I. E. PALMER.

TEXTILE CONDITIONING APPARATUS.

APPLICATION FILED FEB. 23, 1909.

**941,382.** **Patented Nov. 30, 1909.**

4 SHEETS—SHEET 1.

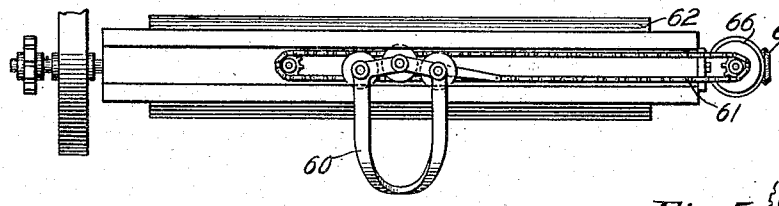



Fig. 4.

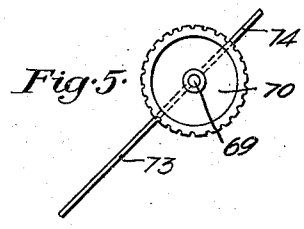
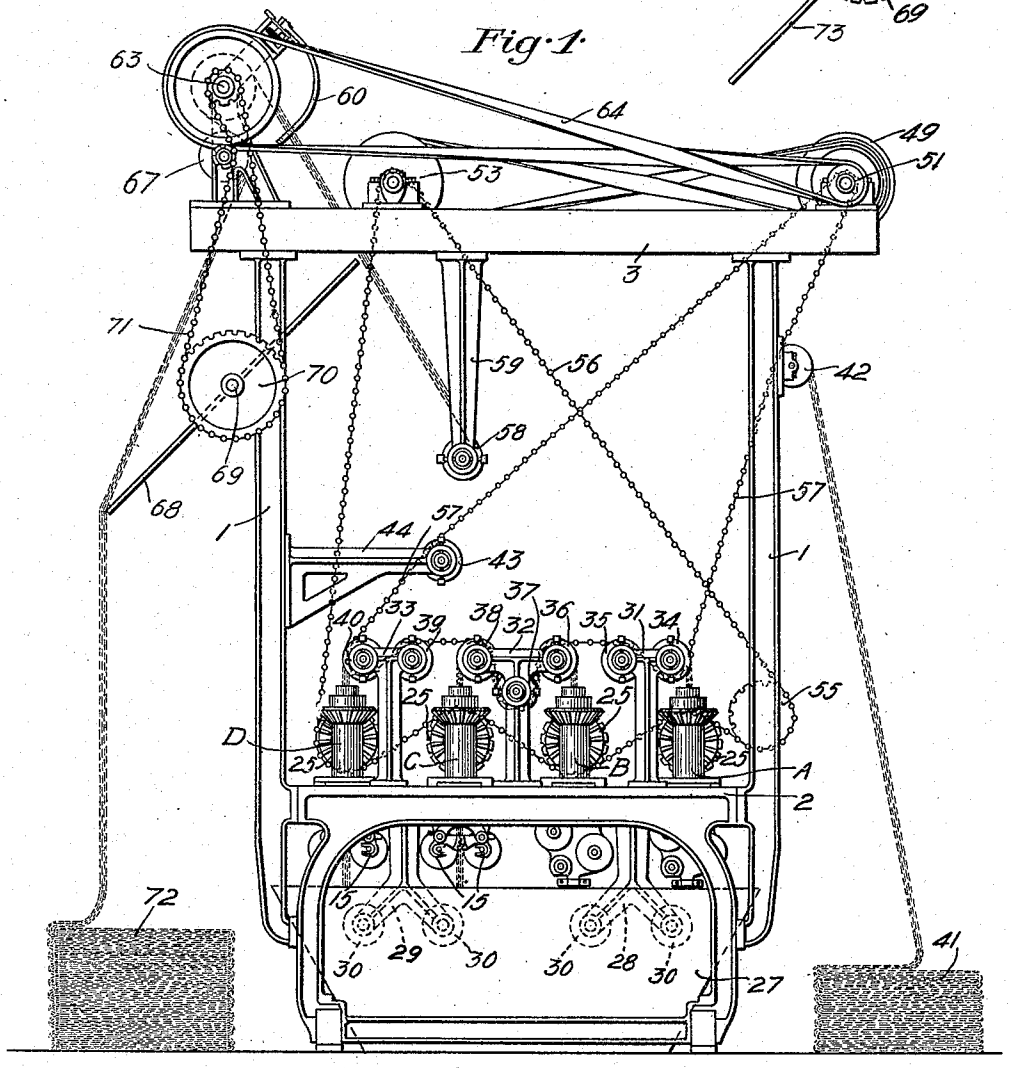



Fig. 5.

Fig. 1.

