

July 6, 1937.

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2,086,100

PROCESS AND APPARATUS FOR TREATING TEXTILE MATERIAL

Filed Nov. 27, 1935

3 Sheets-Sheet 1

Fig. 1.

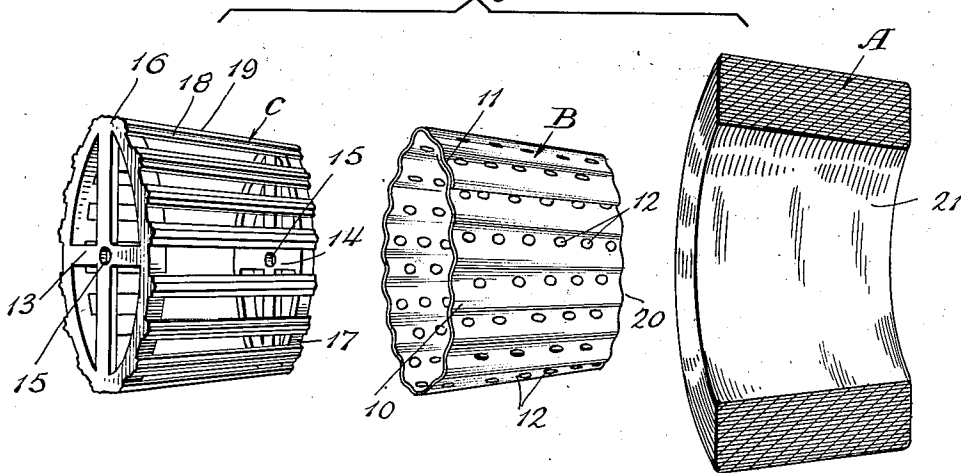
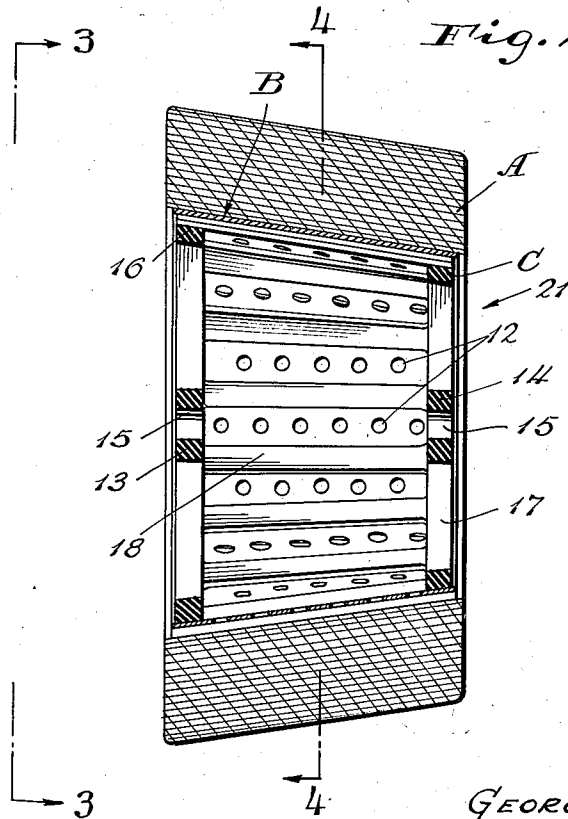


Fig. 2.



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3 Sheets-Sheet 2

Fig. 3.

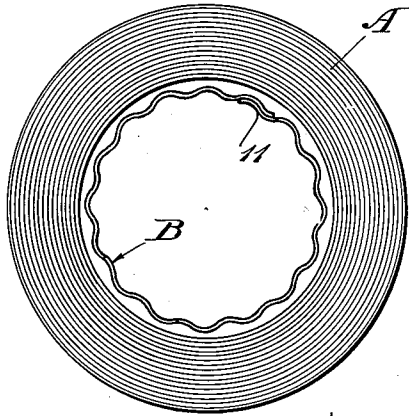


Fig. 4.

