

UNITED STATES PATENT OFFICE.

GEORGES HEBERLEIN, OF WATTWIL, SWITZERLAND.

COTTON FABRIC.

1,392,265.

Specification of Letters Patent. Patented Sept. 27, 1921.

No Drawing.

Application filed March 18, 1921. Serial No. 453,489.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, GEORGES HEBERLEIN, a citizen of the Swiss Republic, and a resident of Wattwil, Canton of St. Gall, Switzerland, have invented certain new and useful Improvements in Cotton Fabrics, (which improvements are described in the following filed applications—*i. e.*, German application, Ser. No. H. 64,376, filed Nov. 20, 1913, Patent No. 280,134, granted Nov. 4, 1914; French application, Ser. No. 67,013, filed Feb. 19, 1914, Patent No. 468,642, granted Apr. 29, 1914; French application, Ser. No. 8,962, filed Nov. 30, 1915, patent of addition No. 20,149, granted July 22, 1916; British application, Ser. No. 13,129 of 1914, filed May 28, 1914, Patent No. 13,129 of 1914, granted as of Nov. 20, 1913; Italian application, Ser. No., (have none,) filed June 9, 1914, Patent No. 143,796, granted Jan. 11, 1915; Italian application filed Feb. 10, 1916, patent of addition No. 152,764, granted Feb. 28, 1921; Belgian application, Ser. No. 219,478, filed June 19, 1914, Patent No. 268,537, granted June 30, 1914; Austrian application, filed May 29, 1914, Patent No. 70,004, granted June 21, 1915; German application, Ser. No. H. 68,470, filed May 19, 1915, Patent No. 295,816, granted Dec. 18, 1916; French application, Ser. No. 83,050, filed Apr. 21, 1916, Patent No. 481,561, granted Sept. 23, 1916; British application, Ser. No. 6,218 of 1916, filed May 1, 1916, Patent No. 100,483, granted as of May 19, 1915; Belgian application, Ser. No. 225,208, filed June 24, 1919, Patent No. 280,937, not yet issued; Italian application, filed May 4, 1916, Patent No. 154,095, granted June 5, 1916; Austrian application, filed Apr. 29, 1916, Patent No. 81,367, granted Sep. 25, 1920,) of which the following is a specification.

The invention relates to cotton fabrics, and the object of the invention is the provision of new fabrics of pleasing and novel appearance or effects.

The invention consists in fabrics having novel effects which are hereinafter described in connection with certain processes where-
by they may be produced, and the inven-

tion will be more particularly pointed out in the appended claims.

Since the fabric that is the subject of this invention is produced by chemically processing or treating cotton fabric so as to chemically structurally change the same in such manner as to produce these novel effects, it may facilitate a better understanding of the invention if I first describe my process by which the fabric may be made, and also the previously known or suggested chemical treatment of cotton fabric to chemically and structurally change its fibers.

A method of producing pattern effects upon cotton fabric is known (in the sense that it has been suggested) wherein concentrated sulfuric acid of from 45° to 55° Bé. (which, as is known, serves to impart a parchmentizing action upon cellulose) is printed upon the fabric, which, after this action has taken place for a few seconds, is washed with water, or in which a resist is printed upon the fabric, after which the latter is passed for a few seconds through sulfuric acid, and finally washed. By this means those parts where the sulfuric acid acts upon the fibers,—that is to say, those parts at which the parchmentizing process takes place, become thinner, and more transparent, while those parts which have not been acted upon by the sulfuric acid or have been reserved, stand out as a pattern by reason of their less transparent quality and their greater thickness relatively to the more transparent background.

This known action of the sulfuric acid on the ordinary cotton fabric did chemically structurally alter the cotton fibers, and the fabric did thereby become more nearly transparent than was the ordinary cotton fabric so acted upon, but the fabric was not thereby rendered actually transparent in the sense in which the word "transparent" is generally understood, nor in the sense that fabric is rendered transparent according to my processes to be hereinafter described, nor in the sense that that term is used in connection with the fabric herein claimed. It is also well known that when ordinary cotton fabric is treated as heretofore suggested

the fibers do not become bright giving to the fabric a smooth, finished appearance or sheen, but on the contrary the fibers are only so altered as to give simply a dull, hard, translucent appearance to the fabric, which is rough and of an unfinished appearance. In short, the effect or appearance of the fabric made according to the previously suggested process is not a pleasing one and the fabric is too crushable to be useful for the purposes for which cotton goods of pleasing appearance are utilized.

