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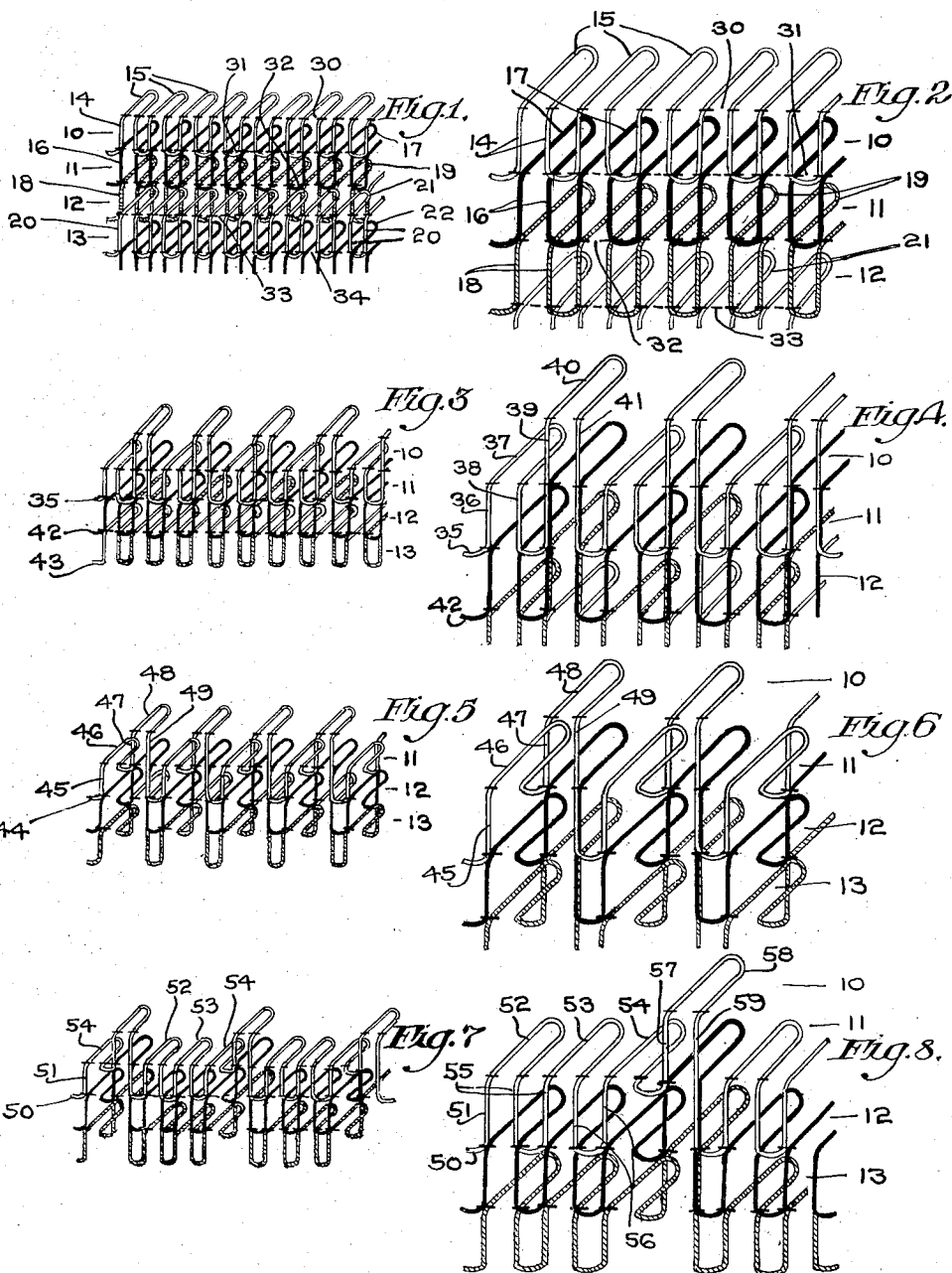
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2,229,469

