April 27, 1965 P. F. MARSHALL 3,180,115

DAMPENING ROLL COVER

Filed July 19, 1962

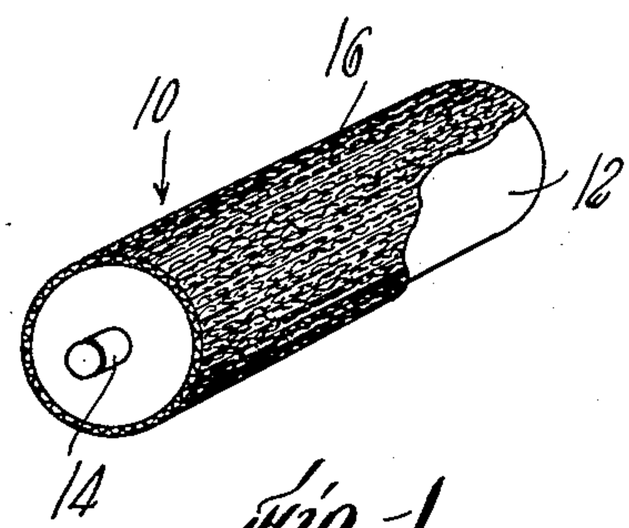

Fig. 1.

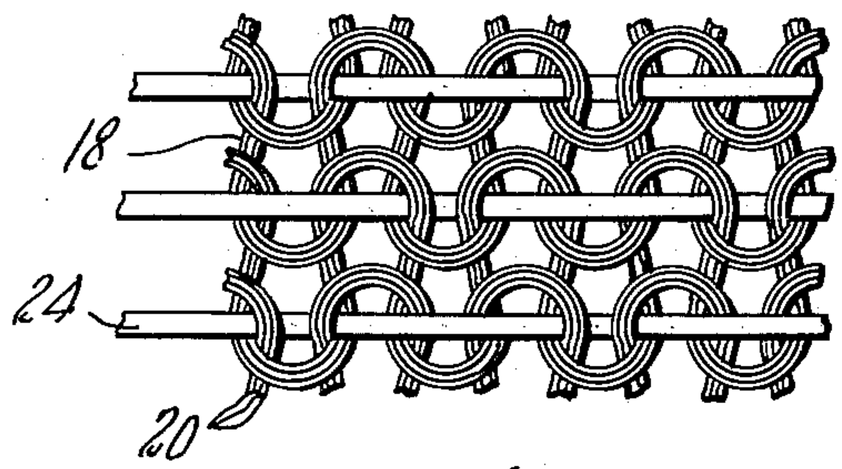

Fig. 2.

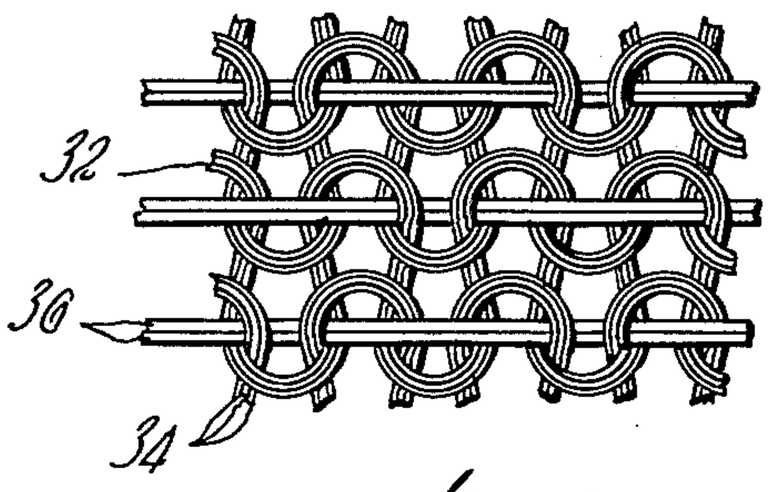

Fig. 3.

