Dec. 5, 1944. A. MELLOR ET AL 2,364,157

TEXTILE APPARATUS

Filed June 18, 1942

FIG. 1

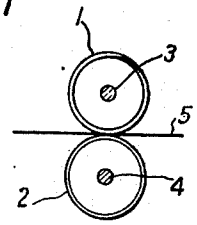


FIG. 2

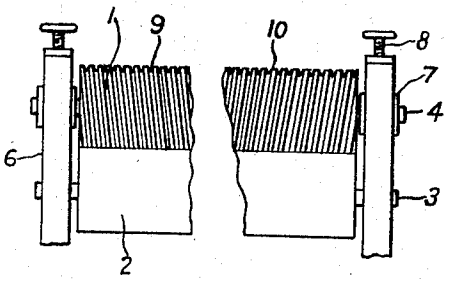


FIG. 3

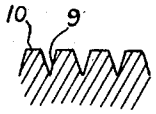


FIG. 4

Patented Dec. 5, 1944

2,364,157

UNITED STATES PATENT OFFICE

2,364,157

TEXTILE APPARATUS

Albert Mellor and Ralph James Mann, Spondon, near Derby, England, assignors to British Celanese Limited, London, England, a company of Great Britain

Application June 18, 1942, Serial No. 447,506
In Great Britain July 7, 1941

9 Claims. (Cl. 26—51)

This invention relates to textile apparatus and in particular to apparatus for improving the properties of woven fabrics.

Many types of fabric in the grey state suffer from what is known as "reediness," i. e. a grouping of the warp ends, and frequently the defect is not removed during finishing and the fabric gives an impression of openness and thinness and generally has an uneven appearance.

The apparatus according to the present invention enables this defect to be removed, the apparatus comprising a pair of rollers forming a nip through which the fabric may be passed in open width, at least one of the rollers having a surface comprising resilient projections that are closely spaced along the length of the rollers and are distorted under pressure at the nip. When a fabric exhibiting reediness is passed through the nip, the fabric being suitably wetted, e. g. with soap solution of a concentration suitable to lubricate the yarns in the fabric, a slipping of warp over weft, which averages the distribution of the warp ends throughout the width of the fabric, is produced by distortion of the projections in a direction parallel to the length of the rollers. It is preferable that one of the rollers should have a plain surface; if not, the projections on the two rollers must register with one another and not intermesh, since if they intermesh the full benefit of the distortion of the projections in a direction parallel to the length of the rollers is not obtained.

The resilient projections may be provided by covering the roller or rollers with a sheet of "porcupine" rubber, but, in order to avoid the difficulties of effecting permanent attachment of such sheet material to the roller surface, the projections may be formed in a solid rubber roller, e. g. a rubber mangle bowl. Thus, a thread may be cut in the rubber covering to give ribs $\frac{1}{16}$" wide having $\frac{1}{8}$" pitch. Under the pressure at the nip the ribs spread in the lengthwise direction of the roller.

In order that the necessary distortion may take place the rubber must be relatively soft. Thus, rubber having a hardness of 65 on the Short and Mason rubbermeter gives good results; the upper limit of resiliency is in the region of 90 on the same meter.

The apparatus according to the invention can be simply constructed on the lines of the usual 2-bowl mangle or may be adapted to provide a plurality of nips, e. g. by having a number of small rollers contacting with one large roller. The 2-bowl form is very simple to operate and may be arranged to provide for the fabric to make a number of passes if necessary. Thus, the rollers may be fitted with reverse gear so that the fabric may be passed first from one side and then from the other, or the fabric with its ends sewn together may be passed repeatedly through the nip. In some cases, however, one passage through the machine may suffice. The multi-roller arrangement gives, in a single pass, the effect of several runs through the 2-bowl form. The open-width treatment enables the fabric to be processed without any tendency towards creasing, as is the case with attempts to improve fabrics by milling in rope-form.