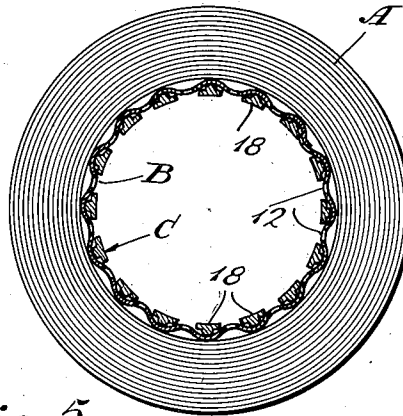


Fig. 5.

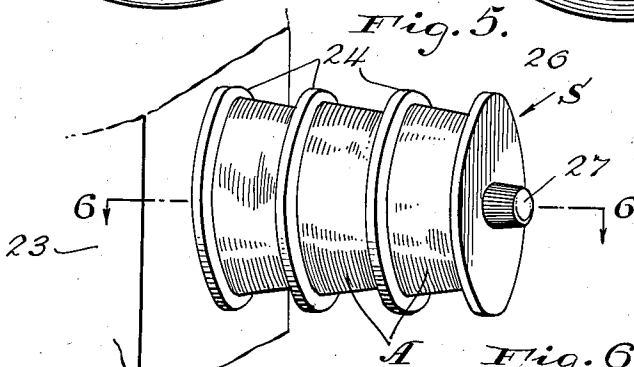
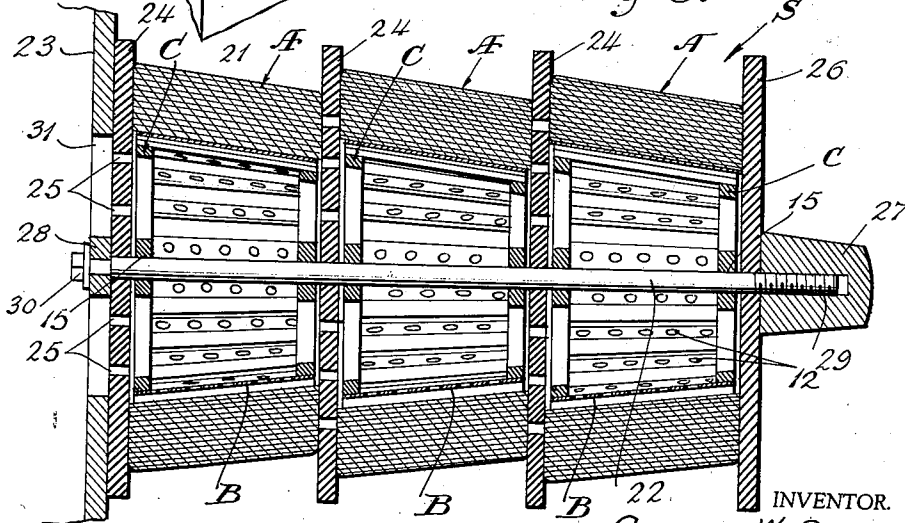


Fig. 6.



