April 7, 1936. F. GUT 2,036,693

APPARATUS AND METHOD FOR TREATING FABRICS WITH LIQUIDS

Filed Sept. 27, 1934 2 Sheets-Sheet 1

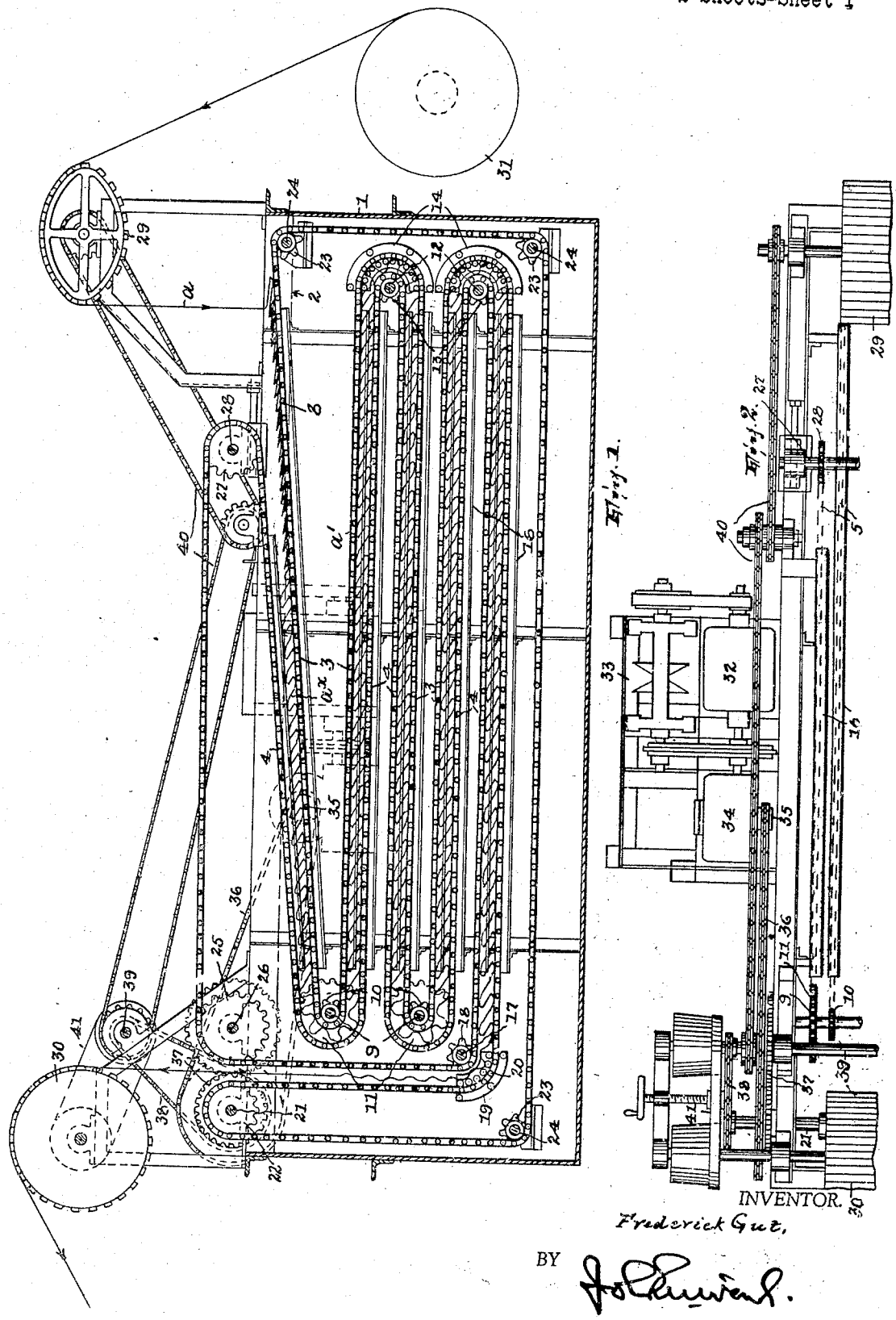


Fig. 1.

