

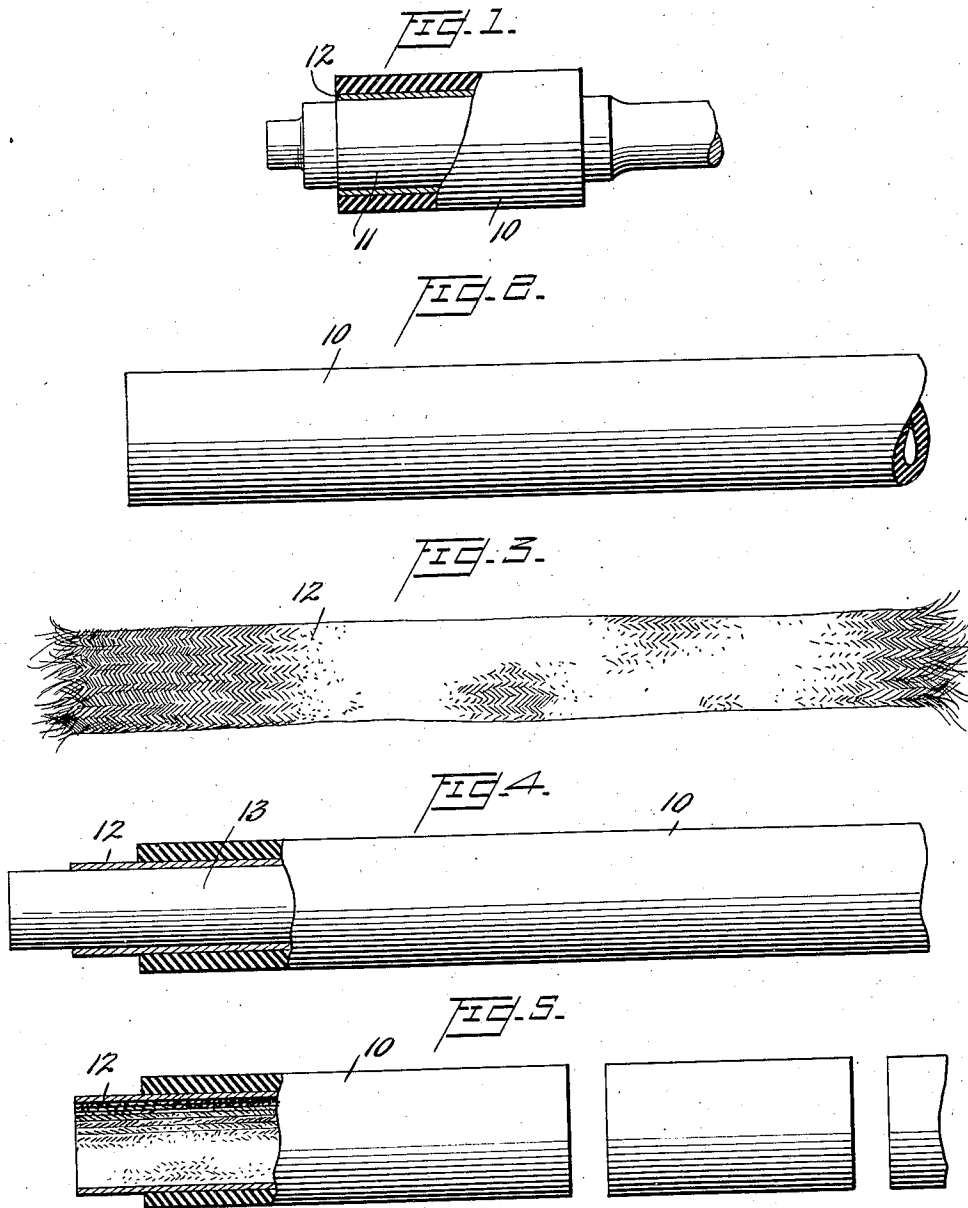
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COVER FOR TEXTILE ROLLS AND METHOD OF MAKING THE SAME

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COVER FOR TEXTILE ROLLS AND METHOD
OF MAKING THE SAME

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This invention relates to textile rolls of the type widely made use of in drafting and working the fibers of rovings, slivers or partially formed yarn in the process of yarn manufacture.