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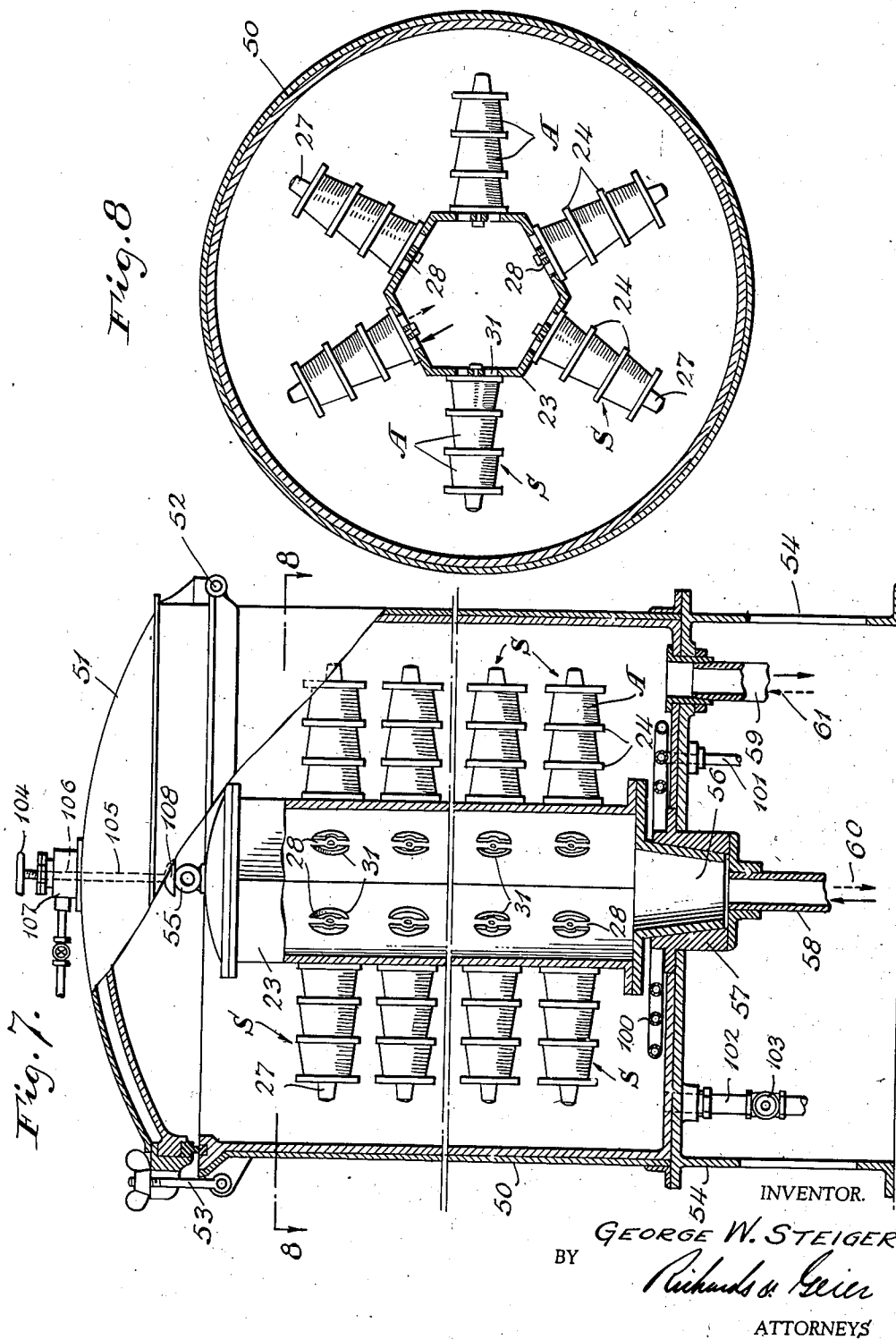
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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,086,100

PROCESS AND APPARATUS FOR TREATING
TEXTILE MATERIAL

George William Steiger, Jackson Heights, N. Y.

Application November 27, 1935, Serial No. 51,839

3 Claims. (Cl. 18—8)

The present application relates to a machine and process for handling textile materials and particularly relates to a machine and process for handling rayon cakes to enable wet processing thereof.

In many textile yarns, fibers or threads are produced or readily handled in the form of closely wound annular masses, as on cones or bobbins, and it is desirable to treat or process these masses without unwinding them into skein form, and it is an object of the present invention to provide a method and means for treating such annular masses of yarn to enable them to be washed, desulphurized, degummed, bleached, sized, dyed and dried all without the necessity of unwinding the mass of yarn or textile material and with assurance that the entire mass of material will be thoroughly and uniformly treated to the desired extent.

Although not restricted thereto, the present invention has a particular application to rayon cakes, in which rayon yarn is originally obtained as an annular frustro-conical mass after it has been precipitated and spun in pots and it is a further object of the present invention to provide an improved process and method which will enable the wet processing of such rayon cakes to accomplish the various ends as above described, which process and means may be readily utilized with assurance that the processing will take place uniformly throughout the rayon mass.

