Jan. 27, 1931. W. B. BRONANDER 1,790,132

APPARATUS FOR TREATING TEXTILE MATERIAL

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Fig. 1.

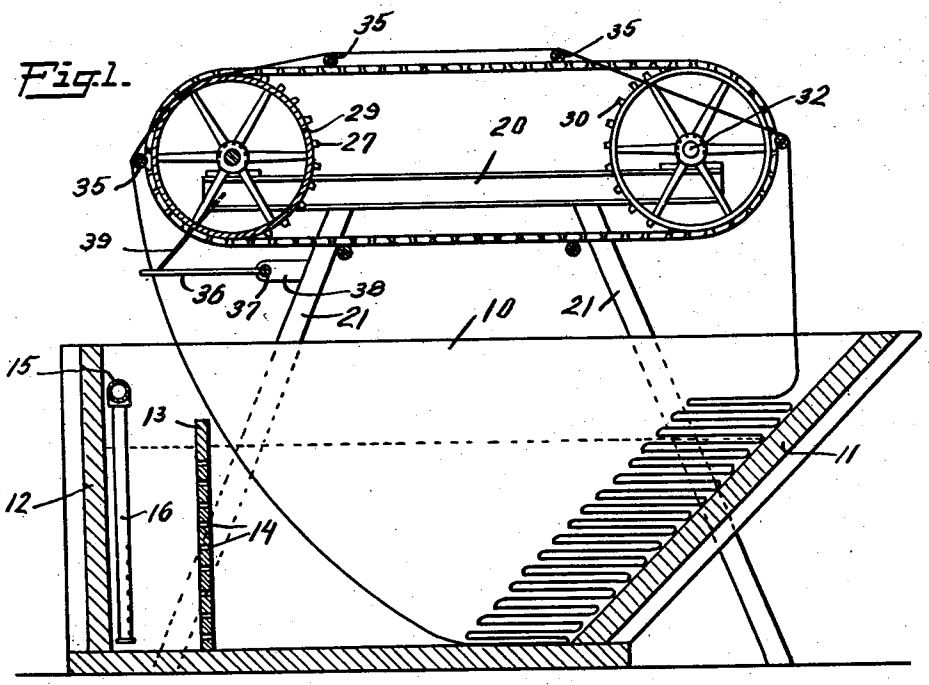
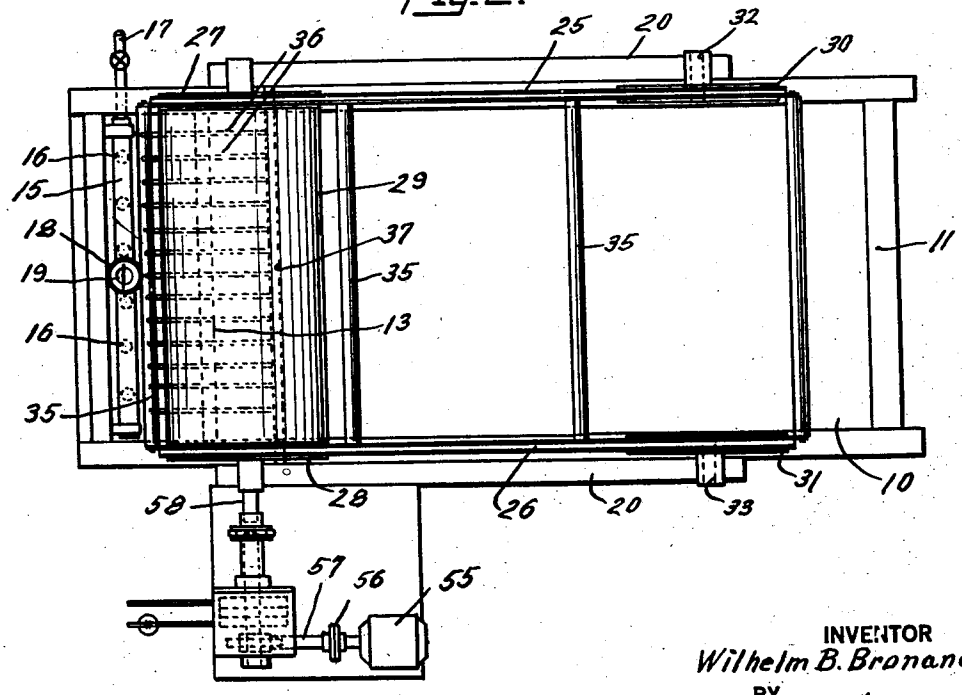


Fig. 2.



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Fig. 4.

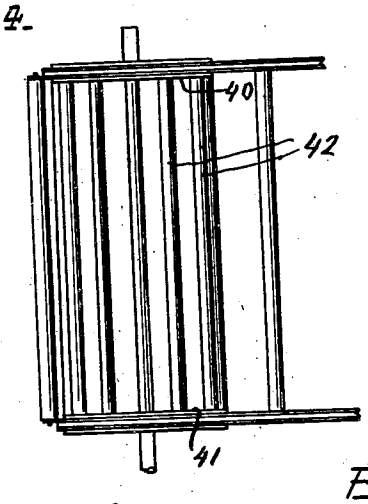


Fig. 3.

