July 9, 1963 R. J. McNAMARA 3,096,559

METHOD AND APPARATUS FOR MAKING TEXTURED FABRICS

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Fig. 1.

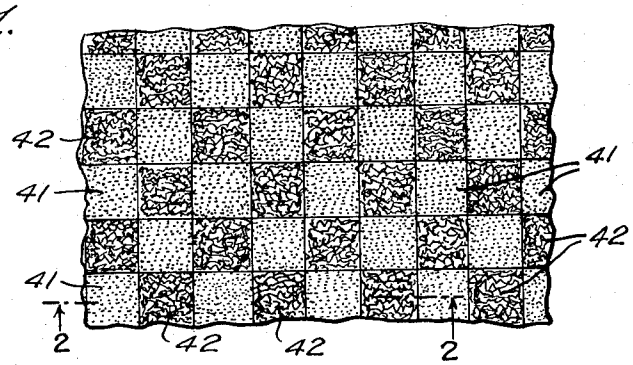
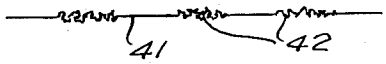


Fig. 2.



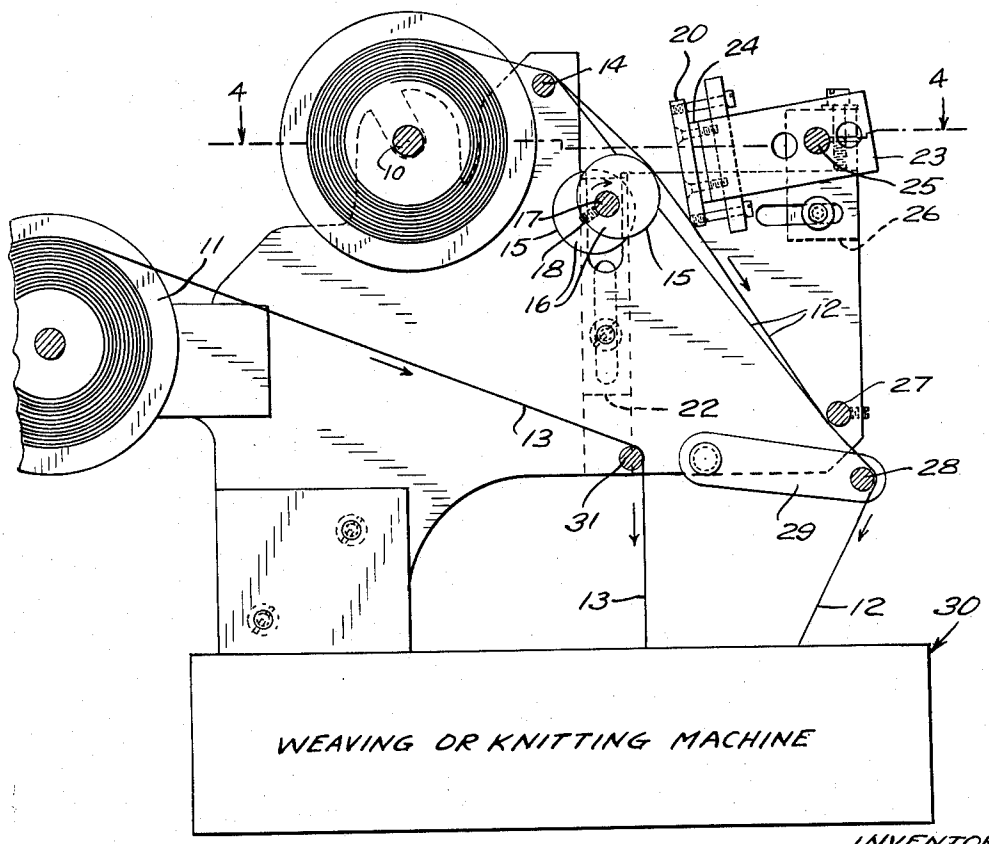


Fig. 3.

