S. W. WARDWELL.

THREAD CONDITIONING AND MANIPULATING DEVICE.

APPLICATION FILED NOV. 2, 1916.

1,316,210.

Patented Sept. 16, 1919.

2 SHEETS—SHEET 1.

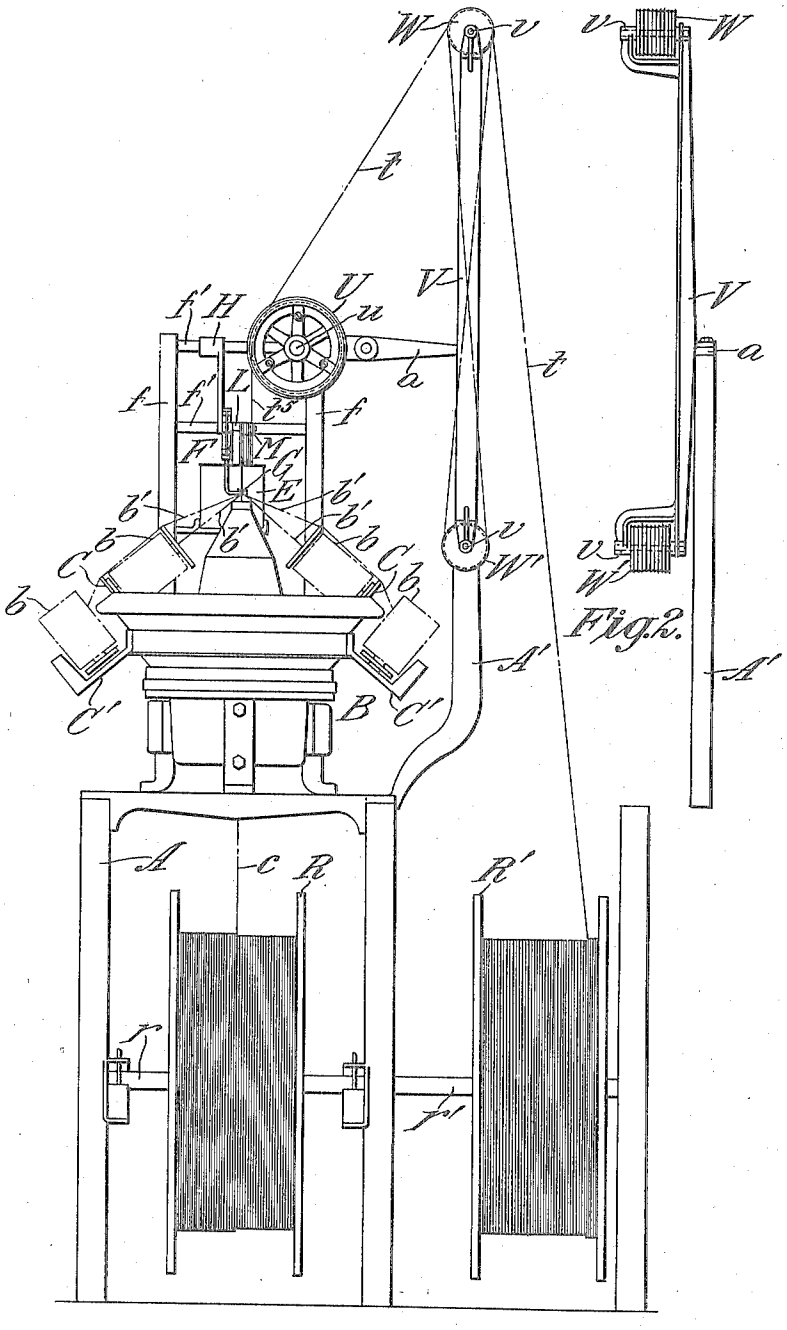


Fig. 1.

