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DEVICE FOR AUTOMATICALLY COATING YARN ELEMENTS FROM WHICH A LAMINATED COHESIVE INTERWOUND FABRIC IS CONSTRUCTED.

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1,208,399.

Patented Dec. 12, 1916.

Fig. 3.

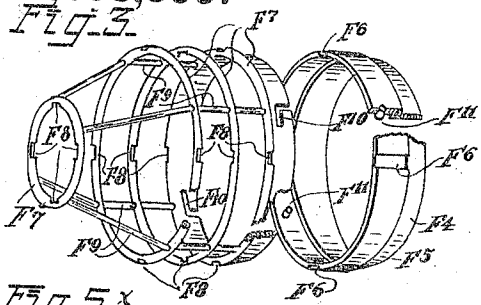


Fig. 5.

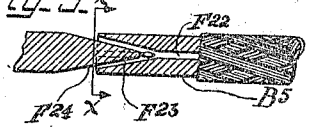


Fig. 1.

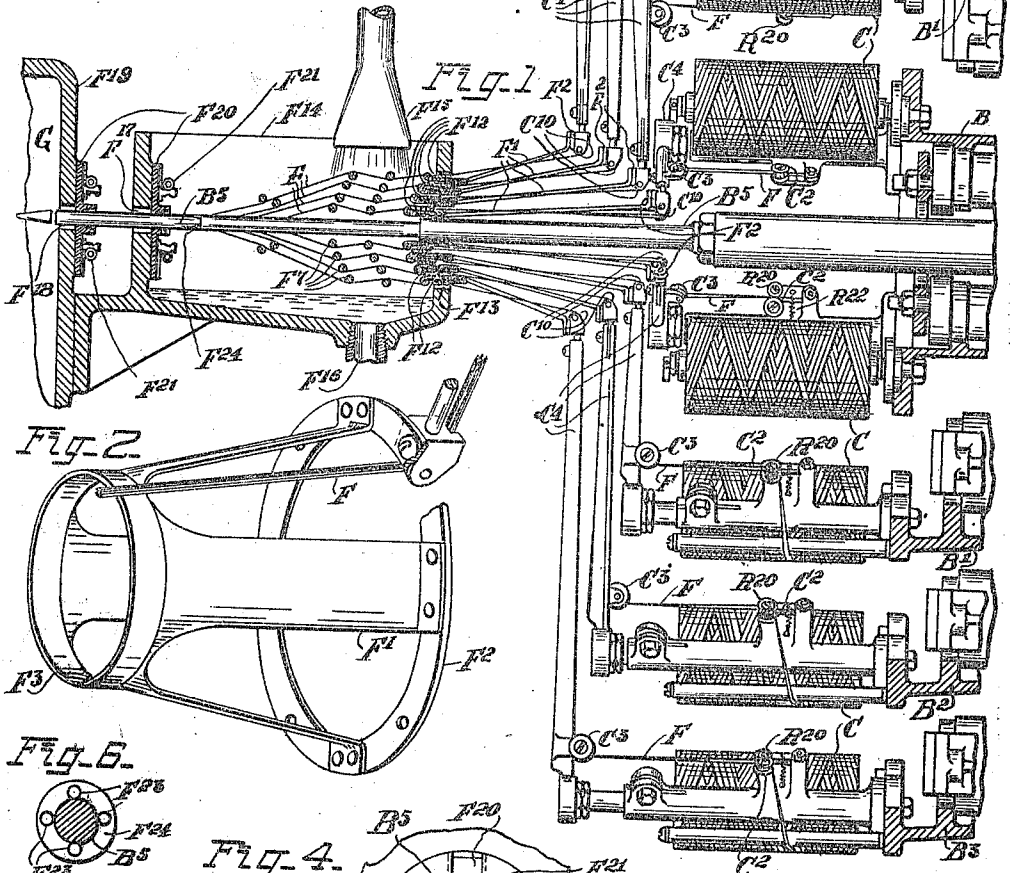
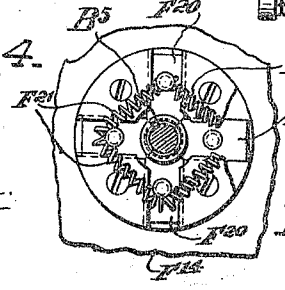


Fig. 2.