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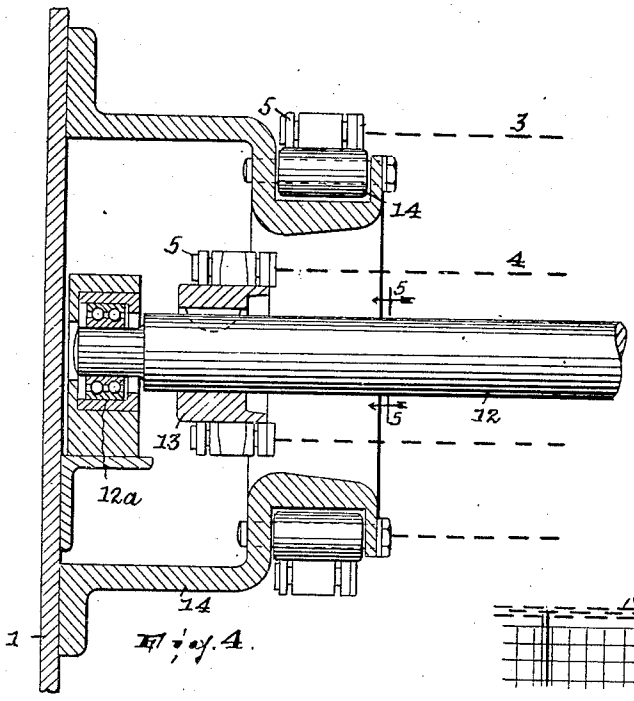


Fig. 4.

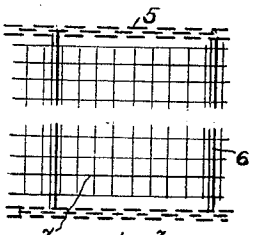


Fig. 3.

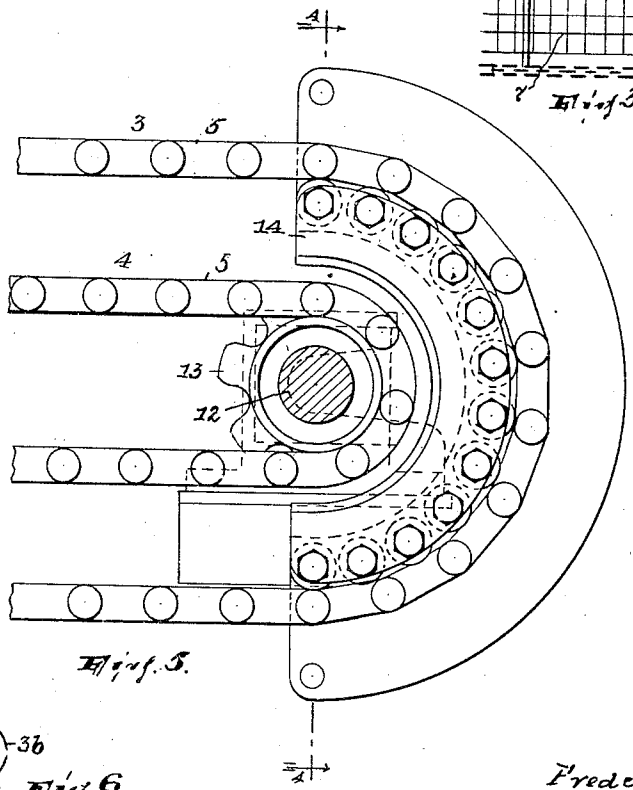


Fig. 5.

