Nov. 26, 1935. D. SIEGEL 2,022,157

NONRUN KNITTED FABRIC

Filed June 1, 1932 2 Sheets-Sheet 1

Fig. 1.

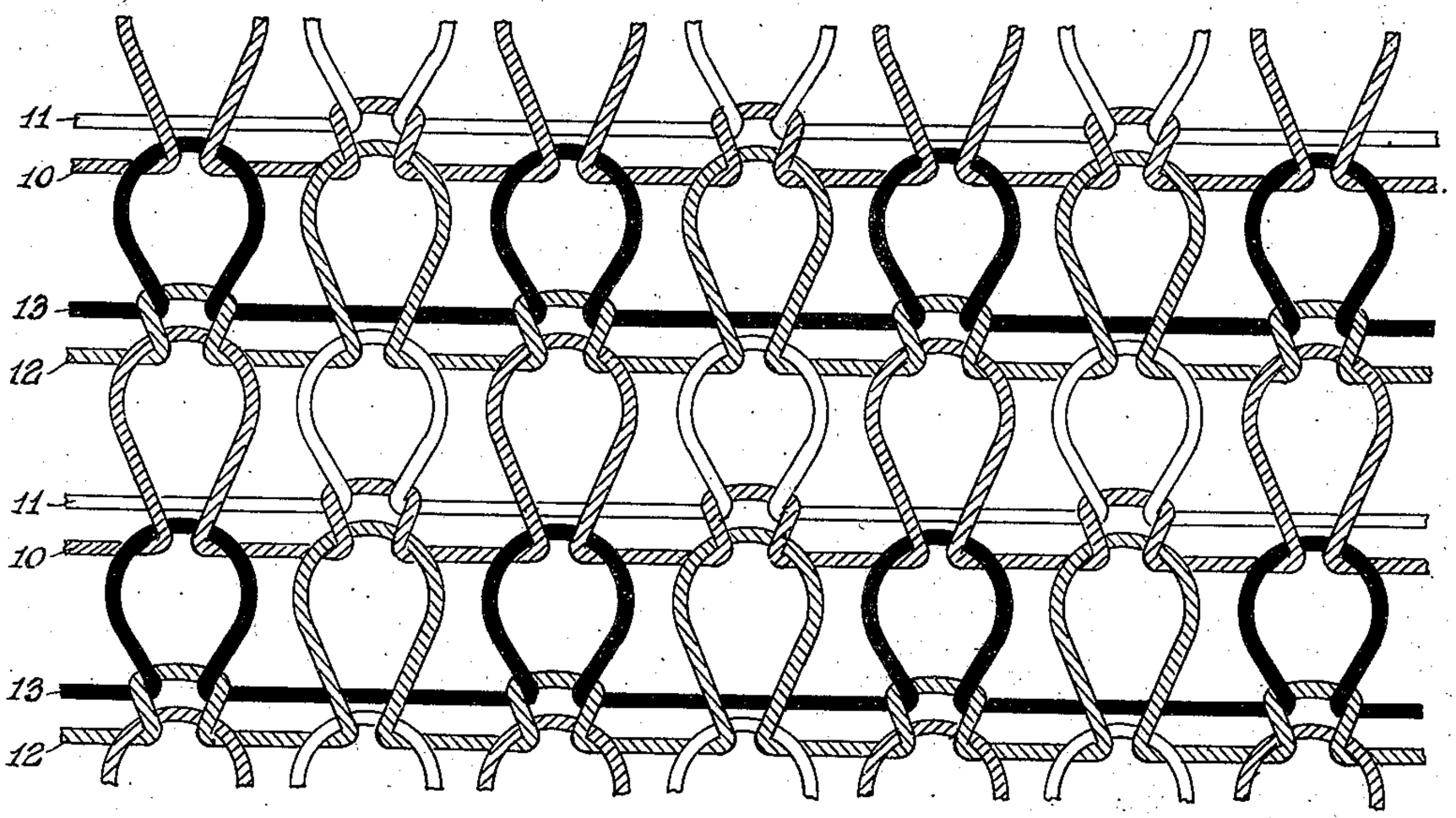
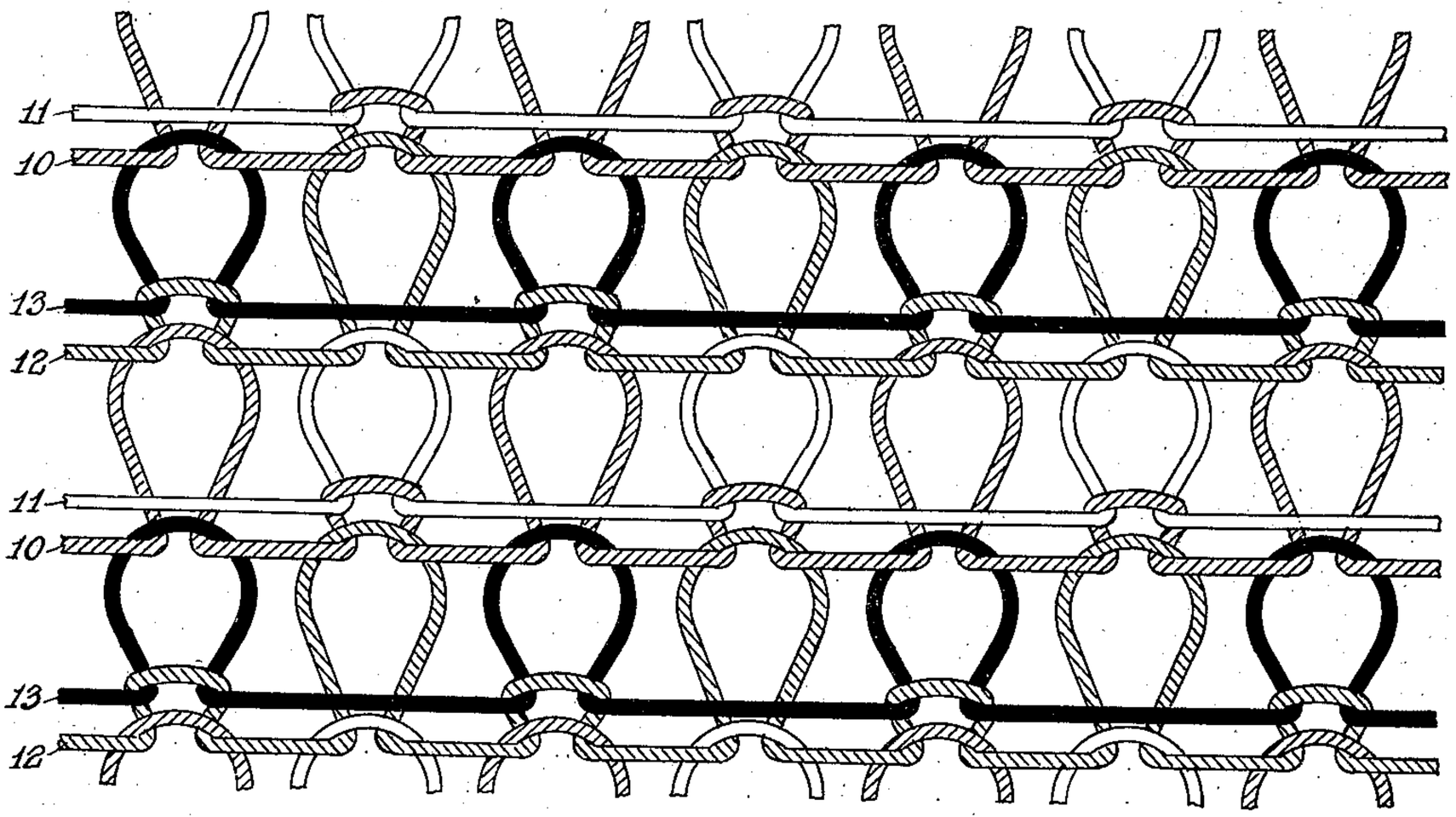


Fig. 2.