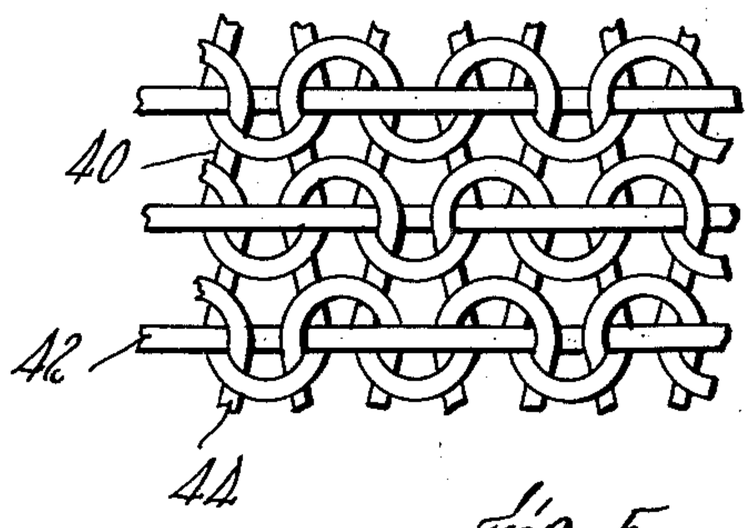

Fig. 5.

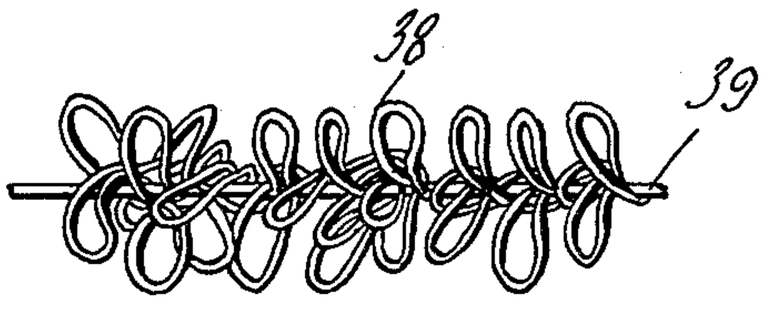

Fig. 4.

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3,180,115
DAMPENING ROLL COVER

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8 Claims. (Cl. 66—170)

This invention relates to dampening roll covers for use in lithographic press rolls. More particularly it relates to knitted dampening roll covers which are composed in part of elastic yarns, to provide a close-fitting seamless cover which does not wrinkle and does not have to be adhesively secured to the core.

It is known to provide dampening roll covers of napped flannel, of the type known as molleton, in the form of sewn tubular sleeves, as well as in the form of a spiral wrap of slit flannel adhesively secured to the roll surface. It has also been proposed to provide dampening roll covers of a plain tubular knit construction, or terry cloth construction, in sleeve form. Although such knitted sleeves may possess stretch, they are in general not truly form-fitting, and must be manufactured to such close tolerances that their application to a rubber dampening roll becomes a major effort, involving the use of slip-sheets of acetate film to serve as a friction-reducing layer between the rubber and the knitted sleeve. Removal is also laborious, since prior art sleeves must be cut from the roll, with the danger of damage to the underlying rubber surface. Additionally, since prior art sleeves have no elastic recovery, they must be anchored on the roll, which is customarily done by means of draw-strings in either end of the sleeve or cover.

I have found that by the incorporation into a dampening roll sleeve of elastic yarns, by which I mean true rubber yarns, spandex yarns, and similar elastomeric yarns with essentially complete and immediate recovery from deformation within elongations of from 10% to 300%, a superior tubular dampening roll sleeve is provided which eliminates many of the disadvantages inherent in prior art covers. Particularly, the dampening roll cover of this invention may be quickly and easily applied to a lithographic roll, and it resists distortion due to axial forces without the use of adhesive, end-ties, or other secondary anchoring devices.

It is, therefore, an object of this invention to provide a formfitting elastic dampening roll cover composed in part of yarns of a natural or synthetic elastomer.

It is a further object of this invention to provide a form-fitting elastic dampening roll cover comprising elastomeric yarns together with at least one second set of yarns, said second set of yarns being wrapped yarns of a type set forth more fully hereinbelow.

