

May 25, 1937.

H. A. SECRIST

2,081,370

FABRIC

Filed Jan. 22, 1936

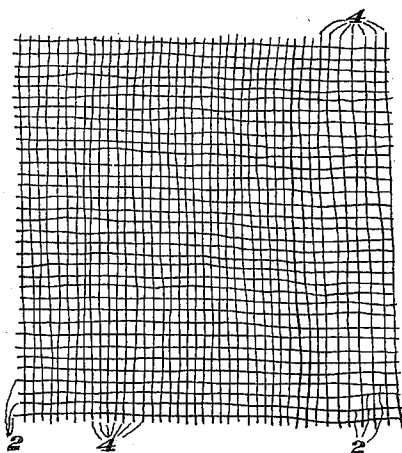


Fig. 1

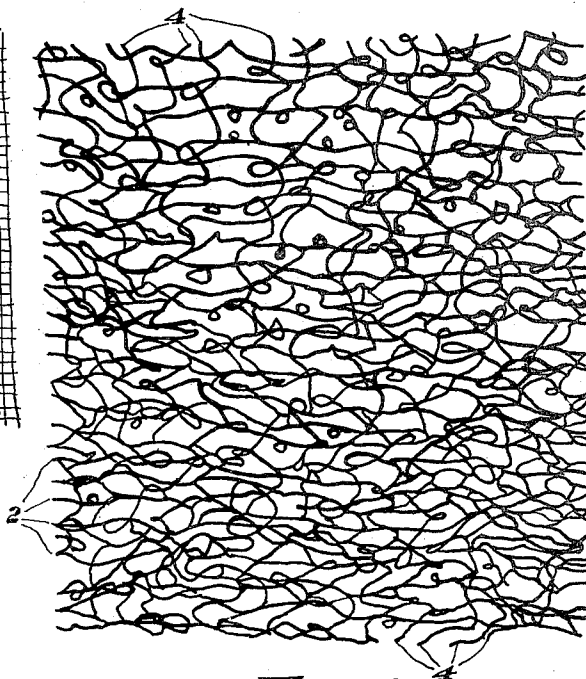


Fig. 3

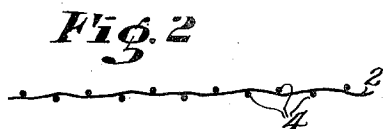


Fig. 2

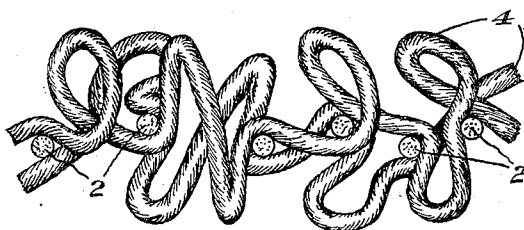


Fig. 4

INVENTOR.

Harace A. Secrist

BY

W. J. Kirkpatrick, Jr.

ATTORNEY.

UNITED STATES PATENT OFFICE

2,081,370

FABRIC

Horace A. Secrist, Walpole, Mass., assignor to
The Kendall Company, Boston, Mass., a corporation of Massachusetts

Application January 22, 1936, Serial No. 60,220

10 Claims. (Cl. 139—391)

This invention relates to a novel open-mesh woven fabric and has principally to do with the provision of what is herein termed a bulked open-mesh woven fabric that is useful for various purposes, for example, among others, for cleaning, wiping and polishing cloths; for making soft and resilient pads or fillings; and for making sound and dust absorbing mediums.