More particularly stated, the invention pertains to textile rolls of the type known as top rolls, each such roll comprising in the general case a core fabricated of metal and having a cylindrical outer surface, together with a covering for such surface which is of yielding or resilient material. It has heretofore been suggested that numerous kinds of roll covering materials may advantageously be employed and many different materials have actually been used as surfacing layers for textile rolls, among such materials being leather, cloth, natural rubber, and artificial cork. Various expedients have been resorted to for securing the facing layers of yieldable material to the metallic cores of such rolls and in certain instances the problem of securing the yieldable facing material to the cylindrical surface of the metal core is one the solution of which involves considerable difficulty. In Patent 1,730,357, issued to W. A. Carpenter October 8, 1929, a method of attaching a surface layer of artificial cork to the cylindrical metallic surface of a roll core is disclosed, this method involving the fabrication of a sleeve of fabric which is secured to the inner cylindrical wall of the artificial cork outer sleeve or surfacing layer by means of an adhesive and the two-part roll cover thus formed being slightly expanded while being drawn over the core so that it frictionally grips the core when finally positioned thereon. Certain other types of roll coverings are fabricated of materials which may be directly secured to the metal surface of the core by means of an adhesive, the covering material having the capacity to satisfactorily bond with the adhesive used, and the adhesive also having the capacity to attach itself firmly to the metal surface of the core.

More recently, however, it has been suggested that textile roll covers may advantageously be fabricated of a synthetic resilient rubber-like composition and it has been demonstrated that such compositions, when utilized in the fabrication of roll covers, result in the formation of textile rolls of great utility, the working surfaces thereof being durable, having good drafting properties, and being otherwise suitable for the purpose intended as well as being comparatively inexpensive. Examples of materials suitable for use in the fabrication of roll covers are set forth in the U. S. Patent 1,929,453 to W. L. Semon and includes the solid rubbery product resulting from

cooling a solution of a polymerized vinyl halide dissolved at an elevated temperature in a substantially non-volatile organic solvent. As an example, one part by weight of polymerized vinyl chloride may be heated and mixed with two parts of o-nitro-diphenylether at a temperature of about 180° C. which solution is cooled to room temperature to produce a rubbery solid. Vinyl halides may be dissolved at high temperatures in a large number of solvents to produce the rubbery material. For example these solvents may be chloronaphthalene, o-nitro-diphenylether, dibutyl phthalate, tricresyl sulphate, benzyl benzoate and others. Also in Patent 2,012,223 to R. W. Cutler is disclosed a composition of matter including such artificial rubbers as chloroprene and bromoprene which are respectively chlorobutadiene 2 chloro-1:3-butadiene- or chloro-2-butadiene-1,3, while bromoprene is referred to as bromo-2-butadiene-1,3. Such artificial rubber compositions may be mixed with various weights of reinforcing and filling agents such as soft gas black, with curing agents such as magnesium oxide and zinc oxide, with rosin as a stabilizer and with such anti-oxidants as phenylbetanaphthalamine. Other compositions are available for this purpose and, when used, give highly desirable results. These synthetic resilient rubber-like compositions, however, have the common deficiency of not bonding satisfactorily with the usual adhesive materials and hence cannot adequately be secured to the outer surfaces of metallic roll cores in the ordinary manner and, as a result, there is substantial opposition to the use of roll covers fabricated of synthetic resilient rubber-like material despite the known advantages of such material in the working and processing of textile fibers. Attempts have been made to apply roll covers of synthetic rubber to metallic cores by stretching such covers and drawing or forcing them over the cores. These methods, however, do not give satisfactory results because a roll cover of this material, when thus applied, has certain portions which are denser than other portions, giving inferior drafting.

