

Aug. 19, 1941.

L. MEES ET AL

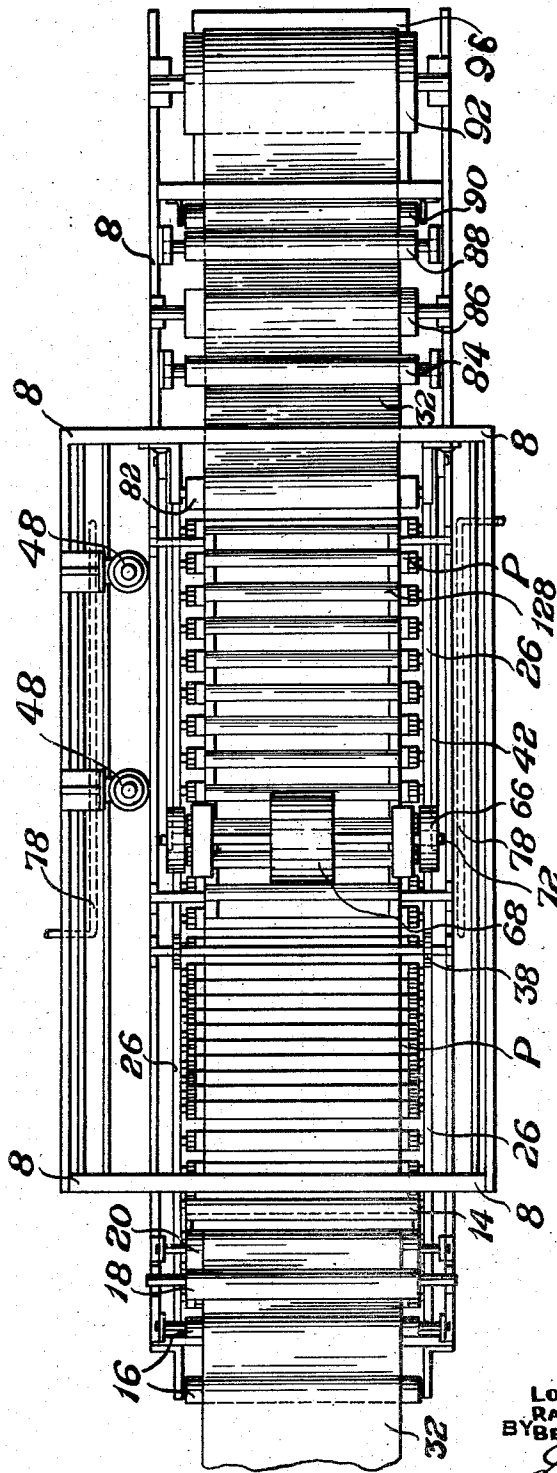
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APPARATUS FOR BOILING-OFF TEXTILE FABRICS

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Fig. 2.



