Jan. 6, 1942. S. H. SCHEUER 2,269,321

TWILL WEAVE FABRIC

Filed Oct. 8, 1941 2 Sheets-Sheet 1

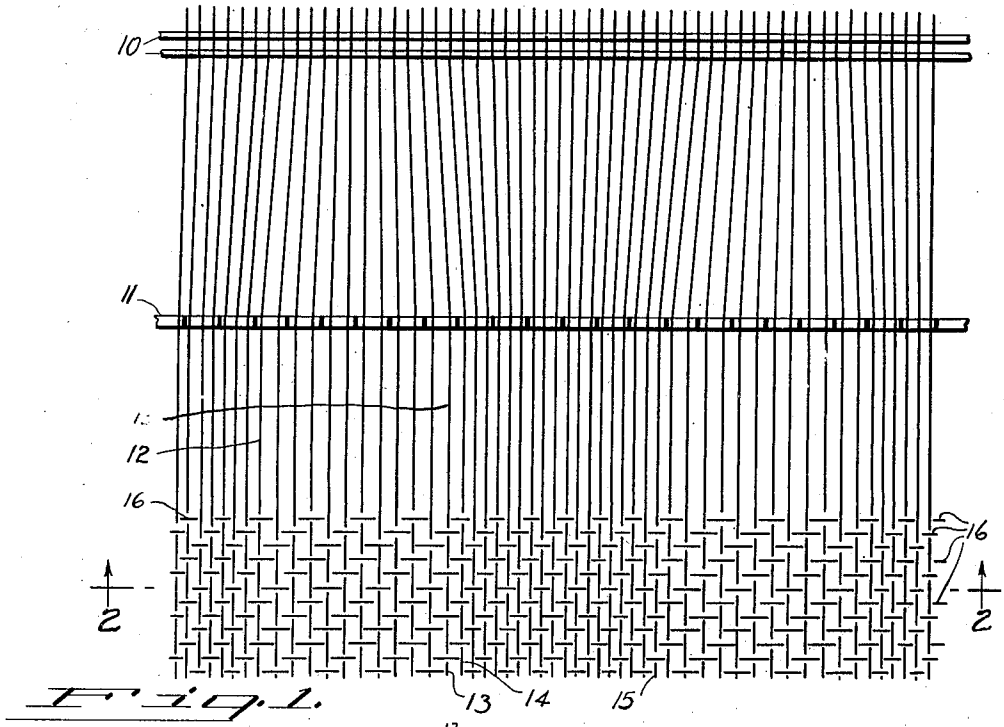


Fig. 1.



Fig. 2.

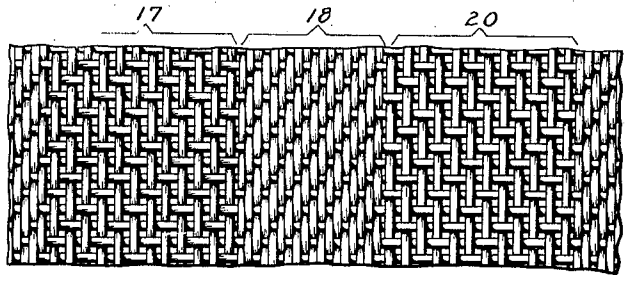


Fig. 3.

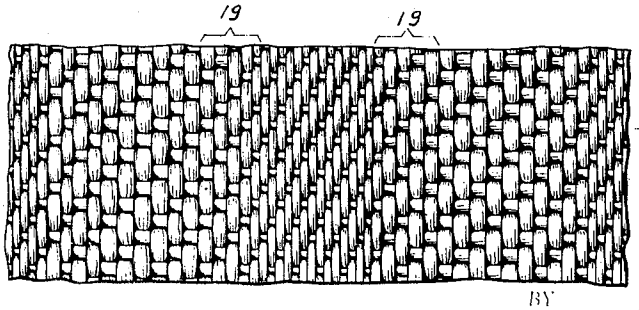


Fig. 4.