Fig. 6.

Fig. 4.



Witnesses

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DEVICE FOR AUTOMATICALLY COATING YARN ELEMENTS FROM WHICH A LAMINATED COHESIVE INTERWOUND FABRIC IS CONSTRUCTED.

1,208,399. Specification of Letters Patent. Patented Dec. 12, 1916.

Continuation of application Serial No. 816,089, filed February 2, 1914. This application filed August 17, 1914. Serial No. 857,070.

To all whom it may concern:

Be it known that I, LAWRENCE A. SUBERS, a citizen of the United States, and resident of East Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Devices for Automatically Coating Yarn Elements from Which a Laminated Cohesive Interwound Fabric is Constructed, of which I hereby declare the following to be a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention comprises an improvement upon the coating device of the machine described in my previous application for Letters Patent bearing Ser. No. 668,625 filed December 30, 1911, for an automatically acting machine for constructing a laminated-cohesive-interwound band in which the band elements are coated under the influence of vacuum and heat and is also an improvement upon the automatically acting device for coating the yarn elements from which a laminated-cohesive-interwound fibrous band is constructed, described in my application for Letters Patent bearing Ser. No. 678,696, filed February 17, 1912, in which stationary guiding means are employed acting to hold the band elements apart while being coated. In both cases the band elements are stored upon reels which rotate in opposite directions, are wound about a stationary mandrel, are passed through a coating device and finally the completed band is pulled from the mandrel and compressed and dried under the action of vacuum and heat.

In the machine hereinafter described the several rotating reels have attached thereto concentric conical guide members which hold the several series of yarn elements and guide them in channels and wind them upon the mandrel in their exact relative positions, and also serve to hold apart the yarn elements while the coating material is applied thereto. The coating chamber is separate and spaced from the vacuum chamber, thus allowing the yarn elements to be coated in the air, thereby gaining a smooth uniform coating, free from bubbles, which are quickly formed when the yarn elements are coated in a vacuum chamber since the solvents are then quickly evaporated from the coating material.

A further object is to apply the coating material preferably without pressure, to maintain it in a sufficiently fluid state to permit of the movement of the several series of yarn elements therethrough without distorting them or without distortion of the yarns forming the elements, and to form a smooth outer coating on the band while still on the mandrel.

A further object is to wind the coated yarn elements upon the mandrel under as slight a tension as practicable so as to reduce the strain on the band in pulling it off the mandrel since the greater the tension the harder the band is pressed against the pulling rolls thereby forcing out a corresponding greater amount of the coating material from the interior of the band. Further by winding the series of yarn elements upon the mandrel without thereafter passing over an enlarged expanding portion a large amount of friction of the yarn elements one upon the other is eliminated and no opportunity is allowed for individual yarns to become distorted from their positions in their respective elements.

I also employ an open coating chamber spaced from the vacuum chamber into which and over the rotating yarn elements the fluid rubber flows either by gravity or by pressure and from which it is withdrawn as quickly as desired.

The invention also includes resilient closing means for the several apertures in the coating and vacuum chambers, and means for supplying fluid rubber to the inner sides of the yarn elements as they are interwound and pulled along the mandrel.

The invention further comprises the combination and arrangement of parts and construction of details as hereinafter described, shown in the accompanying drawings and specifically pointed out in the claims.

This application is a continuation of my prior application 816,089, filed Feb. 2, 1914, allowed February 9, 1914, and now forfeited, the said application 816,089 being a

renewal of application No. 770,054, and application No. 770,054 being a renewal of the original application No. 691,209, filed Apr. 12, 1912, allowed October 29, 1912.

In the accompanying drawings Figure 1 is a vertical longitudinal section of the reels showing the spools containing the yarn elements, the supporting rods for guide tension rollers, the conical supporting frames for the annular guide members for the yarn elements, the several annular guide members and the coating and vacuum chambers; Fig. 2 is a perspective view of one of the conical frames; Fig. 3 is a perspective view of one of the guide rings and of one of the outer series of annular guide members; Fig. 4 is an elevation of one of the resilient gates protecting one of the openings through which the mandrel and band pass; Fig. 5 is an enlarged longitudinal section of the mandrel showing passages through which the fluid rubber can be injected into the band while it is being formed upon the mandrel; Fig. 6 is a transverse section of the mandrel on line x—x Fig. 5.