The apparatus is suitable for the treatment of many types of fabric, for example plain weave fabrics having a basis of artificial filaments or fibres. Some staple fibre fabrics, e. g. of cellulose acetate or viscose fabrics or mixtures of these fibres, suffer badly from reediness and are much improved by treatment in the machine while in the grey state. Again, certain jacquard underwear crepe fabrics and plain underwear crepe-de-chine are improved considerably by treatment in the machine. The machine may also be used to improve the handle of fabrics, as well as to even out inequalities in the warp distribution.

By way of example two forms of apparatus according to the invention will now be described in greater detail with reference to the accompanying drawing, in which:

Fig. 1 is a diagrammatic side elevation of a 2-bowl mangle in accordance with the invention,

Fig. 2 is a front elevation of the rollers shown in Fig. 1,

Fig. 3 shows a section at the surface of one of the rollers of Figs. 1 and 2, and,

Fig. 4 is a side elevation of a multi-roller machine according to the invention.

Referring to Figs. 1 and 2, the apparatus shown therein comprises two rollers 1, 2, mounted on shafts 3 and 4 and forming a nip through which the fabric 5 is passed. Shaft 3 is mounted in a frame 6 and shaft 4 is mounted in bearing blocks 7 carried in slots in the frame 6 and capable of being pressed downwards by means of hand-screws 8. Each of the rollers 1, 2, is surfaced with rubber, the lower roller 2 being left plain. In the surface of the upper roller 1 are cut two single helical grooves, running in opposite directions, the groove in the left-hand half of the roller 1 as shown in Fig. 2 being right-hand helix and that in the right-hand half of the roller a left-hand helix. The pitch of helices is $\frac{1}{8}$ of an

inch and the grooves, as shown at 9 in Fig. 3, are of V-section, of sufficient width to leave a land 10 of 1/8 of an inch between successive grooves. The fabric being treated is wetted with a suitable lubricating liquid e. g. a soap solution of 80 grams per litre or less, or a solution of Turkey red oil, Calcolene oil H. S. or Permanol EML. The wetted fabric is then passed between rollers 1, 2, the pressure between the rollers being adjusted by means of the hand-screws 8 so that, having regard to the thickness of the fabric, the projections 10 on the surface of the roller 1 are distorted and the V-shaped grooves substantially closed up by the pressure between the rollers. According to the nature of the fabric and the degree of initial unevenness of the warp distribution, one pass of the fabric between the rollers may or may not be sufficient to bring about an even distribution of the warp threads.. If, as is usual, more than one run is necessary, the fabric may be run alternately back and forth between the rollers until the desired degree of evenness is obtained or until no further improvement is seen.

In Fig. 4 is shown a more elaborate form of apparatus in which the fabric, indicated at 12 is passed between a large plain rubber covered roller 13 and a series of small grooved rubber covered rollers 14 similar in character to the roller 1 shown in Figs. 1 and 2. The rollers 14 are mounted on shafts 15 carried in bearing blocks 16 which are slidable radially, with reference to the roller 13 in slotted brackets 17. Springs 18 bear on the blocks 16 and are adjusted by means of handwheels 19 and locking nuts 20.

Carried on a plate 21 which is capable of slight rotation about the shaft 22 of the roller 13 are a series of cams 23, one for each roller 14, each cam being capable of engaging the end of a shaft 15 on rotation of the plate 21. Rotation of the plate 12 is effected by means of a handle 25 adapted to rotate a pinion 26 engaging with a few gear teeth 27 on the edge of the plate 21. A similar arrangement is, of course, provided at the other side of the machine, and worked by the same handle 25. Rotation of the plate 21 by means of the handle 25 causes each cam 23 to engage its shaft 15 and to lift the rollers 14 from the surface of the roller 13 in order that the fabric may be threaded through the apparatus at the beginning of the operation.