Another object is to provide a method and means enabling the wet treatment of rayon cakes with assurance that the delicate fibers will not be injured or broken.

Other objects will appear in the course of the specification.

In accomplishing the above objects it is found most satisfactory to provide an internal liner for the rayon cakes which, although initially of smaller diameter than the interior of the rayon cake, may be conveniently inserted therein and then expanded to fit closely within the interior and serve as a means of supporting such rayon cake upon a spindle or rod member.

The liner is also perforated to permit ready admission of treating fluids to the interior of the cake or extraction of fluids therefrom.

Preferably, the liner consists of an overlapping corrugated frustro-conical sheet which is perforated and which may be conveniently made of thin gauge metal and it is most desirably coated with rubber to prevent injury to delicate rayon fibers.

To expand this overlapping sheet metal device

there may be inserted a corresponding conical frame or skeleton member with a series of ribs, the cooperation of the ribs with the corrugations of the liner causing expansion of the liner to tightly grip the interior of the cake.

A plurality of these cakes so held may be positioned upon a horizontal or vertical spindle and separated by plates, the plates being most desirably provided with passages so that various treating fluids may be forced interiorly of the horizontal stack and forced outwardly of the perforations of the sheet metal liner and outwardly through the rayon cake; or on the other hand, the fluid may be drawn inwardly through the rayon cake into the interior of the horizontal stack of said cakes.

By alternately forcing the liquids outwardly through the cakes and by drawing them inwardly through the cakes, a series of treatments may be carried out, assuring most satisfactory processing of the individual fibers in said cakes.

The various spindles carrying the cakes may be arranged on a support structure which may be placed in a tank or liner for treating purposes.

The above and other objects will appear more clearly from the following detailed description when taken in connection with the accompanying drawings, which illustrate a preferred embodiment of the inventive idea.

Figure 1 is an exploded view of the rayon cake, the sheet metal liner and expander for said liner, the rayon cake being shown in section and all three of these elements being shown in side perspective view.

Figure 2 is a side sectional view upon enlarged scale of the assembly.

Figure 3 is an end view.

Figure 4 is a transverse sectional view upon the line 4—4 of Figure 2 upon a reduced scale.

Figure 5 is a perspective view on a smaller scale illustrating how the cakes with the liners and expanders of Figures 1 and 2 may be conveniently stacked.

Figure 6 is a transverse sectional view on the line 6—6 of Figure 4.

Figure 7 is a side sectional of assembly of the devices of Figures 5 and 6 in a tank or liner.

Figure 8 is a transverse cross sectional view upon the line 8—8 of Figure 7.

Referring to Figures 1 to 4, the rayon cake A is adapted to receive the expandible liner B which is in turn expanded by the expander frame C. The rayon cake A is shown in the frustro-conical form in which it is usually produced in pot spinning machines.

The expandible liner B is made of a corrugated sheet of metal 10, preferably provided with a metal coating or plastic covering and it is noted it overlaps as indicated at 11.

5 The entire circumference of the liner B is provided with spaced perforations 12 through which liquid may be supplied through the cake A.

10 The expander C consists of two end cross members 13, 14 which are centrally provided with the openings 15, said cross members supporting the end rings 16, 17. Extending between the rings 16, 17 on the outside of the expander C are the rungs 18 having ridges 19 which are received in the corrugations 20 of the liner B to expand
15 said liner B tightly within the interior of the cake A.

In Figure 2 the liner B and expander C are indicated as in position. The assembly is carried out by first placing the liner B which is of smaller
20 dimension than the cake A into the interior 21 thereof, as indicated in Figure 1. The expander C is then inserted within the liner B to expand said liner to tightly press the interior of the cake A.

25 Preferably, the expander C may be made of hard rubber or a similar plastic material, both the liner B and expander C being of such construction as not to injure the rayon fibers in the cake A.