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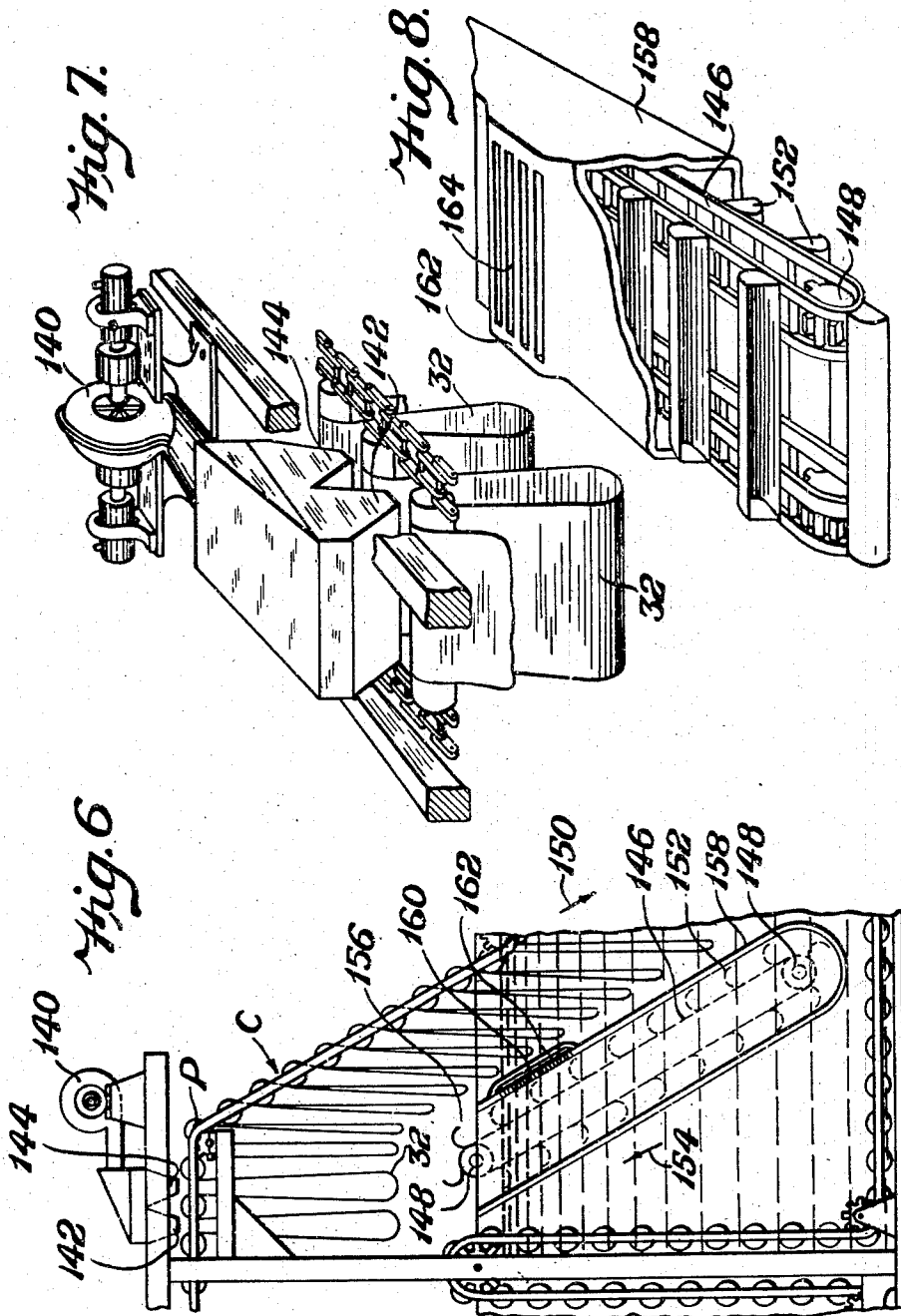
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APPARATUS FOR BOILING-OFF TEXTILE FABRICS

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Textile fabrics are woven or knit of sized yarns or threads and it is necessary before the dyeing and finishing operation that the sizing in the yarns be removed. Great care must be exercised in the boil-off process as otherwise the fabric when dyed and finished will be marked or spotted. This is particularly true in connection with textiles formed of artificial fibers such as rayons, acetates and the like. Furthermore, in the interests of efficiency and economy it is necessary that a boil-off process and apparatus for carrying out the process be provided for perfect speedy and continuous operation.

Since all textile fabrics are lighter than the liquid in which the sizing is boiled-off, difficulty has been experienced in forcing the fabric into the boil-off liquid and keeping it in the boil-off liquid for the necessary time, it being understood that the fabric must have minimum contact with the supporting apparatus and with itself during the boil-off process if marking and spotting are to be avoided.

Our invention therefore is directed to a novel boil-off apparatus by which a continuous boil-off process is rendered possible, whereby speed of operation is increased and whereby the complete immersion of the fabric in the boil-off liquid is effected.

Our invention further relates to an apparatus whereby the fabric is introduced into the boil-off bath and is made to progress through the boil-off bath for a predetermined length of time in the form of spaced loops whereby the entire surface of the fabric is exposed to the boil-off liquid.