It is still a further object of this invention to provide an elastic dampening roll cover which is essentially white or colorless when dry, but which develops a pronounced characteristic color when damp so that the uniformity of moisture distribution may be gauged thereby.

Other objects of the invention will be apparent from the description below and from the examples. The invention will be more fully understood by reference to the drawings, in which:

FIGURE 1 is a perspective view of a dampening roll having a cover made in accordance with this invention.

FIGURE 2 is an enlarged view of the fabric cover of one embodiment of this invention, Example 1, below.

FIGURE 3 is a similarly enlarged view of the fabric of another embodiment of this invention, Example 2, below.

FIGURE 4 is a more highly enlarged view of the nature of the wrapped yarns of FIGURE 3.

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FIGURE 5 is an enlarged view of still another embodiment of this invention, Example 3, below.

FIGURE 1 represents a perspective view, partly broken away, of a lithographic dampening roll 10 consisting of a rubber covered roll 12 with mandrel 14 and a covering of absorbent elastic fabric 16. The covering 16 may be made of a combination of elastic yarns and conventional absorbent cotton or viscose yarns, or may be made of specially-wrapped yarns.

I have found, for example, that elastic dampening roll covers of exceptional durability and smooth performance may be provided by utilizing at least in part the wrapped core yarns described in my applications Serial Number 160,090 filed December 18, 1961 now U.S. Patent No. 3,076,307 and Serial Number 125,814 filed July 21, 1961, now U.S. Patent No. 3,078,653 the former relating to the use of an inelastic core, as in the yarn 34 of present Example 2, and the latter relating to elastic-cored yarns, as in the yarn 36 of Example 2 and the yarn 42 of Example 3.

In the above-mentioned applications I have set forth the method by which I falsely wrap, with no true twist, a wrapping strand about a core strand in a series of more or less smoothly wrapped bundles of loops extending radially from the core, to form a fuzzy wrapped surface on the core yarn. The wrapping strand is thereby associated with the core strand in the form of doubled-back loops wound with false twist for a multiplicity of turns around the circumference of the core strand. Characteristic structural details of such yarns are shown in FIGURE 4.

Due possibly to the loop-like nature of the wrapping strand, dampening roll covers containing yarns of this sort have the ability to wet out smoothly and uniformly, and to carry their moisture content on the roll surface where it is readily available and readily transferred to a lithogaphic plate. Unlike flannel, molleton, or other covers which are given a smooth surface by means of a napping operation, dampening roll covers made with the yarns of applications Serial Numbers 160,090 U.S. Patent 3,076,307 and 125,814 U.S. Patent 3,078,653 need not be napped, which means that they are originally, and remain, exceptionally free from lint and in operation give unusually clean reproduction. As set forth in application Serial Number 125,814, the peculiarly-disposed arrangement of the wrapping strand loops, extending radially from the core strand, facilitates yarn-to-yarn interlocking, and the formation of smooth-surface fabrics, when such yarns are fashioned into woven or knitted structures. Dampening roll covers made in accordance with this embodiment of the invention have exceptionally long life, and have been used to produce over one million impressions, whereas conventional dampening roll covers must generally be replaced after half as many impressions are made.

An additional advantage in the use of wrapped yarns for a dampening roll cover lies in the fact that by the use of a colored core and a normal white or colorless wrapping strand, a moisture-indicating dampening roll cover can be provided. Wrapping a colored core strand with a colorless wrapping strand and knitting at least some of such covered yarns into a dampening roll cover provides a cover which, when dry, appears to be slightly tinted, very little different from prior art covers. When such a roll is dampened for use in lithographic printing, however, the added water has the apparent effect of making the non-colored, core-concealing wrapping strand translucent or semi-transparent, so that the brightly colored but hitherto concealed core yarn shows through the structure, indicating that the roll surface is properly wet out. In this way there is effected a visual indication of

the degree of moisture carried by the dampening roll, and of the uniformity of distribution of said moisture. Such a positive gauge of proper operating conditions is a desirable advance in the lithographic art, where hitherto operability has been estimated by tactile observation or by the wasteful procedure of taking trial impressions.