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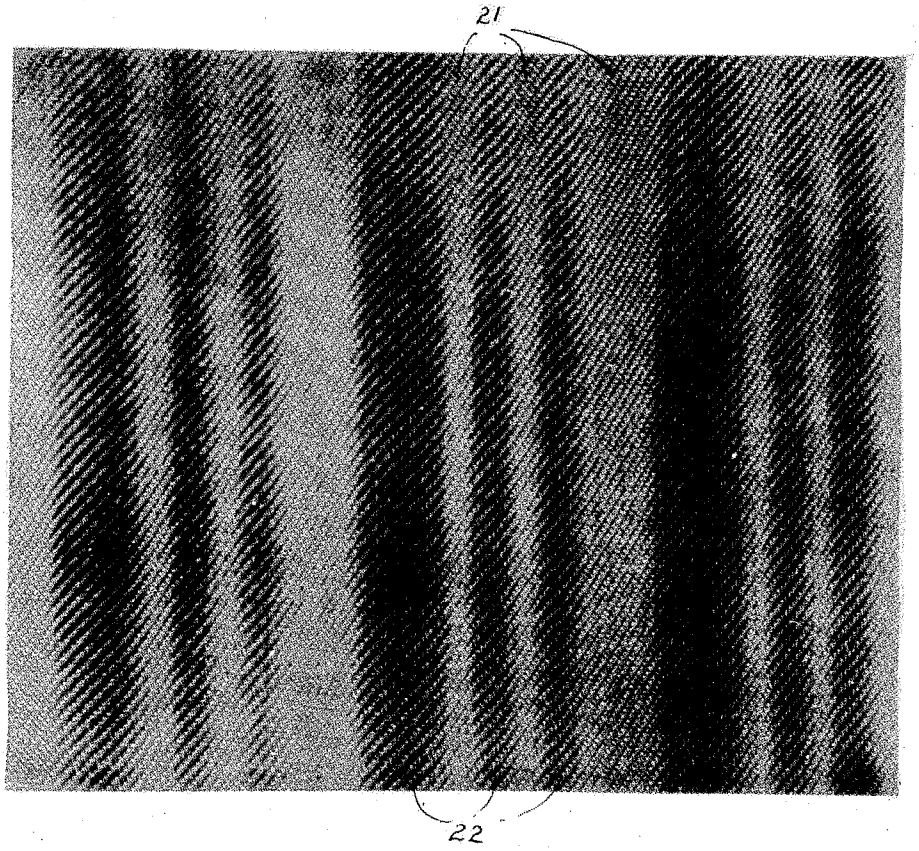


FIG. 5.

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TWILL WEAVE FABRIC

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Application October 8, 1941, Serial No. 414,043

2 Claims. (Cl. 139—417)

My present invention relates generally to the weaving art, and has particular reference to a new type of ornamental woven fabric.

A general object of the invention is to provide a fabric having a unique type of ornamentation consisting of a series of finely-spaced wavy or sinuous lines extending diagonally across the fabric, in combination with a series of parallel longitudinal bands or "shadow stripes." By the term "shadow stripes" I refer to bands between which there are no clean-cut lines of demarcation, each band shading gradually into the bands on each side of it.

A more specific object of the invention is to bring about this novel effect as an inherent characteristic of the woven fabric, independent of any extraneous surface printing or other ornamentation that may subsequently be applied to the fabric.

"Shadow stripes" are not new in the art but the effect has heretofore usually been achieved by the simultaneous use of more than one type of yarn, and by relatively complicated and expensive weaving procedures. The present fabric, on the other hand, may be produced from a single type of yarn, and on a plain loom using a single warp-beam.

My invention is predicated upon the discovery that by weaving the fabric of warp and weft threads composed of swellable yarn, by reeding the warp threads in a particular manner, and by employing a twill weave, certain new and unusual effects are produced when the goods are finished.

By the term "swellable yarn" I intend to refer to any type of yarn which has the characteristic of expanding or swelling when it is wetted, e. g., during the usual finishing procedure. Among the yarns which meet this requirement are most of the continuous-filament synthetic yarns, such as rayon, cuprammonium, nitrocellulose, acetate, viscose and similar yarns. On the other hand, cotton and other spun yarns are unsuitable for the present purpose because the twist which they necessarily possess (which, for example, in the case of spun rayon is usually between twelve and twenty-four turns per inch depending upon the size of the yarn) prevents the desired ultimate swelling of the yarn from taking place when the goods are finished. Spun yarns, therefore, whether composed of synthetic fibers or not, are not intended to be included in the term "swellable yarn" as that term is used herein.

One of the features of the present invention lies in the fact that the weft threads have a uniform density, while the warp threads are specially reeded to define in the fabric certain predetermined spaced parallel bands of relatively closely-woven texture, the intermediate bands being of relatively loosely-woven texture, the interengagement between the weft and warp threads conforming to the same selected twill weave throughout the traverse of the weft threads across said bands. When the fabric, thus woven, is subjected to the usual finishing procedure, the threads in the loosely-woven bands and at the margins of the closely-woven bands become swollen to a greater extent than the threads in the closely-woven bands. This results in the creation of unusual oblique twill lines which extend in sinuous fashion diagonally across the fabric.

Furthermore, because of the fact that the threads in the loosely-woven bands are enabled to swell to a maximum degree, while the threads at the margins of the closely-woven bands undergo a swelling only to an intermediate degree, there is no clean-cut line of demarcation in the finished fabric between each two adjacent bands. As a result, each band of the finished fabric shades gradually into the adjacent bands on each side of it thus producing a "shadow stripe" effect.