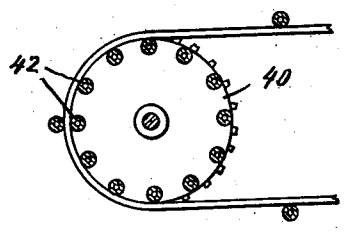


Fig. 5.

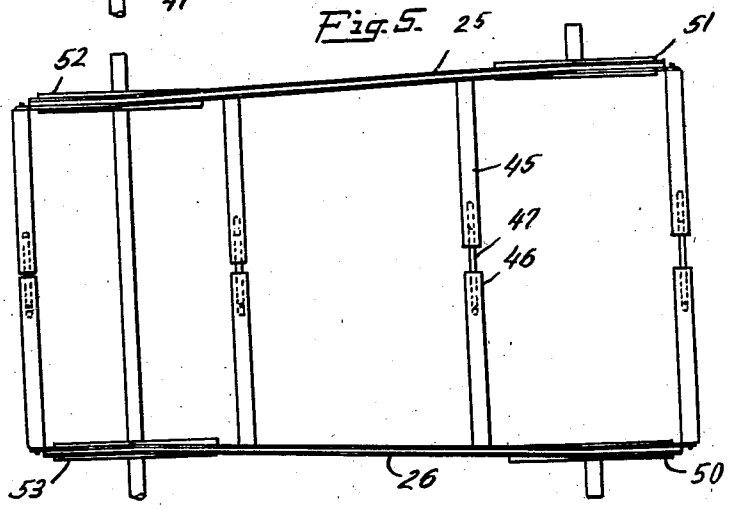
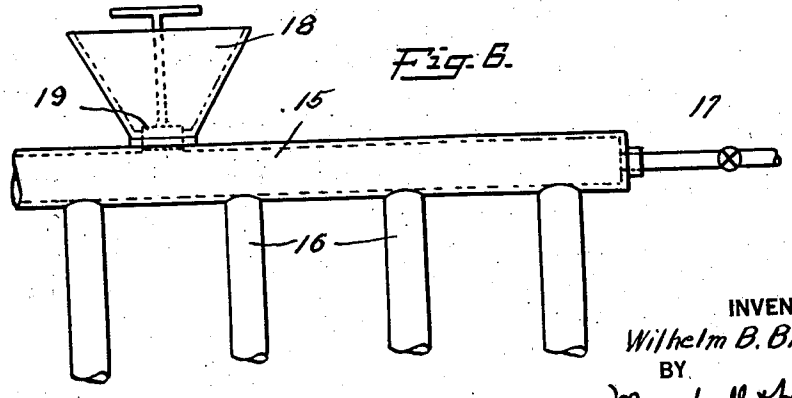


Fig. 6.



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Fig. 7.

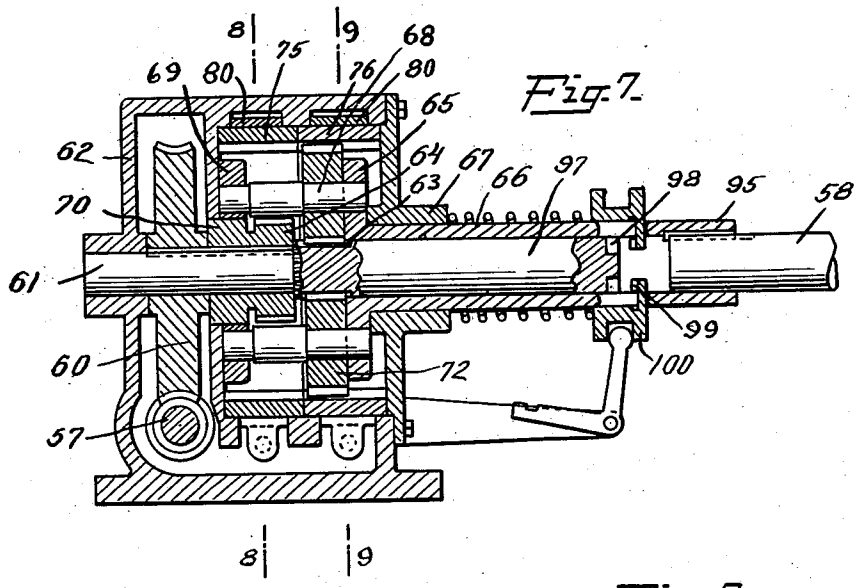


Fig. 8.

