Feb. 10, 1931. F. R. L. THOMAS 1,792,453

BLISTER ORNAMENTED WOVEN FABRIC

Filed Aug. 10, 1929

Fig. 1

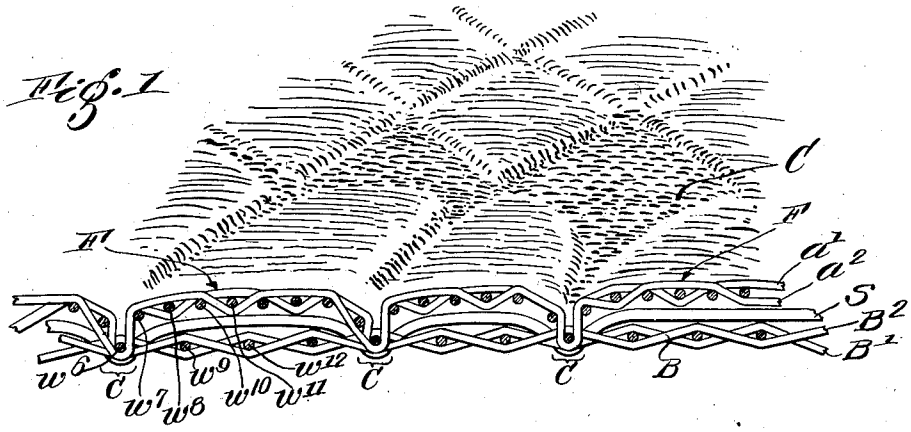


Fig. 2

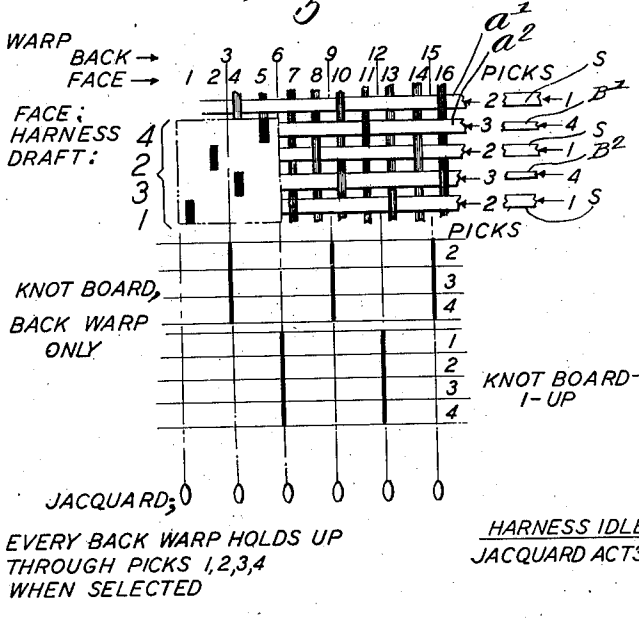


Fig. 3

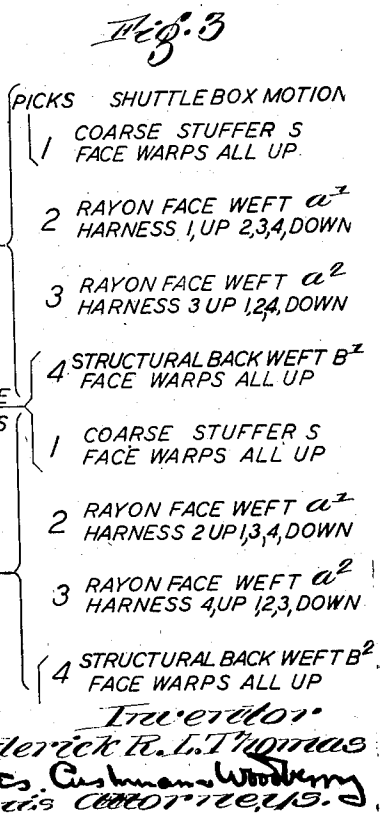
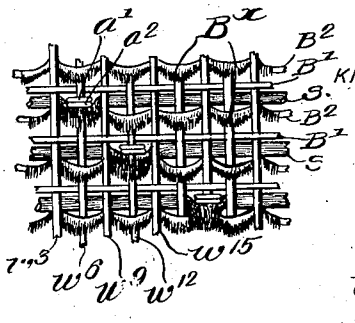


Fig. 4



Inventor
Frederick R. L. Thomas
by Roberts, Cushman & Woodberry
his Attorneys.