Now I have discovered that much more distinctive effects which are ornamental can be obtained by utilizing this previously suggested process on mercerized cotton fabric, or fabric made of mercerized cotton, and by using sulfuric acid of above $50\frac{1}{2}^{\circ}$ Bé. (i. e., not substantially less than 51° Bé.). By mercerizing the fibers and also treating them with sulfuric acid of above $50\frac{1}{2}^{\circ}$ Bé. I obtain a novel fabric having enhanced effects heretofore unknown. This is to be explained by the fact that the chemical alteration which cotton fibers undergo on being mercerized makes them more adaptable or susceptible to reaction, in consequence whereof a greater transparency is obtained in those parts of the fabric treated with sulfuric acid of over $50\frac{1}{2}^{\circ}$ Bé. than is the case with cotton fabric not mercerized.

It is a curious fact that in the treatment of mercerized cotton fabrics with sulfuric acid, the so-called parchmentizing action (but which in reality in the case of my herein recited processes produces a true transparent effect) only results when the concentration of the acid is in excess of $50\frac{1}{2}^{\circ}$ Bé.

As the so-called parchmentized parts of the mercerized cotton fabric possess an exceedingly great affinity for many dyes, and upon being dyed color much darker than the remaining portions of the fabric, the effect produced on the fabric by the processes can be considerably heightened by the subsequent dyeing of the fabric.

It is a characteristic of cotton fabric treated according to my above described process, that it is really quite transparent, giving the effect or appearance of a high grade transparent "organdie," and that the fibers are bright and clean, and give to the fabric a bright or sheen effect, and a smooth, finished appearance in contrast to the dull, rough, unfinished truly parchmentized effect which is characteristic of cotton fabrics produced by simply treating the ordinary cotton fabric with sulfuric acid, as had been known prior to my above set forth process.

It is also a characteristic of fabrics treated according to my above described process, that their chemical structural change is permanent—i. e., will withstand repeated laundering so that the goods may be laundered

without eliminating or materially altering the said characteristics, and this greatly enhances their value.

Where the entire fabric is treated according to my above process, the heretofore described transparent effect is, of course, produced all over the fabric so as to provide a transparent fabric of pleasing effect which has a bright clean appearance with somewhat of a sheen resembling high grade transparent organdies; and where only portions of the fabric are treated according to my invention and the other parts remain as unaltered mercerized fabric, so as to produce pattern effects, of course the mercerized parts remaining untreated retain the physical characteristics of mercerized cotton—i. e., are soft, glossy and opaque, and show up in striking manner in contrast to the transparent portions.

I have also found that a still more enhanced transparency of the cotton fabric can be obtained by an improved process, according to which sulfuric acid of over $50\frac{1}{2}^{\circ}$ Bé. and concentrated caustic alkali are caused to act upon cotton fabric several times alternately, the sulfuric acid being always allowed to act only for a few seconds.

In order to obtain this greater or enhanced transparency as compared with that obtained by my first mentioned process, it is necessary that one of the two agencies be applied at least twice with an intermediate treatment of the other, as for example, caustic soda—sulfuric acid—caustic soda, or vice versa. In between the reactions the goods must be well washed, and subsequently dried.

If cotton fabric treated with concentrated caustic soda is subjected for the second time to the same treatment no further change takes place in the same. That is, the second caustic treatment remains without effect on the fabric. Cotton fabric behaves in similar manner toward repeated treatments with concentrated sulfuric acid. If, however, the cotton fabric that has been mercerized has been subsequently exposed to the action of concentrated sulfuric acid, and then to caustic soda, the caustic soda reacts anew upon the fabric and effects a further change. The same is true if the first treatment is with the concentrated sulfuric acid, and then the next treatment with caustic soda and another treatment with sulfuric acid. In each such alternate treatment the acid or alkali, as the case may be, will again work or be effective upon the fibers of the fabric to further alter them. The alternate treatment with acid and alkali can be several times repeated.

It is evident that varied degrees of transparency are obtained according to the number of manipulations or alternate treatments. Modifications in the quality of the fabric

can also be obtained by either stretching the same more or less during the treatment, or by having the same more or less shrunk in the longitudinal and cross directions.

