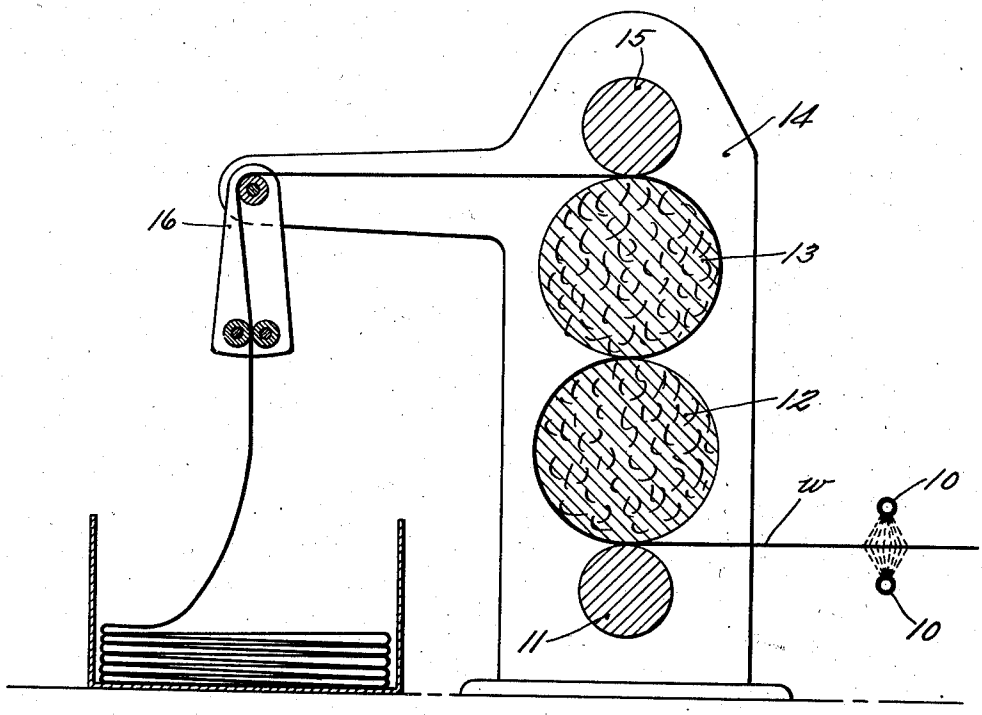
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METHOD OF DAMPENING FABRICS

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METHOD OF DAMPENING FABRICS

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1 Claim. (Cl. 8—5)

In many textile operations it is necessary to have the cloth web uniformly dampened to a point well below saturation and at high speed. To completely saturate cloth, as by immersion, is of course simple; and it is equally easy to apply water to a web below the saturation point if uniformity of dampening is not a requisite, as by passing the web between sprays of atomized water or steam. Neither of these operations is capable of producing a web uniformly dampened to a point well below saturation, say in the neighborhood of thirty per cent. The water retained by a cloth web is in two forms; that held in the meshes of the weave, which may be called mesh-held water, and that held by or between the fibers of the thread or yarn, which may be called fiber-held water. In the uses for which this process is designed, the presence of mesh-held water is not desired, although as will be seen later initially mesh-held water is utilized in achieving the desired result of obtaining uniformly distributed fiber-held water of a definite degree of concentration.

The failure to appreciate these characteristics has apparently been the cause of the uneven results achieved by prior art methods of dampening. One very common method of dampening fabric webs has been to run the web between sprays of atomized water or steam. This distributed the water fairly uniformly over the surface of the web, and could be regulated so that the total amount of water carried by the web could be controlled with fair accuracy. Moisture applied by this method, however, tended to accumulate in small droplets; so that in addition to the fiber-held water there would be, in local regions, a considerable amount of mesh-held water. The presence of these local areas of mesh-held water tended to create variations in the finishing process for which the web was being dampened. Another common method of dampening cloth has been to pass the cloth web between dampened felts, or to roll it up with a dampened backing or lining fabric, so that the web picks up water from the dampened felt or liner. This process is essentially slow, and depends for the uniformity of dampening secured by it upon the uniformity with which the felt or liner was itself dampened.