WARP KNITTED PILE RUG

Filed Sept. 5, 1940

2 Sheets-Sheet 1



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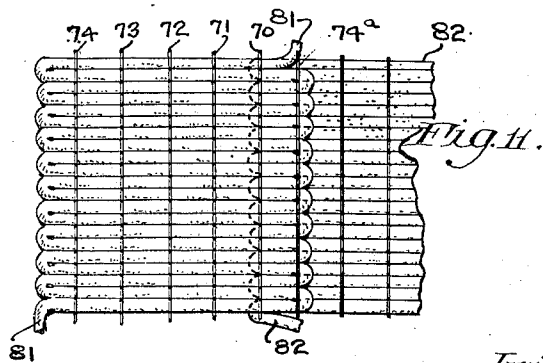
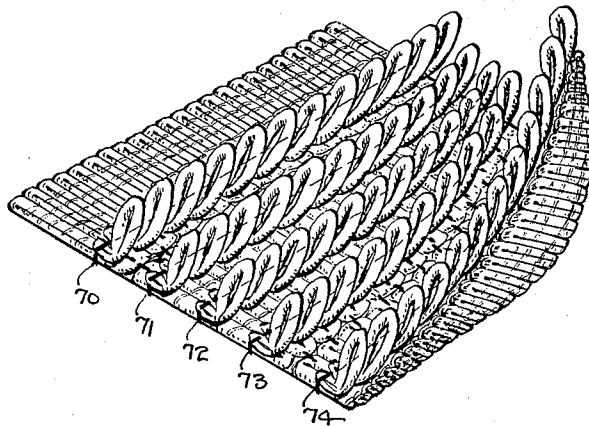
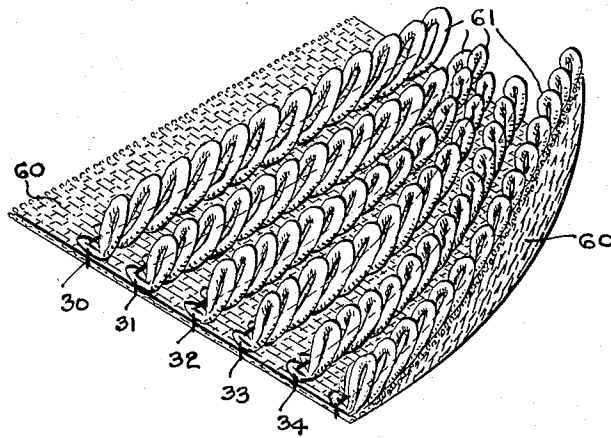
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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WARP KNITTED PILE RUG

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15 Claims. (Cl. 66—191)

The present invention relates generally to a pile fabric. While the present invention may be applied to a large variety of fabrics, it is more particularly adapted for use in the manufacture of rugs, mats and if desired may be employed in the manufacture of bed-spreads or any other cloth, fabric, or article made therefrom. The pile which is produced in the present fabric may be in the form of loops so that the fabric produced thereby may be said to imitate terry cloth or the loops may be shirred or cut, in which case the fabric produced may be said to imitate plush or similar materials or may generally be imitative of rug fabrics produced by other weaving and knitting processes.

In the manufacture of the present fabric the warp is formed by a series of parallel lines of stitching, these lines of stitching being formed during the manufacture of the fabric so as to stitch and hold together the several yarns that form the weft of the fabric. The weft is laid and formed during the stitching and formation of the warp of the fabric, the weft being laid or formed in picks and loops transversely of the stitched warp without any interlocking, interlacing or interknitting between the several courses of weft except that they are held together by the lines of stitching constituting the warp of the fabric. If desired, a previously manufactured fabric such as a woven fabric may be employed as a backing during the process of manufacture of the present cloth, the warp lines of stitching serving not only to stitch together the weft yarn but also to stitch the same to the woven fabric which is fed into the machine simultaneously with the formation of the cloth.