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Filed June 1, 1932 2 Sheets-Sheet 2

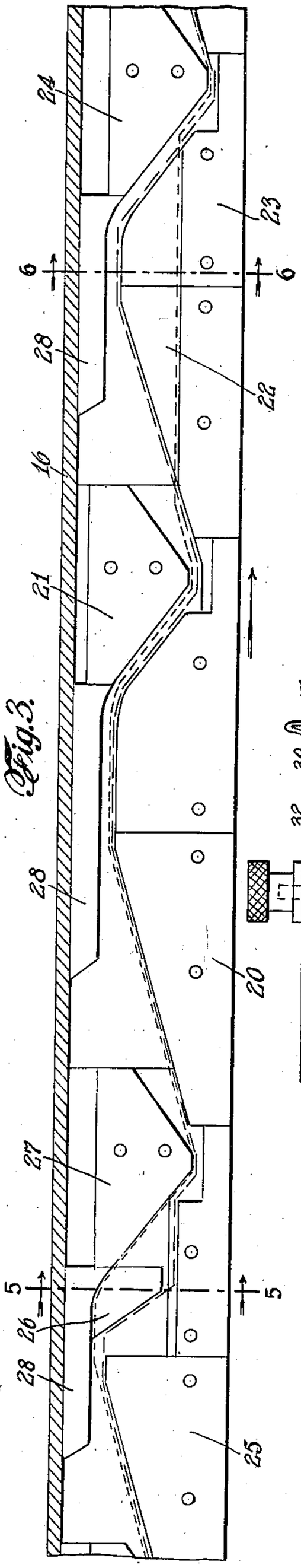

Fig. 3.

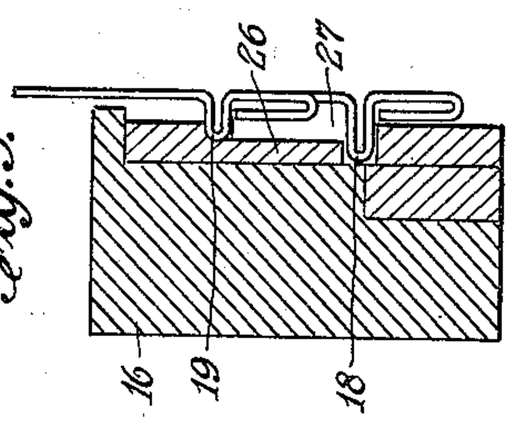

Fig. 5.

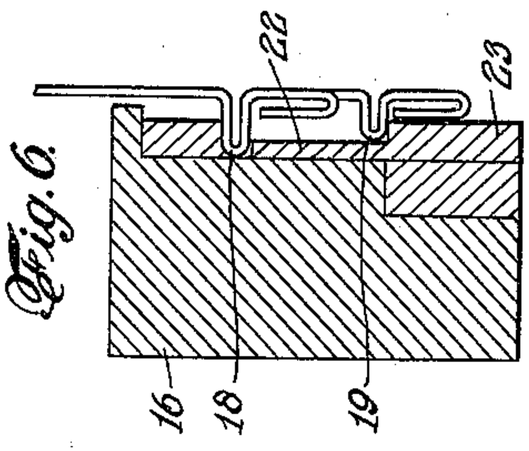

Fig. 6.