Heretofore, cloths for cleaning, wiping and the like, have been largely either cheesecloth or knit cloth with the latter somewhat more in favor on account of its softness and bulkiness due to its loosely knit construction. Because of such construction and the fact that its threads, not having been subjected to great tension or to a bleaching process, are soft and somewhat fuzzy, knit cloth has an excellent ability to pick up and occlude dust particles since its threads do not lie in straight or uniform lines and this feature, together with their not having been bleached and dried under tension, contributes greatly to the softness, elasticity and sponginess of the relatively thick knit fabric of this character. Such material, however, is customarily made in comparatively narrow widths and this, together with its natural elasticity, permits it to stretch out and assume an undesirable rope-like form which is very troublesome in use as a polishing and wiping cloth. Moreover, its tubular construction reduces the amount of surface area which is actually available for wiping and cleaning purposes.

The novel fabric of the present invention has all the advantages of the knit cloth with none of its disadvantages and, in addition, possesses many advantages not found in the knit cloth or other commercially available cleaning and polishing cloths. Also, as before pointed out, the bulked fabric of this invention is useful for many varied purposes because of its novel construction and characteristics which afford a relatively thick though light and fluffy open-weave structure which is soft, elastic, resilient, spongy and dust-absorbent.

In the drawing,—

Fig. 1 is a plan view of a suitable open-weave cloth which may be converted into the bulked fabric of this invention;

Fig. 2 is an enlarged end elevation of the cloth shown in Fig. 1;

Fig. 3 is an enlarged plan view of the bulked woven open-mesh cloth of this invention made from the cloth of Figs. 1 and 2, as herein described; and

Fig. 4 is an enlarged edge or side elevation of

a small portion of my novel bulked fabric illustrating its character.

Referring to the drawing in which like numbers represent like parts,—the open-mesh cloth of Figs. 1 and 2 may be, for example, cheesecloth, tobacco cloth or the like, which are conventionally formed from cotton and preferably is woven, very open mesh and with relatively fine threads, say 14 x 10 mesh with 40's and 45's cotton, or even finer threads. Though a somewhat closer weave will give satisfactory results, the weave for good results should preferably not exceed 24 x 20, or at any rate, not exceed 32 x 28. The openness of the mesh must be such as to provide large spaces relative to yarn or thread size for it is in this way that there is provided room to form the independent random kinks, loops, etc. characteristic of my fabric particularly in the lengths of warp between adjacent filling or weft threads as hereinafter more fully described. The thread size is of some importance as is also the twist multiple and for fabric of the general character described the cotton thread size may be from say 20's to 60's. For example, with yarns of the order of thirty to forty, and a weave of 32 x 28, the spaces will approximate three times the yarn diameter, and with finer threads a larger ratio will obtain, e. g., five times the yarn diameter. The twist multiple (turns per inch over square root of thread number) of the thread may range from say 3 to 7, which range for convenience is herein termed normal twist multiple, though preferably a twist multiple of 4 to 5 or 6 appears to be more desirable for the warp with a slightly lower twist multiple, say 4 or slightly less, for the filling. Though a bleached cloth may be used, for best results an unbleached cloth is more desirable, heavier, and more resilient, and, moreover, is less expensive to make than a bleached cloth. In accordance with this invention ordinary cheesecloth such as just described and shown in Figs. 1 and 2 may be converted into the novel bulked or fluffed product hereof, by strong and continued agitation of the cloth while immersed in a water bath causing the weft and warp threads to assume the characteristic sinuous or tortuous formations with loops, kinks, etc. as hereinafter more fully described. Although the water may be cold, results are better and more rapidly attained the hotter the water. A typical mechanism is an almost entirely closed box through which the cloth is conveyed so that a considerable mass of the material is at all times within the box. The box is partially filled with hot, and preferably soapy water and the whole is