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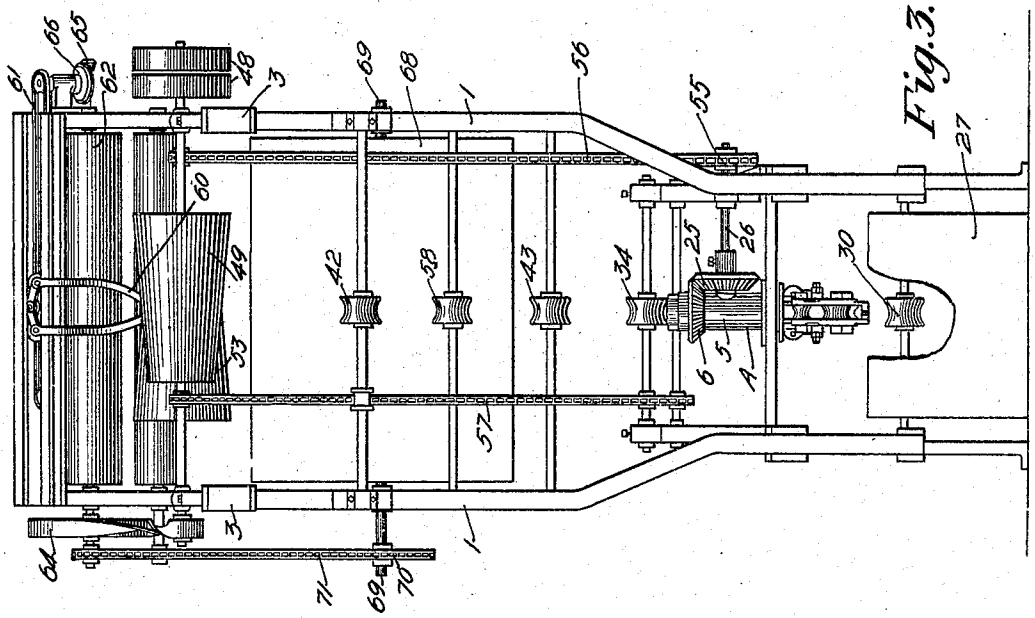

Fig. 3.

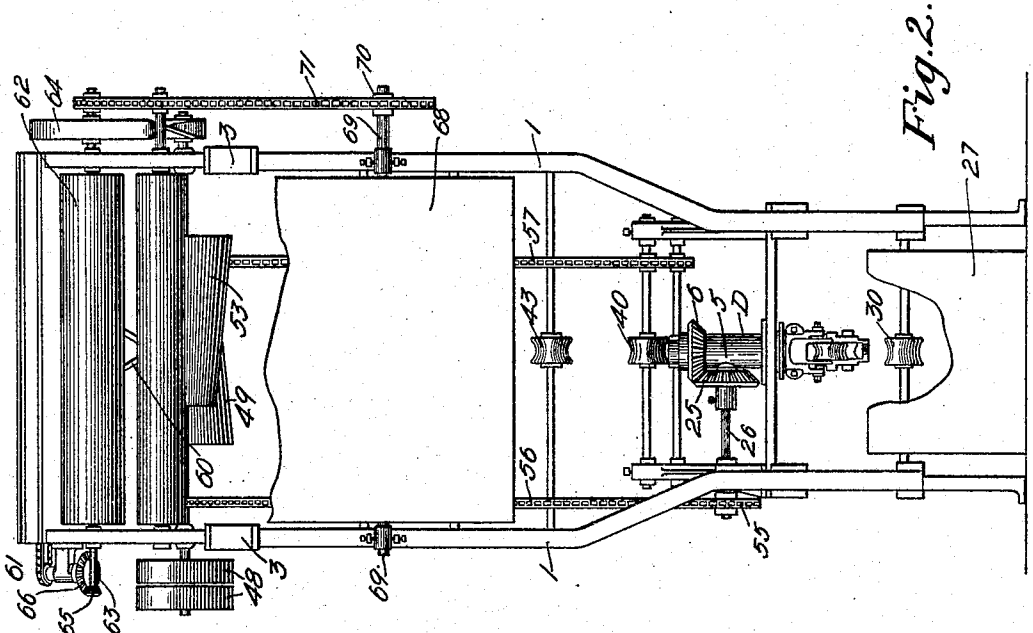

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 6.