Patented Feb. 10, 1931 1,792,453

UNITED STATES PATENT OFFICE

FREDERICK R. L. THOMAS, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO MONADNOCK MILLS, OF CLAREMONT, NEW HAMPSHIRE, A CORPORATION OF NEW HAMPSHIRE

BLISTER-ORNAMENTED WOVEN FABRIC

Application filed August 10, 1929. Serial No. 384,814.

This invention relates to a double woven fabric of the type known to the trade as Marseilles quilting, characteristically ornamented by raised figures of one of the component cloths, defined and separated by stitching connecting the back component cloth to the front component cloth, this stitching in the areas of the back and face cloth closely connected by any of various weave structures establishing the pattern by its differences of actual relief from the blistered surface constituted by the remainder.

One object of the invention is to provide for increasing the decorative effect of the pattern by increasing both the physical relief or elevation of the blisters, and by providing for making the face cloth in such a way as to make it selectively reflecting in respect to incident light. A preferred expedient for securing this appearance in the face cloth is to make it throughout as a satin, preferably a weft satin, the weft system of yarns being highly glossy, polished, of substantial size, and lying closely in widthwise parallel relation, little interrupted by structural engagement with the warps except where the pattern ties the satin face to the backing fabric.

A further object of the invention is to provide a patterned back surface showing the face pattern, in contrasting colors, if desired; a further object is to provide that this fabric back shall be capable of being finished by a brushed nap. A further important object of the invention is to provide for weaving the fabric in such a way as to avoid undue stress and wear on the warps, and to enable an effective fabric to be made of relatively coarse sley and pick at maximum speeds. The invention provides a new method or art of weaving as well as the new genus of fabrics produced.

The invention will now be described in connection with the illustration of one species only, but it will be understood that the invention is capable of expression in many different types of fabric by intended variation of the method or art, of the kinds of warp yarn and weft yarn employed, and of the particular characteristics of the patterns. In the accompanying drawings:

Fig. 1 is a section along the weft yarns and across the warp yarns in diagram, showing the related perspective appearance of the face of a fabric of one pattern;

Fig. 2 is a diagram showing the relation of warp and weft on the face of the fabric, a preferred harness draft and a preferred relation of jacquard healds and knot boards;

Fig. 3 is a diagram table explaining a preferred relation of the picks of the weft or shuttle-box motion to warp shedding; and

Fig. 4 is an enlarged diagrammatic view of a backing fabric.

Referring now to Figs. 1 and 2, the fabric preferably is woven on the basis of a single uniform warp which may or may not be divided for a differential let-off between those warps predominantly used at the back of the fabric and those predominantly used at the face. While it is an object to produce a fabric in which the face is relatively less tense in every dimension than the back, it is not necessary, under conditions of weaving about to be explained, that this difference shall be provided by any actual difference of let-off for the back warp. To this end, therefore, a single warp consecutively entered in the dents of the reed may be employed. In order to produce the desired fabric it is sufficient to divide this warp for the purpose of shedding so that a part of it may be manipulated in one way independently of the manipulation of another part in relation to the entrance of wefts. In the instance to be described, for example, the warps intended to enter into the face fabric may be every recurrent pair separated by a single intervening warp; referring to Fig. 2, if the warp yarns are consecutively numbered, the face is to be comprised of the series 1, 2; 4, 5; 7, 8; 10, 11; 13, 14; etc., whereas the back would then be comprised of the series 3, 6, 9, 12, 15, etc. Any other convenient numerical relationship in which more warps are allocated to face than to back may, however, be chosen.