continually agitated with great violence. The hot water serves to relax and plasticize the threads so that they are soft, and loops, bends and kinks are easily pressed into it and so that the latent tendency of the threads, especially the warp threads, to untwist is developed. The violent agitation of the box containing the mass of heavy, wet cloth and considerable volume and weight of water, continually and repeatedly throws the cloth heavily against one side of the box, then partially opens it up and then throws it violently against the other side of the box. The result is the rapid formation of an immense number of the bends, kinks, etc. in a random and haphazard manner all over the cloth. If this process is continued for a reasonable length of time, the number of bends, kinks, etc. formed is so great and the distance between bends in the yarns is so small, that the bends, kinks, etc., except upon close inspection, are not readily discernible as such but the whole cloth presents a fluffed and bulked appearance, being considerably contracted in length and width. During this pounding process, the cloth is so worked and contracted in its own plane, that the weak tendency of the threads, both warp and weft, though particularly the warp threads, to kink is realized upon with the formation of many e bends and loops therein. Precisely what takes place under these conditions when the wet cloth is, so to speak, compressed in its plane by pressure, impacts or agitation, is somewhat obscure, but the result is that the threads when in plastic condition are forcibly given and/or assume individual or independent random kinks, twists, turns, loops, and zig-zag formations between most, though not all, of the adjacent crossing threads and the fabric is thus narrowed widthwise say 20-50% and shortened warpwise say 25-75%. Due to the open weave, each length of thread between crossings, and particularly each warp thread between adjacent crossing weft threads, is given and is free to independently assume the random shapes without material, if any, effect due to the next adjacent weft or warp threads. Because of the random shapes of the threads thus contracted, the cloth is very much bulked and thickened so that it emerges as a fluffed product several times, for example five to ten times, thicker than when woven. The cloth thus bulked preferably is then rinsed and conveyed by a belt moving slowly through a dryer. Upon being dried, the cloth assumes a highly elastic condition in which the individual shapes imparted in the weftwise and warpwise contracting, particularly the latter, are so to speak, set in the cloth so that such shapes tend to remain in the cloth. Though the thickness of the product and the shapes in the weftwise and warpwise threads may be said to be "set" by the drying process, such shapes need not be, and for my preferred cloth are not, set into the cloth by means of any added setting or sizing solution which hardens upon drying. The soap solution, which is preferably employed, does not have this hardening and stiffening characteristic and, in fact, is a good lubricant which also contributes to the resilience and softness of the product. The bulked cloth in its finished condition and preferred form is then highly elastic, extensible and resilient with the individual and random shapes, curls, loops and kinks in the threads thereof and may then be folded, piled or rolled ready for cutting and folding into packages as desired without in any way minimizing the bulkiness and other desirable characteristics thereof. A typical fin-

ished commercial product made from the preferred 14 x 10 open-mesh cloth woven from 40's and 45's threads in accordance with this invention exhibits a thickness of approximately .065" as compared with an original thickness of but .006"-.008"; a weight of .8 ounce per square yard; and has an initial and normal extensibility weftwise to about one and one-third or even two times its width and warpwise to about one and one-half to two times its length.

Though the product has been described with reference to both weftwise and warpwise contracting, the contracting in either dimension, say weftwise contracting, may be minor due principally to the type and character of the forcible treatment, though at some sacrifice of the bulk-ing and weftwise extensibility which would otherwise be secured. The warpwise contracting, however, is more important in order that there may be produced a cloth having the desired characteristic thickness, warpwise extensibility, and the relatively high number of independent like loops, cusp and cycloid-like kinks, turns and twists between adjacent weft threads in order to provide a cheap and preferably absorbent cloth having to a high degree the desirable properties of bulkiness, softness, springiness, elasticity and extensibility, together with a high surface area and ability to pick up and occlude dust particles.

Having described my invention what I claim is:—

1. As an article of manufacture, a bulked open-mesh woven fabric composed principally of cotton with warp and weft threads, said warp threads being of substantially equal length, and having a construction of not to exceed 32 x 28 threads to the inch and composed of threads having a twist multiple of less than seven, and in which individual warp thread sections between weft threads are characterized by random looping or kinking and bending of individual threads whereby to provide a fluffy fabric.

