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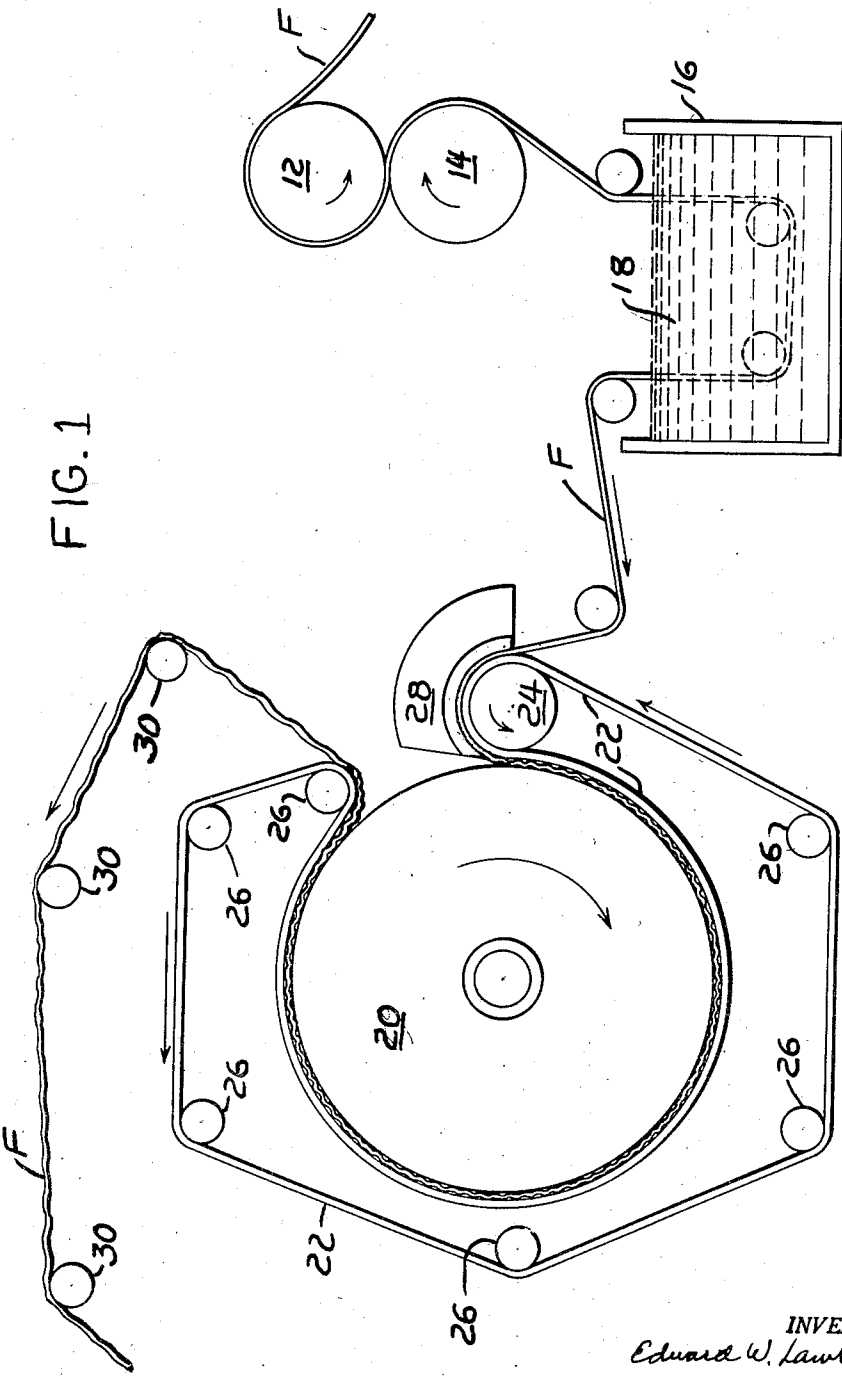
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METHOD FOR IMPARTING WAVED FINISH TO TEXTILE FABRICS