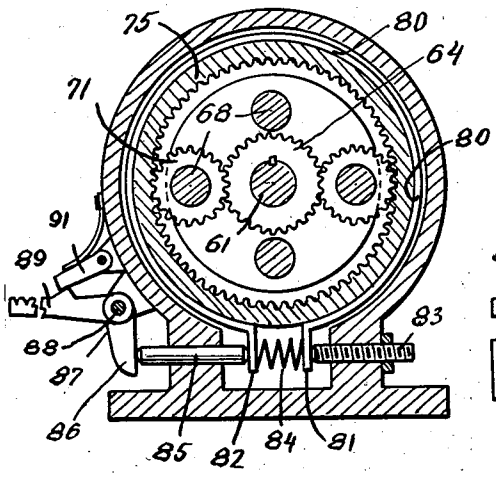
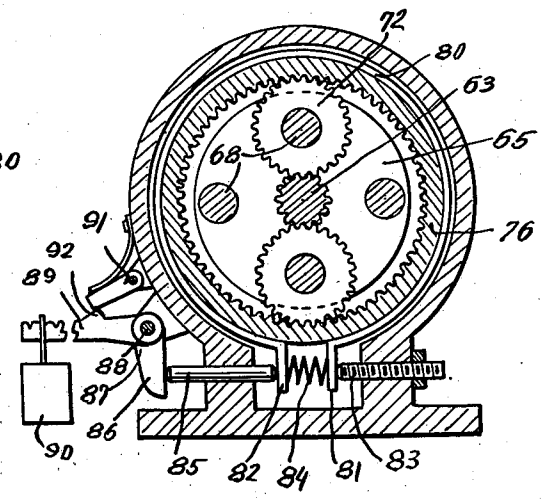


Fig. 9.



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Fig. 10.

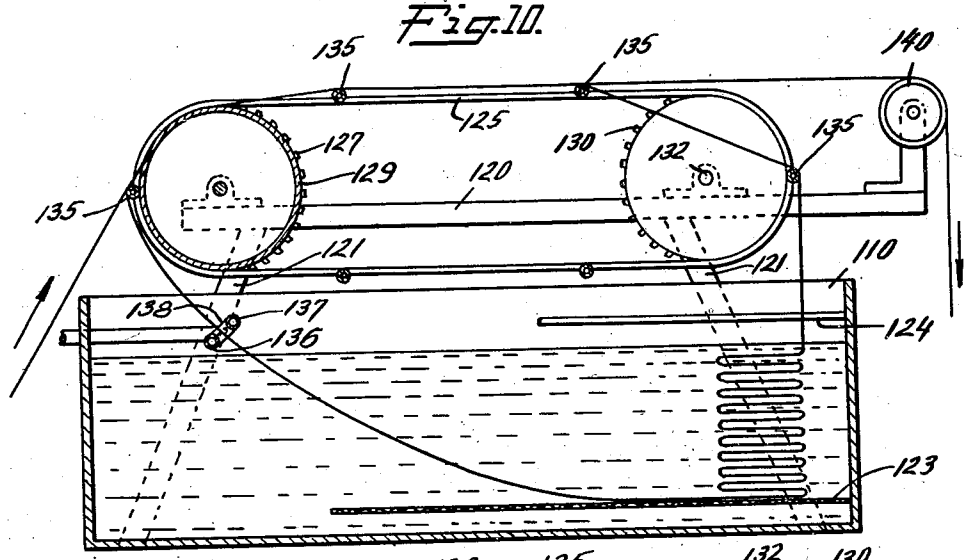


Fig. 11.

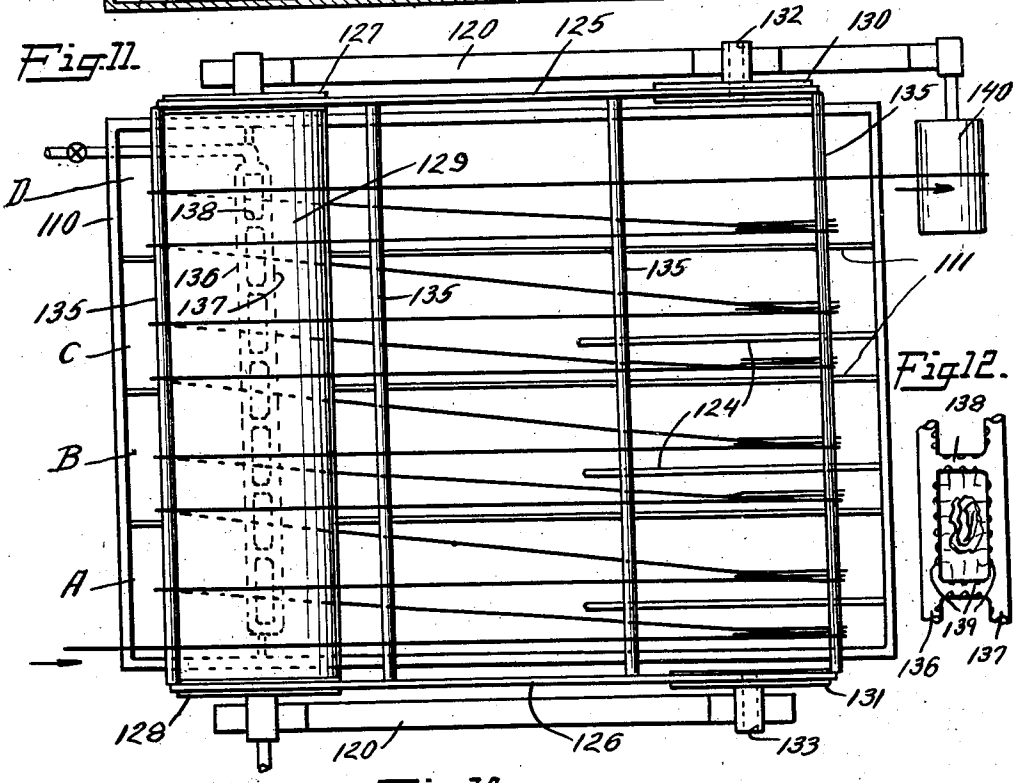
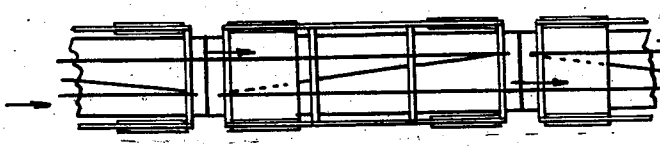