In another form of the present invention, the backing is formed by the same machine and consists of weft yarn which is fed across and secured in position by the warp threads.

The construction of the finished fabric as well as the method of its manufacture will be more clearly understood from the following description of the process as illustrated by the accompanying drawings.

In the drawings:

Figure 1 illustrates the method of manufacture of one type of fabric in which each row of piles or loops, the rows being disposed in the direction of the warp threads, is made from one yarn or end.

Figure 2 is an enlarged development of a smaller portion of such a fabric.

Figure 3 is illustrative of a fabric in which the piles or loops are staggered or offset so that each

row of piles or loops may be formed of two yarns or ends.

Figure 4 is an enlarged development of a portion of such fabric.

Figure 5 illustrates another fabric in which the same pattern effect as that shown in Figure 3 is obtained by a different method and construction.

Figure 6 is an enlarged detailed view of this fabric.

Figure 7 illustrates a fabric in which the stagger effect is varied.

Figure 8 is an enlarged detail of this fabric.

Figure 9 shows generally the type of fabric described in any of the other figures having a backing of woven cloth.

Figure 10 shows fabric of any design having a backing which is formed on the machine while the entire fabric is being stitched or formed.

Figure 11 shows a portion of the form of backing illustrated in Figure 10.

Figures 1 and 2 illustrate the fabric of the present invention in its simplest form. The width of the fabric shown in this figure, as of the other fabrics that constitute embodiments of the present invention, may be said to be divided into a series of zones which extend lengthwise of the fabric. These zones may be of any width desired and the width of the zone may depend in part upon the nature of the fabric, upon the thickness or size of the yarn employed in the manufacture of the fabric, or upon the particular ornamental effect which is sought to be produced by the fabric. In the manufacture of heavy pile rugs and mats, the zones are approximately $\frac{3}{8}$ of an inch in width. It is obvious, however, that even in the manufacture of heavy pile rugs the width of these zones may be varied to any degree desired.

Each of these zones, which are respectively indicated in Figure 1 by the reference characters 10, 11, 12 and 13, is formed of a single continuous yarn or end, which, in the case of zone 10, repeatedly turns upon itself to form the picks 14 and loosely depending loops 15. Similarly, in the zone 11, picks 16 and loops 17 are formed from another yarn or end. In zone 12, picks 18 and loops 19 are similarly formed, while in zone 13, picks 20 and loops 21 are formed. Thus, the portion of the fabric shown in Figure 1 comprises four zones formed of four yarns respectively providing the picks and loops for each zone.

In Figure 1 are also shown the loops 22 which are formed by the yarn which fills the zone not completely shown in this figure. Simultaneously

with the formation of the picks and loops the picks are stitched by the lines of stitchings 30, 31, 32, 33 and 34 which serve to divide the width of the fabric into the zones described hereinbefore. The lines of stitching 30 to 34 inclusive may be said to constitute the warp thread of the fabric and may be in the form of any desired stitch, such as a chain stitch, lock stitch, or any other suitable knitting stitch. Assuming that the zone 10 constitutes a selvage edge of the fabric, the line of stitching 30 merely catches and locks together the adjacent picks 14 of the yarn in the zone 10 at the looped end of each pick. The line of stitching 31, however, stitches and locks together the picks 16 in the zone 11 and also the adjacent ends of the picks 14 in the zone 10, the loops 15 and 17 being permitted to depend freely from each zone. Simultaneously, the lines of stitching 32, 33 and 34 each lock together the looped ends of the picks of one zone and the unlooped ends of the picks of the adjacent zone. As shown, the adjacent picks in each zone are spaced for the purpose of clearly illustrating the construction of the fabric. In actual manufacture, however, each pick in the zone is placed right up against the adjacent or preceding pick in the zone so that in the finished fabric the picks serve to fill quite closely the spaces in the zones formed by the lines of stitching 30 to 34 inclusive. The loops 15, 17 etc. formed in this fabric may be made to overlap the adjacent zone or they may be made to extend up more firmly away from the fabric. This will obviously depend upon the thickness of the yarn and the width of the zones 10, 11 etc. The narrower such widths are the closer such warp stitchings are spaced and the thicker the filler yarn is, the more the loops would be made to stand up.