As one example showing the importance of uniform dampening to a degree substantially less than saturation the production of plisse crepe may be given. This material is made by printing a mercerizing paste in a predetermined pattern upon the web, permitting it to act upon the web to shrink it locally and therefore pucker it, and then neutralizing and washing out the mercerizing paste. It has been found that by imprinting the mercerizing compound upon a dry web the resulting pattern lacked clarity in outline, problably due to a creepage of the mercerizing compound along certain unsaturated fibers. It has been found that moistening the cloth prior to printing causes a lessening of this dispersing effect, and cloth moistened in accordance with my process and then treated with the mercerizing compound shows a clearly defined pattern greatly superior to that produced by any other method. It can readily be seen that saturation of the web with moisture would prevent any absorption of the mercerizing compound. On the other hand, if a partial, but uneven, preliminary dampening were given, the resultant pattern would likewise be uneven. From this illustration, which represents but one of the uses to which the sheet dampened in accordance with my invention can be put, the importance of perfectly even dampening to a point well below saturation will be apparent.

In accordance with my improved method of dampening, the web is first subjected to a thorough application of water, preferably at substantially room temperature, on both surfaces. The time which this initial application of water is permitted to remain in contact with the web before removing all surface water, is kept short enough so that while the web picks up its full complement of mesh-held water, no substantial absorption of water by the yarn or fibers will occur. The removal of the bulk of the surface water can be performed by passing the web between doctor blades, but is preferably accomplished by passing the web between rolls under a heavy pressure. The passage of the web into the bite of the rolls effectively removes all surface water and any excess mesh-held water. At the same time it compresses the web, forcing the mesh-held water into the interstices of the yarn. The pressure on the web is then released for a sufficient length of time to permit the water to be taken up as fiber-held water. At this time the mesh-held water will be substantially converted into fiber-held water, but the latter will not be uniformly distributed through the fibers. Even distribution is accomplished by one or more additional passes between pressure rolls with intervening periods of relaxation of the pressure during which the moisture will be absorbed by the fibers in a more even manner.

The initial application of the water is pref-

erably accomplished by spraying water on both sides of the web. Initial wetting by immersion tends to permit the web to pick up too much water. Surplus water picked up by the web at this stage cannot be effectively removed by later rolling pressure, and as one object is to get a uniformly distributed amount of moisture in the web at a point well below saturation, it is important to avoid too great initial saturation. Similarly, the time during which any excess water is permitted to remain in contact with the web is of importance. It is theoretically possible to spray onto the web exactly the requisite amount of water, so that no excess is present to be removed; but as a practical matter it is easier to spray on an excess amount of water and then to remove the excess after a predetermined time interval than to gauge with the required nicety the amount sprayed on.

It has been stated that the water is used at room temperature. This is of importance in the same way only. Hot water is absorbed into the fibers much more rapidly than cold, and the rapidity of its absorption necessitates a corresponding increase in the accuracy of the time during which the water is permitted to remain in contact with the web. In ordinary operations, therefore, cold water is preferable to hot as it increases the permissible tolerance of accuracy within which the operations must be conducted.

The apparatus on which the method is carried on is illustrated in the drawing. The web *w* is first fed between sprays **10** and is then passed successively between rolls **11** and **12**, **12** and **13**, and **13** and **15** of a four roll stack calender mounted in a frame **14** and having its rolls so driven as to have equal peripheral speeds. Such calenders are well known in the textile finishing art, and the mechanical construction need not be described in detail here. Preferably the rolls **12** and **13** are of fibrous material such as compressed corn-husks, which gives them some resiliency, while the bottom roll **11** and the top roll **15** are of metal such as brass. This combination is desirable as the metal roll has a hard surface which tends to prevent any irregularities from forming in the fibrous roll. The combination also gives, on the one hand, a firmer and more even nip than if two fibrous rolls were used together, and on the other hand, a more resilient pressure than if two metal rolls were used together, the use of a pair of metal rolls being likely to tear the cloth. From the top two rolls the web may be taken to any winding or folding device, one of the latter being indicated at **16**.

Changes in the type of apparatus used for practicing the method may of course be made as required for special cases, the method itself being independent of any special apparatus.

I claim:

A method of dampening fabric in web form which comprises applying water to the web in an amount at least sufficient to fill the meshes of the fabric, removing surface water before the water so applied has had time to penetrate substantially the fibrous structure of the fabric and transferring the mesh held water to the fibers by successive rolling pressure operations with intervening periods of substantial pressure release.

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