Fig. 12.

Fig. 13.



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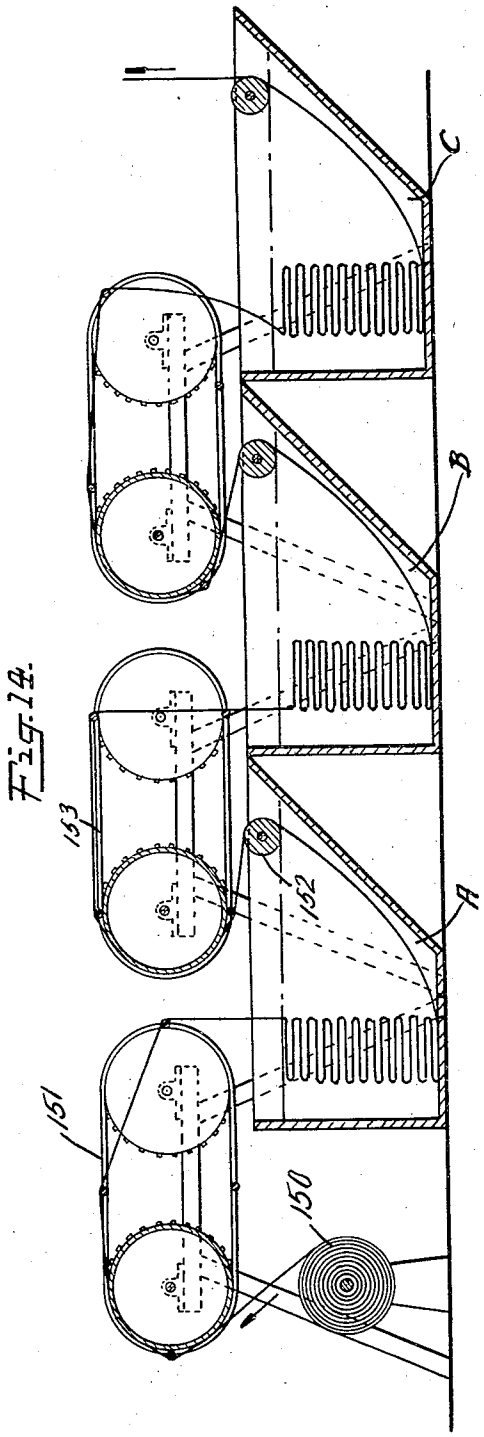


Fig. 14.

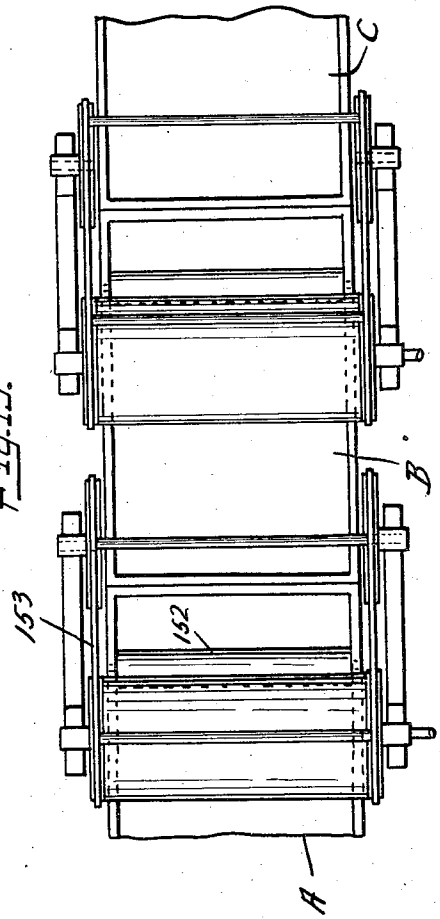


Fig. 15.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR TREATING TEXTILE MATERIAL

Application filed January 29, 1926. Serial No. 84,548.

