. 3 is a side elevation;

Figs. 4 and 5 are fragmentary elevations of partitions seen in Figs. 1 and 2;

Fig. 6 is a plan of another form;

Fig. 7 a section on line 7—7, Fig. 6;

Fig. 8 a fragmentary section on line 8—8, Fig. 6; and

Fig. 9 a side elevation of what is shown in Fig. 6.

Figs. 1 to 5.—Let 1 denote a vat open at the top, as usual, 2 and 3 designates two sets of partitions alternating with each other and extending up from the bottom of the vat to more or less near its top. The two sets reach respectively from opposite sides of the vat and have their ends 2^a 3^a turned off all in the same direction so that each such end 2^a or 3^a

abuts a partition 3 or 2. Considered apart, each partition viewed in plan is bent so that its end portions or legs are angularly related to each other. Thus the vat comprises a series of compartments 4—5 having extensions 4^a—5^a reaching lengthwise of the series in the same direction, each extension 4^a being at one side of the series and laterally opposed to an adjoining compartment and each extension 5^a being at the other side of the series and laterally opposed to an adjoining compartment 4, the term "laterally opposed" being as here used taken to mean with respect to the series.

Let 6 designate supports for horizontal guides 7 for the material A to be treated. (They may be ordinary cylindrical reels, or oval reels as in Fig. 9.) The material A according to this invention is trained over one guide then under and around and so over the other guide and then under the first guide, and so on repeatedly, the stretches of each coil or volute of the material between the guides hanging down in the vat, and it will be noted that each coil is crossed between the guides; this manner of training the material in coils or volutes (each having its stretches between the guides crossed) is effected so that the succession or repetition of coils progresses longitudinally of the guide, or as will appear, extends transversely of the travel of the material through the vat. The material, according to the usual practice, may be caused to travel through the vat by rotating one or both of the guides—preferably, of course, both guides, which then should best rotate reversely as shown by the arrows in Fig. 3, 7^a being a crossed-belt-and-pulley system connecting them.

Now, if the guides with the material trained around the same as shown and just described be combined with a vat constructed substantially as I have described and so that the guides extend lengthwise of its series of compartments the material may be made to travel through the compartments one after another without any interference by the bent-off end of any partition, and with liquid in the vat there will be substantially no rubbing or other contact of the material therewith. (Such a

combination is shown by the drawings). Nor is it material in which direction the travel of the material proceeds. The mentioned crossing of the stretches accounts for both stretches clearing or "hurdling" both of the partition ends 2^a—3^a involved where they extend over the guides, as would not be the case if, according to the usual arrangement, the stretches were not crossed.

The liquid in the vat may be quiescent, or non-flowing. But in certain operations, as tin-washing, phosphating and phosphate-washing, it is kept flowing. It should be noted that according to this invention as shown and described both stretches of any coil or volute, in themselves traveling in opposite directions, are in the vat—thus distinguishing from the ordinary or uncrossed arrangement of the material in which only the lower stretch is in the vat—and that those travelling in one direction are in the alternate compartments and those travelling in the opposite direction are in the remaining compartments. This makes it possible to provide for flow of the liquid successively through the compartments and in each longitudinally of the stretch of the material therein, so that just as the travel of the material is first in one direction through one compartment, then in the opposite direction through the next compartment and then in the first direction through the next compartment, and so on, the flow of the liquid may be likewise, or either against or with the travel of the material in all the compartments, with the advantage in the latter case of avoiding snarling and disturbance of the material. Of course the flow might begin at the same end of the vat at which the material enters (or at the top of Fig. 1). But I prefer to enter the liquid at the opposite end in some instances (notably washing) so that the progress of the flow successively through the compartments will be opposite to that of the material successively through them and the washed goods will finally emerge from clean washing liquid. The drawings (Figs. 1 to 5) show the valved liquid inlet 8 entering the compartment 4 at the end of the vat opposite that at which the material enters and the outlet 9 at the other end, (which outlet may be a "goose-neck" to maintain the liquid in the vat at a suitable level and have a valved means 9^a for drawing off the liquid). A flow responding to all the conditions specified above by way of example will be maintained if at the right in Fig. 1 all the partitions 3 and at the left all the partitions 2 have ports 10—11, respectively, affording liquid communication between the compartments, the former (10) being at the tops and the latter (11) at the bottoms of the partitions so as to insure all solid matter being carried along and finally evacuated. The long horizontal arrows in Fig. 1 indicate the direction of the fabric

travel and the short horizontal arrows that of the liquid flow; the vertical arrow at the left and right indicates the direction of progress of the material and of the flow, respectively, from compartment to compartment.

Figs. 6 to 9.—In some cases it may be desired to evacuate sections of the vat independently. Thus in Figs. 6 to 9 each such section (here comprising only one compartment) has its own inlet 12 and outlet, the latter consisting of a well 13 having a drain-hole 14 at the bottom and being formed by a dam 15 which joins the two partitions flanking the compartment but is lower than the same. Ports of communication between any two such sections or receptacles thus formed are in this case omitted.

At 16 is shown the usual roller which bears on one of the reels to squeeze out the surplus liquid from the material before it issues from the apparatus.

One advantage in providing two guides around which the coils of the material extend, each crossed, is that if the guides be rotated reversely they will influence the goods uniformly: for instance, if the guides are oval reels, so that they act to pile the goods in pleats as indicated at 18 in Fig. 9 there will be equal lengths of goods as between one reel and a pile on the one hand and the other reel and pile on the other.