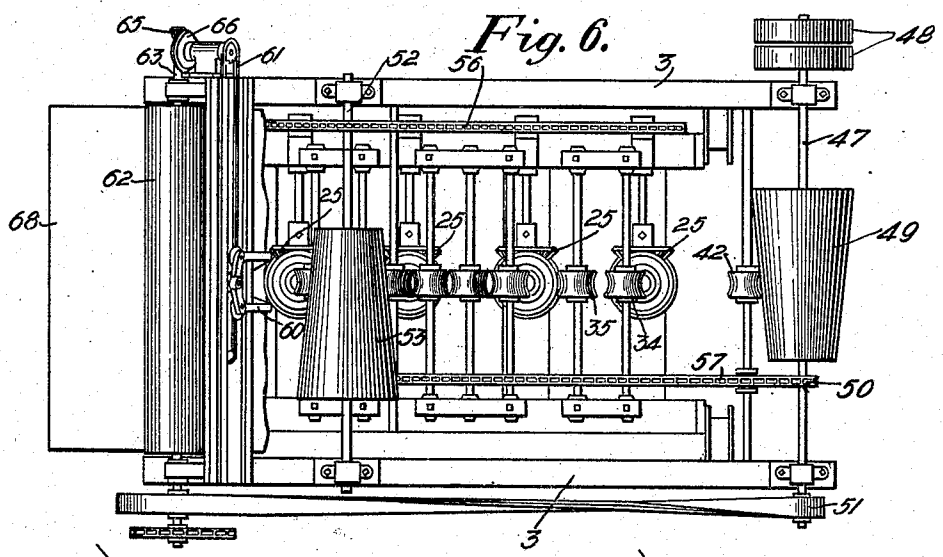



Fig. 7.

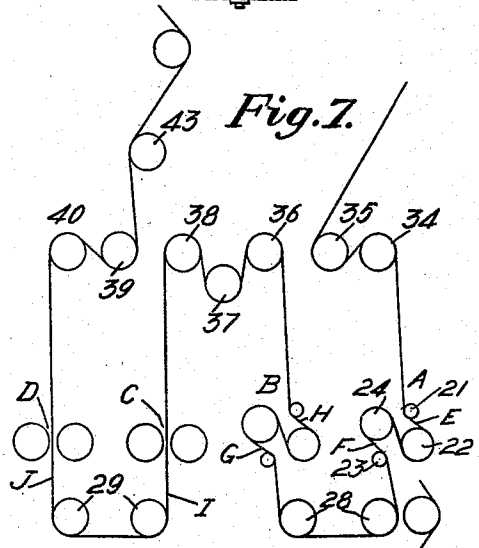



Fig. 8.

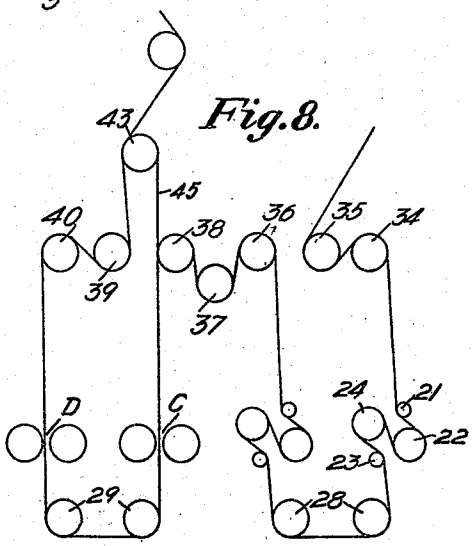
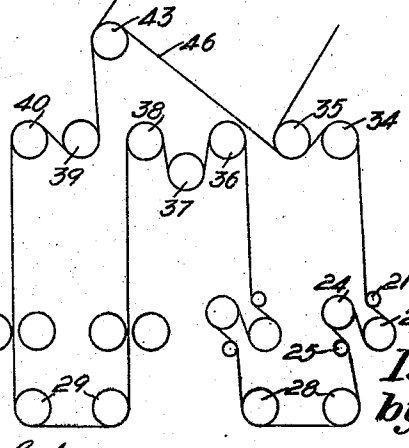



Fig. 9.

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4 SHEETS—SHEET 4.

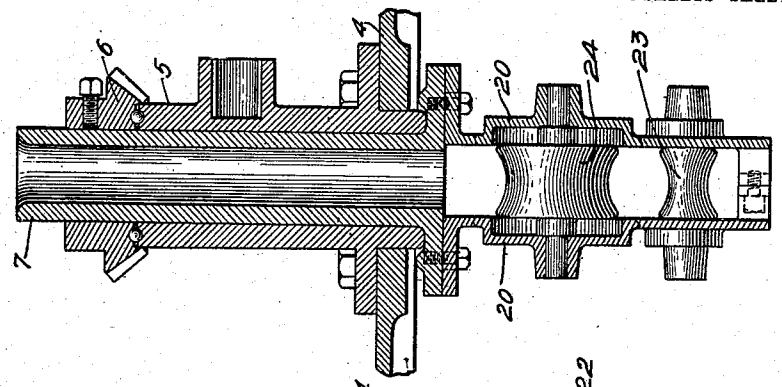


Fig. 14.