2. As an article of manufacture, a bulked, open-mesh plain woven fabric composed principally of cotton and having a single set of warp and weft threads with a twist multiple of less than seven, and having a construction of not to exceed 32 x 28 threads to the inch and having its individual thread sections bent and looped or kinked in a non-uniform and random manner between adjacent cross threads to provide a fluffy fabric.

3. As an article of manufacture, a plain woven open-mesh cloth composed principally of cotton and having a mesh at least five times as large as the diameter of the threads thereof, and having only one set each, of warp and filling threads and in which the twist multiples are less than seven, said cloth having a thickness greater than three times the thickness of the threads and in which the parallel warp and filling threads lie in crooked dissimilar lines respectively, characterized by random kinking or looping of individual threads whereby to provide a fluffy fabric.

4. As an article of manufacture, a bulked open-mesh woven extensible fabric composed principally of cotton and having warp threads of substantially equal length and having weft threads of substantially equal length woven to present mesh openings relatively large with respect to the size of the threads thereof, and of a construction not to exceed 24 x 20 threads to the inch, said threads having a twist multiple of less than seven, said fabric being character-

ized by random kinking or looping of individual threads to provide a fluffy fabric.

5 5. As an article of manufacture, a bulked open-mesh, woven, extensible fabric composed principally of cotton and having warp threads of substantially equal length and having weft threads of substantially equal length woven to present mesh openings at least three times as large as the diameter of the threads thereof, 10 said threads having a twist multiple of less than seven, said fabric being characterized by random kinking or looping of the individual threads whereby to provide a fluffy fabric.

15 6. As an article of manufacture, a bulked, open-mesh, woven, extensible fabric composed principally of cotton and having warp threads of substantially equal length and having weft threads of substantially equal length woven to present mesh openings relatively large with 20 respect to the size of the threads thereof, said threads having a twist multiple of less than seven, said fabric being characterized by random kinking or looping of the individual threads to provide a fluffy fabric, and being extensible to at least one and one quarter times one of its weftwise and warpwise dimensions. 25

7. As an article of manufacture, a bulked open-mesh, woven, extensible fabric composed principally of cotton and having warp threads of 30 substantially equal length and having weft threads of substantially equal length woven to present mesh openings relatively large with respect to the size of the threads thereof, said threads having a twist multiple of less than 35 seven, said fabric being characterized by random kinking or looping of the individual threads to provide a fluffy fabric, said fabric being appreciably extensible in both its warpwise and weftwise directions, and being extensible to at least one and one-quarter times its normal dimensions in one of said directions. 40

8. As an article of manufacture, a bulked, open-mesh plain woven fabric composed principally of cotton and having a construction of not to exceed 32 x 28 threads to the inch, made 5 of warp and weft threads of between 20's and 60's having a twist multiple of not to exceed seven, and with the warp threads of said fabric having between spaced weft threads independent and individual random loops, kinks, and 10 turns whereby to provide a fluffy fabric, said fabric being weftwise extensible to at least one and one-fifth times its normal width and warpwise extensible to at least one and one quarter times its normal length.

9. As an article of manufacture, an open mesh 15 woven cloth composed of threads principally of cotton and having a mesh at least three times as large as the diameter of the threads thereof, and having only one set each of warp and filling threads, said warp threads being of substantially 20 equal length, and in which the twist multiples are less than seven, said cloth having a thickness greater than three times the thickness of the threads, and in which the parallel warp and filling threads lie in crooked dissimilar lines 25 respectively, characterized by random kinking and looping of individual threads, whereby to provide a fluffy fabric.

10. As an article of manufacture, a bulked open-mesh woven fabric composed principally of 30 cotton with warp and weft threads, said warp threads being of substantially equal length, and having a construction of not to exceed 14 x 10 threads to the inch and composed of threads 35 having a twist multiple of less than seven, and in which individual warp thread sections between weft threads are characterized by random looping or kinking and bending of individual threads whereby to provide a fluffy fabric.

HORACE A. SECRIST. 40