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2 Sheets-Sheet 1



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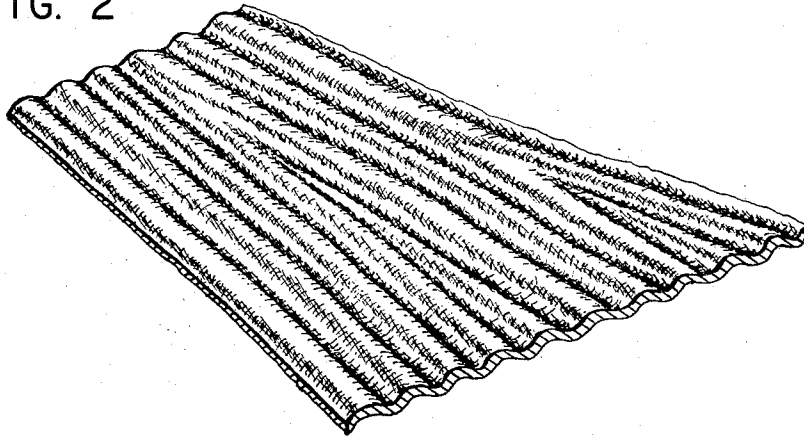
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METHOD FOR IMPARTING WAVED FINISH TO TEXTILE FABRICS

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2 Sheets-Sheet 2

FIG. 2



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METHOD FOR IMPARTING WAVED FINISH TO TEXTILE FABRICS

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3 Claims. (Cl. 117-11)

This invention relates to the treatment of textile fabrics and more particularly to a novel method for imparting to said fabrics a waved or rippled configuration resistant to washing, the same being broadly included in the term "finish," and to the novel product thereof.

Heretofore, waved finishes have been produced in textile fabrics by means of an embossing calender. Such method, however, required the use of an engraved metal cylinder which was geared and fitted together with a softer roll having a surface of wool, cotton, paper, or the like to cooperate with the engraved roll to produce embossed waves or ripples in a textile fabric passed therebetween. Although the end product of such method was generally satisfactory, the method was an expensive one to carry out, since not only was the required mechanism expensive, primarily because of the specially engraved roller required, but also because it operated at a comparatively slow speed of the order of 10 to 20 yards per minute.

I have discovered that a unique waved or rippled finish resistant to washing may be produced in textile fabrics by the employment, in a certain novel modified manner, of a well-known type of textile finishing machine already in use in many textile finishing plants for an entirely unrelated purpose. More specifically, I have found that a conventional compressive shrinking machine, basically unchanged, may be adjusted and operated in a novel manner to produce uniformly distributed, substantially parallel, somewhat discontinuous, rounded waves or ripples generally perpendicular in direction to the warp yarns of a fabric passed through such machine, such result being all the more unexpected in view of the many years' use in the textile finishing industry of compressive shrinking machines, without any realization of the possibility of so operating them continuously to produce a longitudinally extended sheet of a novel textile fabric having an attractive waved or rippled configuration or finish somewhat similar to that produced by the usual embossing, yet having its own unique characteristics.

It is a particular feature of the method of my invention that it may be carried out at the usual speeds of a compressive shrinking machine, which speeds are very much higher than with the heretofore known embossing method described above.

It is a further feature of my invention that it may be carried out on a conventional compressive shrinking machine without radical mechanical modifications thereto so that such machine may be readily used alternatively for compressive shrinking or for providing a waved or rippled finish according to my invention, respectively, depending upon the adjustment and relationship of certain parts of the machine.

To explain still further features of the novel method as well as the waved or rippled fabric of my invention, reference is now made to the following detailed description of a preferred embodiment thereof together with the accompanying drawings, wherein in Fig. 1 is shown a somewhat diagrammatic view of the complete apparatus adapted to carry out my novel method, and in Fig. 2 is

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shown a diagrammatic isometric view of a novel textile fabric having a waved or rippled finish imparted by the method of my invention.

Referring now to Fig. 1, the novel method of my invention comprises supplying a continuous web of textile fabric F from a roll (not shown) preferably first to a friction calender having a heated upper roll 12 and a heated lower roll 14 in frictional pressure contact with one another to provide a smooth glazed calendered surface finish on said fabric. The fabric is then passed through a tank 16 containing a suitable resin-forming liquid mixture or solution 18 to impregnate the fabric with resin-forming components adapted to be heat-hardened to maintain the finish of the fabric so that it will be resistant to washing as well as to ordinary wear. I prefer that the resin-forming solution 18 contain a thermo-setting type of resin essentially monomeric in form, although partially polymerized resins may also be used. Also, I prefer that the fabric be somewhat dried after impregnating, preferably to about 5% to 15% moisture content, although not sufficiently permanently to harden or otherwise set the resin for reasons hereinafter appearing. Typical of suitable resins which may be used are phenol formaldehyde, urea formaldehyde, melamine formaldehyde, and modified urea formaldehyde.

The impregnated fabric is then passed to a compressive shrinking machine, it being essential in the case of a thermo-setting resin that the resin-forming components in the fabric do not react to form a hardened resin before the configuration of the fabric is altered by such machine operated according to my invention as hereinafter explained, since if such occurs the ripples or waves formed will not be resistant to washing. However, it may be desirable in some instances to partially set the resin. This problem will not arise with certain types of thermoplastic resins, since the heat supplied to the fabric in the compressive shrinking machine can be made sufficient to pre-soften such resins for wrinkling.