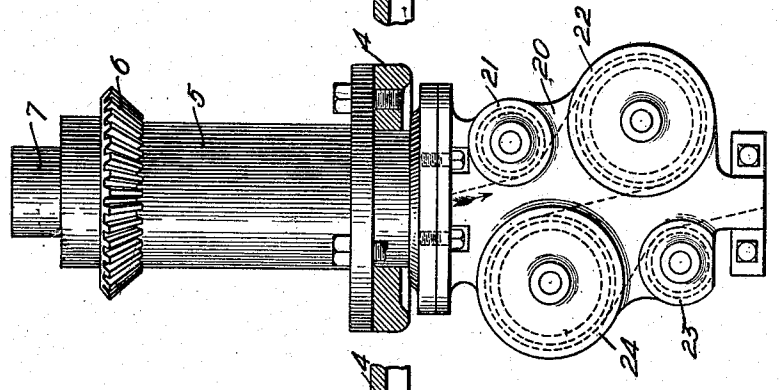


Fig. 13.

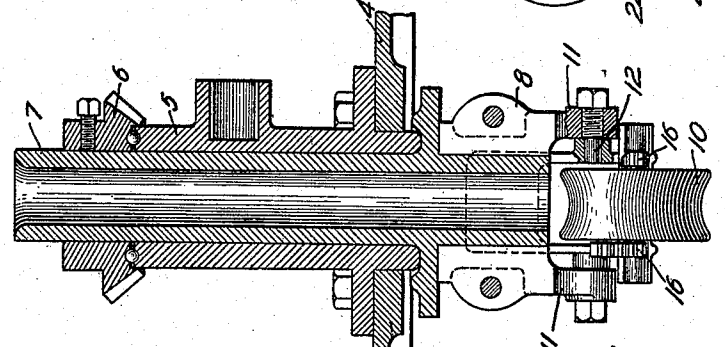


Fig. 11.

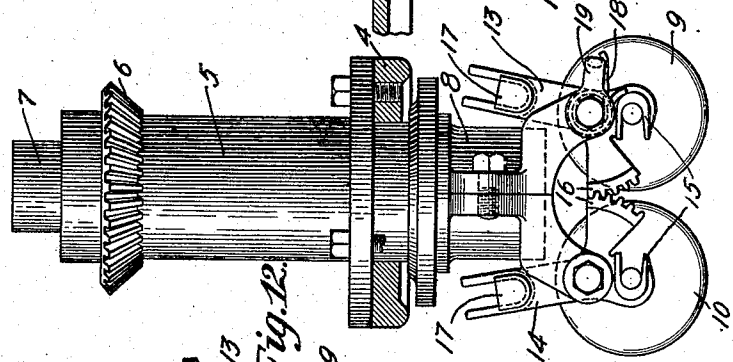


Fig. 10.

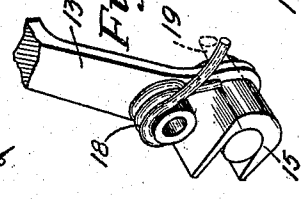


Fig. 12.

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# UNITED STATES PATENT OFFICE.

ISAAC E. PALMER, OF MIDDLETOWN, CONNECTICUT.

## TEXTILE-CONDITIONING APPARATUS.

941,382. Specification of Letters Patent. Patented Nov. 30, 1909.

Application filed February 23, 1909. Serial No. 479,499.

*To all whom it may concern:*

Be it known that I, ISAAC E. PALMER, a citizen of the United States, residing at Middletown, in the county of Middlesex and State of Connecticut, have invented an Improvement in Textile-Conditioning Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to apparatus for conditioning textile material and may be used for starching, dyeing, washing or otherwise treating yarn or fabric in such manner as to render desirable or necessary a twisting or wringing action of the material during or incident to its treatment with a liquor.

In order that the principles of the invention may be readily understood, I have disclosed an illustrative embodiment thereof in the accompanying drawings, wherein—

Figure 1 is a side elevation of one form of textile conditioning apparatus embodying my invention; Fig. 2 is a front elevation of the apparatus shown in Fig. 1; Fig. 3 is a rear elevation thereof; Fig. 4 is a rear elevation of a textile traversing apparatus that may be employed in the practice of my invention; Fig. 5 is a detail representing in side elevation a modified form of fabric folder; Fig. 6 is a top plan view of the apparatus shown in Fig. 1; Figs. 7, 8 and 9 are diagrammatic representations illustrating the paths of treatment to which the material may be subjected while passing through the apparatus shown in Fig. 1; Figs. 10 and 11 are respectively side and vertical sectional views of one form of twister or wringer that may be used in connection with my invention; Fig. 12 is a detail of a portion of one of said centrifugal wringers; and Figs. 13 and 14 are respectively side and vertical sectional views of another form of wringer that may be employed in the practice of my invention.