This invention relates to apparatus for treating textile material.

In the usual construction of vats for treating textile fabric, the textile material is successively deposited in and withdrawn from the liquor until the fabric is thoroughly and evenly permeated with the liquor. The material is deposited in layers or folds in the vat and is withdrawn from the bottom layer. The common means for depositing the fabric in layers, consists of an oval or elliptical feed drum but this device is not entirely satisfactory since it tends to injure the fabric by warping or pulling it out of shape.

Furthermore, in machines of the character described, the fabric often becomes tangled and is torn. This is due partly to the turbulence in the vat caused by the injection of the treating liquor therein.

Moreover, in carrying out cloth treating processes, such as dyeing, weighting or otherwise conditioning textile fabrics, it is necessary to subject the material to successive or repeated treatments, in the same solution or in different solutions. These treatments usually require a considerable amount of time and necessitate the transporting of the material from one apparatus to another.

One of the objects of the invention is to provide an apparatus for treating textile material so constructed that the material will be fed to and withdrawn from the vat without injury to the material.

Another object of the invention is to provide apparatus of the character described so arranged that the injection of the liquor into the vat will not cause turbulence tending to tangle or snarl the fabric.

Another object of the invention is to provide means in a device of the character specified for spreading the material to its full width as it is fed to the vat.

Another object of the invention is to make possible the subjecting of the material to successive or repeated treatments by a continuous process in a single set of apparatus or a single set of units.

Another object of the invention is to provide driving mechanism for apparatus of the character described so constructed and arranged that impedance or tangling of the fabric will cause the drive to slip.

Further objects of the invention will appear from the following specification taken in connection with the drawings, which form a part of this application, and in which

Fig. 1 is a sectional elevation of a vat having means for feeding material thereinto and withdrawing the material therefrom.

Fig. 2 is a top plan view of the construction shown in Fig. 1.

Fig. 3 is a sectional elevation showing a slightly different form of drum from that shown in Figs. 1 and 2.

Fig. 4 is a top plan view of the structure shown in Fig. 3.

Fig. 5 is a top plan view showing another form of fabric feed mechanism from that shown in Figs. 1 and 2.

Fig. 6 is an enlarged elevational view partly broken away showing the means for supplying the steam and liquor to the vat.

Fig. 7 is an enlarged sectional elevation showing the variable speed drive for the fabric feed belt.

Figs. 8 and 9 are sectional elevations taken substantially on lines 8—8 and 9—9 of Fig. 7.

Fig. 10 is a sectional elevation similar to Fig. 1 but showing a slightly modified form of the invention.

Fig. 11 is a top plan view of the structure shown in Fig. 10.

Fig. 12 is a plan view of a portion of the device shown in Fig. 10 for conducting treating liquor to the material, this device also forming a guide or separator for the different lengths of the material which are led through the devices in rope form.

Fig. 13 is a top plan view illustrating one method of using the apparatus shown in Figs. 10 and 11.

Fig. 14 is a sectional elevation showing a plurality of units of apparatus similar to that illustrated in Fig. 1 so arranged that the material can be led successively through the various units, thereby treating or conditioning the material in a continuous process; and

Fig. 15 is a top plan view of a portion of the structure shown in Fig. 14.

The invention briefly described consists

of apparatus for treating textile material or fabric comprising a vat, means for depositing the treating liquor in the vat on such a manner as to prevent undue turbulence therein and means for successively depositing the fabric in layers in the vat and withdrawing fabric from the vat until the material has been thoroughly and evenly permeated by the liquor.

The fabric feeding means consists of a pair of chains or belts connected by transverse rods or rollers. These rods are so located that the material will be deposited thereby in layers in the vat and the feeding mechanism operates in such a manner that the fabric will not be warped or stretched out of shape. In one form of feeding mechanism, the rods or rollers are so constructed and the sprockets around which the chains or belts run, are so located that the material will be spread to its full width as it is fed.

Means is also provided for guiding material in rope form to the feeding mechanism in case it is desired to treat the fabric in rope form instead of in open width.

In one form of the invention illustrated the fabric is deposited in and withdrawn from a plurality of units arranged in series so that the treatments are successively carried out in a continuous process.

The driving motor is so connected to the feeding means that the speed of the drive can be regulated and in case the material becomes tangled or impeded for any reason, the drive will slip thereby preventing tearing of the fabric. Further details of the invention will appear from the following description.

Referring first to Figs. 1 and 2, there is shown a vat 10 having an inclined end wall 11 at one end thereof and an upright wall 12 at the opposite end thereof. A baffle board 13 is mounted adjacent the end 12 and is provided with perforations 14 for permitting the treating liquor to circulate therethrough.

