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DAMPENING ROLL COVER

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This invention relates to a new and useful dampening roll cover for use in lithographic printing. In one aspect this invention relates to a dampening roll cover which can readily be mounted onto ordinary dampening rolls without stitching or other fastening means.

Lithographic printing involves the selective wetting of a printing plate surface with an aqueous composition prior to the application of oil based printing inks. In order to provide the desired wetting characteristics lithographic dampening rolls have traditionally been covered with various types of cloth, pile fabric, etc. Such cloth covered rolls are moistened with water and thereafter passed over the surface of the printing plate, the wetting action being achieved by water pressed out of the porous cloth cover onto the plate surface.

Cloth covers have conventionally been applied to the roll either by securing both ends with stitching or by fastening one end of the fabric across the width of the roll and convolutedly wrapping the fabric around the roll. The mounting of such rolls has been both inconvenient and time consuming. Moreover, to prevent slippage of the cover while in use the cloth or fabric has been tightly wrapped and/or tied securely onto the roll. During the mounting operation the tension created in the cloth can significantly increase the porosity of the cloth sleeve, making frequent adjustments by the operator necessary to obtain the proper water-ink balance.

Recently non-woven materials have been fabricated into shrinkable sleeves for use as dampening roll covers. Although such sleeves have, in general, been highly satisfactory, certain printing applications requiring larger amounts of water have required the use of more than one dampening roll. The maximum void volume of non-woven sleeves consistent with strength and tear resistance is occasionally inadequate to provide sufficient water retention under the larger amounts of water are desired. For such applications a single dampening roll sleeve having the advantages of the non-woven sleeve as well as higher water retention has been needed.

As used herein, "cloth" and "fabric" refer to a fabric containing generally aligned strands or filaments (e.g., yarn or thread) which are interlocked or interconnected in a regular or non-random construction, such as woven or knitted goods.

It is an object of this invention to provide a dampening roll cover of improved design for use in lithographic printing and also a process for the manufacture of such an improved cover.

Another object of this invention is to provide a dampening roll cover which is convenient and economical to use and which fits snugly on the roll, maintaining such snug fit throughout the printing run.

Still another object of this invention is to provide a dampening roll cover which is capable of applying in controllable fashion a uniform quantity of water onto a lithographic plate with a minimum of adjustment during the printing run.

Other objects of this invention will be apparent from the following description:

In accordance with this invention, the new and useful dampening roll cover comprises a hydroscopic, cylindrical cloth sleeve having a uniform surface texture, said cloth being comprised of hydrophilic, regularly or non-

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randomly disposed interlocking strands of a material which:

- (1) is substantially water insoluble at temperatures below about 100° F., preferably below 170° F.,
- (2) can be longitudinally expanded, preferably at least 3% when water wetted,
- (3) has dimensional stability when dry, and
- (4) longitudinally contracts from its expanded state when water wetted to essentially regain its original dimensions,

the sleeve also being resistant to tearing, abrasion, and fiber disruption when water wetted.

Regularly disposed strands in the form of thread or yarn can be used to form a variety of types of cloth or knitted goods by conventional methods. For purposes of this invention, the preferred useful fabrics are seamless and may be woven, knitted, etc., provided the characteristics of the material forming the interlocking strands are as described earlier. The following sample test procedure can be used to determine the suitability of any cloth or fabric in the dampening roll sleeve of this invention.

After the hydrophilic properties of the cloth sample are positively established (i.e., oleophobic when water wetted) a 2" x 3" specimen is cut from the sample. Marks are made 1/2" from each end, 2" apart. The specimen is then wetted thoroughly with water, and each end is clamped in one jaw of a suitable expandable device such as a tensile strength testing machine. The jaws are separated at a rate of 1" per minute until an elongation of at least 2% is achieved. The specimen is then permitted to dry under tension in this expanded condition. The dry specimen is then removed from the tester and placed in an oven at 70° F. and 10% relative humidity for at least 24 hours. No significant contraction should occur during this exposure period. The specimen is then again thoroughly wetted with water and the contraction is measured. The re-wetted specimen should recover at least about 30% of its total original expansion. The individual filaments of which the fabric is made may also be tested in a similar manner, and a wet elongation of at least about 3% in the individual filament or yarn is desirable.