Considering the face warp only, a repeat of the shedding pattern may be comprised of any desired small number of the face warps,

for example four; and one complete shedding series for the purpose of this invention may repeat on a similar number of picks entering the face cloth only; for example four. Such a four-four pattern for a weft satin face is illustrated by the harness draft and adjacent fabric in Fig. 2, which shows the weave concatenation for the type of weft satin diagrammatically, in connection with the harness draft; this specific fabric is also shown in section in Fig. 1 at F. The warps w^7, w^8, w^{10}, w^{11}, etc. are face warps and the warps w^9, w^{12}, etc. are back warps. These warps may be and preferably are like yarns; in the usual case, they are colored for certain pattern effects explained below.

It will be observed that the type of face satin weave indicated in Fig. 2 and shown in Fig. 1 implies no more by way of motions of the face warps to be given by the loom than shedding of a warp drawn in the healds of a four-frame harness according to the harness draft in the order 1, 3, 2, 4 for the passage of a similar number of successive face wefts and when hereinafter a satin weave is referred to it is to be understood as inclusive of such a broken four-leaf twill as herein specifically illustrated as well as other twills including true satins such as may be used in securing the desired surface effects. This order of shedding and picking is quite independent of any order resorted to for shedding and picking the back warps for the structural backing fabric.

In order to weave the back component B of the cloth it is preferred to resort to a one-and-one or plain weave, Fig. 4, by which the successive warps w^3, w^6, w^9, w^{12}, w^{15}, etc. are interwoven with a suitable weft for the back. A preferred order of picking the structural back wefts B^1 and B^2, Fig. 1, in respect to the face wefts, as illustrated, is to weave a pick for the back fabric weft after weaving each two intervening picks of the face fabric. Any other suitable weave structure of the backing fabric may be resorted to within the invention.

It is often desirable, however, for the purpose of giving the fabric weight, and preventing the flattening of the blister pattern, and is recommended, to include between the face fabric F and the back fabric B an unwoven series of stuffers S, which may be coarse cotton yarns, tied in according to the blister pattern; and a preferred order for the inclusion of these stuffers is to lay them in the open shed between the face and backing warps on picks alternating with picks alternately of the structural back yarn B^1 and B^2, which may be the same or different kinds of yarns. As shown in Fig. 3, the preferred order of weft introduction is thus to pick a coarse stuffer S, the face warps all being up, then to pick a suitable face weft a^1 with harness 2 up, 1, 3, 4, down; to pick another face weft a^2 with harness 4 up 1, 2, 3, down; and then to pick a structural back weft B^1 with the face warps all up; and then to repeat.

So far as explained no provision has been made for shedding the back warp of the series w^6, w^9, w^{12}, etc. to produce the one-and-one or other desired back fabric structure. Bearing in mind that the fabric to be produced is to be ornamented by connecting face and back fabric, it is implied for a full capacity for complex pattern that every intersection of warp and weft, at least to the gauge of the backing fabric, shall be adapted for pattern purposes to a structure tying, binding, or stitching the face cloth F and back cloth B together. It is preferred and recommended that every back warp of the series 3, 6, 9, etc. be controlled independently, and to avoid breakages and wear, exclusively by a jacquard actuated heald, sling, eye, or other lifting connection. As a practical matter, this of course implies independently controllable lifting by flexible cords or wires or their equivalents for each back warp, and it is preferred and recommended that the necessary cord-guide, knot or repeat boards of the jacquard mechanism be arranged to be worked up and down to enable them to be utilized for the structural shedding of the back warp, whereas the independent motion of the back warp for the pattern tying-together of the two fabrics is the function of independent lifting, one at a time, of each of the back warps; according, of course, to a perforated-card pattern and the griffe bar mechanism of the usual Jacquard loom. For the purpose of structural shedding, it is necessary only to divide the jacquard connections between the warp eye of whatever kind of flexible connection is in use and the griffe hooks into recurrent series, and to pull these series up alternately, or in any other desired order, after every third pick of the described series of four wefts. A convenient way to do this is to arrange the alternate jacquard connections to the warps 3, 6, 9, 12, 14, etc. to be controlled by knotted cords, or wires having stops on them, and to move these alternate series separately by a comb or a perforated board hereinafter referred to as a knot board. I do not herein claim the loom devices by which I prefer to perform these operations.