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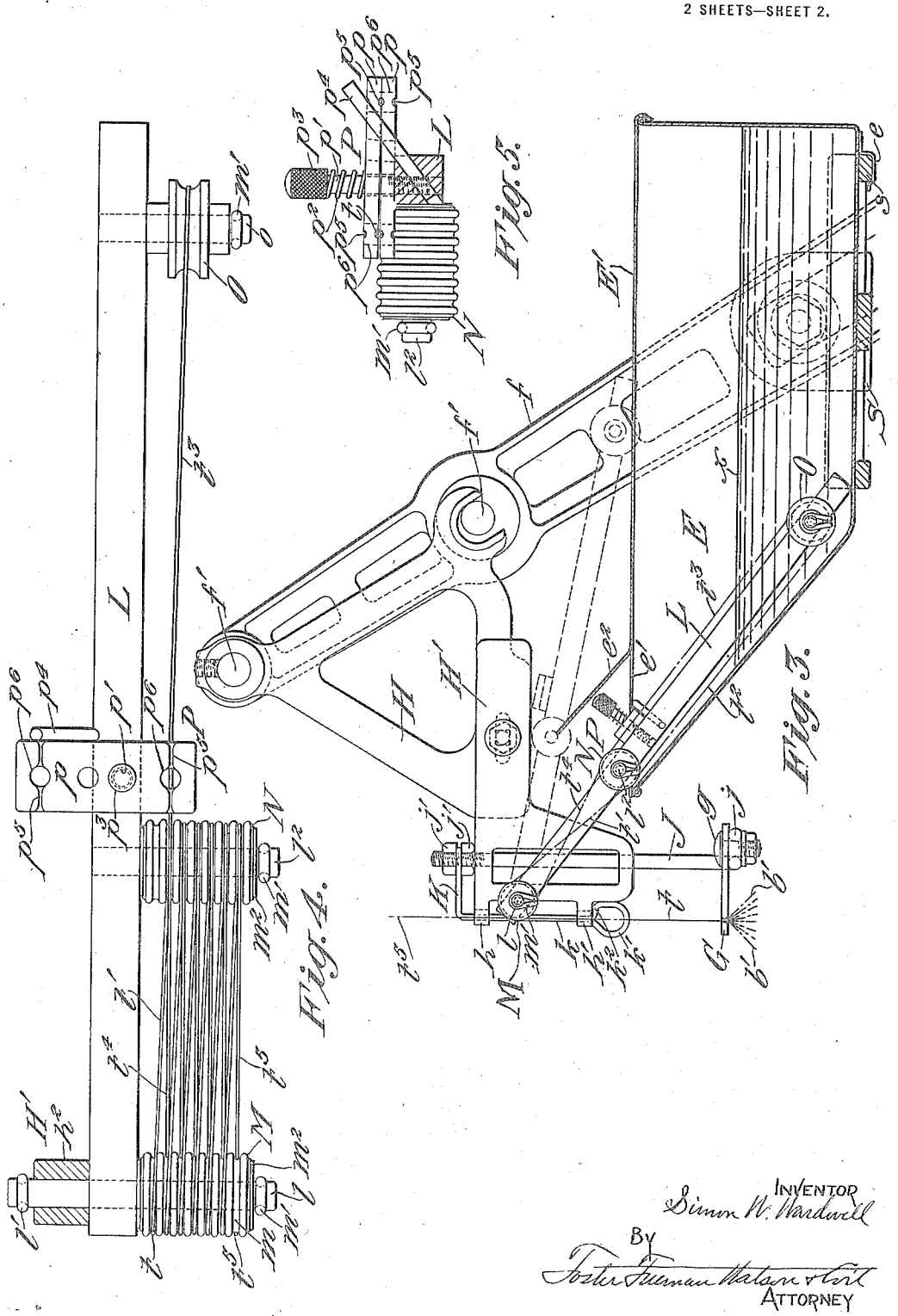


Fig. 4.

Fig. 5.

Fig. 3.

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THREAD CONDITIONING AND MANIPULATING DEVICE.

1,316,210. Specification of Letters Patent. Patented Sept. 16, 1919.

Application filed November 2, 1916. Serial No. 129,181.

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, a citizen of the United States, residing at Providence, in the county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Thread Conditioning and Manipulating Devices, of which the following is a specification.

My invention relates to braiding-, twisting- or like textile-machines and consists particularly of an improved thread-manipulator for treating and conditioning the product thereof. The object of my improvement is to provide means operating in connection with an apparatus for braiding or otherwise fabricating thread, cord or the like to treat and condition the latter by immersion, manipulating and drying, whereby the fibers of the material are amalgamated and bound together, the thread rendered more uniform in size throughout its length, its tensile strength increased, and its flexibility enhanced.