If a single specimen of cloth does not meet the above test requirements, several layers of the same or different cloth may be bonded together to improve its performance. By using a hydrophilic fiber and/or a resin which is fusible with heat or with heat and moisture in conjunction with the other filaments or fibrous material in the fabric, several layers of the material may be bonded together by the application of either heat alone or both heat and moisture while subjecting the several superimposed layers to pressure, e.g., in a heated platen press. The particular conditions of heat, moisture, and pressure depend, of course, on the materials employed. Preferably the pressure should be sufficient to compress several layers to about 20% of their original combined thickness.

A particular preferred class of hydrophilic filament useful in the preparation of the cloth includes polyvinyl alcohol filaments, although a number of materials such as polyvinylpyrrolidone, viscose rayon, saponified cellulose acetate, etc. are available with the desired properties. The preparation of the cloth is not a critical feature of this invention, and any of the well known knitting, weaving and other cloth forming techniques can be utilized. The inclusion of additional hydrophilic materials, e.g., fibers, microfibers, fibrils, impregnants and fiber coating materials, etc., may be desirable to alter the physical properties of the cloth in some instances. Hydro-

phobic materials, e.g., polyesters, etc., may generally be incorporated into the cloth construction in amounts insufficient to reduce substantially the overall hydrophilic nature of the dampening roll sleeve. Thus, for example, the cloth or fabric may contain either a hydrophilic warp and a hydrophobic woof or a hydrophilic woof and a hydrophobic warp, in which cases the hydrophilic and shrinkable threads or filaments of the sleeve fabric are disposed to peripherally extend about the dampening roll to permit the desired shrinking and reduction in diameter of the sleeve when water wetted.

The cloth is formed into a cylindrical sleeve, the diameter of which is selected for the particular size of dampening roll on which the sleeve is to be mounted. In general, these cylindrical cloth sleeves, which are preferably seamless, are made with a slightly smaller diameter than the dampening roll on which they are to be mounted. They are then slid over an expandible mandrel, wetted with water and mechanically expanded at least about 2% in diameter, preferably 5%. The expanded sleeve is dried in its expanded condition, in which state the sleeve retains its expanded dimensions and is ready for use as a dampening roll cover. Such sleeves can easily be slipped onto a dampening roll and moistened with water to cause their shrinkage, thereby tightly adhering the sleeve to the roll surface. It is essential that the sleeves of this invention be capable of expansion in wetted condition, of retention of their expanded dimensions upon drying and of shrinking upon rewetting to regain substantially their original dimensions.

An illustrative shrinkable knitted sleeve was prepared from 2-ply 1100 denier pre-stressed (i.e., pre-expanded) rayon cord (14 turns of twist in the single and 14 turns in the ply) using a plain jersey stitch. The total yarn denier, including both plies and the contraction due to twist, was equal to 2500 denier. The pre-stressed yarn shrinkage was about 11.9% in boiling water and about 10% in room temperature water. The fabric was constructed so that the length of yarn in each stitch approached 16.66 times the normal composite yarn diameter. The characteristics of this sleeve permits its use

as a dampening roll sleeve in the manner described earlier.

Various other embodiments of the present invention will become apparent to those skilled in the art without departing from the scope thereof.

I claim:

1. A shrinkable dampening roll cover which comprises a dry, hygroscopic, cylindrical sleeve capable of shrinking upon being water wetted, said sleeve having a uniform surface texture and being comprised of hydrophilic strands in regular interlocking relationship, said strands being of a material which (1) is substantially water insoluble at temperatures below about 100° F., (2) can be longitudinally expanded at least 3% of its original length without breakage when water wetted, (3) has dimensional stability in the dry expanded state, and (4) longitudinally contracts from said expanded state to the extent of at least about 30 percent of its original longitudinal expansion when water wetted, said sleeve being in its longitudinally expanded state and being rapidly shrinkable when water wetted and further being resistant to tearing and abrasion when water wetted.

2. The dampening roll cover of claim 1 in which said strands comprise from about 20 to 100 weight percent of polyvinyl alcohol fibers and from 0 to 80 weight percent of cellulosic fibers.

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