This "shadow stripe," coupled with the wavy oblique twill lines, produces an unexpectedly attractive ornamentation which makes the fabric useful and desirable for a large variety of purposes. The unique effect that is produced is the combined result of the type of yarn which is used, the manner in which the warp threads are reeded in the loom, the even density of the weft threads, and the use of only a single selected twill weave across the width of the fabric.

The twill weave that is used may be the ordinary so-called "three-leaf" weave, which is in most cases preferred, or any other selected twill weave, such as 2—2, or 3—1—1—1, etc., may be employed. Each leaves its own typical imprint upon the nature of the wavy twill lines that are produced in the finished fabric.

Similarly, the warp threads may be reeded in a variety of different ways depending upon the particular pattern that is desired. For example, 18 ends may be arranged in 6 dents (or 3 ends in a dent), alternating with 12 ends arranged in 6 dents (or 2 ends in a dent), thereby creating a "shadow stripe" effect of relatively simple character in which the stripes or bands are all of approximately the same width.

Other possible patterns, offered here merely

by way of example, could be produced as follows:

Pattern 2.—The warp threads are reeded 12 ends in 4 dents (3 ends in a dent), alternating with 8 ends in 4 dents (2 ends in a dent).

Pattern 3.—The warp threads are reeded: 12 ends in 4 dents, (3 ends in a dent); 8 ends in 4 dents, (2 ends in a dent); 12 ends in 4 dents, (3 ends in a dent); 8 ends in 4 dents, (2 ends in a dent); 30 ends in 10 dents, (3 ends in a dent); 20 ends in 10 dents, (2 ends in a dent), and this sequence of reeding is then repeated across the width of the fabric.

I achieve the foregoing objects, and such other objects as may hereinafter appear or be pointed out, in the manner illustratively exemplified in the accompanying drawings in which:

Figure 1 is a diagrammatic view showing one way of producing a fabric of the present character;

Figure 2 is a cross-sectional view taken substantially along the line **2—2** of Figure 1;

Figure 3 is an exaggerated plan view of the fabric produced as indicated in Figures 1 and 2 prior to any finishing procedure;

Figure 4 is a view similar to Figure 3, showing the appearance of the fabric after the finishing procedure; and

Figure 5 is a photographic plan view of a piece of fabric constructed in accordance with the present invention, showing a slightly different pattern from the one that is shown in Figures 1–3.

At **10** I have diagrammatically illustrated the heddles through which the warp threads are threaded as they are drawn from a single wrap-beam at the rear of the loom (not shown). At **11** I have indicated the reed, and in Figure 1 twenty-two complete dents are illustrated. It will be understood that Figure 1 is of an exaggerated and enlarged nature, and that in actual practice the loom forming the present fabric may use a reed having as many as forty dents per inch, or more. Obviously, the longitudinal distance between the heddles **10** and the reed **11** of Figure 1 is greatly foreshortened, as are the other longitudinal relationships illustrated, this figure being intended to be purely diagrammatic.

In the particular pattern illustrated in Figures 1, 2 and 3, the warp threads are alternately reeded twelve ends in six dents, and eighteen ends in six dents. More particularly, it will be observed that the twelve threads between those designated **12** and **13** are passed through six dents, two threads to a dent, while the next adjacent eighteen threads, lying between those designated **14** and **15**, are also passed through six dents, three threads being reeded through each dent. The latter group of warp threads produces, in the finished fabric, a band of relatively closely-woven texture. The group of warp threads between those designated **12** and **13** produces, in the finished fabric, an adjacent band of relatively loosely-woven texture. These two bands are illustrative of the entire series of adjacent parallel bands, alternately of relatively closely-woven texture and of relatively loosely-woven texture.

Notwithstanding the formation of these various groups of warp threads, it will be understood that the threads are worked individually by the harness in the usual manner.

The reference numeral **16** is applied to the filler threads which, as will be understood by those skilled in the art, are successively shot across the loom by means of the shuttle and are then beaten down by reciprocal movements of the reed **11**.

In Figures 1, 2 and 3 I have chosen to illustrate the employment of a three-leaf twill weave, i. e., each filler thread passes under two warp threads, then over one warp thread, then again under two and over one, etc. However, it is only every third filler thread that passes under and over exactly the same warp threads, the interengagement of the intermediate filler threads being successively shifted laterally in accordance with well-known procedure. Each filler thread, however, conforms to the same selected twill weave throughout the entire traverse of the filler thread across the bands of compacted and less-compacted warp threads.