The manner and means for carrying out the improvement are fully described in the following specification, illustrated by the accompanying drawings, in which like reference characters designate like parts. In the drawings:—

Figure 1 is a front elevation of a braiding-machine showing my improved thread-manipulator applied to use in connection therewith;

Fig. 2, a detail view of the thread-drying rolls;

Fig. 3, an enlarged, detail view of the thread-immersing and manipulating-means shown in combination with the emulsion tank;

Fig. 4, an enlarged, plan view of the manipulating-rolls and thread-stripping device; and

Fig. 5, a detail view of the latter.

Referring first to Fig. 1, my improved thread-manipulator is here shown as applied to a braiding-machine of usual type, but it is also adapted for use with spinning, twisting or other like apparatus for producing cords, threads or similar textile materials. In the drawing, A designates the machine-frame or stand on which is mounted the braiding-mechanism B. As here illustrated, this comprises two sets of carriers C, C', arranged to revolve the yarn-supplies or bobbins *b* about a vertical axis and provided with means for interlacing the strands therefrom to fabricate the braided cord or thread *t*. Beneath the stand A is a reel R, mounted rotatively on a cross-shaft *r*, on which is wound the cord or strand *c* which serves as a core for the braided thread *t*. The cord *c* leads up through the center of the braiding-mechanism B and after the strands *b'*, *b'*, have been braided around it the finished thread *t* leads through a gathering-die or guide-plate G, and thence to the manipulator-device to be next described:

Surmounting the top of the braiding-mechanism B is a framework F comprising two upright arms *f*, *f* connected by cross-rods *f'*, *f'*. The arms *f*, *f* and cross-rods *f'*, *f'* serve as a convenient support for certain elements of the manipulator-device, comprising the emulsion tank E and its associated thread-rolls illustrated in Fig. 3. Secured to the upper cross-rod *f'* is a triangular arm or bracket H having a forked, rearward end straddling the lower rod *f'*. Fastened to the forward end of the arm H is an extension H' formed with bearings for a vertical, slidable rod J. The rod J is formed with an offset arm *j* at its lower end bent in the form of a loop or eye to adapt it to receive a bolt *g*. The bolt *g* serves to secure the guide-plate G in position on the rod J, the latter acting as its support. At the top of the rod J are two nuts *j'*, *j'* between which is held the looped end of a wire catch-member K. The catch K is bent in elbow-shape to provide a vertical arm *k* which is sprung into slots in two lugs *h*, *h'* on the front of the member H'. At its lower end the catch K is formed with a loop *k'* having a square shoulder or abutment k^2 adapted to engage the under side of the lower lug *h'*. The purpose of this arrangement is to hold the rod J normally in the position shown in Fig. 3, while adapting it to slide upwardly in its bearings through the release of the catch. When it becomes necessary to replace a broken strand or otherwise repair the thread or cord at its braiding point it is more con-

venient to move the guide-plate or thread-die G out of the way. This may be accomplished by drawing the catch K out from its grooves in the lugs h, h' and sliding the rod J upwardly in its bearings.

Hinged to the side of the member H′ is a bar or arm L which carries a series of rotatable rolls or pulleys over which the thread leads to direct its course down into the emulsion-tank E and to manipulate it in its passage therefrom. A pin 1 driven through the arm L is pivoted in a bearing h^2 on the member H′, see Fig. 4, and held in place by a wire ring l' sprung into a peripheral groove at its end. Journaled on the forward end of the pin l is a roll or sheave M, formed with a series of peripheral grooves m for the thread, and held in place by the spring-ring m' and washer m^2. A second, similarly-grooved roll N is journaled on a pin l^2 driven into the side of the arm L in spaced relation to the roll M and held in place in the same manner. At the lower end of the arm L is a third roll O formed with a single groove on its periphery and journaled on a pin o.

Fastened to the top of the arm L is a stripper-device P for removing the surplus fluid from the thread t as it emerges from the emulsion-tank E. As illustrated in Fig. 5, the stripper P comprises two substantially flat plates p, p, mounted on a pin p' screwed into the arm L, and pressed together by a coiled spring p^2 surrounding the pin beneath its head p^3. A pin p^4 is driven into the arm L abutting the sides of the plates p, p to prevent them from turning on the pin p' under the draft on the thread. The plates p, p are scored with laterally extending grooves p^5, p^5 adapted to register one with another to form a circular opening for the thread t to draw through. Preferably, the plates p, p are scored with the lateral grooves p^5 on their upper and lower sides and at both ends so that they may be reversed, top for bottom, or end for end, to provide new bearing surfaces after the grooves become worn. Referring to Fig. 4, two holes p^6, p^6 are drilled through the plates p, p midway of their grooves to serve as a vent or drain for the liquid cleared from the thread as it draws therethrough.

