Nov. 1, 1955 E. THORP 2,722,486

METHOD OF FINISHING A WOVEN MULTI-PLY FABRIC

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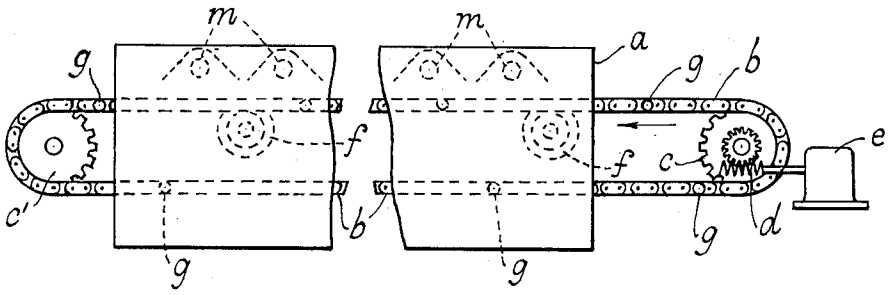


FIG. 1

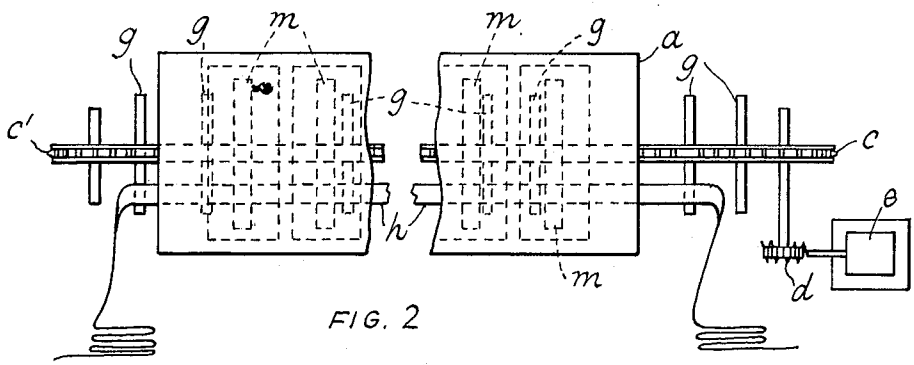


FIG. 2

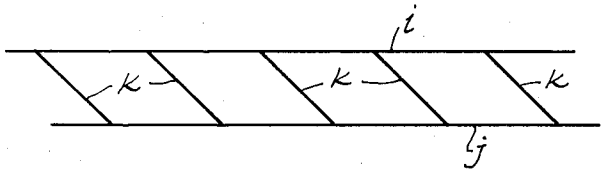


FIG. 3

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METHOD OF FINISHING A WOVEN MULTI-PLY FABRIC

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2 Claims. (Cl. 117—7)

This invention relates to the manufacture of woven multi-ply narrow fabrics, of the kind having at least one main woven web with interwoven elements at predetermined pitch or spacing, as for example, in which there are two or more superimposed main woven webs of which adjacent webs are connected at spaced intervals by cross straps (woven or weftless) the ends of which are interwoven with the main webs by being bound into the respective adjacent main webs during the weaving of the latter, or of any other kind in which there are pockets or other woven formation at predetermined spacing or pitch.

It has long been a problem to improve the accuracy of "pitch" or "gauge" in the manufacture of some varieties of such fabrics, not only as regards different pieces, made say, at different times on the same loom (each loom weaving several, say 16, pieces at a time) or on different looms, but also as regards variations which occur in the same piece, due to change of some factor or another such as atmospheric conditions. Also in such fabrics there is a known possibility of difference of gauge developing in the two main webs of a piece during or after weaving such as could be caused by variation throughout the length of the yarn, mainly as to the warps. All such errors of gauge can be important to the user of some of these fabrics especially where two or more lengths have to be used side by side so that such errors cause mis-alignment of the spaced formations along the lengths. Present day mass production use of such fabrics calls for even greater accuracy of gauge than is obtainable by present methods while any application of mass production methods in the manufacture of the fabric will tend to reduce rather than increase the accuracy of gauge.

Another problem with such fabrics is the question of colour or other factor which may call for dyeing or some aqueous treatment after weaving. Up to the present invention the manufacture of any such fabrics in colour, or for example proofed, has involved the use of coloured or pre-proofed yarn and this entails not only a substantial increase in the stocks which must be held by manufacturers and traders, but also the use of such coloured or proofed yarn seems to increase the already serious problem of "gauge" accuracy. It is well known that yarn, otherwise the same but dyed to different colours, will vary in its behaviour during weaving. Attempts to dye the fabric after weaving have failed up to date because of the varying effect which it has on the gauge. The advantages of being able to weave with undyed and untreated yarn are obvious if only it were possible to overcome the serious disadvantageous results which at present follow necessary treatment after weaving for dyeing, sizing, proofing etc. to make the product saleable.