Our invention still further relates to a novel means whereby the loops of fabric during their passage through the boil-off tank are shogged vertically while their supports are made to rotate intermittently thereby exposing to the boil-off bath those portions of the fabric which would otherwise be continuously in contact with the loop supports and further producing a washing operation directly on the fabric.

Our invention still further relates to a novel means for forming the fabric into loops of predetermined size and for insuring gradual but positive and rapid immersion of the loops into the boil-off bath together with means for agitating the liquid in the boil-off bath without causing undue turbulence which might disturb the loops during their passage through the boil-off bath.

To the above and other ends our invention consists of various other novel features of construc-

tion which will be more fully set forth in the following specification and the accompanying drawings in which:

Fig. 1 represents diagrammatically and in side elevation a boil-off apparatus for carrying out our method, certain parts being omitted in order to show details of construction.

Fig. 2 represents diagrammatically a top plan view of Fig. 1 certain parts being omitted in order to show details of construction.

Fig. 3 represents a view partly in section and partly in elevation on line 3—3 of Fig. 1.

Fig. 4 represents, in perspective, a fragmentary view showing certain details of construction.

Fig. 4a represents a fragmentary plan view showing certain details of construction.

Fig. 5 represents a preferred embodiment of the structure of an expanding pole adapted to be used in connection with the present invention.

Fig. 6 represents a fragmentary view in side elevation of the left hand portion of Fig. 1 showing a modified form of construction.

Figs. 7 and 8 represent, in perspective, fragmentary views showing details of construction shown in Fig. 6.

Referring to the drawings in which like reference characters indicate like parts, and more particularly to Fig. 1, 8 designates a suitable frame for supporting the working parts, 10 designates the boil-off tank and 12 designates the rinsing tank. The fabric 14 is fed into the machine over the rollers 16 and under the roller 18 and over the roller 20 where it is dropped between any two poles 22 and 24 which form part of the conveyer generally designated C, the poles 22 and 24, as well as the other poles generally designated P, being carried by the sprocket chains 26. 28 designates a loop-measuring device which cooperates with the travel of the conveyer C in the direction of the arrow 30 to predetermine the lengths of the loops 32 in the interests of uniformity and in accordance with the depth of the boil-off tank 10 and other mechanical requirements. The loop regulating device 28 is not shown nor described in detail due to the fact that it forms no part of the present application and due to the fact that it is shown and claimed in Parkes et al. App. #216,678 of June 30, 1938, now Patent No. 2,213,502. The chain 26 travels horizontally over the sprockets 34 and 36 and then travels downwardly at a slant or angle determined by the spacing of the sprocket 36 from the sprocket 38. In the top of the tank 10 are provided the longitudinally and