30 The unit as shown in Figure 2 is a compact one and may be conveniently assembled upon a horizontal spindle 22 attached to a spider 28 extending across the opening 31 in the support 23 as indicated in Figures 5 and 6.

35 As shown in Figures 5 and 6, stacks S of units A—B—C may be built up on the spindles 22.

The spindle 22 extends through the holes 15 in the frames 13 and 14 of the expander C and the various units A—B—C of Figure 2 are separated by the plates 24, which are provided with
40 recesses or openings 25 to permit a treating fluid to pass into or out of the interiors 21 of the rayon cakes A.

45 The end plate 26 is devoid of openings so that all liquids will have to flow through the rayon cakes A toward or from the interiors 21.

The entire stack S is clamped together on the spindle between the head nut member 27 and the end nut 30, the head nut 27 screwing on to the threaded end portion 29 of the spindle 22 and the nut 30 being fixed upon the inner end of said spindle.

Through the opening 31 fluid pressure or vacuum may be applied to the interiors 31 of the stack
55 5 as shown in Figures 5 and 6, the entire stack being preferably immersed in a vat or tank of treating fluid as shown in Figures 7 and 8.

60 As shown in Figures 7 and 8, the member 23 may take the form of a polygonal post (a six-sided element being illustratively shown). This post may carry 24 of the stacks S, each consisting of three units A—B—C.

65 The post 23 is positioned within the tank 50 having the cover 51 with hinge 52 and the locking or clamping means 53. The tank 50 is supported on the legs 54.

70 The post 23 at its upper end is provided with the ring 55 enabling it to be lifted out of the tank 50 and at its lower end it is provided with the conical connecting nipple 56 received in the conical socket 57.

75 The pipes 58 and 59 may respectively or alternately be utilized to feed fluid into and/or remove fluid from the tank 50 as indicated by the

arrows 60 and 61, by alternate or successive application of vacuum or pressure.

8 The treating fluid may be a washing fluid, a desulphurizing fluid, a bleaching fluid, a dyeing fluid, a sizing fluid, a degumming fluid, heated
10 air or a finish fluid and successive treatments with these fluids may be carried on.

If desired, warm air may also be forced or drawn through the rayon cakes A to dry the same.

15 By using the arrangement and method previously described, it is possible to treat the cakes in the various methods disclosed with assurance that the rayon will be thoroughly treated and with further assurance that the delicate fibers
20 thereof will not be injured.

As stated before, the spindle 22, the expander C and the liner B may all be coated with or made of a plastic material, such as rubber, which will
25 not be attacked by the treating liquids.

The assembly, A—B—C, as indicated in Figure 2 after the liquid treatment or before the liquid treatment, may also be utilized for creels and warping machines or to fit over the yarn
30 holder pins on winding or spooling machines.

The nut 27, shown in Figures 5 and 6 may be provided with quick acting breach lock.

The working of this device is as follows:

35 When the cake 4 is finished in the pot of the spinning machine, and removed therefrom the liner B is placed inside of the cake A. This can be accomplished by this device without damaging the inside wall of the cake, because the design of this holder is so arranged that there is about
40 $\frac{1}{8}$ to $\frac{1}{4}$ " or more of clearance between the liner and the inside wall of the cake.

45 After this is accomplished, expander C is inserted into the inside of liner B and by pressing expander C down into the grooves of the liner B, the latter consequently will be expanded towards the inside wall of the cake.

The grooves and ridges of the corrugated cake holder will create a uniform expansion force on the inside wall of the rayon cake, thereby opening up the wind of the cake, which will help
50 greatly the circulation of the processing liquors.

Stops for the expander C may be provided inside of some of the corrugations of liner B to limit the expansion of the liner.

55 The units may then be assembled as shown in Figures 5, 6, and placed in a treating tank as shown in Figures 7 and 8.

60 The corrugated structure of the liner cake B will permit the use of a thinner gauge of spring steel material, because by these corrugations the stiffness and tension of the metal sheet is greatly increased. It will be noted that the perforations 12 of the liner B are all in valleys so that the ribs 18 of the expander C will not block said
65 perforations.

