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FABRIC CONSTRUCTIONS

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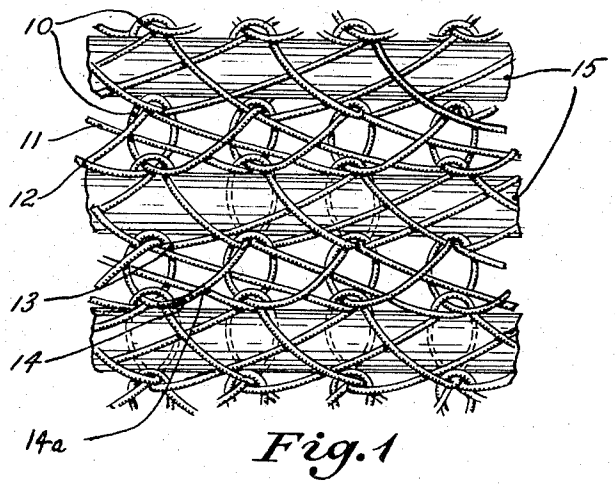

Fig. 1

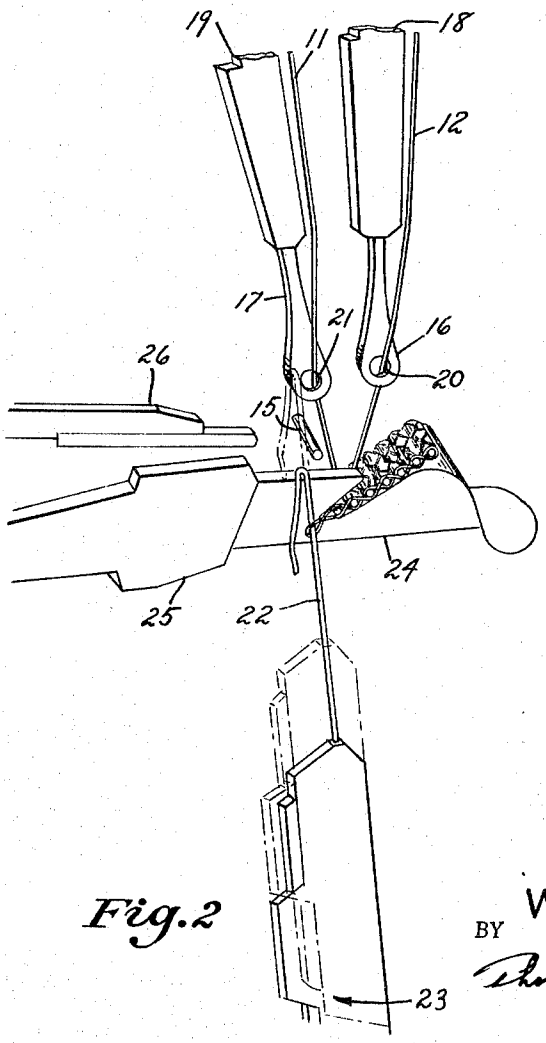

Fig. 2

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FABRIC CONSTRUCTIONS

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ABSTRACT OF THE DISCLOSURE

A fabric construction having needle loops formed from at least two warp elements. One warp element overlies the other warp element and the underlying warp element has a larger underlap than the overlying warp element. This specific structure securely locks filling elements which are laid across the width of the fabric between the underlaps and the needle loops of the warp elements. The warp element with the shorter underlap locks both the filling element and the warp element with the longer underlap thereby providing a fabric construction which prevents both the filling elements and the underlying warp elements from popping up when the fabric is submitted to lengthwise tension.

This invention relates to textiles. More particularly, the invention relates to fabric constructions and a method for making the same.

Knit goods are becoming increasingly popular. This is generally so since they have good drapeability, are easy to care for, easy to pack and provide excellent comfort and styling. In contrast, woven fabrics do not exhibit such advantages with respect to drapeability, care and packing. On the other hand, woven fabrics still find greater usage, especially from the aesthetic viewpoint, since they present an acceptable and more varied surface appearance, particularly in the field of outer wear, such as suits, coats and the like. Even in those cases where filling yarns have been inserted in a knit construction to lend some semblance of woven appearance thereto, the filling yarns have a tendency to "pop through" the basic knit structure if the fabric is distorted by warpwise tension, thereby making such fabrics somewhat undesirable and not popular commercially. There exists a need, therefore, for fabric constructions which exhibit the advantages of good drapeability, easy care, easy packing, comfort, styling and a woven-like appearance on at least one surface.

Woven unbalanced fabrics have been made with pleasing aesthetic effects but fraying and shifting of the threads make them unmerchantable. This invention permits a successful construction of unbalanced fabrics that are practical and merchantable.

In the past, many attempts have been made to produce a knit fabric which did not have the disadvantages set forth above. For example, single guide bar warp knitted fabrics comprising a knitted warp with filling yarns inserted therein are known. Moreover, multi-guide bar warp knitted fabrics have also been developed. However, none of these fabrics were fully effective in overcoming the mentioned problems especially in regard to commercial applications, usefulness, and a woven-like appearance.