The shedding of the back warp for a one-and-one backing is by alternate lifting of alternate warps; but each of these warps may be independently lifted according to a pattern during throw of the face and any of the stuffing and any other of the wefts.

For the kind of fabric principally desired to be made according to this invention, the jacquard pattern may be an exceedingly large pattern running to repeats for many hundreds of counts of the warp and counts of the weft, and the blister pattern is capable of

expression in figures of relatively wide areas of free face cloth, as well as in diaper-patterned, diagonally patterned, or other ornamented ground patterns in which the back cloth and the face cloth are relatively closely bound together by binding or tying stitches consisting of warps of the back cloth brought forward to engage wefts of the front cloth. These binding points, lines or areas are typically shown at C, Fig. 1.

It will now be apparent that at the stitch points C, Fig. 1, the stuffer weft S as well as the face wefts go to the rear face of the cloth. If, as recommended, the fabric is carried out with a colored warp and a white or contrasting pair of silk or rayon face wefts a^1, a^2, the back cloth shows a colored pattern like the face, but what is the satin blister surface on the face is on the back a flat area of one-and-one weave of the back fabric B; and what is the stitched valley or depression C on the face is on the back a three-part weft stitch of the yarns a^1, a^2, S. In the case of the colored warp, the structural wefts B^1, B^2 may be of the same or a different color, and the stuffer S may be the same color as the warp or the same color as the face yarns a^1, a^2.

A satisfactorily upstanding face blister is produced without further precaution than the mode of weaving explained above. The face wefts a^1, a^2 are preferably subject to little shuttle tension. It is preferred in some cases to cause the relative looseness of the front face F as compared with the back face B in a greater degree, and this may be accomplished merely by weaving the structural wefts B^1, B^2 with a sufficient shuttle tension. To secure a super-elevation of the blisters, at least one of the structural wefts B^1, B^2 may be a yarn of relatively great thickness, preferably a twisted rayon yarn, which will normally stand up from the back face; after the weaving is completed the back face of the fabric, Fig. 4, is subjected to the action of a napping or gigging brush of the kind familiar to manufacturers of blankets and other brushed woolens, which has the effect of raising a covering nap on the back surface of the goods, and at the same time, of pulling laterally on the back face runs of this weft B^2 to extend them to arc-shaped loops B^x, shown in Fig. 4, the formation of which pulls lengthwise upon the wefts B^2, and contracts the back fabric laterally. This contraction after weaving, although of only two or three per centum in the length of an alternate weft component of the back fabric, is found satisfactorily to decrease the relative width of the back fabric as compared with the face or satin blister of the fabric, and goods so finished display their satin blisters much more prominently than goods not so finished. The highly glossy face of the satin blisters shows the pattern by reflection of bright and dark edges, and the relatively tense back fabric displays this effect in an enhanced way.

In the manufacture of bed-spreads, the jacquard pattern may provide a weft-wise cutting line and a warpwise cutting line of closely-bound double-cloth for the finished edge of the goods, which may be bound by over-edge taping, or by over-edge stitching with a suitable sewing machine, or otherwise, or the goods may be woven of a great width by this method of weaving, and the individual bed-spreads cut from the wide goods on a type of trimming and over-edge sewing machine producing an over-edge finish, which may or may not follow a scalloped or other ornamental line warpwise or weftwise of the goods.