The compressive shrinking machine itself is well known in the textile finishing art and includes a rotatably mounted normally heated drum 20 having a relatively thick blanket 22 forming a continuous web around a major portion of its periphery, said blanket being supported and fed into contact with said drum by an infeed roll 24 of relatively small diameter, the return flight of said blanket out of contact with said drum being supported by a number of supporting rolls 26. Typically, drum 20 may have a diameter of about 5 feet and infeed roll 24 of about 2 to 4 inches. The infeed roll 24 is provided with a heated curved shoe 28 cooperating therewith to press the blanket 22 and fabric F by confining them therebetween and feed them to the heated drum 20, the outer surface of said relatively thick blanket being stretched by reason of the blank 22 bending around the small diameter of infeed roll 24, and the infeed sheet of fabric being led onto said stretched surface of said blanket.

Although in the normal use of a compressive shrinking machine, the point of shoe 28 is arranged to be almost in contact with the peripheral surface of drum 20, with the infeed roll 24 as close to said surface as the thickness of blanket 22 will permit, according to my invention, I space the shoe 28 and preferably also the infeed roll 24 a substantial, although limited, distance from the said surface of drum 20. That is, the point of shoe 28 is spaced a limited distance, say about .010 to .125 inch, from the surface of drum 20 so that a limited length of said fabric in progressively passing from contact with shoe 28 at its point is released and remains substantially unconfined for a limited distance before it is again confined between the surface of drum 20 and blanket 22. Also, the infeed roll 24 is preferably spaced

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from said surface at a distance of about .010 to .100 inch greater than required by the thickness of the movable blanket 22 upon which the fabric is carried and by the fabric itself.

Thus, since the fabric contacting surface of blanket 22 in effect contracts on passing between contact with the curved surface of shoe 28 and contact with the oppositely curved surface of drum 20, the fabric carried on said surface being substantially unconfined for a limited distance between shoe 28 and drum 20 and being fed toward said drum at a speed about 2% to 6% greater than the peripheral speed thereof, will itself contract about 2% to 6% to form surprisingly uniformly distributed, substantially parallel, rounded but discontinuous waves or ripples generally perpendicular to the warp yarns of the fabric, as shown in Fig. 2. Furthermore, such wrinkles, once so formed, are strangely enough not pressed flat by reason of again being confined between blanket 22 and drum 20, even though the resinous material has not yet been hardened, and they remain substantially similar in appearance even after hardening.

As the rippled or waved fabric F passes around the heated drum 20 it is dried and the resinous material therein is preferably at least partially hardened to aid in maintaining it in waved form, although I have found that with the conventional compressive shrinking machine it is difficult to achieve complete hardening without unduly slowing down the speed of the machine with consequent loss of production, since such machine may be operated at its usual speed of about 50-70 feet per minute. Hence, I prefer to take the fabric from drum 20 over suitable fabric supporting rolls 30 to a fabric take-up roll (not shown) and to complete the hardening process by the use of a conventional air dryer (not shown) in which the resin hardening is completed by heat hardening at a temperature of about, say, 300° F. for 5 minutes, to make the waved fabric resistant to washing.

The following will serve as typical examples of the practice of my novel method, although it will be understood that my invention is by no means limited thereto:

Example I

A bleached 39" 80 x 80 4.00 cotton cloth which had been dyed a naphthol navy blue was impregnated with a solution of 6¼% ethylene urea formaldehyde, 2½% cationic softener, and 1½% organic acid catalyst. The cloth was then dried to 10-12% moisture, run through a compressive shrinking machine with a 5' drum heated to about 300° F. and a 2¼" infeed roll at a speed of 50-70 yards per minute, to form the ripples or waves, the shoe being heated to about 350° F. and with its point spaced about .070" from the drum surface and the infeed roll being spaced about .020" from the drum surface in addition to the thickness of the blanket plus that of the fabric to leave an unconfined length of fabric, the speed of the infeed cloth being about 5% higher than that of the peripheral speed of the drum to give a contraction of the cloth of about 5%. After passing through said machine, the resin was cured 5 minutes at 290° F. in an air drier. The finished cloth had a series of substantially uniform rounded ripples or waves about ⅜-¼" across, which ripples were substantially perpendicular to the warp yarns of the fabric.