It will now be understood that the construction of the fabric as shown in Figs. 1 and 2 is particularly useful in the manufacture of a fabric in which all of the filler yarn is made of the same color or in which the pattern desired merely involves a stripe effect. For obviously, the yarn filling adjacent zones may be varied in color, thus providing any desired stripe effect. Where other ornamental effects may be desired, each zone instead of being filled exclusively and solely by a single yarn may be filled by more than one yarn and the loops of one yarn or end instead of all falling in one zone may be staggered to fall in alternate zones. In Fig. 3 one method of obtaining this type or pattern of fabric is illustrated. The yarn or end 35 in this construction serves largely to fill the zone 11 and in part also fills the zone 10; thus, beginning at one end of the yarn 35, it will be seen to form a pick 36 in zone 11, a loop 37 in zone 10 and another pick 38 in zone 11. At the next turn the pick 39 is lengthened so as to cover the two adjacent zones 11 and 10 and the loop 40 extends beyond the loop 39 and may be said to fall in the zone outside of zone 10. The next pick 41 again covers the two adjacent zones 10 and 11. This process then repeats itself throughout the length of the fabric. Simultaneously, yarns 42 and 43 are made to fill their corresponding zones in such a manner that first one pair of picks lie wholly within one zone and the next pair of picks cover two adjacent zones and, similarly, the loops formed by such yarn alternate between two adjacent zones. It will now be understood that this manner of construction permits of a novel pattern for the fabric. For if adjacent yarns are of different color or of different ornamental

structure then the loops in each zone alternate in color or in ornamental effect.

Referring to Fig. 5, the same ornamental effect as that obtained by the structure shown in Fig. 3 is had in a modified manner. In this construction each end or yarn such as yarn 44, for example, has its first pick 45 in one zone, namely in zone 12 in the present case, this being followed by loop 46 which is disposed in zone 11 and then instead of forming a pick in zone 12 it immediately at the end of the loop 46 forms a pick 47 in zone 11 and a loop 48 in zone 10, this being then followed by a pick 49 extending over two adjacent zones 11 and 12. This arrangement then repeats itself with the result that, as in Fig. 3, the alternate loops in each zone derive from different yarns. The ornamental effect obtained by means of structural organization shown in Fig. 5 is substantially identical with that obtained in Fig. 3. This is for the reason that the ornamental effect obtained in the fabric flows largely from the free loops rather than from the picks. It will be understood, however, that if such loops are cut or sheared short, then the picks may also enter into the ornamental effect with the result that the effect had from the structure of Fig. 5 may be somewhat different from that had in the structure of Fig. 3.

It will now be understood that a large variety of patterns and ornamental effects may be obtained by varying the arrangement of the picks and loops as desired. In Figs. 7 and 8, an arrangement is shown in which every fourth loop is made to extend into the further zone. Referring, for example, to the yarn or end 50, it is made to form a pick 51 in zone 12, then three loops 52, 53, and 54 lie disposed in zone 11 and with the pairs of picks 55 and 56 interposed between the adjacent loops, this then being followed by a pick 57 in zone 11 and a loop 58 in zone 10 and a lengthened pick 59 in adjacent zones 11 and 12. By this organization of the several parallel yarns or ends the loops in each zone are arranged with every fourth loop deriving from a different yarn or end.