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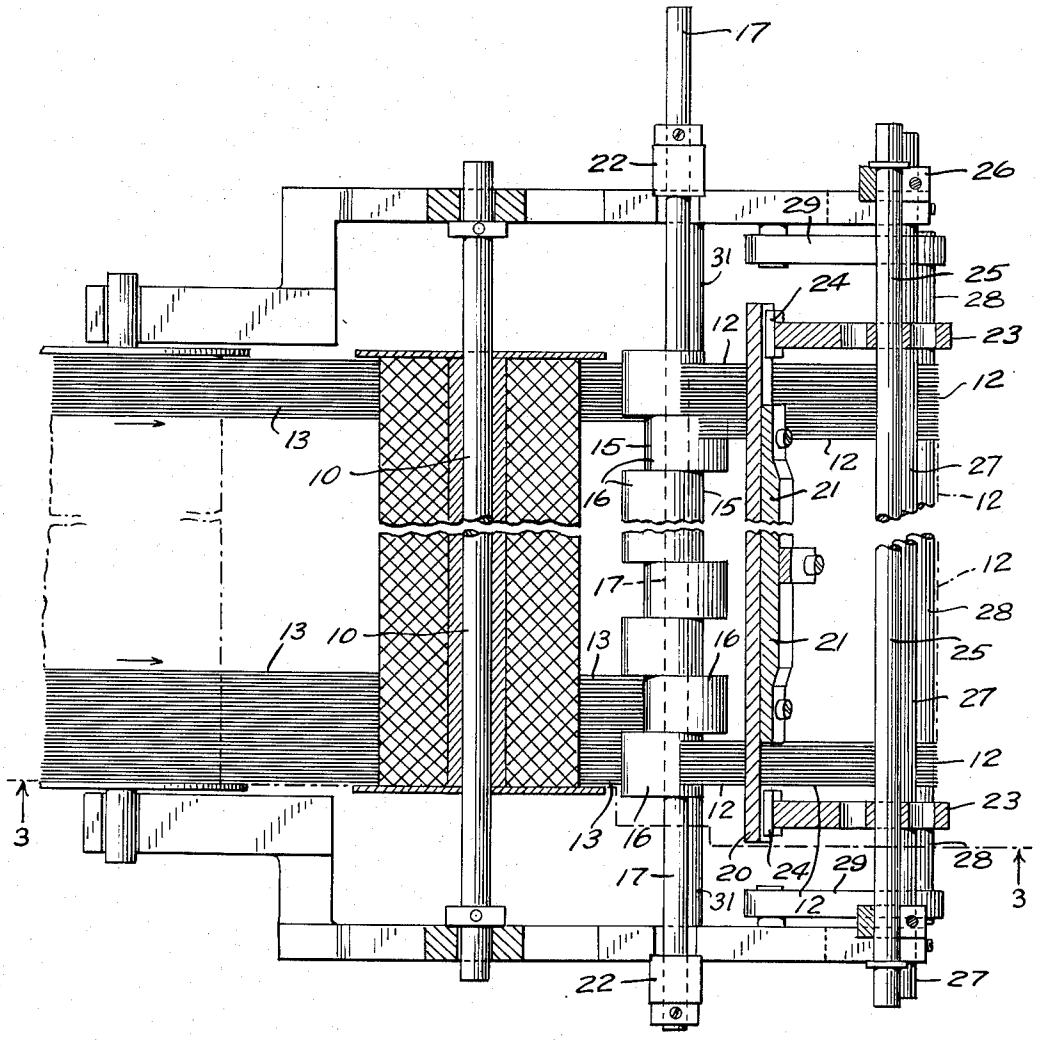
Fig. 4.



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METHOD AND APPARATUS FOR MAKING TEXTURED FABRICS

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5 Claims. (Cl. 28—1)

This invention relates to a method and apparatus for making a textured fabric and more particularly to a method of forming bulked and flat areas in a predetermined pattern in a knitted or woven fabric.

An object is to provide a novel and improved method and apparatus of the above type.

Another object is to provide a method of treating a crimped yarn during weaving or knitting so as to produce the above textured effect.

More specifically the invention applies to a method of weaving or knitting wherein a yarn sheet is taken from a warp beam and fed into the loom or knitting machine for fabrication. If the yarn on the beam is of the type which has been previously crimped and wound under tension on the cop or beam the yarn is in a temporarily straight form wherein the crimp has been straightened out but will be restored when the yarn is relaxed during fabrication.

The invention is based upon the fact that the crimp may be permanently removed from the yarn by subjecting the yarn, while in the straight form, to setting conditions. Accordingly heat is applied by a pattern roll or the like to selected positions of the yarn sheet as it is fed from the warp beam to the loom or knitting machine. When the yarn is relaxed after fabrication the crimp will be restored only to the areas which have not been heated by the pattern roll and a patterned or textured effect is obtained.

The nature of the invention will be better understood from the following description, taken in connection with the accompanying drawings in which a specific embodiment has been set forth for purposes of illustration.