Many portions of the machine previously shown and described in my former application referred to, such as the pulling and flattening devices and band shaping devices are not shown again in this application since it is not necessary to do more than to refer to them herein, since they have been previously claimed.

In these views B^5 is a stationary mandrel. B, B′, B^2 and B^3 are reels rotatable in alternately opposite directions thereabout.

C^4, C^4 are rods secured to these reels and extending radially inward and provided with guide rolls C^3, C^3 for the bands of parallel yarns F, F which compose the fabric band and are herein designated as yarn elements. Tension is supplied by tension rollers C^2 and R^{20} and springs R^{22} for the yarn elements as they are pulled off from the spools C, C. The inner ends of the rod C^4 are provided with terminal guide rollers C^{10}, C^{10}. Alternate reels rotate in opposite directions and the rods from each reel, shown as four in number, are secured at their lower ends to a ring F^2 upon a frame F′ shown in Figs. 1 and 2. The four guide rods are secured to and equally spaced about this frame and the rollers C^{10} pass the yarn elements F inside the ring F^2 which forms the base of the frame F′. At the outer end of this frame is shown a second ring F^3 which is tightly sleeved over the reduced portion F^4 of the guide ring F^5. This guide ring is provided with four guide channels F^6, F^6 on its outer face through which the yarn elements pass but they do not pass directly therefrom to the mandrel B^6 since the distance passed over before winding them is too great to insure the accurate application of the yarn elements thereto. For this reason a series of rings F^7, F^7 are provided gradually nearing the surface of the mandrel so that the yarn elements will be accurately spaced apart and kept out of contact with each other.

The rings F^7 are provided with guide channels F^8, F^8 alternately situated on the outer and inner sides of the rings so as to bind the yarn elements and prevent them from slipping or drawing sidewise out of proper alinement and yet permitting them to be pulled freely off from the reels.

In Figs. 1 and 3 the last one F^7 of the series of channeled rings is reduced in diameter and is brought as close as possible to the mandrel so that the yarn elements can be applied thereto at as acute an angle with the axis of the mandrel as may be desired, and the yarn elements are bound underneath in the channels F^8 therein, in close proximity to the mandrel so that perfect accuracy in winding can be obtained without slipping, also the length of the yarn elements exposed between the channeled guide and the surface of the mandrel is much reduced thereby.

Fig. 3 is a perspective view of the outermost series of rings which are connected together into a frame by means of longitudinal bars F^9, F^9. The inner and larger ring is flattened and provided with transverse slots F^{10}, F^{10} and the bearing guide ring F^5 is provided with corresponding pins F^{11}, F^{11} or other means of attachment so that the parts can be detachably secured together and others substituted therefor if required. In this manner the guides are brought as near to the surface of the mandrel as the angle of winding will permit and are spaced apart at a predetermined distance. The several frames and guide rings attached thereto are so proportioned and fitted together as to sleeve over each other, space being left between them for packing rings F^{12}, F^{12} of felt or other soft material and are inserted in "nest" form into an opening F^{13} in one end of a coating chamber F^{14} which opening they with the packing rings completely fill and prevent the escape of rubber therefrom. The yarn elements fill the guide channels F^6 and the rubber cannot escape. The rubber preferably falls by gravity through a funnel shaped spout F^{15} upon the rotating guides and yarn elements and they are completely coated before winding them on the mandrel. The rubber or other adhesive material runs out of the outlet opening F^{16} and the depth of rubber maintained in the receptacle can be controlled at pleasure in any desired manner. The mandrel projects through an opening F^{17} in the opposite wall of the receptacle and through an opening F^{18} in the wall F^{19} of the inclosed vacuum and heat chamber G. These openings are preferably spaced apart so as to prevent any possible action of the vacuum upon the rubber in the

receptacle. The openings F^{17}, F^{18} are protected by resilient gates formed of sliding sections F^{20}, F^{20} controlled by one or more springs F^{21}. These gates will make close contact with the fabric band as it passes out over the mandrel but will prevent the rubber from oozing out and will yield sufficiently to permit a knot or collected mass of rubber to pass. The resilient action of these gates will tend to smooth and equalize in thickness the exterior coating of rubber upon the fabric band.