While conceivably the fabric manufactured in the manner thus far described and without the assistance of any other yarn or fabric as a backing therefor may be useful for some purposes, the present invention being more particularly concerned with the manufacture of rugs, mats or other floor or article coverings, such as bed spreads, toilet seat covers or the like, such a fabric would be much too fragile and too perishable for these purposes. In order, therefore, to add to the strength and durability of the fabric, a backing for the structure thus far described is provided. This backing may take any of several forms. In one form of the invention such backing may be any suitable woven cloth 60. This cloth is fed to the machine during the formation of the fabric so that the lines of stitching 30 to 34 inclusive and all of the other lines of stitching throughout the width of the fabric will not only lock and stitch the pick and loop forming yarns to each other, but also to this cloth 60. This structure is shown in Fig. 9 wherein the rows of loops 61 of the facing fabric are shown separated somewhat, it being understood that preferably, although not necessarily, the weft-forming picks 62 thereof are contiguously arranged. This preferred effect would be obtained by providing additional rows of loops between those shown in Figure 9.

In this figure, 60 illustrates the woven cloth

backing, which is fed to the machine while the present fabric is being formed, as illustrated in Figures 1 to 8 inclusive, or any desired variation thereof.

5 In another form of the invention the backing is formed and produced during the formation of the fabric shown in Figures 1 to 8 inclusive. For this purpose any suitable yarn, but preferably a yarn of the same type as that employed
10 in the formation of the pick and loops, is fed to the machine simultaneously with the feeding of the other yarns. Figure 10 illustrates this type of backing for the present fabric and may be said to constitute a back shot filling for the fabric. In this figure, lines 70 to 74, inclusive, represent the lines of warp stitching previously described forming the filling zones which receive the yarns previously described for the formation of the picks and loops filling the zones between
20 the warps 70 to 74 inclusive. The back shot filling shown in Figure 10 consists of a plurality of yarns or ends 81, 82, etc., which are fed simultaneously with the formation of the picks and loops shown in Figures 1 to 8, inclusive, the yarns
25 81, 82, etc., being fed and laid transversely of the warps to simulate a true weft as shown in Figure 10. It will be understood that the warps capture and stitch the back shot filling at the same time that the picks and loops are stitched so that together they constitute a firm fabric.

As shown in the specific form of the invention illustrated in Figure 11, each throw of yarns 81 and 82 preferably covers four or more zones or
35 may be said to approximate two or more inches in length. It will be understood, however, that the lengths of these throws may be varied as desired and will depend in part upon the nature of the yarn employed, the particular pattern which is being produced and the use to which
40 the fabric is to be put. The lengths of these throws may be varied substantially. In all cases, however, it is preferred that a plurality of yarns or ends be employed alongside of each other for the formation of this backing in this manner.
45 The employment of a plurality of yarns for the back shot filling greatly facilitates the production of the fabric. While only two such yarns are shown in Figure 11, it is obvious that in the actual manufacture the fabric produced is many
50 times wider than the portion shown in the figure and the back shot filling comprises as great a number of yarns such as 81 and 82 as may be necessary to form the complete backing for a given size of fabric.

55 As shown in Figure 10, the throws of yarns 81 and 82 overlap one zone, namely, the zone between the warps 70 and 74. The warp stitches 70 and 74, therefore, bind the back shot yarns 81 and 82 to each other and at the same time also bind the face yarns. This binds the adjacent
60 back shot filling yarns securely with each other and with the face yarns.

Each warp thread 70, etc., is continuous and forms a chain of knit stitches or loops of any
65 suitable type of knitting or stitching. Such stitches are formed concurrently with the laying of the back shot filling yarns 81 and 82 and of the front face yarns.

70 The present fabric, although it is produced on a knitting machine, still does not have the tendency to ravel even when punctured or torn.

The warp stitchings 30, etc., or 70, etc., are preferably of a finer, tougher and stronger yarn than the face or back shot filler yarn and are
75 not designed to enter into the pattern or orna-

mental appearance of the fabric, but serve primarily and almost solely to hold the looping yarns and their backing securely together.

Thus, it will be seen that both the face filling and the back filling each comprise a plurality of
5 yarns, each of the yarns being arranged in serpentine weft-wise lines. The weft-wise lines of the backing extend over several zones and are longer than the weft-wise lines of the face filling, and the number of yarns in the face filling is,
10 therefore, greater than in the backing. The spaced warp lines of stitches secure the face and back fillings and also secure adjacent face yarns to each other and adjacent back yarns to each
15 other.