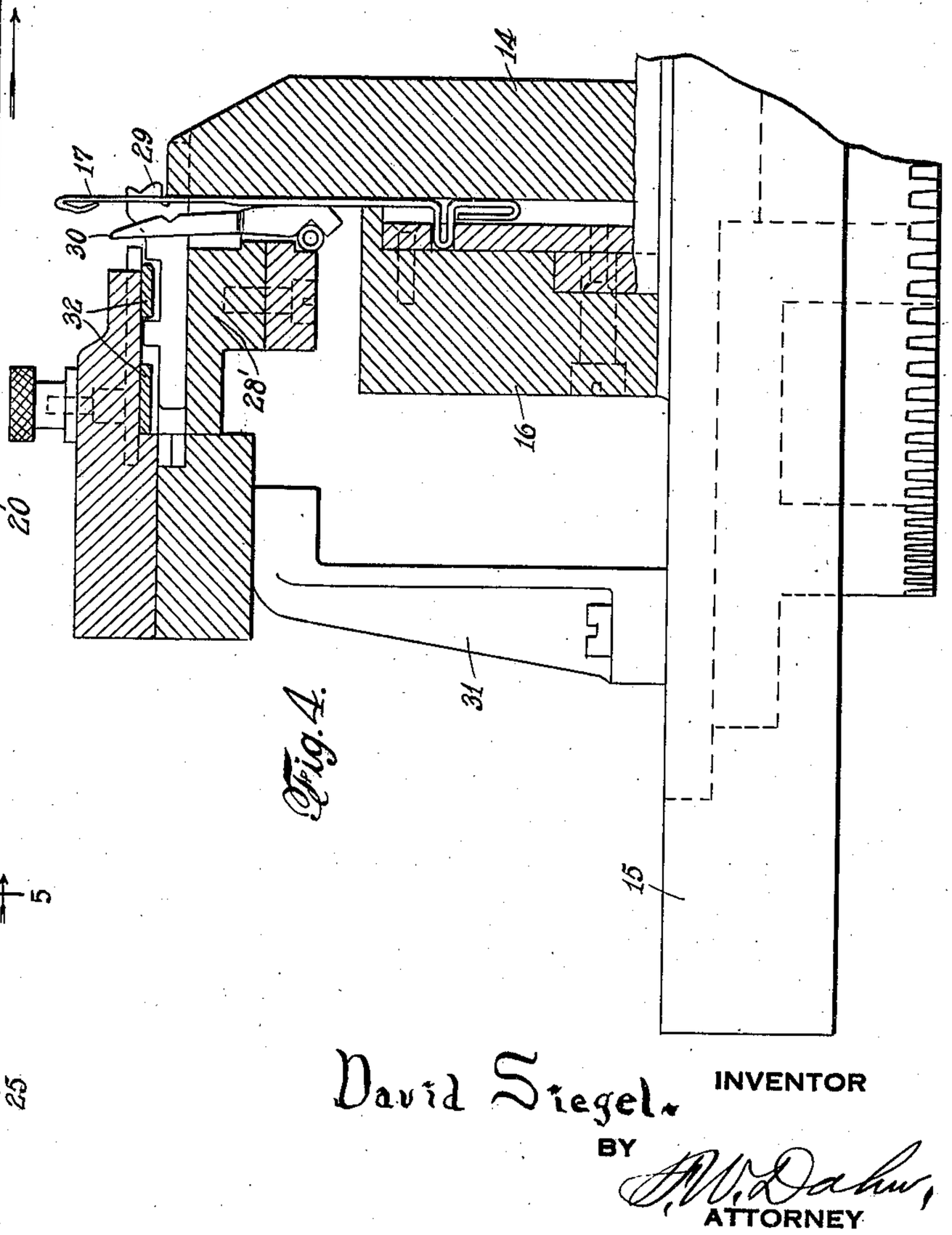

Fig. 4.

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UNITED STATES PATENT OFFICE

2,022,157

NONRUN KNITTED FABRIC

David Siegel, Weehawken, N. J.

Application June 1, 1932, Serial No. 614,802

1 Claim. (Cl. 66—169)

My invention relates to a knitted fabric and a method of making the same, the principal object of the invention being to provide a run-resisting plain knitted fabric. The term "plain knitted fabric" is used in this specification to distinguish on the one hand from warp fabrics which have a plurality of yarns running substantially lengthwise of the cloth and shogged laterally so as to be interknit with other warp yarns, and on the other hand to distinguish from rib fabric or other special fabrics, the term indicating substantially such fabrics as are made by a single series of needles each forming loops successively from a yarn or yarns fed continuously to a series of needles in succession so as to be knitted into courses running crosswise of a flat knitted fabric or round and round in the case of a tubular fabric.

When a stitch is broken in a plain knitted fabric the continuity of a wale is interrupted and usually the successive concatenated loops slip successively out of one another, so making what is known as a run or ladder. Such plain knitted fabrics are sometimes provided with anti-run courses to stop runs. Warp fabrics are usually substantially or entirely free from runs and ribbed fabrics run in one direction only but plain knitted fabrics run either up or down the wale and commonly run very freely, particularly when made from slippery yarns such as silk or rayon yarns. The fabric of my invention is distinguished from other plain knitted fabrics by the fact that it does not run even under very rough treatment after a break in a wale or wales.