The textile conditioning apparatus embodying my invention is adapted for treating yarn, either in the form of warp or woven material, preferably in flat or ropy form, and includes certain means for wringing the material during or incident to its treatment with a liquor, the nature whereof depends upon the character of treatment of the material. The apparatus herein disclosed may be used for starching, dyeing, washing or otherwise treating material. In the event that the apparatus be employed for treating starched material, the latter is preferably starched prior to its entrance into the apparatus. If, however, the apparatus be employed for dyeing, preferably a vat is arranged as hereinafter described, as a part thereof, so that the material may pass through the vat and be subjected to the liquor therein substantially coincident with the wringing or twisting thereof.

Referring more particularly to that specific embodiment of my invention selected for illustration, the framing of the apparatus comprises side uprights 1—1 suitably connected as represented at 2 and 3 to support the wringing mechanism proper and the driving mechanism for the various parts.

The wringing mechanism proper is represented as mounted upon the transverse member 2 of the framing and comprises a suitable number of rotating wringers or twisters vertically arranged for reasons more fully set forth hereinafter, and through which the material is passed successively, it being if desired returned through all or a part of the treatment path for further twisting and additional liquor treatment.

Referring more particularly to Figs. 1 and 10 to 14 inclusive, I have represented a series of wringers of two different types, it being understood, however, that all of the wringers may be of either type. The transverse member 2 is provided with suitable girts 4 in openings wherein are secured the wringers. Referring first to the form of wringer shown in Figs. 10 and 11, I have represented as bolted to the girt 4 a sleeve 5 upon the upper end whereof is mounted, preferably with interposed ball bearings, a beveled or other gear 6 fast upon a tube 7 received for rotation within the stationary sleeve 5 with its lower end protruding therethrough as represented. Clamped about the lower protruding end of the tube 7 is a two part sleeve 8 rotating therewith and carrying centrifugally actuated wringer rolls 9 and 10, between which the material passes. I employ suitable means to force the rolls 9 and 10 toward each other to squeeze the material passing therebetween. Herein for the purpose I have represented the two part clamping sleeve 8 as having depending lugs 11, wherein are received removable fulcrum pins or studs 12, whereon are mounted for free rocking movement the lever arms 13, 14

having at their lower ends partial bearings 15 receiving the axles of the rolls 9 and 10. Preferably said arms 13, 14 are provided with intermeshing teeth 16 compelling conjoint movement of said arms. The upper ends of the lever arms 13, 14 are forked and receive therein weights 17 which may be secured in position, preferably removably, in any suitable manner. I contemplate the employment of different weights in order to vary or regulate the centrifugal action upon the rolls 9 and 10, and I may also secure the weights at different distances from the pivotal point of said levers. It will be apparent that the greater the weights employed or the greater their distance from the pivotal points of said levers, the greater the resistance to the centrifugal action tending to separate the rolls 9 and 10 in the action of the apparatus. In some cases but a single weight need be employed. By suitably proportioning the weights with respect to the rolls, it will be apparent that the centrifugal action upon the latter may be overbalanced to any desired extent. Either in conjunction with the weights or in substitution therefor, I employ one or more springs, such as represented at 18, (Fig. 12), said spring 18 being coiled about one of the lugs 12 and coöperating with a lug 19 upon the divided sleeve 8 and the partial bearing 15 of one of its rolls in such manner as to tend to force said rolls inward against or toward the opposing rolls. It is apparent that by the described construction of parts the centrifugal action of the rolls can be overbalanced by the weights 17 and no spring be employed, or the weights can be so proportioned as to exactly balance the centrifugal action and a spring or springs be employed. Preferably, however, I use such weight or weights as to overbalance the centrifugal action, and also supplement said weights by one or more springs, in order to secure the most effective squeezing action of the rolls upon the material.

In Figs. 13 and 14, I have represented a different form of wringer that may be employed in conjunction with or in substitution for that shown in Figs. 10 and 11. In said Figs. 13 and 14, the sleeve 5, the gear 6 and the driven tube 7 may be and preferably are similar to those shown in Figs. 10 and 11. Instead of mounting centrifugally actuated rolls upon the driven tube 7, I secure to the lower end thereof side castings or brackets 20 wherein are received for free rotation the rolls 21, 22, 23 and 24, the material passing about said rolls in the direction indicated by dotted lines in Fig. 13 in the direction of the arrow thereon. Each of the beveled gears 6 is driven in any suitable manner, as for example by a beveled gear 25 (Figs. 1, 2 and 3) meshing therewith and fast upon stud shafts 26 mounted in the framing 1. Between the side members of the framing 1 is positioned a vat 27 to receive the liquor with which the material may be treated.

In Fig. 1, I have represented the use of four wringers herein designated by the characters A, B, C and D. Between the wringers A and B and between the wringers C and D and extending downward from the cross piece 2 into the vat 27, I have represented guides 28, 29 preferably having mounted thereon for free rotation the rolls 30, about which the material passes. Also extending upwardly from the cross piece 2 and between the rollers A and B, B and C, and C and D, I have represented guides 31, 32 and 33 having mounted thereon rolls 34, 35, 36, 37, 38, 39 and 40, said rolls being preferably driven as hereinafter described.