The adjacent yarns whether in the face or in the back filling always overlap or interleave sufficiently to permit at least one line of stitches to secure such adjacent yarns to each other as well
20 as to the other filling. The overlap or inter-leaving in such adjacent yarns may be increased so that two or more warp lines of stitches will secure such adjacent yarns to each other and to the other filling. The extent of such overlap
25 will depend upon its purpose. In the back filling an overlap of one zone, when it is desired to increase the strength of the fabric is adequate. In the face filling the overlap is varied with the design or ornamental effect sought. Whatever
30 is said herein about the face filling is applicable also to the fabric employing a woven backing or having no backing.

As has been pointed out hereinbefore, the weft-forming yarns of the present fabric are laid transversely of the warp lines of stitches and are
35 secured in place at points spaced lengthwise of said yarns by said warp stitches at the time of formation of the latter, the freely depending loops of the weft-forming yarns being formed by drawing a free portion of the supply yarn out-
40 wardly of the face of the fabric at each point where the yarn is interlocked with the warp stitch, thus forming a loop between each successive pair of interlocking points. While the fabric
45 of the present invention may conceivably be made on various types of warp-knitting machines, it is preferred to make the same on the type of warp-knitting machine such as is shown and described in United States Letters Patent
50 No. 1,748,495 of February 25, 1930, the tubular yarn guides therein shown being suitably multiplied in number and the lateral travel thereof adjusted to form the requisite loops spaced warp-
55 wise in the fabric for each supply of yarn, the outward movement of the loop-forming hooks of said prior patented machine being also adjusted to provide the depth of loop desired to be formed.

Having described several preferred forms of the invention, many variations thereof, fully
60 within the scope of the appended claims, will become apparent to persons skilled in the art.

What is claimed as new and useful is:

1. A fabric comprising spaced warp lines of
65 stitches forming zones extending lengthwise of the fabric, and a filling consisting of a plurality of separate supplies of yarns for respectively serving said zones, the filling yarns being arranged in lines and freely depending loops, each
70 line being disposed weft-wise and having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other by said lines of stitches, the lines of one yarn completely filling its serviced zone.

2. A fabric comprising spaced warp lines of 75

stitches forming zones extending lengthwise of the fabric, and a filling consisting of a plurality of separate supplies of yarns for respectively serving said zones, the filling yarns being arranged in lines and freely depending loops, each line being disposed weft-wise and having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other by said lines of stitches, the lines of one yarn filling its zone and the loops overlying the adjacent zone.

3. A fabric comprising spaced warp lines of stitches forming zones extending lengthwise of the fabric, and a filling consisting of a plurality of separate supplies of yarns respectively serving said zones, the filling yarns being arranged in lines and freely depending loops, each line being disposed weft-wise and having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other by said lines of stitches, the lines of one yarn filling its zone and the loops overlying other zones.

4. A fabric comprising spaced warp lines of stitches forming zones extending lengthwise of the fabric, and a filling consisting of a plurality of separate supplies of yarns respectively serving said zones, the filling yarns being arranged in lines and freely depending loops, each line being disposed weft-wise and having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other by said lines of stitches, some of the loops in a yarn overlying one zone and others being disposed to overlie an adjacent zone.

5. A fabric comprising spaced warp lines of stitches forming zones extending lengthwise of the fabric, and a filling consisting of a plurality of separate supplies of yarns respectively serving said zones, the filling yarns being arranged in lines and freely depending loops, each line being disposed weft-wise and having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other by said lines of stitches, some of said yarn lines extending over the width of one zone and others over the width of two zones.

6. A fabric comprising a backing, spaced warp lines of stitches forming zones extending lengthwise of the fabric, and a face filling consisting of a separate yarn supply for each zone arranged in weft-wise lines and freely dependent loops, each line having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other and to the backing by said lines of stitches.

