

May 14, 1940.

G. BLOCH

2,200,946

FABRIC-MAKING MATERIAL

Filed Sept. 16, 1937

2 Sheets-Sheet 1

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

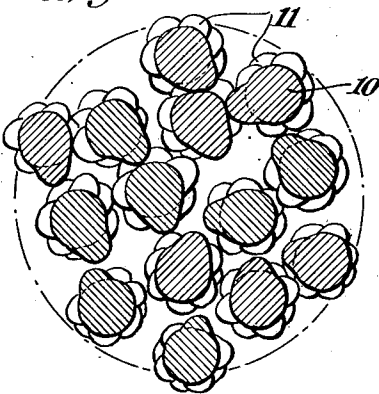
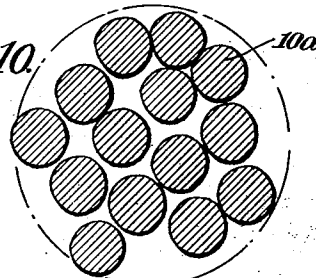


Fig. 10.



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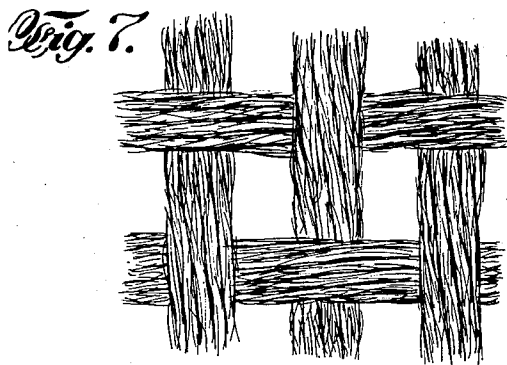
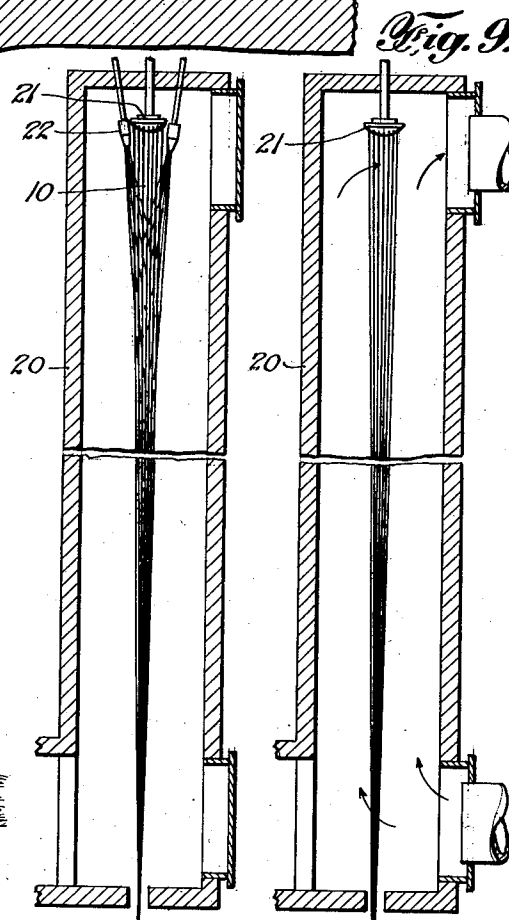
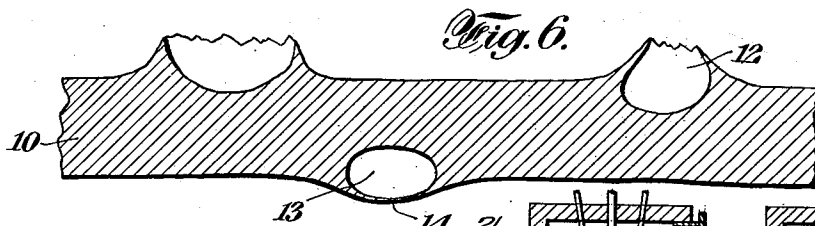


Fig. 8.

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FABRIC-MAKING MATERIAL

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11 Claims. (Cl. 18—54)

This invention relates to fabric-making materials and more especially to synthetic textile filaments such as filaments composed of viscose, cellulose acetate, ethyl cellulose, benzyl cellulose or other cellulose compounds.

Heretofore, cellulosic filaments used in the manufacture of cloth have been smooth on the surface and the cloth made therefrom has been devoid of dead air pockets. As a result, such cloth has had a high co-efficient of heat transfer and has been unfitted for use in garments, blankets and the like where protection against cold and a warm-to-the-touch feeling is desirable.

An object of this invention is a cellulosic filament having an irregular surface of such nature that cloth woven from yarn composed of such filaments contains a high percentage of dead air space, thereby giving the cloth high insulating properties and adapting it for use in which protection from cold is a requisite.