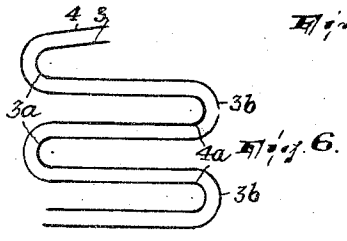


Fig. 6.

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APPARATUS AND METHOD FOR TREATING FABRICS WITH LIQUIDS

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6 Claims. (Cl. 8—19)

This invention relates to apparatus for treating textile materials, as fabrics, with liquid, and whereas it is herein described and shown with reference to what is known as "boil-off" apparatus (to wit, for removing the gum from silk piece goods) it will be understood that it is not necessarily so limited. As the "boiling-off" or gum removing is usually performed the goods is hung on sticks in a succession of pleats or folds depending into the liquid in a vat and two men pass the sticks along and so drag the folds one after another through the liquid. According to this invention this operation may be performed entirely automatically.

In carrying out my invention, given a vat containing the liquid of treatment, a sinuous passaged conductor having inter-communicating portions extending laterally (as that term is hereafter defined) at different elevations and submerged in the liquid is formed by two flexible conveyors having, submerged in the liquid, portions extending substantially parallel and adapted to receive the material between them and each arranged to form at different elevations laterally reaching loops and to have its loops alternate with and be between those of the other such portion, the conveyors when moved to pass downward through the liquid lengthwise of themselves being adapted to convey the material generally lengthwise of itself through the liquid. This apparatus, per se, is known.

But in accordance with my invention the said portions of the conveyors are spaced throughout their lengths and the material is not at any point by them or otherwise subject to obstruction or any pinching or compressing or the like action which might set up strains, rubbing or other harmful effects where a fine fabric, for instance, is being treated. Instead the conveyance of the fabric is effected and at the same time all obstructive and harmful effects, including those which might otherwise be incident to the sinuous form of the conductor, are prevented by providing for entry of the material to the passage in already undulated form, so that it will thereupon stand undulated and hence desirably slack in the conductor and yet be carried along and therethrough by the conveyors. Being the first, so far as I am aware, to form a series of undulations in a fabric to be treated with a liquid and then, while maintaining the undulations thus already formed, cause the fabric to enter the liquid at its surface, and then pass through the liquid, progressively of the undulations I claim the method thus involved accordingly.

One conveyor is wide and the other narrow, which permits supporting both conveyors at each of those intervals where a bend of the wide conveyor receives a bend of the narrow conveyor by a common axial support having enlarged portions, as sprocket wheels, for the bends of the wide conveyor. At each interval where a bend of the narrow conveyor receives a bend of the wide conveyor there is means, substantially wholly exterior of the passage between the conveyors, to support them at such bends.

Further, according to this invention the uppermost portion of the passage has its relatively under side, formed by a portion of one conveyor, extended into the liquid at a downward incline, and it affords above the liquid means forming a loading platform onto which the fabric may be delivered pleated and in that respect undulated preparatory to its entry into the passage and through the liquid.

In the drawings,

Fig. 1 is a vertical longitudinal substantially central section of the improved apparatus, certain parts appearing partially in broken lines;

Fig. 2 is a fragmentary plan, showing principally the driving instrumentalities;

Fig. 3 is a diagrammatic fragmentary plan of a conveyor;

Figs. 4 and 5 are sectional views on lines 4—4 and 5—5 of Figs. 5 and 4, respectively; and

Fig. 6 is a diagram of portions of the conveyors.

Let 1 designate a suitable vat for the liquid whose level is indicated at 2.

There are two endless flexible conveyors for the material *a* (here a silk fabric) designated in Fig. 1 as 3 and 4 and each preferably of the more or less reticulated type and constructed as follows: Two endless chains, as 5, are connected at suitable intervals by cross-rods 6 and between the chains, supported by the cross-rods and chains, is stretched an endless net 7.