7. A fabric comprising a backing of woven cloth, spaced warp lines of stitches forming zones extending lengthwise of the fabric, and a face filling consisting of a separate yarn supply for each zone arranged in weft-wise lines and freely dependent loops, each line having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other and to the backing by said lines of stitches.

8. A fabric comprising a backing, spaced warp lines of stitches forming zones extending lengthwise of the fabric, and a face filling consisting of a separate yarn supply for each zone arranged in weft-wise lines and freely dependent loops of a length approximating the width of a zone, each line having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other and to the backing by said lines of stitches.

9. A fabric comprising a backing, spaced warp

lines of stitches forming zones extending lengthwise of the fabric, and a face filling consisting of a separate yarn supply for each zone arranged in weft-wise lines and freely dependent loops, each line having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other and to the backing by said lines of stitches, said backing consisting of a plurality of yarns arranged in weft-wise lines over several zones, the adjacent yarns overlapping one zone.

10. A fabric comprising a back filling consisting of a plurality of yarns each arranged in weft-wise lines, a face filling consisting of a greater number of yarns arranged in relatively short weft-wise lines and freely depending loops, and spaced warp lines of stitches securing together the adjacent face filling yarns and backing yarns.

11. A fabric comprising spaced warp lines of stitches of sewing thread forming zones extending lengthwise of the fabric, and a face filling consisting of a plurality of yarns derived from separate sources of supply, each source of supply serving a separate zone, some of the yarns differing from other yarns in ornamental quality, the yarns being arranged in weft-wise lines and freely depending loops, the weft-wise lines having a length greater than the width of a zone so that corresponding lines of adjacent yarns are secured to each other by said stitches, some of the loops formed of a given yarn supply overlying one zone, and other loops of the same yarn supply overlying an adjacent zone.

12. A fabric comprising spaced warp lines of stitches forming zones extending lengthwise of the fabric, and a filling consisting of a plurality of separate supplies of yarns for respectively serving said zones, all of the filling yarns being each arranged in sinuous form to provide a series of freely depending loop sections spaced warp wise and separated from each other by intermediate straight line sections, each line section being disposed weft-wise and having a length greater than the width of a zone so that corresponding straight line sections of adjacent yarns are secured to each other by said lines of stitches.

13. A fabric comprising a backing, spaced warp lines of stitches extending lengthwise of the fabric, and a face filling for the fabric consisting of a plurality of separate supplies of yarns, the filling yarns being each arranged in sinuous form to provide a series of freely extending loops spaced warp-wise and separated from each other by short intermediate sections, all of said latter sections of a given yarn being secured together and to the backing by at least one of said warp lines of stitches and all of said loops extending in the same direction laterally of said line or lines of securing stitches, the sections of the yarn intermediate said free loops being devoid of free loops.

14. A fabric comprising a backing, spaced warp lines of stitches forming zones extending warp-wise of the fabric, and a face filling consisting of a plurality of yarns for respectively serving said zones, the filling yarns being each arranged in serpentine form to provide a series of closely related parallel sections and intervening freely extending loops, each of the parallel sections of the yarns being longer than the width of a zone and corresponding parallel sections of the yarns being in longitudinal contiguity with each other to provide a series of parallel weft lines, the lines of stitches serving to secure the face filling yarns to the backing and to secure together the

adjacent ends of the longitudinally contiguous weft-forming sections of the yarns.

5 15. A fabric comprising a backing, spaced warp lines of stitches extending lengthwise of the fabric, and a face filling for the fabric composed of a plurality of yarns derived from separate sources of supply, the several filling yarns being each arranged in sinuous form to provide two series of loops disposed and directed oppositely relative

to the median line of the sinuous form, the loops on one side of said median line being all attached to the backing by at least one of said warp lines of stitches extending through the apices of said loops, the loops on the opposite side of said median line being all freely depending from the face of the fabric. 5

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