In Fig. 5 is shown a central passage F^{22} and oblique passages F^{23}, F^{23} in the mandrel through which the rubber can be injected into the interior of the fabric band before being collapsed to thoroughly coat the yarn elements therein. An annular groove F^{24} communicating with these passages distributes the rubber evenly around the exterior of the mandrel.

Having described the invention what I claim as new and desire to secure by Letters Patent is:

1. In a device of the character described, the combination with a stationary mandrel and a series of reels rotatable thereabout in opposite directions, of a series of guide rods depending from each reel and rotatable therewith, a support secured to each set of guide rods, and a channeled guide member secured to each support.

2. In a device of the character described, a mandrel, a series of reels rotatable thereabout in opposite direction, an annular guide support operatively connected with each reel, a series of channeled guides secured to said support and encircling said mandrel, spools for storing flexible elements upon said reels and means for guiding said flexible elements from said spools to said channeled guides.

3. In a device of the character described, a stationary mandrel, a series of reels rotatable in opposite directions about said mandrel, a series of spools thereon, a guide support connected to rotate with said reels and a series of channeled guides, encircling said mandrel and detachably connected with said supports.

4. In combination with a stationary mandrel, a series of reels rotatable in opposite directions and spools thereon, a series of channeled guides rotatable with said reels, a series of guiding rollers adapted to guide flexible elements to said channeled guides, said channeled guides encircling said mandrel, a receptacle into which said mandrel and guides extend, and means for delivering a coating material to said flexible elements in said receptacle.

5. The combination with a receptacle for coating material having an opening in its side, of a series of guide supports and channeled guide members sleeved over each other and arranged in said opening, a central stationary mandrel, and intermediate strips of coating excluding material interposed between said guide members and between the outer guide member and the edges of said opening.

6. The combination with a stationary mandrel, of a series of guide supports rotatable thereabout, a series of spaced channeled guides having guide channels alternately on their outer and inner faces, said guides spaced apart, and secured respectively to said supports.

7. The combination with a series of rotatable concentric guide supports and a central stationary mandrel, of a series of channeled guide rings detachably secured to said supports, one ring to each support, and series of channeled guide rings outwardly spaced therefrom and from each other, the guide channels therein being formed alternately on the inner and outer sides of said rings.

8. The combination with a receptacle for rubber, of spaced guide members extending into said receptacle, said guide members for yarn elements provided with guide channels alternately on their outer and inner faces, a central mandrel encircled by said guide members, and means for depositing coating material upon said yarn elements and mandrel while in said receptacle.

9. The combination with a receptacle having opposite openings, of a mandrel passing through said openings, resilient gates closing one opening and concentric channeled guide members and interposed packing layers closing the opposite opening and encircling said mandrel.

10. The combination with a support, of a channeled guide ring detachably secured thereto, a series of channeled guide rings spaced apart outwardly from said guide ring and rigidly secured to said guide ring and to each other, the channels in said guide rings being arranged alternately on the inner and outer sides of said guide rings, and a central mandrel encircled by said guide rings.

11. The combination with a receptacle for rubber, and a vacuum and heating chamber, said receptacle and vacuum chamber having openings in their walls in line with each other, of a mandrel extending through all said openings, resilient gates closing the openings in the adjoining walls of the receptacle and vacuum chamber, and a series of channeled guide members extending through the opposite opening in said receptacle, said guide members encircling said mandrel.

12. The combination with a mandrel of annular guides for yarn elements rotatable thereabout said guides spaced apart and provided with guide channels, the outer annular guide approaching more closely to

the surface of the mandrel, and having the guide channels therein arranged on its inner face.

15. In combination with a central mandrel, a series of reels rotatable thereabout in opposite directions, spools on said reels, a series of guides rotatable with said reels and encircling said mandrel, said guides receiving flexible elements and delivering them to said mandrel, and means for guiding said flexible elements from said spools to said guides.

In testimony whereof, I hereunto set my hand this fourteenth day of August, 1914.

LAWRENCE A. SUBERS.

In presence of—
ERNEST MOSMAN,
A. T. OSBORN.