The objects of the present invention are to improve the accuracy of gauge of the finished product, to render such product less sensitive to change of gauge due to the effect of humidity or other conditions hitherto known

to affect the gauge and also to make it possible to dye or otherwise process the fabric in the piece while at the same time achieving the aforesaid objects of gauge accuracy.

The invention comprises the method of finishing a woven multi-ply narrow fabric of the kind referred to wherein it is "wet impregnated" with a setting preparation, such as an aqueous solution of thermo-setting synthetic resin, so that the fabric takes up sufficient of the impregnant, and is then dried while under tension and held to gauge with reference to the interwoven formations by the application of sufficient heat to cause the impregnant to set the fabric to gauge. The fabric may be dyed by a normal aqueous process before impregnation, if desired.

The invention also comprises apparatus for drying and setting the fabric.

In the accompanying drawings:

Fig. 1 is a diagrammatic side elevation, and

Fig. 2 is a diagrammatic plan of one example of apparatus operating in accordance with the invention;

Fig. 3 is a diagrammatic side elevation showing one example of tape suitable for treatment by the said apparatus.

In one example of the invention an undyed piece of webbing, such as that shown in Fig. 3 having two main webs *i* and *j* and a plurality of cross straps *k*, is dyed by immersion in an aqueous dye solution and dried after washing to remove loose dye. The fabric is then immersed in an aqueous solution of a thermosetting resin. A suitable resin is a urea-formaldehyde polymerising on exposure for 2 minutes at 320° F. The piece is then passed through rollers, so set as to leave 8% by weight of the resin on the fabric. The webbing which has shrunk as the result of the previous treatment and of being wet, is fed to a drying machine which consists of a tunnel about 30 feet in length, in which are arranged a number of infra-red lamps. Arranged in the tunnel *a* is an endless chain carried at each end by sprockets *c*, *c'* respectively of which *c* is driven at a slow speed through worm drive *d* from an electric motor *e*. The chain passes over intermediate supports *f* to keep it level in the tunnel. To simplify the drawings, such elements as bearings for the sprocket are not shown. Secured to the chain at regular intervals of 1 yard, are laterally extending cross bars *g* on which the fabric *h* is adapted to be threaded. An operator standing beside the chain *b* at the entrance end, separates the main tapes and stretches and threads the web onto the cross bars *g* as they move forward, selecting the correct location between the cross tapes so that a length having the predetermined number of cross tapes between such bars is held to correct gauge as it is carried through the drying tunnel in which are a plurality of infra-red heating elements *m*. The pieces are removed manually at the other end. The rate of travel of the chain and the heating of the tunnel are adjusted so as to ensure that the setting impregnant is properly dried out and set before the fabric leaves the drying tunnel. Thereafter, the fabric is further manipulated and/or packaged in the usual manner.

By such treatment, it has been found that, whether the fabric is dyed or not, it is possible to produce fabric of a much greater accuracy of gauge than has been possible up to date, and moreover, the impregnation not only sets the gauge but also gives the material a resistance to mildew and other forms of degradation, as well as making it less sensitive to conditions such as humidity, which are liable to affect the gauge and to which it may be subjected in use.

Obviously, the invention can be applied to correcting errors which may have been caused after the fabric has

been once so treated. For example, fabric accidentally submerged with resultant shrinkage, discolouration etc. can be reprocessed to restore the gauge and make the fabric again saleable. Also, where redyeing or special extra proofing treatment is required this can be done while maintaining gauge accuracy.

It has been found that fabric produced in this manner has a greater accuracy of gauge than is obtainable from the loom, has a better appearance due to the condition of finishing, and can be made with controlled degrees of stiffness which was not hitherto possible.

What I claim is:

1. The method of finishing a woven multi-ply narrow fabric consisting of at least two main webs with a plurality of cross members located between each adjacent pair of main webs, said cross members each being attached to each of said pair of main webs by having its ends bound in to said main webs during the weaving of the latter, which comprises wet-impregnating the fabric with a resinous setting preparation, placing the fabric under tension while wet and holding it to gauge with reference to selected bound-in ends of the cross members by holding the fabric adjacent said selected bound-in ends of the cross members, and applying sufficient heat to the fabric while under tension and held to gauge to cause the impregnant to set the fabric to gauge.

2. The method of finishing a woven multi-ply narrow fabric consisting of at least two main webs with a plurality of cross members located between each adjacent pair of main webs, said cross members each being attached to each of said pair of main webs by having its ends bound in to said main webs during the weaving of the latter, which comprises impregnating the fabric with an aqueous solution of a thermo-setting resin, placing the fabric under tension while wet and holding it to gauge with reference to selected bound-in ends of the cross members by holding it adjacent said selected bound-in ends of the cross members, and applying sufficient heat to the fabric while so held to gauge to polymerize the resin and set the fabric to gauge.

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