The following examples will illustrate various embodiments of the present invention.

Example I

A dampening roll cover for an Addressograph-Multigraph machine, Model No. 1250, was made on a 72-needle circular knitting machine with approximately 5 needles per inch. The machine was run using two knitting feeds and two inlay feeds. One inlay feed operated on alternate needles and the other on intervening needles. The knitting feeds were each furnished with two ends of yarn. The knitting feeds were each supplied with two ends of 5's count bleached cotton yarn and one end of 3.5's bleached cotton yarn. The twist multiple of these knitting feed yarns was 2.75. Thus a total of six ends of knit yarn were fed into the machine. Each inlay feed was furnished with one uncovered 44's rubber count rubber elastic thread. The rounds of finished elastic fabric ran 11 per linear inch of knitted tube. The length of yarn in a knitted round measured approximately 40 inches and the length of a round of interlaced yarn measured approximately 3.5 inches. The circumference of the knitted tube measured 4.5 inches and the tube weighed approximately 3.12 grams per running inch.

A stylized showing of this structure, in enlarged detail, is shown in FIGURE 2, illustrating the loops **18** of three cotton yarns **20** interlaced with the bare rubber yarn **24**.

Example II

A dampening roll for an Addressograph-Multigraph machine, Model No. 1250, was made on a 72-needle circular knitting machine with approximately 5 needles per inch. The machine was run using two knitting feed stations and two lay in stations. The two knitting feed stations were each furnished with three ends of yarn and each lay in station was furnished with two ends of yarn, thus giving a total of ten ends of yarn being fed into the machine. The knitting feed stations were each furnished with one end of 1500-denier yarn consisting of a viscose 300-denier spun-dyed multifilament core, colored red, This 300-denier core was wrapped with a 75-denier 30 filament viscose yarn by the process described in my Patent No. 3,041,812 issued July 3, 1962. The other two knit feed yarns were of 1000-denier and were constructed in an identical manner as the above described yarn including the red core, with the exception of a reduced weight of wrapping, so that the total denier was reduced to 1000. The two inlaid yarns furnished to each lay in station were identical and consisted of a 44's rubber count elastic rubber core wrapped with a 75-denier 30-filament white viscose rayon yarn to a total denier of 5900. The wrapping was carried out according to the process of my copending application Serial No. 178,192 of March 7, 1962, now U.S. Patent No. 3,078,654. The rounds per linear inch of finished relaxed fabric ran from 9 to 11. The length of yarn in each knitting round measured about 40 inches, and the length of the relaxed interlaced yarn per round ran about 4 inches. The circumference of the knitted tube measured about 5.25 inches and the tube weighed approximately 4.78 grams per running inch.

A stylized showing of this structure, in enlarged detail, is shown in FIGURE 3, wherein the loops **32** of three ends of wrapped red-cored yarn **34** are shown inlaid with two ends of wrapped elastic-cored yarn **36**.

A still more enlarged view of the wrapped yarns of this example is presented in FIGURE 4, wherein the viscose wrapping yarn **38** is shown disposed in wrapped-loop formation around the core **39**. It will be appreciated that for the knitted ends of Example 2, the core strand **39** is spun-dyed red viscose, whereas for the inlaid yarns of Example 2 the core strand **39** is 44's rubber count elastic rubber yarn. Except for differences attributable to the nature of the core, the wrapped yarns **34** and **36** of Example 2 are similar in structure.

Example III

A 200-needle circular knitting machine of approximately 21.2 needles per inch of circumference was run utilizing 2 knit feeds and 2 lay in stations. Each knit feed was furnished with a single end of 150-denier 40 filament dull viscose yarn. Each lay in station was furnished with a single end of elastic yarn constructed according to the process described in my Patent No. 3,041,812, issued July 3, 1962. The yarn was constructed on a 420-denier spandex core with a 75-denier 30-filament viscose rayon wrap entwined around the core in sufficient bulk to bring the total denier to 5900.