oppositely disposed tracks 40 and 42 over which the poles P travel after passing the sprocket 38, it being seen from Fig. 4 that each of the poles P is provided at its opposite ends with pinions 44 which are adapted to ride on the horizontal portions 46 of the tracks 40 and 42 and over the ratchet areas 48 so that each of the poles P, when it rides on the ratchet areas 49, is turned about its axis through one or more turns. This results in moving the loops with respect to the poles P thus bringing those portions of the loops, which are in contact with the poles P, into the liquid of the boil-off bath which would not happen if the poles P were not turned about their axes intermittently during their progress through the boil-off tank. This is done in order to insure contact of other portions of the fabric with the boil-off bath. On one or opposite sides of the boil-off tank, and as many as might be needed, we provide the agitators 48 having the propellers 50 which keep the liquid in the boil-off tank 10 agitated and, by reference to Fig. 3, it will be seen that the agitators 48 are positioned in compartments 52 which communicate through the opening 54 with the bottom of the tank 10 so as to draw the liquid from the bottom of the tank 10 through the opening 54 and propel it upwardly in the direction of the arrow 56, the liquid being then discharged over the upper edge 58 of the partition 60 on top of the fabric 14 carried on the poles P. In order to effect a washing motion we secure to the frame of the machine the bracket 62 which carries the shaft 64 on which are mounted the eccentrics 66, the shaft 64 being driven by the pulley 68 and belt 70 in any suitable manner. To the eccentric 66 are secured the arms 72 which are connected at their bottom ends to the ends of the tracks 40 and 42 so that, as the shaft 64 is turned, the eccentrics 66 will vertically reciprocate the arms 72 and thus raise and lower the tracks 40 and 42 on which the poles P carrying the fabric 14 are moving through the tank 10. The tracks 40 and 42 as shown in Fig. 4 are pivoted as at 74 to a suitable support 76 forming part of the framework or housing of the machine but it is understood that it is within the scope of our invention if desired to provide another bracket 62 and a duplicate pair of eccentrics 66 and arms 72 to engage the now pivoted ends of the tracks 40 and 42 so that the tracks may be raised and lowered at their opposite ends instead of at one end thereof as at present shown. Since, in order to do this, it is merely necessary to duplicate the structure of Fig. 4, we have deemed it unnecessary to show the same separately or in further detail. In order to heat the liquid in the tank 10 we provide the heating coils 78 which may be positioned as shown in Fig. 3 or which may be placed directly in the boil-off bath as desired, the location, number and size of the heating coils 78, or the heating medium used therein being optional. In connection with the position of the sprocket 38 and the tracks 40 and 42, which in turn predetermine the position of the conveyer C as it travels horizontally in the tank 10, it is to be understood that the tank 10 is filled with liquid to a point well above the center of the sprocket 38 so that the poles P are at all times submerged during their travel through the tank 10. In order not to confuse the drawings the liquid level has not been shown in Fig. 1 but is shown as much as possible in Fig. 3. After the fabric 14 has travelled in the form

of loops 32 through the tank 10 in the direction of the arrow 80, the fabric 14 passes over the roller 82 under the roller 84, over the roller 86, under the roller 88, over the roller 90 to the folding mechanism 92 so that the fabric 14 is finally deposited in the form of folds 94 on the table 96 or removable truck or the like. It will be noted that the rollers 84 and 88 are positioned in tank 12 which contains a rinsing liquid 100 through which the fabric 14 passes after emerging from the boil-off tank 10. The conveyer C, after leaving the tracks 40 and 42, travels downwardly, passes under the sprockets 101 in the bottom of the tank 10 and over the sprocket 102 which is outside and above the feed end of the tank 10 where the conveyer C and the poles P enter the chamber 104 containing a washing liquid 106. The conveyer C and the poles P then travel under the sprockets 108 so as to submerge the poles P in the liquid 106 and the conveyer C and poles P then pass over the sprockets 34 in position to receive new loops of fabric 32. During the travel of the conveyer C between the sprockets 108 and 34 the poles P are subjected to the cleansing action of the brush 110 which is preferably rotary, and, after passing the brush 110, the poles P are dried by passing in front of the blower 112 which may blow ordinary air or heated air as desired. The cleaning and drying of the poles P in the chamber 104 is necessary in order to prevent spotting or marking of the fabric.

Since the loops 32 of the fabric are lighter than the liquid in the tank 10 considerable difficulty was experienced in forcing the loops or submerging them into the liquid and in order to insure a rapid and untangled submersion of the loops we have provided the conveyer 114, which may be a sprocket chain or belt travelling over the sprockets or pulleys 116 which are journaled on shafts 118 and which are carried by the brackets 120. The conveyer 114 is provided exteriorly with the slats 122 and it will be noted from Fig. 1 that the conveyer 114 is disposed at an angle with respect to the perpendicular, said angle corresponding to the inclination or slant of travel of the conveyer C between the sprocket 36 and 38 and being positioned sufficiently close to the plane of travel of the conveyer C into the tank 10 so that the bottom ends of the loops 32 will just about touch the slats 122. Since the conveyer 114 travels in the same direction as the conveyer C or in the direction of the arrow 124, it will follow that the movement of the slats 122 gently but nevertheless effectively tends to pull the bottom ends of the loops 32 down into the liquid in the tank 10.