Perhaps the most serious objection to the use of plain knitted fabric, especially in garments made from sheer fabric of silk or rayon yarn, is the tendency to run and so spoil the appearance of the garment. My method of knitting provides for the first time, so far as known to me, plain knitted fabrics that can be made on an ordinary plain knitting machine and which are run-proof in every part of the fabric or the garment made therefrom.

A further object of the invention is to provide a run-resisting fabric of the character described which shall be light in weight and thus suitable for use in the manufacture of light-weight underwear, pajamas, dress goods, etc.

Referring to the drawings, which are made a part of this application and in which similar reference characters indicate similar parts:

Fig. 1 is a plan on a greatly enlarged scale showing one side of the fabric,

Fig. 2, a similar view showing the opposite side,

Fig. 3, a developed diagram of needle cams viewed from the outside,

Fig. 4, a vertical section through a portion of a circular independent needle machine on which the fabric has been made, and

Figs. 5 and 6, sections respectively on lines 5—5 and 6—6 of Fig. 3, illustrating the position of the needles with respect to certain needle cams.

Referring first to Figs. 1 and 2 which illustrate the fabric structure made on a multiple-feed circular machine having independent spring needles, reference character 10 indicates a yarn which is taken by certain needles in each wale of a course, i. e., it is formed into a loop at each needle, which loop is interknitted with prior and succeeding stitches of the corresponding wale so as to form a knitted stitch in each wale of the fabric. The yarn 11 of the second feed is knitted into the second, fourth and sixth wales, i. e., in alternate wales, but floats across the first, third, fifth and seventh wales. The yarn 12 of the third feed is also taken by the needles at every wale, it being similar in this respect to yarn 10. The yarn 13 of the fourth feed is knitted in wales intermediate the alternate wales where yarn 11 is knitted and floats across the alternate wales, i. e., the yarn 13 is knitted into the first, third, fifth and seventh wales and floated across the second, fourth and sixth wales in Figs. 1 and 2.

For convenience the second, fourth and sixth wales are hereinafter designated as alternate wales and the first, third, fifth and seventh wales are designated as intervening wales. It will be noted that the feeds in this instance are shown as arranged in sets of four though I do not necessarily limit myself to such arrangement. In intervening wales the yarn 10 forms long stitches while in alternate wales it is drawn into short tight stitches; all stitches of yarns 11 and 13 are long; yarn 12 has long stitches in alternate wales and short tight stitches in intervening wales, or in opposite order as compared with yarn 10. It will be seen that in each wale two long stitches (relatively speaking, for in the actual fine fabric all stitches are small and short, being made of fine yarn and forming a close fabric), are followed by a tighter stitch that embraces the neck of a long stitch and chokes it so as to stop a run at once. Each wale has the same number of stitches in a given length, as the floats of yarns 11 and 13 occur in different wales and are evenly divided. The floats conceal the body of the fabric to a considerable extent and this feature, together with the multiple feeds, etc., affords extensive possibilities in the way of variations in appearance

of the fabric, which can obviously be further varied by the use of yarns of different color or quality at the various feeds.

In the preferred form of the fabric here shown the yarn 10, or at least a yarn similarly knitted into each wale, follows the yarn 13 in the next course and is followed successively by yarns 11, 12 and 13 in ensuing courses and so on, but it will be understood that I do not necessarily limit myself to the precise number and arrangement of yarns illustrated in the drawings.