Where it has been attempted to directly secure synthetic rubber-like composition roll covers to metallic roll cores by means of adhesives, considerable practical inconvenience has been experienced. Generally it has been found necessary to heat the synthetic cover in hot water in order to often and expand the same, then to coat both the metallic core and inner surface of the cover with a liquid adhesive, and finally to push the cover over the core while such adhesive is still

wet. This method of assembly is time-consuming and wasteful of adhesive as well as being messy. It has, up until this time, been found to be impossible to coat the interior of a synthetic rubber roll cover with a liquid adhesive, allow the same to dry, and thereafter apply the cover to a roll core after moistening the adhesive. No adhesive known seems to be able to adhere to the synthetic material sufficiently well to permit this to be done. A fabric lined roll cover made in accordance with my improved process however, may be glue coated interiorly, dried, and applied to a roll core at any time subsequently, after the adhesive has been moistened. The practical advantage of so forming the improved cover will be apparent.

It is the purpose of the present invention to provide a textile roll the cover of which is fabricated of the desired synthetic resilient rubber-like material, made for instance in accordance with the teachings of Patent 1,929,453, but in which the cover is firmly attached to the surface of the supporting metallic core and is uniform in density and effectiveness throughout.

It is also a purpose of the present invention to provide a method whereby the attachment of a cover of this specified material to the metallic surface of a core may be readily and economically effected. A roll constructed in accordance with the present invention comprises, in addition to the customary metallic core, a seamless sleeve of textile fabric closely encircling the cylindrical surface of the core and in turn being closely encircled by the covering of synthetic resilient rubber-like material, the intermediate fabric layer being secured to the surface of the core by a suitable adhesive, for instance any of the usual glues, and the intermediate fabric layer being also attached to the outer cover by a bond comprising a material identical or substantially identical with the material of which the cover itself is fabricated.

The method of assembling the several component parts of the roll involves the preliminary formation of a hollow cylindrical cover of resilient synthetic rubber-like material, this cover being preferably formed by an extrusion process or molding process, so that it is entirely seamless. As a preliminary step also a seamless tube of textile fabric is made, being preferably woven, knitted, or braided of cotton yarn, the outer diameter of this fabric tube being approximately the same as the inner diameter of the cover, and the inner diameter of the fabric tube being approximately the same as the outer diameter of the metallic core. The fabric tube is then inserted within the cover and heat applied to effect the bonding of the fabric tube and cover, the temperature of these members being raised to that at which the synthetic material of which the cover is composed softens or fuses and intimately engages the fabric tube. Thereafter the cover as thus lined is allowed to cool and the bond so solidify. Finally the inner surface of the fabric lining of the cool cover is coated with glue and allowed to dry. The lined cover may then be readily assembled with a metallic core by moistening the inner coating of glue, drawing the cover over the core while the glue is in moist condition, and allowing the same to harden. The built-up cover is firmly retained in position upon the core when the glue is hardened and will not become loose as the result of any ordinary shock or circumferential force which may be applied.

The method may be most economically prac-

ticed by the fabrication of a substantial number of roll covers at a single operation, both the synthetic rubber and the fabric tubes being relatively long prior to and after assembly and the resulting lined tube, after application of glue to the inner surface of the lining, being transversely severed into short cylindrical members of the length required.

In the accompanying drawing one form of the roll is illustrated and in other views are shown the several elements which are ultimately combined to form the roll cover.

In the drawing:

Figure 1 is a side elevation of a portion of a textile roll of the type specified, a portion of the cover being broken away;

Figure 2 is a side elevation of a tubular member fabricated of synthetic resilient rubber-like material;

Figure 3 shows in side elevation a textile fabric tube of seamless nature;

Figure 4 shows, partially in side elevation and partially broken away, the cover and fabric tube assembled together and supported upon a mandrel; and

Figure 5 discloses the completed tube and indicates the manner in which the tube is severed into short lengths to provide the desired roll covers.

The tubular member 10 shown in Figure 2 is preferably seamless and is fabricated by extruding or molding a body of resilient synthetic rubber-like material, for instance of the composition defined in Patent 1,929,453. It is preferably of such length that, at the completion of the process, it can be transversely severed into a plurality of roll covers. Its internal diameter is slightly larger than the external diameter of the metal core 11 upon which it is to be eventually mounted. The seamless knitted, woven or braided textile tube 12 may be fabricated of cotton or other fibrous material and its outer diameter is such that it may be drawn into the tube 10 freely and will make full contact with the inner wall of the tube, without wrinkling.