Example II

A bleached 39" 80 x 80 4.00 cotton cloth which had been dyed a naphthol navy blue was given a high luster by running on a friction glazing calender at 400° F. The sample was then run as described in Example I. The finished cloth had a series of ripples or waves about ⅜-¼" across which were substantially parallel to the filling, with an all-over smooth, glazed surface.

Other natural fabrics, such as wool, may also be treated by the above-described method of my invention, as well as such cellulosic fabrics as cotton, rayon, or the like.

Ripples or waves may also be produced in a fabric

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composed in whole or in part of thermoplastic fibers according to the method of my invention, for example on fibers such as nylon, Dacron, and Orlon, since fabrics composed of such thermoplastic materials can be softened or otherwise modified by heat to set them in a desired shape or form which will be permanent unless the original setting temperature is again reached. Therefore, by running fabrics containing thermoplastic fibers through a compressive shrinking machine at a temperature high enough to soften the resin, it is possible to obtain a permanently rippled or waved finish by the action of the heated shoe 28 to soften the resin, which may then be hardened by a suitably low temperature of drum 20. Likewise, a fabric modified by the application of thermoplastic resins may be similarly treated to provide a waved or rippled finish.

The following examples will serve to illustrate the method of my invention as applied to thermoplastic fibers.

Example III

A filament nylon 152 x 100 fabric was run through a compressive shrinking machine as described above, having an infeed roll 2¼" in diameter, feeding the nylon fabric at a speed of about 5% higher than the peripheral speed of the drum, such machine being operated with its shoe at a temperature of 350° F. and its drum at 300° F., and with an unconfined fabric length, as described in Example 1. The resulting cloth had a series of small waves or ripples about ⅜-⅛" across essentially perpendicular to the warp yarns of the fabric.

Example IV

A spun Dacron 58 x 48 fabric was run as in Example III. The resulting cloth had a series of ripples in the cloth about ⅜-¼" across and essentially perpendicular to the warp direction of the cloth.

Thus it will be seen that I have provided a novel method for continuously producing in an extended sheet of textile fabric closely adjacent waves or ripples uniformly distributed throughout the extent of said sheet, such waves or ripples being substantially similar to embossed waves or ripples. Various modifications of my novel method within the spirit of my invention and the scope of the appended claims will occur to those skilled in the art.

I claim:

1. A method of finishing a continuous sheet of textile fabric to provide substantially parallel and uniform waves therein generally perpendicular to the warp yarns of said fabric comprising first treating said fabric with a resinous material adapted to be hardened, then supporting said treated fabric on a movable web having a contractible curved fabric-supporting surface cooperating with an opposed fixed curved surface to confine said fabric therebetween, next progressively releasing a limited length only of said fabric from said opposed confining surfaces while contracting said fabric supporting surface of said web to reduce the surface speed of travel of said web and fabric to wave said fabric supported thereon while said limited length of said fabric remains substantially unconfined, and finally confining said waved fabric between said contracted fabric-supporting web surface and an opposed curved surface to at least partially harden said resinous material to set said waves to provide a resin treated waved fabric resistant to washing.

2. A method of finishing a continuous sheet of textile fabric to provide substantially parallel and uniform waves therein generally perpendicular to the warp yarns of said fabric comprising first treating said fabric with a resinous material adapted to be hardened by heating, then supporting said treated fabric on a movable web having a contractible curved fabric-supporting surface cooperating with an opposed fixed curved surface to confine said fabric therebetween, next progressively releasing a limited length only of said fabric from said opposed confining surfaces while contracting said fabric-support-

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ing surface of said web to reduce the surface speed of travel of said web and fabric to wave said fabric supported thereon while said limited length of said fabric remains substantially unconfined, and finally confining said waved fabric between said contracted fabric-supporting web surface cooperating with heated opposed curved surface to at least partially heat harden said resinous material to set said waves to provide a resin treated waved fabric resistant to washing.

3. A method of finishing a continuous sheet of textile fabric to provide substantially parallel and uniform waves therein generally perpendicular to the warp yarns of said fabric comprising calendering said fabric to provide a smooth surface thereon, then treating said fabric with a resinous material adapted to be hardened by heating, then supporting said treated fabric on a movable web having a contractible curved fabric-supporting surface cooperating with an opposed fixed curved surface to confine said fabric therebetween, next progressively re-

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leasing a limited length only of said fabric from said opposed confining surfaces while contracting said fabric-supporting surface of said web to reduce the surface speed of travel of said web and fabric to wave said fabric supported thereon while said limited length of said fabric remains substantially unconfined, and finally confining said waved fabric between said contracted fabric-supporting web surface cooperating with heated opposed curved surface to at least partially heat harden said resinous material to set said waves to provide a resin treated calendered waved fabric resistant to washing.

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