Having thus fully described my invention, what I claim is:

1. In combination, a horizontal series of open-top liquid compartments respectively having extensions reaching lengthwise of the series in the same direction, the extension of each alternate compartment being at one side of the series and laterally opposed to an adjoining compartment and the extension of each of the other compartments being at the other side of the series and also laterally opposed to an adjoining compartment, and spaced guides above and extending lengthwise of the series and around which each length of textile material to be treated, travelling lengthwise of itself, is adapted to extend in a succession of coils progressing longitudinally of the series with each coil crossed between the guides and its stretches between said guides extending into said compartments.

2. In combination, an open-top liquid receptacle having a partition formed in plan with two legs angularly related to each other, said partition separating the contained liquid into two bodies, and a guide around which each length of textile material to be treated travels lengthwise of itself first in one direction through one liquid body and longitudinally of one leg of said partition and then in the other direction through the other liquid body and also longitudinally of said leg, said guide being arranged above and extending transversely of said leg.

3. The method of treating a lengthy piece

of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in coils arranged in a succession extending lengthwise of the guides and each coil being crossed between the guides and having its stretches between the guides depending therefrom and thereupon advancing said piece lengthwise of itself around the guides and while the various stretches are immersed in liquid.

4. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in coils arranged in a succession extending lengthwise of the guides and each coil being crossed between the guides and having its stretches between the guides depending therefrom and thereupon advancing said piece lengthwise of itself around the guides and while the various stretches are immersed respectively in a succession of liquid bodies below the guides.

5. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in coils arranged in a succession extending lengthwise of the guides and each coil being crossed between the guides and having its stretches between the guides depending therefrom and thereupon advancing said piece lengthwise of itself around the guides and while the various stretches are immersed respectively in a succession of liquid bodies below the guides each flowing lengthwise of the stretch therein.

6. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in coils arranged in a succession extending lengthwise of the guides and each coil being crossed between the guides and having its stretches between the guides depending therefrom and thereupon advancing said piece lengthwise of itself around the guides and while the various stretches are immersed respectively in a succession of liquid bodies below the guides each flowing lengthwise of the stretch therein and to the next liquid body in succession.

7. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in coils arranged in a succession extending lengthwise of the guides and each coil being crossed between the guides and having its stretches between the guides depending therefrom and thereupon advancing said piece lengthwise of itself around the guides and while the various stretches are immersed respectively in a succession of liquid bodies be-

low the guides each flowing in the direction of advance of the stretch therein.

8. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in coils arranged in a succession extending lengthwise of the guides and each coil being crossed between the guides and having its stretches between the guides depending therefrom and thereupon advancing said piece lengthwise of itself around the guides and while the various stretches are immersed respectively in a succession of liquid bodies below the guides each flowing in the direction of advance of the stretch therein and to the next liquid body in succession.

9. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in coils arranged in a succession extending lengthwise of the guides and each coil being crossed between the guides and having its stretches between the guides depending therefrom and thereupon advancing said piece lengthwise of itself around the guides and while the various stretches are immersed respectively in a succession of liquid bodies below the guides each flowing lengthwise of the stretch therein and also to the next liquid body in a succession reverse to that in which the material is advanced successively with respect to said liquid bodies.

10. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that all the respective stretches travel through a succession of liquid bodies.

11. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that all the respective stretches travel through a succession of liquid bodies and causing each body to flow lengthwise of the stretch therein.

12. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that all the respective stretches travel through a succession of liquid bodies and causing each body to flow lengthwise of the stretch therein and to the next body in succession.

13. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal suc-

cession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that all the respective stretches travel through a succession of liquid bodies and causing each body to flow in the direction of advance of the stretch therein.

14. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that all the respective stretches travel through a succession of liquid bodies and causing each body to flow in the direction of advance of the stretch therein and to the next body in succession.

15. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that all the respective stretches travel through a succession of liquid bodies and causing flow through the succession of bodies relatively contrary to the direction in which the material is advanced with respect to said succession of bodies.

16. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that stretches thereof travel through a succession of liquid bodies and causing each body to flow lengthwise of the stretch therein.

17. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that stretches thereof travel through a succession of liquid bodies and causing each body to flow lengthwise of the stretch therein and to the next body.

18. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that stretches thereof travel through a succession of liquid bodies and causing each body to flow in the direction of advance of the stretch therein.

19. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile ad-

vancing the material lengthwise of itself and so that stretches thereof travel through a succession of liquid bodies and causing each body to flow in the direction of advance of the stretch therein and to the next body.

20. The method of treating a lengthy piece of textile material with liquid which consists in maintaining a substantially horizontal succession of back-and-forth-extending stretches of said material and meanwhile advancing the material lengthwise of itself and so that stretches thereof travel through a succession of liquid bodies and causing flow through the succession of bodies relatively contrary to the direction in which the material is advanced with respect to said succession of bodies.

21. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of spaced guides in coils each crossed between the guides and in a substantially horizontally extending succession and with the coils depending from the guides, and advancing the material lengthwise of itself while the depending portions of the coils are immersed in liquid.

22. The method of treating a lengthy piece of textile material with liquid which consists in training the same around a pair of substantially horizontal and parallel guides in a coil crossed between the guides and having its stretches between the guides depending therefrom, wetting the material, advancing the material lengthwise of itself around the guides, and shifting the depending and downwardly traveling portions of the stretches crosswise of their paths of advance while supporting the said portions from beneath, whereby said portions will be formed in piles.

In testimony whereof I affix my signature.

GEORGE W. LANE.