The surface irregularities may be of any nature which will effect the provision of dead air spaces between filaments composing a yarn. The surface irregularities may be in the nature of protrusions from the filament. The irregularities are produced in the spinning of the cellulosic filament which may be cellular, solid or hollow. Staple yarns may be made from the filaments by cutting the same into short uniform lengths or staples and spinning the same as heretofore and a high degree of resiliency is obtained in such yarn. The surface irregularities of the filaments result in an increase in yarn strength as such filaments will not slip one against the other as readily as smooth surface filaments.

In one method of producing cellulosic filaments embodying the invention, cellulose acetate filament is produced in the usual manner by dry spinning and additional cellulosic material is sprayed on to such filaments, thereby producing the desired surface irregularities in the form of protrusions. Yarn is produced from such filaments in the usual manner and used in the manufacture of cloth. The cloth thus produced has a high percentage of dead air space due to separation between filaments composing the yarn and between the yarns themselves.

In another method of producing cellulosic filaments embodying the invention, chemicals forming or reactive in forming gas bubbles are introduced into the cellulosic material prior to the spinning operation and the filament after passing through the spinnerette is subsequently treated to cause the surface bubbles to break, thus forming crater-like protrusions. The breaking of the

bubbles may be effected by regulation of the pressure, temperature and/or other conditions under which the cellulosic filament is produced.

Other methods of obtaining the desired irregular surface may be utilized so long as the surface irregularities are of such nature as to effect the separation of filaments above referred to with the consequent formation of dead air space. Such other methods will suggest themselves to those skilled in the art of producing cellulosic filament. It is immaterial as to just what the nature of the irregularities may be so long as there is provided in the yarn and fabric composed of such filaments a high percentage of dormant or quiescent air space around and between individual filaments.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawings, wherein:

Fig. 1 illustrates on an enlarged scale a filament having protrusions formed by spraying additional cellulosic material on to the filament;

Fig. 2 illustrates on a smaller scale yarn composed of a plurality of the filaments of Fig. 1;

Fig. 3 illustrates the yarn composed of Fig. 2 on the scale of Fig. 1;

Fig. 4 is a cross-section of the yarn of Fig. 3;

Fig. 5 illustrates on an enlarged scale a filament having protrusions formed by breaking gas bubbles at the surface of the filament;

Fig. 6 is a longitudinal section of the filament of Fig. 5;

Fig. 7 illustrates fabric woven from yarn composed of filaments embodying the invention;

Figs. 8 and 9 illustrate diagrammatically two methods of producing filament embodying the invention, and

Fig. 10 illustrates in cross-section yarn composed of standard filaments.

In Figs. 1, 2, 3 and 4, the cellulosic filament has protrusions formed by spraying a mist of cellulosic material thereon during the operation of dry spinning. As clearly shown in Figs. 3 and 4, these protrusions effect provision of dead air spaces between the filaments composing the yarn and also serve to minimize relative longitudinal movement of the filaments composing the yarn spun from same.

In Figs. 5 and 6, the filament is also represented by 10, and 12 represents the crater-like projections formed on the surface of the filament by reason of breaking of gas bubbles contained in the filament near its surface. There may also be gas bubbles within the filament which

may provide smooth protrusions 14 as distinguished from the crater-like protrusions 12. In yarn composed of filaments such as shown in Figs. 5 and 6, the protrusions 12 serve to space apart the filaments in the same way as shown in Figs. 3 and 4 to produce a high percentage of dead air space in the yarn.

In a fabric made from yarn composed of the illustrated filaments, the filaments in the yarns are spaced one from the other through the action of the protrusions from the filament surface. In such fabric there is a very high percentage of dead air space due to the fact of the spacing of the filaments one from the other in the yarn. Such fabric, therefore, has high insulating properties and is adapted for any use in which protection from cold is a requisite. In Fig. 7 is disclosed a fragment of cloth in which the yarn constituting the warp and weft is composed of filament 10 having protrusions which may be of the nature disclosed in either of the Figures 1 and 5.

In Figs. 8 and 9, 20 is the drying chamber or stack of the standard apparatus for producing acetate fibers by the dry spinning method and 21 is the spinnerette through which the solution is forced into the chamber 20 in the form of filaments 10. In Fig. 8 are provided spray heads 22 through which acetate solution is introduced into the chamber, in the form of a fine mist so that additional acetate solution is deposited on the filaments 10. The additional solution is dried to form the protrusions 11 illustrated in Figs. 1, 3 and 4. The filaments 10 are gathered at the bottom of the shaft in the usual manner and supplied to the usual winding device.

In the apparatus illustrated in Fig. 9, the acetate solution supplied to the spinnerette 21 is provided with gas-forming chemicals which produce bubbles in the filaments, some of the bubbles being near the surface. As the filaments pass downwardly through the stack 20 they are subjected to proper regulation of temperature and pressure and/or other conditions to cause the surface bubbles to break to form the crater-like protrusions 12 illustrated in Fig. 5.