The treating liquor is conducted to the vat through a manifold 15 and perforated pipes 16 extending downwardly from the manifold. A steam pipe 17 is connected to one end of the manifold 15 and a pouring spout or funnel 18 may be carried at the upper end of the manifold, the opening through which the liquor is poured into the manifold being normally closed by a plug 19.

The mechanism for feeding the material to the vat and withdrawing the material therefrom is supported on longitudinal beams 20 which in turn are carried on supports 21.

The feeding mechanism consists of a pair of endless chains 25 and 26 which extend around sprockets 27 and 28 mounted at the ends of a drum 29 and around sprockets 30 and 31 which are mounted on trunnions 32 and 33 supported on the beams 20.

Particular attention is called to the fact that the sprockets 30 and 31 are not mounted on a shaft which extends across the space between the beams 20 and that the space between these sprockets is open.

The two endless chains 25 and 26 are connected by transverse rods or rollers 35, six of these rollers being shown.

When the material is to be fed into and out of the vat in rope form, guiding means is provided for separating the different ropes. This means consists of a plurality of fingers 36, preferably formed of glass, mounted on a rod 37 which is pivotally mounted in lugs 38 carried by two of the uprights 21. Links 39 are connected to the end fingers 36 and are adapted to secure the fingers in elevated position, these links being adapted to engage the beams 20 as shown in Fig. 1.

In the form of the invention shown in Fig. 1, it will be evident that the material will be fed into and out of the vat by the cross rods or rollers 35 carried by the chains 25 and 26 and by the drum 29.

The showing in Fig. 1 illustrates the manner in which the cross rods deposit the material in layers since the material can fall freely between the sprockets 30 and 31 when not engaged by one of the rods or rollers 35.

By depositing the treating liquor in the manifold 15, which also receives the steam, and conducting the liquor to the vat by means of pipes 16, the entrance of the liquor into the vat does not cause undue turbulence and does not tend to snarl or tangle the goods; furthermore, the baffle board 13 assists in preventing turbulence.

In the construction shown in Figs. 3 and 4, the feed drum which is used in place of the drum 29 of Figs. 1 and 2, consists of a pair of end disks 40 and 41 which are connected by a plurality of peripherally mounted cross rods or rollers 42.

In Fig. 5 the cross rods which connect the chains 25 and 26 are formed in two sections 45 and 46. The sections 45 has a spindle 47 secured thereto at 48 and extending into the section 45. It will also be noted that the sprockets 50 and 51 in Fig. 5 are spaced farther apart than the sprockets 52 and 53 so that as the chains move around the sprockets and the rods pass from the sprockets 52 and 53 around the sprockets 50 and 51, they will be extended or the sections 45 and 46 will move apart as clearly shown in the drawings. This spreading of the rod sections also tends to spread the material to its full width thereby eliminating wrinkles or folds therein.

In the form of the invention illustrated in Figs. 2, 7, 8 and 9, the driving mechanism for the chains and feed drum consists of a motor connected by a coupling 56 to a worm shaft 57, the worm being connected to the shaft 58 of the drum 29 through variable speed mechanism which will now be described.

As shown in Figs. 7 to 9 inclusive, the worm

shaft 57 drives a worm gear 60 which is keyed to a shaft 61 mounted in a casing 62. The shaft 61 has formed thereon or secured thereto a pair of pinions 63 and 64, the pinion 64 having a greater diameter than the pinion 63. A spider 65 is carried by a sleeve 66 mounted in a bearing 67 and the spider carries a plurality of stub shafts 68, the opposite ends of the shafts being mounted in a ring 69 which in turn is carried by a sleeve 70 mounted on the shaft 61.

The stub shafts 68 carry two sets of planet gears 71 and 72, the gears 71 meshing with the central pinion 64 and the gears 72 meshing with the central pinion 63.

The planet gears in turn engage ring gears 75 and 76.

Means is provided for releasably gripping the ring gears 75 and 76 and for applying any desired pressure thereto. This means as shown in Figs. 8 and 9 consists of metallic bands 80 having lateral extensions 81 and 82. The extension 81 abuts against an adjustable stop 83 and a spring 84 is mounted between the extensions 81 and 82. A pin 85 engages the extension 82 and this pin is in turn engaged by an arm 86 of a bell crank lever 87 pivoted at 88. The other arm 89 of the bell crank lever has a weight 90 adjustably mounted thereon and by moving the weight toward or from the pivot 88, the pressure of the bell crank lever against the pin 85 can be regulated. If desired, the gear casings may be provided with pawls 91 adapted to coact with lugs 92 on the arms 89 to hold the bell crank levers in position to cause the brake bands to grip the ring gears.

The sleeve 66 which carries the spider 65 is extended as shown at 95, this extension being keyed to the shaft 58.

The shaft 61 is also extended through the gear casing as shown at 97, the end of the shaft having clutch teeth 98 formed therein adapted to coact with clutch teeth 99 formed on a slidable clutch member 100. When these teeth engage, a direct drive can be obtained.