I have shown in the drawings portions of a multiple-feed circular independent spring needle knitting machine, this machine comprising a rotary needle cylinder 14 on a frame 15 which also supports a fixed cam carrier 16 carrying the needle cams for reciprocating needles 17 to knit a fabric, it being immaterial, however, whether the needle cylinder or the cam carrier rotates. The needles are arranged in two sets, one set having long butts 18 and the other set having short butts 19 as shown in Figs. 5 and 6, the series consisting of short butt and long butt needles occurring alternately. At such a feed as indicated at the middle of Fig. 3 there is a needle raising cam 20 for elevating all the needles, in the manner indicated by the two broken lines, the dotted line indicating the course of travel of the butts of the short butt needles and the dash line indicating the course of travel of the butts of the long butt needles. Cam 20 is followed by a stitch cam 21 and it will be seen from the drawings that all the needles are raised at this feed to take the yarn (e. g. yarn 10) and all the needles are lowered to draw loops, hence the yarn supplied at this feed forms loops at each wale. The relative direction of travel of the needles with respect to the cams is indicated by the arrow in Fig. 3 and after passing stitch cam 21 the long butt needles only are elevated by cam 22, the butts of the short butt needles passing along the top of a ledge indicated at 23 and not being elevated sufficiently to take the yarn, but holding their old loops. The long butt needles which are elevated by cam 22 take a new yarn at this feed, e. g. yarn 11 of Figs. 1 and 2, and are then drawn down by a stitch cam 24 to draw loops of yarn 11 in alternate wales. Stitch cam 24 is sufficiently lower than cam 21 to draw somewhat longer stitches in each alternate wale than those in the preceding course, and the stitches of yarn 10 in intervening wales, being held by their needles, rob the stitches of said yarn 10 in alternate wales so as to make the last-named stitches very short and tight, whereby they hug the necks of the stitches of yarn 11 closely so as to arrest any incipient run in the corresponding wales. The short butt needles which are holding loops of yarn 10 drawn in the previous course also move down slightly because ledge 23 is higher than the lower end of cam 24, and this appears to contribute to the robbing action by the long stitches of yarn 10. The needles now pass to another feed (not shown) where they are elevated by a cam such as shown at 20 and are drawn down by a cam like cam 21 to draw loops of yarn 12 on all the needles. For knitting in intervening wales only the machine is provided at appropriate places with a feed such as shown at the left in Fig. 3 where a cam 25 elevates all the needles and where the long butt needles are drawn down by a cam 26 to a level at which they do not take the yarn, leaving the short butt needles only in position to take the yarn and be drawn down by stitch cam 27 to a level where their beards are closed by pressers 30, so that they draw new loops of yarn 13 and knit off the old loops of yarn 12. The stitch cam 27, similarly to stitch cam 24, extends down to a lower level than does stitch cam 21 and the loops of yarn 12 in intervening wales are robbed in the manner above described, so that in the final product yarn 12 has long loops in alternate wales and short run-preventing loops in intervening wales.

In a fabric formed as above described, each wale has stitches at brief intervals which effectively bind down the intermediate long loops to prevent them from running. At the same time the floats of yarns 11 and 13 on one face of the fabric conceal the body of knitted yarns quite thoroughly and so form a characteristic effect, which can be taken advantage of also for color effects by the use of yarns of different colors, or by using stronger yarns as binders with more expensive and ornamental yarns in the courses having floats, thus securing a sort of plated effect.

In addition to the parts above described the cam ring of the machine is provided at appropriate points with guard cams 28 and the machine has a sinker bed 28' for sinkers 29, which sinker bed also forms part of the supporting means for pressers 30. Posts 31 on the support for the cam ring carry sinker cams 32 and means for actuating the pressers, all as known to those skilled in the art.

I have shown and described a preferred form of fabric and machine for making the same but it will be obvious to those skilled in the art that the fabric may be made on machines of other types than that illustrated and that changes may be made in the machine and the fabric all without departing from the spirit of my invention; therefore I do not limit myself to what is shown in the drawings and described in the specification but only as indicated in the appended claim.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent is:

A run-resisting plain-knitted fabric having repeats comprising a yarn knitted with short tight stitches in alternate wales and long stitches in intermediate wales, a second yarn knitted with long stitches in alternate wales and floated over intermediate wales, a third yarn knitted with long stitches in alternate wales and short tight stitches in intermediate wales, and a fourth yarn floated over alternate wales and knitted into long stitches in intermediate wales, whereby in each wale two long stitches are followed by a short tight stitch for arresting a run in such wale.

DAVID SIEGEL.