70 The tank, as shown in Figures 7 and 8 may be operated as described in my copending application, Serial No. 51,840 filed November 27, 1935 or as described in my Patents Nos. 1,706,826; 1,706,827; 1,988,364.

75 It is to be understood that the method and structure described above may be used for other purposes than for processing rayon cakes and in arrangements than shown in Figures 5 to 8.

In the tank shown in Figures 7 and 8, the heating coils 100 and 101 may be employed for heating the liquid contents of the tank 50, which liquid contents may take the form of a dyeing solution or other suitable solution to be used for wet processing the textile materials A.

The pipes 58 and 59 of the tank 50, as shown in Figure 7 may be connected to two expansion tanks as shown in my copending application, Serial No. 51,840 filed November 27, 1935 so that the treating fluid may be caused to pass first radially outwardly through the materials A and then radially inwardly depending upon whether vacuum is being applied to the expansion tank connected to the pipe 58 or to the expansion tank connected to the pipe 59.

Suitable drain connections may be provided or connected to the pipes 58 and 59 to allow the treating liquids to be washed out of the tanks 50 and discharged to a drain or to a sewer.

A drain line 102 provided with a valve 103 may be positioned at the bottom of the tank 50 so as to enable hot air to be forced into the tank 50 to dry the textile material A or to enable the treating liquids to be drained.

To assure that the connection 56—57 will be liquid tight, the hand wheel 104 may be connected to a threaded pusher member 105 which screws through a tap bore 106 in the boss 107 on the cover of the tank 51.

The lower end of the rod 105 is provided with a contact member 108 which presses down on the ring 55 and assures a tight connection between the nipple 56 and the recess or socket 57.

It is an important advantage of the present invention that all wet processing operations and the incidental drying operations may be carried out once the rayon cakes have been loaded into the tank, as shown in Figures 7 and 8, and it is not necessary to remove these rayon cakes once they have been loaded until they have been completely processed and dried.

After the complete processing of the cakes, the cakes in the form of the units shown in Figure 2 may be shipped to weaving mills to be put on creels for warping purposes or to winding mills to be wound into any shape required by the textile manufacturer.

The saving in operations by utilizing the process and apparatus of the present application results in a tremendous saving in cost and also assures the protection of a superior quality yarn, particularly in the case of fine denier yarns.

Any number of treating tanks, such as shown in Figures 7 and 8 may be connected to one cen-

tral vacuum station such as shown in my above mentioned co-pending application, as for example, by switch pipe arrangement, to connect or disconnect at will.

Many other embodiments might also have been shown and described and many changes and modifications might be made in the devices illustrated without departing from the scope and essence of the invention and it is intended to include all such altered or modified devices within the scope of the appended claims.

I claim:

1. In a unit for handling rayon cakes, or other textile mass of annular shape, a thin gauge metal liner consisting of corrugated metal and provided with a plurality of perforations and an expander to be inserted therewithin to expand said liner to tightly grip the interior of the cake, said expander including a plurality of conically disposed ribs to fit into and against said corrugations and end frames to receive a central mounting rod.

2. In a unit for handling rayon cakes, or other textile mass of annular shape, an expansible perforated liner to be inserted within said cake and an expander therefor consisting of two spaced cross members the ends of which are provided with hoop members, slats extending between said hoop members to form a frustro-conically shaped skeleton member, said last mentioned member being adapted to be inserted within the liner to expand the same within the rayon cake.

3. In a unit for handling rayon cakes and other similarly shaped masses of textile materials which comprises an expansible liner consisting of perforated corrugated metal of frustro-conical shape and normally of substantially smaller diameter than the rayon cake into which the liner is to be inserted, said liner being formed of thin gauge sheet metal coated with rubber and an expander for said liner comprising a frustro-conical skeleton member consisting of a plurality of side slat members to fit into said corrugations and end supporting members provided with means to support the cake or mass of material upon a spindle or similar device on a machine in which the rayon cake or mass is to be treated or processed.

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