The speed of rotation of the shaft 58 can be regulated by gripping one or the other of the brake bands around the ring gear 75 or 76. It will be evident from the difference in the size of the pinions 63 and 64 that pinion 64 will give a high speed drive and pinion 63 will give a low speed drive; therefore, for a high speed drive, the brake band surrounding the ring gear 75 will be gripped and for a low speed drive, the ring surrounding the gear 76 will be gripped. The weight 90 can be so placed on the arm 89 that any undue hinderance of the movement of the fabric or material around the feeding mechanism will cause the drive to slip, thereby preventing the tearing of material.

The apparatus above described operates as follow. The material is placed around the drum 29 across the tops of the rollers or rods 35 and beneath the feeding apparatus and the two ends are secured together. When the drive is started, the fabric is continuously withdrawn from the vat or receptacle 10 with an even, uniform tension and is fed continuously into the vat in overlapping folds as shown in Fig. 1. By this even feed, no undue strain or pull is exerted on the fabric and the material is not jerked out of the vat as with the ordinary feed; furthermore, the treating liquor is introduced into the receptacle in such a manner that its does not cause turbulence in the vat and thus tend to tangle or snarl the material. By reason of the drive illustrated in Figs. 7 to 9 inclusive, the feed is interrupted or stopped in case the material is impeded or tangled, thus preventing tearing of the fabric.

In Figs. 10 to 13 inclusive, there is illustrated a slightly modified form of the invention in which, however, the structure is the same as that already described in its essential details. In this form of the apparatus the material is withdrawn from the vat 110 and is deposited in the vat by feeding mechanism mounted on beams 120 carried by supports 121. This mechanism, as in the structure already described, comprises a pair of chains 125 and 126 mounted on sprockets 127, 128, 130 and 131, the chains being connected by a plurality of cross rods 135. The sprockets 130 and 131 are carried by shafts or spindles 132 and 133 and the sprockets 127 and 128 are positioned at the end of a drum 129.

In this form of the invention the material is fed through the machine in rope form and the different laps are successively deposited in and withdrawn from the vat. A screen 123 is mounted in the vat above the bottom thereof to form a support for the material.

Longitudinal guide rods or bars 124 are connected to the ends of the vat for the purpose of separating the different laps of material. Guide means for the material is provided below the drum 129 and consists of transversely extending tubular members or pipes 136 and 137. The pipes 136 and 137 are connected by a plurality of transverse conduits 138 which form partitions between which the various laps are guided. In addition to forming guide means for the material, the pipes 136 and 137 and the intercommunicating conduits 138 are used to conduct treating liquor to the vat and these pipes are provided with a plurality of apertures or openings 139 through which the treating liquor is sprayed on the material as it passes through the guiding means.

The first lap of material entering the apparatus shown in Figs. 10 and 11 is shown at the bottom of Fig. 11 and passes over the drum 129, across the rods 135, and is deposited in zigzag folds in the receptacle as shown

in Fig. 10. The material is withdrawn from the bottom of the zigzag folds and is led through one of the guide openings and around the drum, across the rods 135, and is again deposited in the receptacle, and this procedure is continued until the final lap is withdrawn from the receptacle and passes across the rods 135 and around the guide roller 140.

In Fig. 13 there is shown diagrammatically, a plurality of units similar to that shown in Figs. 10 and 11, the material being led successively through the various units for repeated or successive treatments.

Fig. 14 illustrates another method of using the apparatus shown in Figs. 1 and 2 and discloses a plurality of units A, B and C arranged in series. Since each unit is similar in form to that shown in Figs. 1 and 2, the details of the feeding mechanism will not be further described. From the illustration it will be seen that the material is led from a supply roll 150 and around the feeding mechanism 151 and is deposited in zigzag folds in the vat of the unit A. The bottom layer of the zigzag folds is withdrawn around a guide roll 152 and is fed by a feeding mechanism 153 into the vat of the unit B and is thence withdrawn and fed into the vat of the unit C. It will be obvious that the various units may be used for different treating liquors, or if desired, for successive treatments in the same treating liquor. By means of such a plurality of units arranged in series, the material may be treated in a continuous process thus obviating the necessity of transporting the material from one apparatus to another and in this way eliminating labor and shortening the time required for the conditioning of material.

Although the driving means for the mechanism shown in Figs. 10 to 15 inclusive have not been illustrated it will be understood that the drive shown in Figs. 2, 7, 8 and 9 can be used for each of the feeding mechanisms.

Although certain specific embodiments of the invention have been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. Apparatus for treating textile material comprising a receptacle, a drum for continuously withdrawing the material from the receptacle and means including spaced endless chains and cross rods carried thereby for continuously depositing the material in folds in the receptacle.

2. Apparatus for treating textile material comprising a receptacle, a substantially cylindrical member for continuously withdrawing the material under even tension from the receptacle, transverse means supported at their ends only for depositing the material in folds in the receptacle, said means being spaced a material distance apart and so arranged that said means will operate successively to guide the material into zigzag folds and means for moving said transverse spaced means in a predetermined path into and out of supporting and guiding relation with respect to the material.