As will appear, each conveyor has a portion extending into the vat and arranged and supported so as to form at different elevations laterally extending loops and to have its loops projecting reversely to and alternating with those of said portion of the other conveyor; see Fig. 6 where the loops are designated 3*a* and 4*a*. Usually each stretch of (1. e. between the bends in) all the loops (except as will appear) will extend actually horizontally, but as I do not wish to be limited precisely to this condition I have used the term "laterally", here to be taken to mean relatively to the vertical. Said portions are substantially parallel to each other and here suitably spaced to ad-

mit the fabric between them. The latter is to travel generally lengthwise of itself through the succession of loops and between said portions, and as it moves from stage to stage of the sinuous conductor in effect formed by said portions each relatively underneath laterally reaching stretch of one conveyor will serve to support it while the relatively overlying stretch of the other conveyor serves to confine it from rising as an incident of its tendency to float. The conveyors in the present example move in the direction indicated by the arrows associated with the fabric, or so that the travel is progressively downward. The uppermost stretches of the two said portions are here inclined so as to be in part above and in part submerged in the liquid, such stretch of conveyor 3 having its exposed portion extending further laterally from the surface of the liquid than the corresponding part of the inclined stretch of conveyor 4 so that the former affords a loading platform at 8. Conveyor 4 is here wider than conveyor 3.

The means for supporting the two conveyors is as follows:

First as to the means for supporting the loop-forming or vat contained portions of the conveyors: Near one end of the vat are journaled supports for the loops each consisting of a transverse shaft 9 carrying a pair of small sprockets 10 spaced to accommodate and suit the spacing of the chains of the narrow conveyor 3 and a pair of diametrically enlarged portions, as, sprockets 11, spaced to accommodate and suit the spacing of the chains of the wide conveyor 4. Thus the conveyors are supported on the one hand, or at the left in Figs. 1 and 6. On the other hand, in view of the stated relative widths of the two conveyors, it is obvious that both conveyors cannot be supported with the bends 3b, Fig. 6, (between the loops of conveyor 3) and the extremities or rebends in the loops of conveyor 4 both on sprockets in each instance on the same shaft or as above described, wherefore I provide supports consisting of transverse rotary shafts 12 having sprockets 13 spaced to accommodate and suit the spacing of the wider conveyor 4 and semi-circular elements 14, affixed to the sides of the vat, affording races (preferably roller-equipped, as shown in Figs. 4 and 5) concentric with the shafts and spaced to accommodate and suit the spacing of the chains of conveyor 3. The shafts may be journaled in bearings 12a carried by the elements 14. (Under each stretch of each chain of each conveyor may be a ledge 16, attached to one side of the vat, to oppose possible undue sagging of such stretches under the load of the material and steady the motion of the conveyors.) The two conveyors, after passing the lower one of the two assemblies last described and shown in Figs. 4 and 5, are next passed to the left and under an assembly of essentially similar construction (comprising a transverse rotary shaft 17 with sprockets 18 for the chains of the wide conveyor 4 and quadrant-shaped elements 19 having roller-equipped races 20 for the chains of the narrow conveyor 3, and thence upwardly.

Conveyor 3 then extends over sprockets 22 on a transverse rotary driven shaft 21 and thence around sprockets 23 on rotary transverse idler shafts 24 arranged at the lower left and the lower and upper right of the vat, completing its circuit. Conveyor 4 extends over sprockets 25 on a transverse rotary driven shaft 26 and then around sprockets 27 on a transverse rotary idler shaft 28, completing the circuit, the latter sprockets being so arranged that conveyor 4 leaves clear the loading platform at 8 already indicated.

In any previous construction in which the conductor is formed of two sheet-like conveyors, as here, what may be termed the receiving bends thereof as shown in Fig. 6 were supported, both at the right and left, by transverse guides (as the shafts 9 and 12 and their sprocket wheels) the same as the received bends in that figure, rather than by opposed guides, such as are shown in Fig. 5, which are bent around the transverse guides and have the opposite margins of the receiving bends engaged therewith; wherefore, the passage through the conductor was interrupted by such guides for the receiving bends so that the guides interferred with the transit of the material through the passage.