The material to be treated is received from any suitable source and is in Fig. 1 represented as piled upon the floor at 41, it being thence directed over a suitable guide roll 42, and as diagrammatically represented in Fig. 7, down about and under the roll 35 and thence over and about the roll 34 into the first wringer A, the rolls 35 and 34 being driven to act as drawing rolls to draw the material from the supply 41 into the apparatus. The material passes downwardly through the wringer A, and if this be of the type illustrated in Figs. 13 and 14 the material is subjected at E to a twisting action in one direction, and at F to a reverse twisting action, serving to restore it to the normal condition. This twisting action serves, if the material, for example, has been previously subjected to a starching action, to work the material into the fibers. The material passes from the wringer A about the guide 28 into the vat 27 and is there subjected to the action of the liquor therein. The material then passes upward through the wringer B and is subjected to a twisting and then an untwisting action at G and H respectively, after which it is drawn upward by the rolls 36, 37 and 38 and is then passed downward through the wringer C, which, if it be of the type illustrated in Figs. 10 and 11, subjects it to a single twisting action at I. The material then passes about the guide 29 and is again subjected to the action of the liquor in the vat, and then passes upward through the wringer D, being subjected to another twisting action at J. The material is then drawn upward by the rolls 40, 39 over and under which it respectively passes.

I contemplate passing the material through the treatment path herein described once or a plurality of times, and in its second or subsequent passage the material may traverse the whole or a portion of such path. If the material is to be passed but once through the treatment path, it is drawn upward over a roll 43 (see Fig. 1) mounted upon a bracket 44 extending inward from the fram-

ing and preferably driven. From thence the material is conducted in a manner to be hereinafter more fully described to its point of final delivery.

I may, however, direct the material again through all or a portion of the treatment path. In Fig. 8, I have represented the material as passing completely through the treatment path just described and represented in Fig. 7, and then as passing about the roll 43 and then downward as represented at 45 to pass a second time through the wringers C and D. In this manner the material is again subjected to the wringers C and D and to the action of the liquor in the vat 27, or the material after having passed once through its treatment path may be redirected through the same path in its entirety, such treatment being represented in Fig. 9, wherein the material after passing once through the several wringers A, B, C and D and over the roll 43 is redirected as indicated at 46 under the roll 35 and thence over the roll 34 and again through the several wringers.

The vertical arrangement of the wringer or wringers is an important feature of my invention.

I am enabled thereby to subject most efficiently the material while passing from one wringer to another to the liquor contained in the vat 27. Moreover the vertical arrangement presents a very compacted mechanism, requiring but comparatively small floor space. Again, it greatly facilitates the repassage of the material through the treatment path and permits a better balancing of the parts of the wringers during their rotation, and in the case of centrifugal wringers secures a far more effective wringing action upon the material.

Power may be applied to the apparatus in any suitable manner. Herein I have represented (see Figs. 1, 2, 3 and 6) a drive shaft 47 having thereon fast and loose pulleys 48 and also having fast thereon a driving cone 49, a sprocket gear 50 and a pulley 51. Suitably mounted upon the top piece 3 of the framing is a countershaft 52 having thereon a cone pulley 53 adapted to be driven by a suitable belt from the cone pulley 49, suitable mechanism being employed to shift the belt as desired to impart variable speed to the countershaft 52. Upon the stud shafts 26 carrying the driving beveled gears 25 are mounted suitable sprocket gears 54, and if desired a guiding sprocket gear 55 (see Fig. 1) may be mounted in the framing 1. About the sprocket gears 53, 54 and 55 is passed a sprocket chain 56, it being preferably directed alternately over and under the sprocket gears 54, so as to drive them and the wringers A, B, C and D in opposite directions. By means of the cones 49 and 53 the speed of the beveled gears 25 may be varied. Moreover the beveled gears 6 are removable to permit the substitution for one or more thereof of different sized gears, thereby permitting the wringers to be driven at different speeds with respect to each other.

A sprocket chain 57 passes about the sprocket gear 50 upon the shaft 47 and also about suitable sprocket gears upon the shafts of the rolls 34, 35, 36, 37, 38, 39, 40 and 43, in such manner as to drive them in the direction of travel of the material through the apparatus, as already described. The sprocket chain 57 is driven at a constant rate of speed.

The material after having passed one or more times through the apparatus is directed about the said roll 43 and thence over a guide roll 58 mounted upon a hanger 59 depending from the top piece 3, said roll 58 being driven if desired by said chain 57. After passing about the roll 58, the material is directed upward to the guide 60 of a suitable traversing mechanism 61 and thence over a roll 62 mounted upon a shaft 63 upon brackets rising from the top piece 3 and driven from the pulley 51 by the belt 64. As shown in Figs. 2 and 4, the traversing mechanism 61 is driven from shaft 63 by beveled gears 65 and 66 in a manner not requiring further explanation. The material passes about the roll 62 and thence preferably downward about a roll 67 to a folder 68, herein represented as a blade fast upon a shaft 69 mounted in the framing 1, and having fast thereon a sprocket gear 70 driven from the shaft 63 by a sprocket chain 71.