In accordance with the present invention, there are provided fabric constructions and a method for the manufacture thereof which meet the requirements and overcome the disadvantages set forth. Such fabric constructions comprise fabrics having needle loops formed from at least two warp elements. One warp element must overlie the other. The underlying warp element has a larger underlap than the overlying element. This securely locks the filling elements which are laid across the width of the fabric between the underlaps and the needle loops of the warp elements. Thus, the warp element with the shorter underlap locks both the filling element and the warp element of longer underlap.

In conjunction with this specification, reference is directed to the attached drawing wherein:

FIG. 1 is a plan view in detail of a fabric construction according to the invention; and

FIG. 2 is a partial view in perspective of a multi-guide bar bearded needle knitting machine.

Referring to FIG. 1 there is illustrated a fabric construction according to the invention which has needle loops designated by numeral **10**. These loops are formed by a bottom warp element **11** and a top warp element **12**. The bottom warp element, as will be noted, has a larger underlap **13** than the underlap **14** of the top warp. The top warp underlap **14** overlies bottom warp underlap **13** as at *14a* in FIG. 1. Positioned transversely in nonconsecutive courses in said fabric are filling elements **15** located between the underlap of the bottom warp and needle loops of both warps. The foundation stitches, that is, the needle loops of the top and bottom warp elements or yarns are usually made on a bearded needle warp loom.

In order to obtain such a fabric, construction may be carried out on a bearded needle warp loom. This is achieved by traversing the guide bars in opposite directions, that is, the guide bars are so arranged that the front (top) guide bar is traversed in a sidewise or endwise direction a smaller distance than the back (bottom) bar. This has the effect of tying in the crossover yarn of the back guide bar and lends a semblance of stability to the fabric as well as resulting in a fabric, according to the present invention, wherein the back guide bar which forms tthe bottom warp has a larger underlap than the top warp formed by the front guide bar. The greater the distance, the larger the underlap. As an example, the front guide bar may move sidewise over the needles in a pattern such as 1·0–1·2 in one direction in contrast to the back guide bar which moves in a pattern from 2·3–1·0 in the opposite direction. Such a movement by the back guide bar insures that it traverses laterally across at least 3 needles or with reference to the fabric construction, 3 wales. It is to be understood that both the back guide bar and the front guide bar are fully threaded. The limit of sidewise movement can vary widely and depends on the construction of the particular machine being used. The filling elements are inserted by hand, as mentioned hereinbefore, between the underlap of the bottom warp and the needle loops as explained more fully hereinbelow.

Referring now more particularly to FIG. 2, the mechanism shown there includes top guide **16** and bottom guide **17** mounted in leads **18** and **19**. The guides contain eyes **20** and **21** through which the warp yarns **11** and **12** are passed. In the illustrated mechanism guide **16** is connected to the front or top guide bar (not shown). Guide **17** is connected to the back or bottom guide bar (not shown). The bearded needle **22** is also mounted in a lead **23** in an almost vertical posi ion on the needle bar (not shown). Both the guides and needle obtain their motion from the main cam shaft of the machine through the guide bars and needle bar respectively. The guide bars have a compound motion and achieve an additional movement obtained from pattern wheels or pattern chains. In addition, sinkers such as illustrated at **24** are positioned to function as web holders and are also mounted in leads **25** which in turn are mounted on a moveable sinker bar (not shown). The sinker bar also derives its motion from the main cam shaft of the machine. Finally, as on all bearded needle apparatus, an external means to close the needle beards such as the horizontal plate or presser **26** is adapted to close the beards after the warp threads have been positioned around the needle.

At the start of the operating cycle, the elements are in the full line position shown in FIG. 2. The guides are at the front of the needle, that is, on the side away from the beard. The sinker 24 is forward, holding fabric in its throat and maintaining the already formed fabric loops at the correct height on the needle stem. As will be noted, the presser is withdrawn and clear of the needle beard.

During the first portion of the cycle, movement in a sidewise direction is applied to the guide bars, thus moving the guides laterally. However, in the practice of the present invention, the guide bars are moved in opposite directions to each other and the back or bottom guide bar with the bottom guides 17 is moved a greater distance than the front or top guide bar with top guides 16, thereby forming a larger lapping movement (as mentioned above) of the bottom warp 11. This lateral movement of the guides is the underlap. By the time the underlap movement is completed, the filling yarn 15, as mentioned hereinbefore, is inserted in any convenient manner back of the warp yarns, the needle 22 being in the full line position shown in FIG. 2. Yarn 15 becomes tightly held in place upon completion of the overlap portion of the cycle.

The overlap portion of the cycle follows the insertion of the filling yarn and completion of the underlap. The guides 16 and 17 are swung away from the front of the needle passing between adjacent needles, now in the dotted line position as shown in FIG. 2, to carry the warp yarns to the back or beard side of the needle at which time the guides move (on the overlap) sidewise or endwise one needle space in a direction reverse to the underlap to form the warp loops.