In the drawings:

FIG. 1 is a plan view of a portion of a fabric embodying the invention;

FIG. 2 is a partial section taken on the line 2—2 of FIG. 1;

FIG. 3 is a vertical, longitudinal section taken on the line 3—3 of FIG. 4 illustrating one type of apparatus for making the product of FIG. 1; and

FIG. 4 is a horizontal section taken on the line 4—4 of FIG. 3.

Referring to the drawings more in detail the invention is shown as embodied in apparatus comprising upper and lower warp beams **10** and **11** respectively carrying warp sheets **12** and **13** respectively of the type commonly used in warp knitting machines of the tricot type as shown for example in the Young Patent 2,476,344, dated July 19, 1949.

The warp **12** is of the crimped type such as nylon continuous filament yarn which has been crimped in a stuffer crimper and wound on a cop or beam under a tension to substantially remove the crimp and leave the yarn in straight condition. However the crimp will be restored by heating the yarn in tensionless state after weaving or knitting.

In accordance with this invention the warp sheet **12** while still in the straight state is passed over a guide rod **14** in a downwardly inclined direction over a series of cam faces **15** carried by cams **16** which are mounted eccentrically on a cam shaft **17**. The cams **16** may be individually adjusted about the shaft **17** and fixed in place

by set screws **18**. Each cam face **15** is of a width to engage a plurality of the warp yarns **12** so as to elevate such yarns at a selected point during the rotation of the shaft **17**.

A shoe **20** which may be heated by suitable means such as resistance rod **21** is positioned above the yarn sheet **12** adjacent the cam faces **15** and in a position to be engaged by the yarns as they are elevated by the cam faces. The cam shaft **17** is mounted on an adjustable bracket **22** for varying its position with respect to the warp sheet.

The shoe **20** is mounted on brackets **23** from which it is heat insulated by pads **24**. The brackets **23** are apertured for adjustment purposes, and are mounted on a rod **25** which is adjustably mounted in clamping bars **26**. The yarn sheet **12** then passes under a guide rod **27** and over a tension rod **28** which is mounted on a pivoted arm **29**. From the tension rod **28** the yarn sheet passes to a fabricating station shown as a knitting or weaving machine **30** such as a tricot knitting machine as disclosed in the Young patent above referred to.

The warp sheet **13** passes over a rod **31** to the machine **30** where it is woven or knitted with the yarns **12** to form a knitted or woven product.

In the operation of this apparatus the yarn **12** is heated when it is pressed against the shoe **20** by the cams **16**. Since the yarn is held under tension during this heating it becomes set in straight condition and the crimp in this portion of the yarn is permanently removed. The crimp in the portions of the yarn which are not thus heated, however, will be restored when the fabric is heated and relaxed after fabrication.

By arranging the cams **16** in a predetermined manner a pattern effect may be obtained. In the embodiment shown the cams are alternated and displaced by 180° so as to produce a checkerboard effect as shown in FIG. 1. In this figure the flat areas **41** correspond to the areas in which the yarns have been heated by the shoe and the bulked areas **42** represent the areas where the crimp has been retained. This patterned, textured effect can be varied as desired by suitable setting of the cams **16**.

While the invention has been shown as adapted for use with a tricot knitting machine using a pair of warp beams it may also be applied to the warp beam of a loom for obtaining a similar effect.

What is claimed is:

1. The method of making a textured fabric which comprises feeding a sheet of crimped yarn to a fabricating station under a tension to substantially remove the crimp, applying heat to selected parts of said yarn sheet in a predetermined pattern to produce a permanent straight set in the heated potrions of the yarns, fabricating said yarn sheet into a fabric and heat-treating said fabric to relax the yarns and to restore the crimp to said yarns except in the areas of said straight set yarns whereby a patterned textured effect is obtained.

2. The method set forth in claim 1 in which said yarn sheet is passed in heat exchange relationship with a heated pattern member adapted to apply heat to selected areas of said sheet.

3. Apparatus for making a textured fabric comprising a warp beam carrying a set of crimped yarns, means feeding a sheet of said yarns from said beam to a fabricating machine, a heating shoe positioned along and normally out of contact with said yarn sheet, a pattern member adapted to raise selected yarns of said sheet into contact with said shoe for heating the yarns to permanently set the yarn in straight form in the heated areas.

4. Apparatus as set forth in claim 3 in which said pattern member comprises a series of cams disposed along the path of said yarn, and means mounting said cams for adjustment for varying the pattern effect.

5. Apparatus as set forth in claim 3 in which said pattern member comprises a rotating member having raised areas adapted to contact and raise said yarns into contact with said heating shoe.

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