In Fig. 1, I have represented the folder blade 68 as having arms of equal length, so as to fold the material into a pile 72 in the manner represented. If the arms of the folder be of equal length, the folds of the material are always positioned at the extreme edges of the pile. I may in certain cases, however, wish to pass the material after its treatment in the wringer through a receiver having a curved throat, and this is most effectively accomplished by providing a folder having arms of unequal length. Such folder is represented in Fig. 5 wherein the arms 73, 74 are of such relative length as to position alternate folds at one side of the pile, as at the extreme edge of the pile and then at a point removed therefrom to an extent depending upon the length of the arm 74.

It will be apparent from the foregoing description that material of any suitable nature may be received from any suitable source and passed one or more times through one or more twisters, the material being subjected if desired to the action of liquor in the vat 27. The material is drawn positively through the apparatus in the described manner, and during its course passes through

the several wringers, the rolls of which serve to squeeze the liquor into the fibers thereof. The degree or amount of treatment may be readily varied by repassing the material through the whole or a part of the treatment path, and in fact even though the four wringers A, B, C and D be employed, the material may be passed through but a pair of them in the first instance, as for example the wringers A and B or the wringers C and D. The material is passed at a constant speed through the apparatus, but the speed of the various wringers may be varied as an entirety by the conical drive referred to, or the speed of certain of the wringers may be altered by substituting a larger or smaller gear 6. The vertical arrangement of the several wringers permits the ready subjection of the material to the action of the liquor in the vat 27, and moreover permits a compacted arrangement of parts and a more ready driving of the several wringers. The material after treatment may be readily piled in the manner described and thence removed for further treatment or storage or use.

The construction of the centrifugal wringer is such as to permit a delicate but effective treatment of the material by the adjustment or variation of the weights 17 and the use of the spring or springs 18.

It will be understood from the foregoing description and drawings that the material to be treated may be of any length, and that while one portion thereof is passing for the first time through the wringers, another portion may at the same time be passing through the same wringers, the internal diameter of the wringers being sufficient to permit two or more portions of the material to pass simultaneously therethrough.

While the parts 7 are defined as tubes, it is to be understood that such term is used in a generic sense, and that they may be of any suitable length to serve as carrying and rotating means for the rolls 9 and 10 or the rolls 21, 22, 23 and 24. Furthermore in certain cases as where the arms 13, 14 have interengaging means compelling conjoint action, only one of said arms need be weighted. In referring to the parts carried by the tubes 7 as rolls in the claims, it is to be understood that such term is used generically, as in certain instances non-rotary means or a combination of rotary and non-rotary means may be employed to coact upon the material, such construction being covered by the claims. Any suitable driving means may be employed in lieu of the chains 56, 57, and the parts coöperating therewith.

Having thus described one illustrative embodiment of my invention, I desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

1. Textile conditioning apparatus comprising in combination a vat, one or more vertically arranged wringers supported thereover and including rotary tubes and squeeze rolls carried thereby, and means to direct the material passing through said wringer or wringers into the said vat.

2. Textile conditioning apparatus comprising in combination a frame, a plurality of vertically arranged wringers supported thereby and including rotary tubes and squeeze rolls carried thereby, and means for directing the material through said wringers in succession.

3. Textile conditioning apparatus comprising in combination a plurality of wringers and supporting means therefor, each wringer including a tube and squeeze rolls carried thereby, means to rotate said wringers, means to pass textile material through a treatment path including a plurality of said wringers, and means to redirect the material through one or more of said wringers.

4. Textile conditioning apparatus comprising in combination a plurality of wringers and supporting means therefor, each wringer including a tube and squeeze rolls carried thereby, means to rotate said wringers, and means to pass different portions of the material simultaneously through one or more of said wringers.

5. Textile conditioning apparatus comprising in combination a plurality of wringers and supporting means therefor, each wringer including a tube and squeeze rolls carried thereby, means to rotate said wringers, means to pass textile material through a treatment path including all of said wringers and means to return the treated material through a part or all of said wringers while a succeeding portion of the textile material is passing through said treatment path.

6. Textile conditioning apparatus comprising in combination a vat, a plurality of vertical wringers supported thereover, each including a rotary tube and squeeze rolls carried thereby, means to direct the material through a treatment path including said wringers and said vat, and means to return the treated material through a part or all of said wringers while a succeeding portion of the material is passing through said treatment path.