Above the tracks 40 and 42 is provided another endless conveyer 126 which is also provided with slats 128 and which travels endlessly over the sprockets or pulleys 130 in the direction of the arrow 132 in Fig. 1. The conveyer 126 is spaced above the tracks 40 and 42 sufficiently to permit of the vertical reciprocation of the tracks as explained in connection with Fig. 4 but it is to be understood that the bottom side of the conveyer 126 is below the upper edge of the tank 10 and immersed in the boil-off liquid, the function of this conveyer being to prevent the upper part of the loops 32, which rests on the poles P, from rising above the level of the liquid in the tank 10 during the vertical reciprocation of the tracks 40 and 42, or, if, for any reason, the loops 32 should float off the poles P. It will be remembered that the impellers 50 of the agi-

tators 48 raise the liquid in the compartment 52 and in this connection it is pointed out that the liquid so raised by the impellers 50 is discharged over the underside of the conveyor 126 and between the slats 128 thereof and is not discharged directly on top of the fabric 14 itself. In order further to effect proper distribution of the liquid discharged over the conveyor 126 by the impellers 50 there are provided the angle-shaped slats 134.

While ordinary single-piece poles P can be used successfully it is preferable to use the form of expansion pole formed of the sections 136 and 138 but it is deemed unnecessary to describe the construction and operation of this pole in detail since the same is shown and described in U. S. Pat. #1,997,696, issued to B. A. Parkes, April 16, 1935.

In Fig. 6 there is shown a modified form of construction in which a blower 140 is used to blow air through the ducts 142 and 144 between an adjacent pair of poles P on the conveyor C so as to force the fabric 14 downwardly between adjacent poles P thus forming the loops 32. Also in this construction, instead of the conveyor 114 which has the slats 122 for pulling the lower ends of the loops 32 frictionally and by contact into the liquid in the tank 10, we employ a conveyor 146 which may be a belt or a sprocket and which travels over the sprockets or pulleys 148 in the direction of the arrow 150, the conveyor 146 being provided with elongated, cup-shaped paddles 152 which carry the liquid on their upward movement in the direction of the arrow 154 and discharge it downwardly as at 156 thus creating a downward current of liquid in the direction of the arrow 150 which tends in turn to suck or draw the lower ends of the loops 32 as they reach the upper level of the liquid in the tank 10. The conveyor 146 is housed in a casing 158 and the casing 158 is provided with the screen 160 which corresponds to the point at which the lower ends of the loops 32 enter the liquid in the tank 10 so that, as the paddles 150 travel downwardly past the screen 160, they tend to draw liquid through the screen 160 in a downward direction thus creating a further downward current which acts on the lower ends of the loops 32. The portion of the casing 158 covering the screen 160 is raised as at 162 and is provided with overlapping slats 164 to permit liquid to flow therethrough but to prevent the lower ends of the loops 32 from coming in contact with the screen 160.

In order to avoid turbulence the false bottom 166 having the openings 168 is positioned in the tank 10 below the loops 32 but above the impellers 50 of the agitators 48 so that the liquid is drawn by the agitators 48 through the openings 168 thus preventing the formation of currents or turbulence which may disturb the loops.

With respect to the stretching or expanding pole illustrated in Fig. 5 it is pointed out that it is so constructed as to be expanded longitudinally intermittently in the manner set forth in Patent No. 1,997,696 above referred to or any other desirable means so that, as the loops travel through the boil-off liquid and tend to become more or less wrinkled, the intermittent expansion of the pole serves to smooth out the wrinkles and maintain the fabric in properly spread condition.

The operation is as follows:

The fabric 14 is formed into the loops 32

which hang from the poles P with or without the assistance of the air blown through the loops, the function of the latter being merely to insure proper spreading and smoothing out of the wrinkles. The poles P are then fed on a downward slant and, when the lower ends of the loops reach the top of the boil-off liquid, the downward current created by the conveyor 114 in Fig. 1 or the endless bucket conveyor illustrated in Fig. 6 insures the gradual but rapid and positive submersion of the loops without floating, wrinkling or entanglement. As the loops progress through the boil-off tank 10, the fabric is subjected to the action of the boil-off liquid and the intermittent rotation of the poles, as well as their vertical reciprocation, insures contact of every portion of the fabric with the boil-off liquid and subject it to a washing action. If the poles are not intermittently rotated, the portion of the fabric contacting the poles will not be as much in contact with the boil-off liquid as the remaining portions. The conveyor 126 travelling in the direction of the arrow 132 serves to push down any loop that may accidentally float off its supporting pole. If the conveyor 126 were stationary or simply in the form of a plate positioned above the boil-off liquid tank, any loop which floats off its pole would rub against the underside of the conveyor, whereas, due to the conveyor moving, all such friction is eliminated. The agitators 48 tend to circulate the liquid through the perforated false bottom 166 drawing the liquid from the bottom of the boil-off tank and pouring it on top of the fabric through the slats 128 and the angle irons 134. After the fabric has been drawn off into the rinsing tank 12, the poles are propelled into the compartment 104 where they are washed in the liquid 106, scrubbed by the brush 110 and dried by the blower 112. This insures cleanliness of the poles to prevent spotting of the fabric.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An apparatus for boiling-off textile fabrics comprising, endlessly travelling poles, means for from said poles, means for propelling said loops draping the fabric in the form of loops, hanging and said poles downwardly and at an angle to the perpendicular, into the boil-off liquid, means for propelling said loops and said poles in submerged condition through the boil-off liquid, an endless conveyor horizontally disposed above said poles, and means for propelling said conveyor in a direction opposite to the movement of said poles.

2. An apparatus for boiling-off textile fabrics comprising, endlessly travelling poles, means for draping the fabric in the form of loops, hanging from said poles, means for propelling said loops and said poles downwardly and at an angle to the perpendicular, into the boil-off liquid, means for creating a constant downward current in said boil-off liquid near the point at which the lower ends of said loops first come in contact with said boil-off liquid whereby said loops are positively drawn downwardly and submerged in said boil-off liquid, means for propelling said loops and said poles in submerged condition through the boil-off liquid, an endless conveyor partly submerged in said liquid, and means for propelling said conveyor in a direction opposite to the movement of said poles.

3. An apparatus for boiling-off textile fabrics

comprising a pole conveyor, means for draping the fabric in the form of loops hanging from the poles of said conveyor, means for submerging and propelling said poles and the loops carried thereby through a boil-off liquid, means for intermittently rotating said poles, during their travel through said boil-off liquid, an endless conveyor at least partly submerged in said boil-off liquid and disposed at an angle to the perpendicular, and means for propelling said endless conveyor for creating a downward pull in the area in which the lower ends of said loops enter said boil-off liquid.

4. An apparatus for boiling-off textile fabrics comprising, a boil-off tank, an endless pole conveyor adapted to support the fabric being treated, means for submerging said endless conveyor and the fabric carried thereby and propelling it through said boil-off tank, and a guard disposed substantially horizontally above said boil-off tank and partly submerged in the liquid therein for preventing the fabric carried by said pole conveyor from floating above the surface of the liquid in said boil-off tank.

5. An apparatus for boiling-off textile fabrics comprising a conveyor, means for forming the fabric to be treated into loops carried by said conveyor, means for propelling said conveyor through a boil-off liquid, and means for assuring positive entry of the loops of fabric into the

boil-off liquid comprising, a submerged inclined endlessly traveling belt disposed in the area in which said loops enter said liquid, and means for actuating said belt whereby a downward current is created in said liquid to draw the lower ends of the loops and whereby the lower portions of the loops are also frictionally engaged and guided downwardly by said endless member.

6. An apparatus for boiling-off textile fabrics comprising a boil-off tank adapted to contain a boil-off liquid, an endless pole conveyor adapted to support the fabric to be treated, an auxiliary compartment adjacent one end of said boil-off tank and adapted to contain a washing liquid, said auxiliary compartment communicating with said boil-off tank at a point above the level of the liquid in said tank and said compartment, scrubbing devices mounted in the lower portion of said auxiliary compartment, drying means also mounted in said compartment above the level of said washing liquid, and means for propelling said endless pole conveyor through said boil-off tank and from said boil-off tank into said auxiliary compartment, through said washing liquid and past said scrubbing devices and said drying means.

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