The fabric is delivered onto the platform 8 by a reel 29, preferably elliptical in form so as to cause pleating of the deposited fabric, as indicated at a'. It is drawn from the apparatus by another reel 30. 31 designates a suitably supported roll of the fabric affording the supply thereof.

A motor 32 drives a so-called variable-speed drive 33 (here of the well-known Reeves type), which in turn drives a speed-reduction unit 34 (these parts being shown diagrammatically and not being necessary to describe in detail), it being sufficient to regard the shaft 35 of the unit 34 here as the driver. Through a sprocket-and-chain connection 36 this shaft drives shaft 21 which, through gearing 37, drives shaft 26. Thus the two conveyors are driven. Through a sprocket-and-chain connection 38 connecting a counter-shaft 39 with shaft 21 such counter-shaft is driven. Through sprocket-and-chain connections 40 the shaft of reel 29 is driven. And through a belt- and cone-pulley variable-speed connection 41 connecting the counter-shaft with the shaft of reel 30 the latter is driven.

In this example reel 29, due to its elliptical form, causes the fabric to be deposited on the platform in undulations or here successive pleats or folds (which may be of any extent, as much as a yard in length) and as these descend with conveyor 3 to the surface of the liquid if they bulge, as at ax, and tend to float clear of said conveyor such will be opposed by the overlying stretch of conveyor 4 which will itself act to advance the material. However, it is to be understood that undulation of the fabric is not essential to its progress, for always there are portions in its length which, either by floating or sinking, are in contact with one or the other of the two conveyors and so subject to the advancing action thereof.

Having thus fully described my invention what I claim is:

1. The method of treating a fabric with liquid which consists in forming a series of undulations in the fabric and then, while maintaining the undulations, causing the undulated part of the fabric to enter the liquid at its surface, and thereupon pass through the liquid in a downward sinuous course, progressively of the undulations.

2. The method of treating a fabric with liquid which consists in forming a series of undulations in the fabric and then, while maintaining the undulations, causing the undulated part of the fabric to enter the liquid at its surface at an incline, and thereupon pass through the

liquid in a downward sinuous course, progressively of the undulations.

3. In combination, a liquid-containing vat, a pair of flexible conveyors having parts thereof spaced from and substantially parallel with each other and bent to form a bent conductor forming a passage for the textile material to be treated and including laterally extending portions arranged in the liquid in the vat at successive elevations, supporting means past which the conveyors are movable lengthwise of themselves relatively downwardly through the liquid, the uppermost portion of said passage having the relatively under side thereof formed by a portion of one conveyor extending into the liquid at a downward incline approaching the horizontal and above the liquid forming a loading platform, and means to deliver the fabric pleated onto the platform.

4. Apparatus of the class described including a liquid-containing vat, wide and narrow flexible conveyors each having a portion arranged to be submerged in the liquid in the vat, said portions extending in face to face relation to and being spaced from each other and forming a passage of substantially constant width throughout their whole extent and being bent back and forth at successive elevations, means to support said portions at the intervals where the bends of the wide conveyor receive those of the narrow conveyor, and means, substantially wholly exterior of said passage, to support said portions at the intervals therein where the bends of the narrow conveyor receive those of the wide conveyor.

5. The method of treating a fabric with liquid which consists in forming a series of undulations in the fabric and then, while maintaining the undulations, causing the undulated part of the fabric to enter the liquid at its surface, and thereupon pass through the liquid progressively of the undulations in a sinuous course.

6. The method of treating a fabric with liquid which consists in forming a series of undulations in the fabric and then, while maintaining the undulations, causing the undulated part of the fabric to enter the liquid at its surface at an incline, and thereupon pass through the liquid progressively of the undulations in a sinuous course.

FREDERICK GUT.