7. Textile conditioning apparatus comprising in combination a plurality of pairs of wringers, each including a rotary tube and squeeze rolls carried thereby, means to direct the material through a treatment path including all of said wringers and for passing the material in opposite directions through the members of each pair of wring-

ers, and means to redirect the material through one or more of said pairs of wringers while a succeeding portion of the textile material is passing through said treatment path.

8. Textile conditioning apparatus comprising in combination a vat, a plurality of pairs of vertical wringers supported thereover, each including a rotary tube and squeeze rolls carried thereby, and means to direct the material through a treatment path including all of said wringers and said vat, the material passing through the contents of said vat when passing from one member of a pair of said wringers to the other.

9. Textile conditioning apparatus comprising in combination a vat, a plurality of wringers supported thereover and each including a rotary tube and squeeze rolls carried thereby, means to direct the material in alternation through said wringers and said vat, and means to fold the treated material.

10. Textile conditioning apparatus comprising in combination a vat, a plurality of wringers supported thereover, and each including a rotary tube and squeeze rolls carried thereby, means to direct the material in alternation through said wringers and said vat, a fabric traversing mechanism and means to direct the material thereto.

11. Textile conditioning apparatus comprising in combination a plurality of wringers, and means to support the same, each wringer including a rotary tube and squeeze rolls carried thereby, means to direct the material through said wringers, a material folder, means to traverse the material along said folder and means to direct the material from the wringers to said traverser.

12. Textile conditioning apparatus comprising in combination a frame, a plurality of vertical wringers supported thereby, each including a rotary tube and squeeze rolls carried thereby, a vat beneath said wringers, means to pass the material in alternation through said wringers and into said vat, a folder and a traverser upon said frame, and means to direct the material thereto from wringers and vat.

13. A wringer for textile conditioning apparatus comprising a tube, rotating means therefor, a pair of arms pivoted upon said tube, a squeeze roll mounted upon each arm, said rolls engaging the material passing therebetween and means to control the centrifugal action of said rolls.

14. A wringer for textile conditioning apparatus comprising a tube, rotating means therefor, a pair of arms pivoted upon said tubes and weighted at one end, and squeeze rolls supported upon the opposite end thereof and adapted to co-act upon the material passing therebetween.

15. A wringer for textile conditioning apparatus comprising a tube, rotating means therefor, interengaging arms pivoted upon said tube, co-acting squeeze rolls carried by said arms, and means acting upon said arms to control the centrifugal action of said rolls.

16. A wringer for textile conditioning apparatus comprising a tube, rotating means therefor, arms pivoted upon said tube, co-acting squeeze rolls carried by said arms and springs and weights acting upon said arms to control the centrifugal action of said rolls.

17. A wringer for textile conditioning apparatus comprising a tube, rotating means therefor, arms pivoted upon said tube, co-acting squeeze rolls carried by said arms and variable weights carried by one or more of said arms.

18. Textile conditioning apparatus comprising in combination a plurality of vertical wringers, each including a rotary tube and squeeze rolls carried thereby, feeding means to pass material through said wringers, means to rotate said tubes and means to vary the speed of rotation thereof.

19. Textile conditioning apparatus comprising in combination a plurality of vertical wringers, each including a rotary tube and squeeze rolls carried thereby, a vat beneath said wringers, feeding and guiding means to pass the material in alternation through said tubes and into said vat, and means to rotate said tubes at a variable speed.

20. Textile conditioning apparatus comprising in combination a plurality of wringers, each including a rotary tube and squeeze rolls carried thereby, a vat beneath said wringers, feeding means to pass the material through said wringers, guiding means between pairs of said wringers to direct the material into said vat, means to rotate said tubes, and means to vary the speed of rotation thereof.

21. Textile conditioning apparatus comprising in combination a plurality of wringers, each comprising a rotary tube and squeeze rolls carried thereby, each of said tubes having a distinct driving gear, permitting the use of change gearing, and hence individual variation in the speed of said wringers, a common driving means for said gears, means to vary the speed of said common driving means, and means to feed the material through said wringers.

22. Textile conditioning apparatus comprising in combination a frame, a plurality of wringers mounted thereon, each comprising a tube and wringer rollers carried thereby, a vat below said wringer, a gear mounted upon each tube and a second gear meshing therewith, a sprocket chain engaging the several second gears, means to drive said sprocket chain at a variable speed, feed rolls to pass the material through said wringers,

and means to drive said feed rolls at a fixed speed.

23. Textile conditioning apparatus comprising in combination a frame, a plurality of wringers mounted thereon, each comprising a tube and wringer rolls carried thereby, a vat below said wringer, a gear mounted upon each tube, a band drive for said gears, means to vary the speed thereof, feed rolls to pass the material through said wringers, and a separate band drive for said feed rolls.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ISAAC E. PALMER.

Witnesses:
FRED. E. FOWLER,
GEO. C. HAINS.