5 Finally transparent pattern effects may be obtained by printing the alkali or the acid at one or more of the operations only upon particular portions of the fabric, or
10 by printing on particular portions of the fabric a resist (for instance gum thickening) either at the commencement of the treatment or between the first and the second or between two successive operations, the
15 said resist preventing a further reaction of the alkali or the acid. For example it will be obvious from the above that if the afore-
said pattern effect of glossy mercerized portions and of transparent portions is to be
20 produced, the fabric can be treated with alkali all over, then a resist of the design put on and then the background is treated with acid and then with alkali.

The fabric herein claimed may be made by either of the above processes, and it is
25 a characteristic of the fabric made by either process that the effects produced are permanent, *i. e.*, will withstand repeated laundrying.

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

1. A cotton fabric having pattern effects, *i. e.*, background portions and design portions, and in which one has the physical
35 characteristic of mercerized fabric, *i. e.*, soft and glossy, and the other has the physical characteristic of organdie, the contrast between said portions being such as to clearly
define the desired pattern.

40 2. A fabric having pattern effects, *i. e.*, background portions and design portions extending through its thickness so as to appear identically and in register on both surfaces, and in which the portions of one have the
45 physical characteristic of mercerized fabric, *i. e.*, soft and glossy, and the portions of the other have the physical characteristic of being stiffer but flexible and more transparent, the contrast between said portions
50 being such as to clearly define the desired pattern, and being due to chemical differences in the fibers of the respective portions, the fibers of both said portions being such structurally as to withstand repeated laundrying without material alteration of its
55 said characteristics.

3. A cotton fabric having pattern effects, *i. e.*, background portions and design portions, and in which one has certain physical
60 characteristics and has had its fibers undergo a chemical change from ordinary cotton, and in which the other has markedly different physical characteristics and has had its fibers undergo a different chemical change

resulting in the fibers being decidedly more
65 transparent, the difference in characteristics between said portions being such as to clearly define the pattern.

4. A cotton fabric having pattern effects, *i. e.*, background portions and design portions, and in which one has certain physical
70 characteristics due to its fibers having undergone a chemical change from ordinary cotton, and in which the other has markedly different physical characteristics due to its
75 fibers having undergone a different chemical change resulting in its being rendered harsher and more transparent than said first mentioned portions, the differences in characteristics between said portions being such
80 as to clearly define the pattern, and being permanent, *i. e.*, capable of withstanding repeated laundrying without materially altering said contrasts.

5. A cotton fabric having pattern effects, *i. e.*, background portions and design portions, and in which one has the physical
85 characteristics of mercerized fabric, *i. e.*, soft and glossy, and the other has the physical characteristic of being more transparent, the contrast between said portions being
90 such as to clearly define the desired pattern.

6. A mercerized fabric having pattern effects, *i. e.*, background portions and design portions, and in which one has the
95 physical characteristics of mercerized fabric, *i. e.*, soft and glossy, and the other has the physical characteristic of being harsher and more transparent, the contrast between said portions being such as to clearly define
100 the desired pattern, such contrasts being due to the structural differences in the fibers of the respective portions, which differences are permanent, *i. e.*, will not be eliminated by repeated laundrying.
105

7. A cotton fabric fibers of which have been chemically altered from ordinary cotton, characterized by the fact that it is substantially transparent and resilient, as distinguished from a dull translucent or truly
110 parchmentized fabric.

8. A cotton fabric fibers of which have been chemically altered from ordinary cotton, characterized by the fact that it is substantially transparent with bright fibers giving
115 a sheen or brightness to the fabric, as distinguished from a translucent or truly parchmentized fabric with dull fibers giving a rough unfinished appearance.

9. A cotton fabric fibers of which have been chemically altered to render the fabric thinner, finer and more transparent than would be possible by chemical treatment with acid only or by alkali only, and which transparency is permanent, *i. e.*, will not be
125 eliminated by repeated laundrying.

10. A cotton fabric fibers of which have been chemically altered to produce a per-

manent organdie effect, *i. e.*, an organdie which will withstand repeated laundering without material alteration as to stiffness and transparency, and in which the transparency is materially greater than can be produced by treatment with an acid only or with an alkali only.

11. A mercerized fabric fibers of which have been chemically altered to render the fabric thinner and more transparent.

12. A mercerized fabric in which its fibers have been altered to produce a permanent organdie effect, *i. e.*, an organdie which will withstand repeated laundering without material alteration as to stiffness and transparency.

In testimony whereof, I have signed my name to this specification.

GEORGES HEBERLEIN.