The resulting tubular knit weighed 1.61 grams per running inch and measured 4¼ inches in circumference. The rounds per inch of knit tube length was approximately 30. There were approximately 31 inches of knit feed yarn per round and approximately 4.18 inches of inlaid yarn per round.

A stylized showing of this structure in enlarged detail is shown in FIGURE 5, wherein loops **40** of viscose yarn **44** are interlaced with viscose-covered spandex yarn **42**, the yarn **42** being similar in structure to the wrapped yarn of FIGURE 4.

The above examples are representative and not restrictive, since it will be obvious to those skilled in the art that various modifications can be made without departing from the spirit of my invention.

For example, the above specific description of embodiments of this invention are confined to tubular knitted sleeves, although it will be apparent to those skilled in the art that similar structures may be woven and fashioned into cut and sewn elastic sleeves. Since this procedure involves the formation of a seam, with the consequent liability of an irregular dampening of the plate, the invention has been described in terms of the more favored knitted examples.

Furthermore, the knitted structures have been illustrated and described as having the elastic yarn inlaid with the courses and wales of an absorbent yarn. Since the elasticity and the contractive holding power of my elastic dampening roll covers are most desirable in a direction around the circumference of the sleeve, this is the preferred embodiment, although not the only embodiment, of my invention.

What I claim is:

1. An elastic dampening roll cover comprising at least one set of wrapped yarns, said wrapped yarns comprising a colored core wrapped with a non-colored wrapping strand, said wrapping strand being disposed in core-concealing fashion around said core strand in the form of doubled-back loops wound with false twist for a multiplicity of turns around said core strand.

2. The product of claim 1 wherein the wrapped yarns containing the colored core are knitted into a series of loops forming a set of courses and wales, said set of courses and wales being interlaced with at least one end of elastomeric yarn.

3. The product of claim 2 wherein the elastomeric yarn comprises an elastic core strand and a wrapping strand associated with said elastic core strand in the form of doubled-backed loops wound with false twist for a multiplicity of turns around the circumference of said elastic core strand.

4. The product of claim 1 wherein the core of the wrapped yarn comprises a strand of spun-dyed viscose rayon.

5. An elastic dampening roll cover knitted in the form of a tubular sleeve comprising a series of loops forming

a knitted set of courses and wales, the yarn in said set of courses and wales comprising a substantially inelastic colored core strand associated with an absorbent wrapping strand, said wrapping strand being disposed in core-concealing fashion around said colored core strand in the form of doubled-back loops wound with false twist for a multiplicity of turns around said colored core strand, said knitted set of courses and wales being interlaced with a wrapped elastomeric yarn, said elastomeric yarn comprising an elastic core strand and a wrapping strand associated with said elastic core strand in the form of doubled-back loops wound with false twist for a multiplicity of turns around the circumference of said elastic core strand.

6. The product of claim 5 in which the core strand of the yarn comprising the knitted set of courses and wales is spun-dyed viscose, and the wrapping strand of both the knitted substantially inelastic yarn and the wrapping strand of the interlaced elastomeric yarn are water-absorbent strands.

7. An elastic dampening roll cover knitted in the form of a tubular sleeve comprising knitted courses and wales of absorbent yarn, with an elastic yarn interlaced with said courses and wales around the circumference of said tubular sleeve, said elastic yarn comprising an elastomeric core strand and an absorbent wrapping strand associated with said core strand in the form of doubled-back loops wound with false twist for a multiplicity of turns around the circumference of said core strand.

8. An elastic dampening roll cover knitted in the form of a tubular sleeve comprising knitted courses and wales of absorbent yarn, with an elastic yarn interlaced with said courses and wales around the circumference of said tubular sleeve, both the knitted yarns and the interlaced yarnes being composite yarns comprising an absorbent wrapping strand associated with a core strand in the form of doubled-back loops wound with false twist for a multiplicity of turns around said core strand, the core strand in the case of the elastic interlaced yarn being of elastomeric material and the core strand in the case of the knitted composite yarn being essentially inelastic.

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RUSSELL C. MADER, *Primary Examiner.*