The relationship of the weft and warp threads, after the actual weaving procedure but before any finishing procedure, is illustrated in an exaggerated manner in Figure 3. It will be observed that the band **17** is of relatively loosely-woven texture, while the band **18** is of relatively closely-woven texture, this being the result of the special reeding of the warp threads. Because of the twill weave that is employed, a series of oblique twill lines are discernible in each of these bands, but the obliquity of these twill lines is greater in the denser band **18** than in the looser band **17**.

The fabric is ultimately subjected to the usual finishing treatment during which time sizing and impurities are boiled off, and at the same time such dyeing as may be desired is effected. Both the warp and weft threads having been purposely composed of swellable yarn, these threads proceed to swell during the wetting to which they are subjected. The threads in the loosely-woven bands, such as the band **17**, proceed to swell to a maximum degree, thereby closing all interstices and presenting an ultimate appearance as indicated in Figure 4. Both the warp threads and the filler threads now present wider surfaces to view. Also, the diagonal twill lines become wider and more pronounced.

The threads in the relatively closely-woven bands, however, are incapable of swelling or expanding to any substantial degree, as a result of which the twill lines remain relatively narrow, and the light-reflecting properties of these bands are different from those of the other bands.

At the margins of the closely-woven bands, the threads expand or swell to an intermediate degree. This in indicated by the threads designated **19** in Figure 4. These threads cannot swell to the maximum degree because they are partially held in relatively firm interwoven relationship. Nevertheless, their expansion is not completely impeded since there is some room for them to expand in the direction of the looser-woven bands on each side. The result of this partial swelling is twofold. In the first place, it destroys any clean-cut line of demarcation between the closely-woven band **18** and the relatively loosely-woven band **17**. In the second place, the interaction between the threads in the marginal regions **19** brings about a gradual curvilinear merger between the oblique twill lines in the band **17** and the steeper oblique twill lines in the band **18**.

These same effects are produced at the opposite side of the band **18**, i. e., between the band **18** and the next adjacent loosely-woven band **20**. Not only is there a destruction of any clean-cut

line of demarcation between the bands 18 and 20, but there is created a curvilinear juncture between the oblique twill lines of the band 18 and the less-oblique twill lines of the band 20.

The ultimate result is unique and unusually ornamental. Not only is a "shadow stripe" effect produced, running lengthwise of the fabric, but this striped ornamentation is coupled with a series of wavy oblique twill lines extending in sinuous fashion diagonally across the fabric.

I have illustrated in Figure 5 a piece of finished fabric embodying these novel features, the alternate bands of relatively closely-woven texture 21 contrasting in a pleasing manner with the intermediate bands 22 of relatively loosely-woven texture. The unique sinuous or wavy twill lines, extending diagonally across the fabric, are clearly discernible in this figure. The particular pattern shown in Figure 5 is the one hereinbefore described as "Pattern 3."

Since the fabric may be produced on a simple loom, using a single weave throughout and employing a single type of yarn, it can be manufactured at relatively small expense. It is eminently suitable for men's wear linings, for women's wearing apparel, for tie materials and scarfs, and for decorative fabrics generally. As a printing medium, the fabric forms an interesting background, and because of the inherent ornamental character of the background, printed effects are vastly enhanced.

In general, it will be understood that those skilled in the art may make changes in the details herein described and illustrated without departing from the spirit and scope of the invention as expressed in the appended claims. It is, therefore, intended that these details be interpreted as illustrative, and not in a limiting sense.

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

1. A finished ornamental woven fabric in which the warp and weft threads are composed of swellable continuous-filament yarn having little or no twist, the weft threads having a uniform spacing throughout the fabric but the warp threads being reeded to define in the fabric predetermined spaced parallel bands of relatively closely woven texture and intermediate bands of relatively loosely woven texture, the interengagement between the weft and warp threads conforming to the same twill weave throughout the traverse of said weft threads across said bands, the threads in said loosely woven bands and at the margins of said closely woven bands being swollen to a greater extent than the threads in the closely woven bands, the oblique twill lines thereby extending in sinuous fashion diagonally across the fabric.

2. A finished ornamental woven fabric in which the warp and weft threads are composed of swellable continuous-filament yarn having little or no twist, the weft threads having a uniform spacing throughout the fabric but the warp threads being reeded to define in the fabric predetermined spaced parallel bands of relatively closely woven texture and intermediate bands of relatively loosely woven texture, the interengagement between the weft and warp threads conforming to the same twill weave throughout the traverse of said weft threads across said bands, the threads in said loosely woven bands being swollen to a maximum degree and to a greater extent than the threads in the closely woven bands, the threads at the margins of said closely woven bands being swollen to an intermediate degree, each band of the finished fabric thereby shading gradually into the adjacent bands on each side of it and the oblique twill lines extending in sinuous fashion diagonally across the fabric.

SIDNEY H. SCHEUER.