When this overlap movement is completed, the guides are then swung back to their original position in front of the needle, and the warp yarns are left lying over the beard. At this point in the cycle, the needle is moved upwardly above the dotted line position of FIG. 2 until the warp yarns slip down the beards and on to the needle stems. The needle is now moved downwardly and the warp yarns pass underneath the beard while the presser moves forward until it is in contact with the beard and passes the tip of the beard into the needle eye (not shown), thereby locking the warps inside the needle hook. The sinker which has remained stationary up to this point now withdraws causing any fabric including the old loops in its throat to slide up the needle stem and pass over the tip of the beard which is now imbedded in the needle eye coming to rest on the closed beard. The presser is then withdrawn and the needle bar continues a downward motion causing the fabric loop to pass further up the needle beard until it is finally knocked over the head of the needle as the head passes below the level of the sinker, thereby securely locking the filling thread between the needle loops and the bottom warp and completing the cycle.

Fabric constructions manufactured in accordance with the above cycle of manipulations exhibit good stability and have a woven appearance on one surface and a knit appearance on the other. The differences in the distance of lateral movement of the guide bars and the insertion of the filling yarn at the completion of the underlap portion of the cycle result in the formation of a fabric construction which overcomes disadvantages of known knit fabrics. Moreover, depending upon the desired properties of the resulting fabric, the filling yarns can be introduced in every course or in nonconsecutive courses, resulting in the production of fabric constructions which while having extremely good stability in contrast to known knit fabrics have varying degrees of drapeability and hand.

Generally, the denier of the filling yarns can be of any desired size. For example, the filling yarns can be of the same denier size as the warp yarns being utilized to make a particular fabric construction. On the other hand, in a preferred embodiment of the invention, filling yarns of much greater denier than the warp yarns are utilized. It is to be noted, however, where the filling yarns are of relatively high denier, the resulting fabric construction is coarser in nature, thereby having somewhat reduced drapeability. The drapeability and hand can be improved by inserting the high denier filling yarns in nonconsecutive courses while retaining excellent stability with the long underlap 13 holding the coarser fill yarn.

In manufacturing fabric constructions according to the invention, it is generally preferred to use filling yarns which are from about 5 to 100 times greater in denier size than the warp yarns. Excellent fabrics have been constructed in accordance with the invention wherein warp yarns having a denier size of about 20 were employed with filling yarns of 2000 denier. Such fabric constructions had good stability in both warpwise and fillingwise directions, and the filling yarns were the predominant elements in the fabric thereby giving the fabric an essentially woven appearance at least on one surface, since the warp yarns are for all practical purposes not visible.

These fabrics have unbalanced structures in contrast to known woven fabrics which must be of essentially balanced constructions. That is to say, in known woven fabric constructions a great disparity between the denier size of warp and filling yarns does not result in stable woven structures. For example, where heavy denier filling yarns are utilized with relatively small or light denier warp yarns in the manufacture of a woven fabric, there is a tendency for the filling yarns to pop through or buckle, since it exhibits no structural stability. On the other hand, fabric constructions of this invention are unbalanced yet they exhibit substantially permanent structural stability, that is, the filling yarns do not pop through or buckle. Accordingly, there is achieved, according to the invention, an unbalanced fabric construction which has a woven appearance and exhibits other valuable aesthetic values normally characteristic only of woven type fabrics.

In those cases where nubby yarns or other types of novelty yarn constructions such as stretch yarns are employed as filling in the instant fabric constructions, many widely varying surface patterns result. Such novelty fabrics are useful in a wide variety of fields, for example, outer garments, such as top coats, overcoats, jackets and the like.

The method of the invention is illustrated in connection with a bearded needle. It is obvious to one skilled in the art that a latch needle can also be employed. The tighter loop generally achieved with the bearded needle is regarded as preferable.

Numerous other advantages of the present invention will be readily apparent to those skilled in the art. FIG. 1 shows the back of the fabric surface and for purposes of definition it is to be understood that the warp element 12 which lays on the back fabric surface is designated as the top warp element.

It is to be understood that although the invention has been described and set forth herein in a preferred form thereof, numerous modifications can be made without departing from the spirit and scope thereof, and such modifications are to be understood as coming within the scope of the appended claims.

What is claimed is:

1. Fabric constructions which have stability similar to woven fabrics in both warpwise and fillingwise direction and a woven-like appearance on at least one surface comprising needle loops; at least 1 bottom warp element; at least one top warp element, wherein said bottom warp element has larger underlaps then said top warp element and said bottom warp element traverses laterally across as least 3 wales and filling elements positioned transverse the width of said fabrics in selected non-consecutive courses and held tightly between the underlap of the bottom warp and the needle loops, said filling elements being of greater denier size than said warp elements.

2. Fabric constructions as defined in claim 1 wherein the filling elements comprise a nubby yarn.

3. A fabric construction according to claim 1 wherein the filling elements are present in alternate courses.

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