I claim:

1. Art of weaving blister ornamented cloth comprising as steps shedding recurrent groups of warp yarns and throwing successive picks of weft for a satin face fabric; at intervening times between the said operations operating upon warps intervening between said recurrent groups, to shed said intervening warps in relation to each other to receive throws of weft for a backing fabric; placing said throws of weft; laying a stuffer weft between face and backing fabric at times between weaving the face fabric and throwing weft for the backing fabric; and operating independently upon each of the said warps intervening between the recurrent face-fabric groups to lift them to receive beneath some of them according to pattern successive face wefts and a stuffer weft.

2. Art of weaving satin blister ornamented cloth comprising as steps shedding recurrent groups of warp yarns and throwing successive picks of weft for a weft-satin face fabric; at intervening times between the said operations operating upon warps intervening between said recurrent groups, to shed said intervening warps in alternate relation to each other to receive throws of weft for a one-and-one backing fabric; placing said throws of weft; laying a stuffer weft between face and backing fabric at times between weaving the face fabric and alternating with each throw of weft for the backing fabric; and operating independently upon each of the said warps intervening between the recurrent face-fabric groups to lift them to receive beneath some of them according to pattern successive face wefts and a stuffer weft.

3. Art of weaving double fabrics ornamented by satin blister effects comprising as steps shedding in relation to each other warps of recurrent groups only of a warp, and throwing successive wefts, for the production of a satin face fabric on said recurrent warps; operating on each warp of the intervening warps at each interval between shedding and weft placing operations for the satin face to open a shed for picks of weft

for a structural back fabric, and placing said picks; and operating on the said intervening warps to lift some of them individually according to a pattern during successive picks of face weft to make tying stitches the picks of face weft being laid under lesser tension than the picks of the back fabric.

4. Art of weaving double fabrics ornamented by satin blister effects comprising as steps shedding in relation to each other warps of recurrent front face groups only of a warp, and throwing successive wefts for the production of a satin face fabric on said recurrent face warps: operating on each warp of the intervening back warps at intervals between shedding and weft placing operations for the satin face to open a shed for picks of weft for a structural back fabric, and placing said picks; placing a stuffer weft between said recurrent groups of front face warps and the back warps at intervals and operating on the said back warps to lift some of them individually according to a pattern during successive picks of face weft and picks of stuffer weft to make tying stitches.

5. Double fabric having therein a woven face fabric of weft satin weave having weft runs engaged under warps and over groups of warps each comprising at least three warps of the face structure, and having a backing fabric containing fewer warps and fewer wefts than the face fabric, the backing fabric having certain structural warps interwoven above certain wefts of the face according to a pattern.

6. Double fabric having therein a woven face fabric of weft satin weave having weft runs engaged under warps and over groups of warps each comprising at least three warps of the face structure, and having a backing fabric containing fewer warps and fewer wefts than the face fabrics, the backing fabric having some of its structural warps interwoven above successive wefts of the face according to a pattern, and above otherwise free weft runs of a stuffer yarn lying between said satin face and said backing fabric.

7. Double fabric of the Marseilles quilting type characterized by a face pattern of satin blisters, having therein a continuous face cloth of four-harness weft-satin weave connected to a backing cloth of one-and-one woven plain cloth of a coarser sley and coarser pick, and also having between its faces a weft system of stuffer yarns interengaged with the face and back cloths by tying engagements of certain back warps according to pattern, said back warps passing towards the face side of the fabric over at least one of said stuffers and at least two of the face fabric wefts.

8. Double fabric of the type having a weft satin face cloth and a plain weave backing cloth tied together by warp pattern stitches of the back cloth to form ornamental raised blisters, having a system of weft yarns in the backing fabric extended into loops by brushing, whereby the backing fabric is laterally shrunk and enhances the relative looseness of the face blisters.

9. Blister ornamented double cloth having a satin face and a one-and-one woven back tied together by warp stitches of the back arranged to form on the face a pattern, and an intervening stuffer, the backing cloth showing the face weft and the stuffer respectively at the positions of said tying stitches.

Signed by me at Claremont, New Hampshire, this 7th day of August, 1929.

FREDERICK R. L. THOMAS.