It is of course understood that the filaments disclosed in Figs. 1 and 5 are merely illustrative of types of surface irregularities that may be produced on the filaments and that the methods described are merely illustrative of methods that may be used to produce the desired surface irregularities and that the invention is not limited to such types of surface irregularities or methods. Other types of surface irregularities may be obtained by other methods of treatment within the scope of this invention. This invention contemplates the production of the above-described filament by wet spinning methods as well as by the dry spinning methods heretofore described. The nature and arrangement of the surface irregularities is not material except as they provide space between filaments and yarns to form dormant air spaces which give to the fabric a low co-efficient of heat transfer, a warm-to-the-touch feeling and the protection against cold which is desirable for blankets and some garments.

Comparison of Figs. 4 and 10 will make evident the additional dormant air space provided in yarn by the filaments embodying the invention. The number of filaments and denier of such filaments is the same in both of these figures, but it will be noted that the perimeter and cross-sectional area of the yarn of Fig. 4 greatly ex-

ceeds that of the yarn of Fig. 10. Also, the air space between the filaments 10 of Fig. 4 is much greater than the air space between the filaments 10a of Fig. 10. Consequently, the yarn of Fig. 4 has a lower co-efficient of heat transfer and is a better heat insulator than the yarn of Fig. 10. It naturally follows that cloth composed of yarn of Fig. 4 will be superior to cloth composed of the yarn of Fig. 10 with respect to insulating qualities and protection against cold.

Filaments made in accordance with this invention may be blended and/or twisted with similar filaments or with filaments of any other nature as has been the common practice. Also, a yarn composed of such filaments may be used for knitting as well as for weaving. In addition, the filament is particularly adapted for making felt fabrics as the protrusions serve to prevent relative movement of the filaments. Such filaments, therefore, have the same felting qualities as rabbit fur and the like now used in the manufacture of felt fabrics.

The acetate solution supplied to the spray heads 22 of Fig. 8 for producing the filament of Fig. 1 may contain gas-forming chemicals. In such event, the surface bubbles may be broken and thus produce in the protrusion small craters generally similar to the crater-like protrusions illustrated in Figs. 5 and 6.

The filaments herein described may if desired be subjected to crimping. In such event, the surface irregularities of the filaments will serve to prevent slippage of staple in a spun yarn as well as serve to increase the dead air space in yarn resulting from spacing of the staple by reason of the crimping thereof.

The word "protrusion" in this specification and claims is used to include the types described or types of integral local surface protrusions such as might be designated as knobby, papulous or stumpy, or characterized by substantial width in relation to projection. The word "protrusion" as herein used particularly excludes hairy or filamentary appendages.

I claim:

1. An artificial filament with spaced protrusions eccentric to the filament body axis, said protrusions being formed of solidified film-forming fluid.

2. Yarn spun with artificial filamentary staple wherein filaments have spaced protrusions eccentric of the filament body axis, said protrusions being formed of solidified film-forming fluid of the same material as the body of the filament.

3. Artificial filamentary staple in which filaments have spaced protrusions eccentric of the filament body axis, said protrusions being of material additional to the body of the filament.

4. An artificial filament with spaced protrusions eccentric to the filament body axis, said protrusions being formed of solidified film-forming fluid of substantially the same material as the body of the filament and additional to the body of the filament.

5. Artificial filamentary staple which is crimped and which has spaced protrusions eccentric to the filament body axis, each protrusion being formed of solidified film-forming fluid.

6. Artificial filamentary staple which is crimped and which has spaced protrusions eccentric to the filament body axis, each protrusion being formed of solidified film-forming fluid, wherein the protrusions are formed of material additional to the body of the filament.

7. Yarn formed of discontinuous filaments, at least a portion of which have spaced protrusions eccentric of the filament body axis, the said protrusions being formed of solidified film-forming fluid.
8. Yarn formed of discontinuous artificial filaments, at least a portion of which have spaced protrusions eccentric of the filament body axis, the said protrusions being formed of solidified film-forming fluid of the same material as the body of the filament.
9. The method of producing artificial filament having surface protrusions which comprises passing film-forming solution through a spinnerette to form filaments, spraying film-forming solution on to said filaments while separated, and solidifying said solution on said filaments in the form of protrusions.
10. A felt fabric composed of artificial filaments having longitudinally a succession of crater-like protrusions which individually encompass less than the periphery of the filament whereby relative slippage of the filaments is prevented and a high percentage of dead air space is provided in the fabric.
11. A felt fabric containing artificial filaments with spaced protrusions eccentric to the filament body axis, said protrusions formed of solidified film-forming fluid.
- GODFREY BLOCH.

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