3. Apparatus for treating textile material comprising a receptacle, a substantially cylindrical member for continuously withdrawing the material under even tension from the receptacle and means including a pair of chains and cross rods connected to said chains for depositing the material in folds in the receptacle.

4. Apparatus for treating textile fabric comprising a receptacle, and mechanism positioned above the receptacle for continuously withdrawing the fabric from the receptacle and for continuously depositing the fabric in the receptacle in folds, said mechanism including extensible means for spreading said fabric to its full width as it is being fed.

5. Apparatus for treating textile material comprising a receptacle, mechanism for continuously withdrawing the material from the receptacle and for depositing the material in the receptacle, said mechanism including a pair of flexible endless conveyor elements, longitudinally extensible and contractible cross members connected at their ends to said elements and guiding and feeding means for said elements, spaced farther apart at the delivery end of the mechanism than at the receiving end thereof whereby said cross members will be longitudinally extended at the delivery end of the mechanism.

6. Apparatus for treating textile material comprising a receptacle, a substantially cylindrical drum for continuously withdrawing textile material from the receptacle, a sprocket wheel at each end of the drum, a pair of sprocket wheels spaced from said wheels, an endless chain extending around the wheel at each end of the drum and around one of said pair of wheels spaced therefrom, and cross rods connected to said endless chains, the space between the wheels of the second mentioned pair of sprocket wheels being open.

7. Apparatus for treating textile material comprising a receptacle, a substantially cylindrical drum for continuously withdrawing textile material from the receptacle, a sprocket wheel at each end of the drum, a pair of sprocket wheels spaced from said wheels and separated a greater distance than said first named wheels, an endless chain extending around the wheel at each end of the drum and around one of said pair of wheels spaced therefrom, and longitudinally ex-

tensible and contractible cross rods connected to said endless chains, the space between the wheels of the second mentioned pair of sprocket wheels being open.

8. Apparatus for treating textile material comprising a receptacle, means for continuously withdrawing the material from the receptacle and for depositing the material in folds therein, variable speed driving mechanism for said means and control means for said driving mechanism so constructed and arranged that the drive will slow up or stop when the material fed is impeded at any point in the feeding thereof.

9. Apparatus for treating textile material comprising a receptacle, means for continuously withdrawing the material from the receptacle and for depositing the material in folds therein, variable speed driving mechanism for said means and friction control means for said driving mechanism so constructed and arranged that the drive will slow up or stop when the material fed is impeded at any point in the feeding thereof.

10. Apparatus for treating textile material comprising a receptacle, means for continuously withdrawing the material from the receptacle and for depositing the material in folds therein, variable speed driving mechanism for said means and adjustable friction control means for said driving mechanism so constructed and arranged that the drive will slow up or stop when the material fed is impeded at any point in the feeding thereof.

11. Apparatus for treating textile material comprising a receptacle, means disposed above said receptacle, and means in said receptacle for separating and guiding different laps of the material, said means being constructed and arranged to conduct treating liquor and direct said liquor on the material.

12. Apparatus for treating textile material comprising a receptacle, means disposed above said receptacle, and means in said receptacle for separating and guiding different laps of the material, said means comprising conduits for conducting treating liquor to the material.

13. Apparatus for treating textile material comprising a receptacle, a member for withdrawing the material under even tension from the receptacle, transverse, spaced means supported at their ends only for depositing the material in folds in the receptacle, said means being spaced a material distance apart and so arranged that said means will operate successively to guide the material into zigzag folds and means for moving said transverse, spaced means in a predetermined path into and out of supporting and guiding relation with respect to the material.

14. Apparatus for treating textile material comprising a receptacle, a substantially cylindrical member for withdrawing the material under even tension from the receptacle and means including a pair of chains and rollers carried by said chains for depositing the material in folds in the receptacle.

15. Apparatus for treating textile material comprising a receptacle, means for withdrawing the material from the receptacle and for depositing the material in folds therein, variable speed driving mechanism for said means and control means for said driving mechanism so constructed and arranged that the drive will slow up or stop when the material fed is impeded at any point in the feeding thereof.

16. Apparatus for treating textile material comprising a receptacle, means for withdrawing the material from the receptacle and for depositing the material in folds therein, variable speed driving mechanism for said means and adjustable friction control means for said driving mechanism so constructed and arranged that the drive will slow up or stop when the material fed is impeded at any point in the feeding thereof.

17. Apparatus for treating textile material comprising a receptacle, a drum for continuously withdrawing the material from the receptacle, means including transversely extending members supported at their ends only for engaging spaced portions of the material and continuously depositing the material in folds in the receptacle, said means being spaced a material distance apart and so arranged that said means will operate successively to guide the material into zigzag folds and means for moving said transverse, spaced means in a predetermined path into and out of supporting and guiding relation with respect to the material.

In witness whereof, I have hereunto set my hand this 26 day of January, 1926.

WILHELM B. BRONANDER.