The fabric 12 coming from a batch (not shown) passes over a guiding and feeding roller 29, under the first of the rollers 14 and between that roller and each of the succeeding rollers 14 and the roller 13. Leaving the last of the rollers 14 the fabric passes under a guide roller 30, over two guide rollers 31, 32, and thence to an oscillating arm 33 by means of which it is folded into batch 34. The machine is driven from a motor 35, connected through a worm drive 36, belt drive 37, gear box 38, belt drive 39 and gears 40 to the shaft 22 of the roller 13. The guide roller 29 is driven from a shaft 22 by means of a belt 41, the guide roller 32 is driven from shaft 22 by a belt 42 and the batching arm 33 is driven from the shaft 43 of the roller 32 by means of a belt 44, crank 45 and connecting rod 46. By means of this machine the fabric may be submitted to repeated pressure in a single pass, its action being equivalent to that of several passes through the 2-bowl mangle shown in Figs. 1 and 2.

Having described our invention what we desire to secure by Letters Patent is:

1. Apparatus for the treatment of woven fabrics, said apparatus comprising a pair of rollers forming a nip through which the fabric may be passed in open width, at least one of the said rollers having a surface comprising resilient ridges closely spaced along the length of the roller and extending round the roller, said ridges being of narrow width so that they are distorted in a direction parallel to the length of said roller by the pressure of the other roller acting directly through the fabric in said nip.

2. Apparatus for the treatment of woven fabrics, said apparatus comprising a single pair of rollers forming a nip through which the fabric may be passed in open width, one of the said rollers having a plain surface and the other having a surface comprising resilient ridges closely spaced along the length of the roller and extending round the roller, said ridges being of narrow width so that they are distorted in a direction parallel to the length of said roller by the pressure of the other roller acting directly through the fabric in said nip.

3. Apparatus for the treatment of woven fabrics, said apparatus comprising a single pair of rollers forming a nip through which the fabric may be passed in open width, one of the said rollers having a plain surface and the other having a surface comprising resilient ridges closely spaced along the length of the roller and extending round the roller, said ridges being of narrow width so that they are distorted in a direction parallel to the length of said roller by the pressure of the other roller acting directly through the fabric in said nip, wherein the resilient ridges are formed in a surface of rubber having a hardness of from 65–90 as measured on the Short and Mason rubber-meter.

4. Apparatus for the treatment of woven fabrics, said apparatus comprising a single pair of rollers forming a nip through which the fabric may be passed in open width, one of the said rollers having a plain surface and the other having a surface comprising resilient ridges closely spaced along the length of the roller and extending round the roller, said ridges being of narrow width so that they are distorted in a direction parallel to the length of said roller by the pressure of the other roller acting directly through the fabric in said nip, wherein the resilient ridges are formed by cutting in a helical groove of V-section in the surface of a rubber covered roller.

5. Apparatus for the treatment of woven fabrics, said apparatus comprising a single pair of rollers forming a nip through which the fabric may be passed in open width, one of the said rollers having a plain surface and the other having a surface comprising resilient ridges closely spaced along the length of the roller and extending round the roller, said ridges being of narrow width so that they are distorted in a direction parallel to the length of said roller by the pressure of the other roller acting directly through the fabric in said nip, wherein the resilient ridges are formed by cutting a helical groove of V-section in the surface of a rubber covered roller, the rubber having a hardness of from 65–90 as measured on the Short and Mason rubber-meter.

6. Apparatus for the treatment of woven fabric, said apparatus comprising a plurality of rollers, all engaging with a common plain-surfaced roller, forming a plurality of nips through which the fabric may be passed in open width, each of the said plurality of rollers having a surface comprising resilient ridges closely spaced along the length of the roller and extending round the

roller, said ridges being of narrow width so that they are distorted in a direction parallel to the length of said roller by the pressure of said plain-surfaced roller acting through the fabric in each of said plurality of nips, and means for guiding the fabric between each of said plurality of rollers and said plain-surfaced roller.

7. Apparatus according to claim 6, wherein the resilient ridges are formed in a surface of rubber having hardness of from 65–90 as measured on the Short and Mason rubber-meter.

8. Apparatus according to claim 6, wherein the resilient ridges are formed by cutting a helical groove of V-section in the surface of a rubber covered roller.

9. Apparatus according to claim 6, wherein the resilient ridges are formed by cutting a helical groove of V-section in the surface of a rubber covered roller, the rubber having a hardness from 65–90 as measured on the Short and Mason rubber-meter.

ALBERT MELLOR.
RALPH JAMES MANN.