Referring now to Fig. 3, the emulsion-tank E consists of a trough-like pan supported on a bracket or shelf S bolted to one of the side frames f. On the bottom of the tank E are suitable clips e adapted to hook under the slats s of the shelf S to hold it in place thereon while providing for its convenient removal therefrom. The manipulator-arm L is arranged to set in inclined position with its end resting on the bottom of the tank E, adjacent its sloping side. The top of the tank E is protected by a cover E′ formed with an opening e' for the arm L, the opening being provided with an inclined apron or spatter-guard e^2 overhanging the clearer-device P.

Referring to Fig. 1, a take-up wheel U is mounted on a shaft u held in bearings at the top of the frame F and is driven by gearing or through any suitable connection with the operating-mechanism of the machine as usually arranged, but not herein shown or described. Projecting upwardly from the side of the machine-stand A is an arm A′ braced from the frame F by a strut a. Supported on the arm A′ is a bracket or vertical arm V formed at its top and bottom with bearings for cross-pins v, v, see Fig. 2. Journaled on the pins v, v are two thread-rolls or multiple-grooved pulleys W, W′ for receiving the thread which crosses back and forth thereover as it leads from the take-up wheel U. At the side of the stand A is a reel R′ journaled on a shaft r' and provided with friction driving-means, not herein shown, for rotating it to wind on the thread t as it leads down from the drying-rolls W, W′. Usually means are provided for guiding the thread back and forth on the barrel of the reel R′ to lay it smoothly in place thereon, but as this mechanism forms no part of the present invention it is not herein shown or described.

Having now described the construction and arrangement of my improved apparatus, the method of threading up the manipulator and the manner of its operation will next be explained: Referring first to Fig. 1, the strands b' from the supply bobbins b may be braided about a central core c or in some cases merely fabricated together in the form of a tubular cord. In either case the strands b' are merged or combined in the cord or thread t beneath the gathering-die or guide G, and the thread then passes up over the first manipulator-roll M. From the roll M the thread is passed down under the roll N, as indicated by the dot-and-dash line t', Fig. 3, and thence leads in the stretch t^2 down around the end-roll O and back again at t^3 to the roll N. It is then crossed back and forth, as indicated at t^4, Fig. 4, between the rolls M and N with a plurality of turns around each roll. Finally the last length t^5 is led up from the roll M over and around the take-up wheel U, see Fig. 1. Usually the thread is given several turns around the wheel U to provide a gripping friction whereby the turning of the wheel will feed the thread through and from the machine in the usual manner. From the take-up wheel U the thread t leads up around the upper drying-roll W and is then passed back and forth to the lower roll W′ in a manner similar to its course between the manipulator-rolls M and N. The last turn of the thread on the upper roll W is then drawn down to the reel R′ on which it is wound while being

fed thereto through suitable means as usually provided.

In treating thread intended for use in sewing shoes or other articles of apparel, it is usually subjected to a sizing bath consisting of a starchy fluid or emulsion contained in the tank E. In the case of threads or cords employed in the manufacture of tire fabric or like materials they are usually treated with liquid rubber or a like mucilaginous compound to render the fabric better adapted for vulcanizing to the carcass of the tire. Either of the above mentioned emulsions, or any other compound may be employed for treating and conditioning the thread with my improved manipulator and the method of operation employed is as follows:

In applying the cord or thread *t* to the manipulator-rolls M, N and O, the arm L is lifted out of the tank E by swinging it upward on its hinge or pivot *l*, as shown by broken lines, Fig. 3. After the thread has been passed around the rolls, in the manner as before explained, the arm L is lowered into the tank, which in the meantime has been partly filled with the prescribed fluid-mixture *x*. The cover E′ is then set in place and the machine is ready for operation. As the take-up wheel U is rotated from the machine it draws the thread *t* up from the braiding-mechanism B, through the guide G, over the roll M, thence down under the roll N, and around the roll O. As the thread passes around the roll O and through the bath it becomes saturated and impregnated with the emulsion *x*, a considerable part of which will adhere to its surface. In leading back from the roll O the thread draws through the stripper P and the excess of fluid is thereby scraped off or stripped from its surface, leaving its strands still saturated. From the stripper P the thread is next passed back and forth over the rolls M and N in a plurality of crossing lengths and a manipulating action is thereby set up as follows: As the thread draws around the peripheries of the rolls M and N it is bent into sharp loops, thus tending to open up its fibers and to knead and work the emulsion into its body. That is to say, the fibers of the yarn of which the thread is composed will be manipulated back and forth and worked one against another to knead the fluid into and through the pores or interstices. In this way the emulsion is caused to insinuate through the whole structure of the thread to thoroughly permeate and condition its innermost fibers and to cause them to be straightened and laid in parallelism. As the thread continues its passage around the manipulator-rolls the grooves in the latter will have a tendency to roll and shape it to a true round and to iron out irregularities and draw it down to a uniform size throughout its length. Finally, as the thread is drawn off from the manipulator-rolls it feeds from the take-up wheel U to the drying-rolls W, W′, and these also have an added effect in shaping and sizing it during the drying process. That is to say, the fibers of the thread will be further straightened and ironed into place while being set by the drying of the emulsion. In this manner the thread is conditioned and improved by increasing its strength and pliability, while rendering it more uniform in size and better adapted for use in the various arts for which it is intended.

It will be observed that my improved apparatus provides an exceedingly simple and convenient means for handling and treating the product of textile-machines to attain the desired benefits above pointed out. Various modifications might be made in the structure and arrangement of the parts of the device or in the method of its application to use without departing from the spirit or scope of the invention; therefore, without limiting myself to the exact embodiment shown and described, what I claim is:—

1. In a thread-conditioning and manipulating device for textile-apparatus, the combination with means for feeding a continuous thread or cord, of a bath of conditioning-fluid for the thread, means for directing the thread to and from the bath, means for stripping the excess fluid from the surface of the thread as it feeds from the bath, and a series of manipulator-rolls outside of the bath for doubling the thread back and forth in reverse bends immediately it delivers from the stripping-means to open its pores and knead the fluid into its fibers.

2. In a thread-conditioning and manipulating device for textile machines, the combination with means for feeding a continuous thread or cord, of a bath of treating fluid, means for leading the thread to and from the bath, means outside of the bath for directing the thread back and forth in a series of reverse loops after it emerges from the treating fluid to manipulate its fibers to facilitate the permeation of the fluid thereinto, and a series of grooved drying-rolls over which the thread is drawn as its leads from the manipulating-means to smooth and iron it out to a uniform size.

3. In a thread-conditioning and manipulating device for textile materials, the combination with means for feeding a continuous thread or cord, of a tank for the conditioning-fluid, a guide-roll in the tank for leading the thread into and out of the bath in a single loop, a pair of spaced manipulator-rolls outside of the tank for passing the thread back and forth as it emerges from the bath to manipulate its fibers, and a stripper-device arranged between the guide-roll and manipulator-rolls and pro-

vided with resilient means bearing against the thread to strip the excess fluid from its surface.

4. In a thread-conditioning and manipulating device for textile materials, the combination with a tank for the conditioning-fluid, of means to feed the thread thereto, an arm hinged above the tank to adapt its end to be lowered therein, a guide-roll on the end of the arm for directing the thread through the fluid bath, and a pair of multiple-grooved rolls spaced apart on the arm above the tank to lead the thread back and forth in reverse bends to manipulate its fibers to facilitate the permeation of the fluid.

5. In a thread-conditioning and manipulating device for textile materials, the combination with means for feeding a continuous thread, of a tank for the conditioning-fluid, a member hinged above the tank to adapt its end to be lowered therein, a guide-roll on the end of the member for directing the thread through the bath in the tank, a pair of grooved stripper-plates on the arm, resilient means for pressing the plates against the thread as it passes through their grooves to strip the excess fluid therefrom, and a pair of grooved rolls journaled on the arm to receive the thread as it draws from the stripper-plates and to direct it back and forth to manipulate its fibers to facilitate the permeation of the fluid.

6. In a thread-conditioning and manipulating device, the combination with a bath of conditioning-fluid, of guiding-means for feeding a thread to and from the bath, and a stripper-device for stripping the excess fluid from the thread as it emerges from the bath comprising a pair of overlying plates formed with lateral grooves adapted to register to form a passage for the thread, a screw extending through the center of the plates, and a spring on said screw acting to press one plate against the other.

In testimony whereof I affix my signature.

SIMON W. WARDWELL.