In practicing the process the first step involved is to draw the fabric tube 12 through tube 10 so that the cylindrical inner face of tube 10 is completely covered and closely engaged by the fabric tube. Tubes 10 and 12 as thus assembled together are then drawn over a mandrel, indicated at 13 in Figure 4, which mandrel is heated uniformly throughout its length to such temperature that the material of the fabric tube 12, as well as at least the adjacent portions of tube 10, are raised in temperature to the point of melting or fusion of the synthetic material. Where the material described in Patent 1,929,453 is used, for instance, the temperature to which the inner fabric tube and the outer synthetic tube are raised is approximately 555° F. and this temperature is maintained for from twenty to forty seconds. The mandrel 13 may be electrically heated or heated by any suitable means or method. As the result of the heating the synthetic material of which the outer tube 10 is composed melts or fuses and to a certain extent flows into intimate contact with the inner fabric tube 12. The thus assembled tubes may then be withdrawn from the heated mandrel 13 and allowed to cool, whereupon they will be found to be most firmly bonded together by the synthetic material itself. The inner and outer tubes are, while cooling, positioned upon a mandrel which is substantially similar to that indicated at 13 in the drawing,

but which is not heated, the mandrel preventing distortion of the tube while cooling and ensuring a straight uniform product.

After complete cooling the inner surface of the inner fabric tube 12 is coated with a suitable adhesive, for instance, say animal glue, and the assembled tubes are then hung by the end until dry. Thereafter the unit may be severed transversely into smaller units of a length suitable for roll covers, as indicated in Figure 5. The roll covers may be stored for indefinite periods and all that need be done to assemble one upon a metal core is to moisten the adhesive upon its cylindrical inner surface, then force or draw the covering onto the core and allow the glue to harden.

It has been found, in the actual practice of this process, advantageous to apply to the fabric liner, prior to its insertion within the synthetic rubber-like tube, a solution which is in the nature of a solvent for the material of which the covering tube is fabricated. This solution softens to a certain extent the inner surface layer of the synthetic material and facilitates bonding of this material with the fabric liner upon subsequent heating. The nature of the solution employed for this purpose may be varied substantially but in every case, to be effective for the purpose intended, it must be of such character that it will soften to an appreciable extent the inner wall of the synthetic tube when brought into contact therewith. The use of such solvent, however, is not essential to the successful practice of the process. It will also be understood that it is not essential, in fact not desirable, that the entire synthetic tube be raised to the temperature of melting or fusion to effect bonding with the fabric liner. It is only necessary that the inner layer of the synthetic tube be raised to the desired temperature in order to obtain the desired result.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A hollow cylindrical textile roll cover adapted to be forced onto a cylindrical core by an axially applied force, said cover comprising a tubular outer member of resilient synthetic rubber-like material having an outer truly cylindrical fiber-working surface and a tubular inner member of fabric the inner surface of which is adapted to be coated with an adhesive by means of which the cover may be secured to a supporting core, the outer and inner tubular members being firmly connected together due to the intimate bonding with the fabric of that portion of the synthetic rubber-like material of the outer member which lies nearest its inner surface, which portion has been rendered plastic by the local application of heat thereto after said members have been brought into coaxial relationship and thereafter allowed to solidify.

2. The method of making a hollow cylindrical cover for a textile roll which cover may be forced onto a cylindrical core by application of an axially applied force and the outer cylindrical fiber-working surface of which is resiliently backed, said method comprising the steps; separately forming hollow cylindrical members of fabric and synthetic rubber-like material respectively; disposing said members in coaxial relationship with the outer surface of the fabric member in engagement with the inner surface of the synthetic rubber-like member; and thereafter raising the temperature of the fabric member and a portion of the outer member immediately adjacent the inner surface of such member, by the local application of heat thereto, to such degree that said specified portion of the outer member becomes plastic and intimately bonds with the fabric, the thread-working surface of the outer member and the resilient backing material directly underlying the same being unaffected by such local application of heat.

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