Dec. 30, 1941. V. H. HURT 2,268,399

RUN-RESISTING KNIT FABRIC AND BATHING GARMENT

Filed June 15, 1938

Fig. 1.

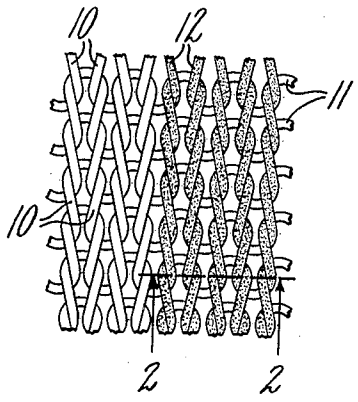
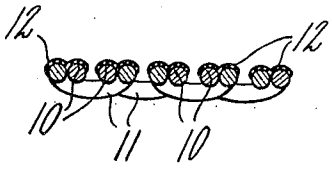


Fig. 2.



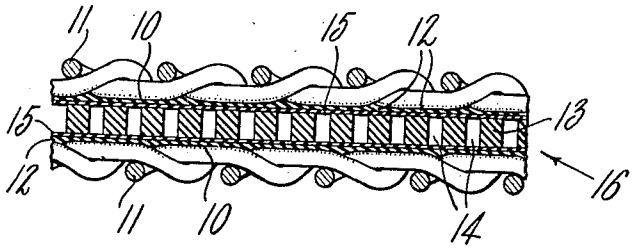


Fig. 3.

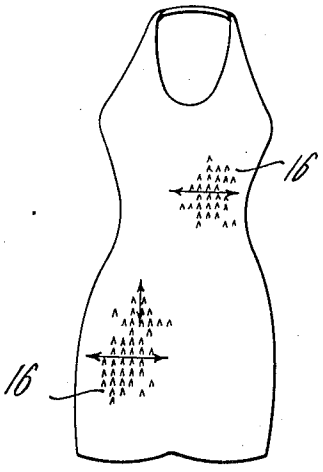


Fig. 4.

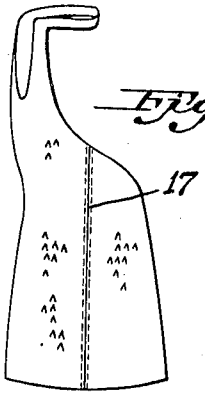


Fig. 5.

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UNITED STATES PATENT OFFICE

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RUN-RESISTING KNIT FABRIC AND BATHING GARMENT

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Application June 15, 1938, Serial No. 213,854

6 Claims. (Cl. 154—48)

This invention relates to a process of treating knit fabrics so as to reduce greatly their tendency to "run" or "ladder" when a thread is cut or breaks, also to the resulting fabric and to a laminated elastic sheet material employing such treated fabric in its construction.

The tendency of fine knitted fabrics to "run" or "ladder" is a great source of annoyance and expense to those who deal with such knitted goods, and while various remedies have been proposed heretofore they have not overcome this difficulty.

It is old to provide an elastic fabric by securing a rubber backing to a knitted fabric or to sandwich such rubber backing between two knitted fabrics, but it is found that when such elastic fabric is produced by adhesively securing a knitted fabric to a rubber sheet the adhesive bond between the fabric and sheet in many cases does not prevent runs from developing in the knitted fabric.

The present invention was therefore developed primarily to prevent a knitted fabric from developing runs when it is provided with a rubber backing, but the invention is not limited to this field and may be employed upon knitted goods which are not backed or formed into a laminated sheet.

Knitted fabrics whether plain or rib knit are commonly formed of series of loops consisting of curved components and linear components. In plain knit fabrics the curved components all lie at the back of the fabric and the linear components, all lie at the face of the fabric, and in rib knit fabrics the linear components lie at both sides or faces of the fabric.

The present invention is based largely upon the discovery that a plain or rib knit fabric may be prevented from developing runs by applying to the surface thereof which is formed of such linear components a small quantity of fluid rubber compound or dispersion. It is desired to point out here that in order to prevent runs without causing the dispersion to penetrate entirely through the fabric it is important to apply the dispersion to the surface of the fabric formed of said linear components rather than to the surface formed of said curved components, since a small quantity of rubber dispersion works better on the linear components to prevent the formation of runs in the fabric when a thread breaks or is cut.

It is found that this prevention of runs can be secured without causing the rubber dispersion to strike through even a thin knit fabric to the opposite side, or show at said opposite side. This is important because in many cases there may be a serious objection to the appearance of the rubber on both faces of the knitted fabric. If it is attempted to prevent runs by applying the rubber compound or dispersion to the surface of the fabric having the curved components a less satisfactory result is secured due to the fact that a deeper penetration of the dispersion into the fabric structure is needed to prevent the runs from occurring.

After the knitted fabric has had the surface thereof which is formed of the linear components treated with a rubber dispersion as herein contemplated, it may then be adhesively secured to a rubber sheet to form a laminated elastic sheet material. It is however highly desirable that the dispersion treated surface of the fabric be secured to the rubber sheet, since this surface will adhere better to the rubber sheet than the opposite untreated surface, and this arrangement will cause the outer or exposed surface of the fabric to be free from the rubber.

The laminated or plied sheet may have the knitted fabric secured to only one face of the rubber sheet but in many cases it is desired to cover both faces of the rubber sheet with the knitted fabric so as to conceal the rubber and cause the laminated sheet to present a textile face at both surfaces.

This laminated or plied elastic material is well adapted for use in the construction of corsets, girdles and other elastic garments or articles of wear, but is particularly well adapted for use in the construction of bathing suits or bathing garments, because the stretch characteristics of such material are practically the same whether the material is wet or dry. In this respect it has an important advantage over most textile bathing suits which stretch very differently when wet than when dry. Furthermore since the treatment herein contemplated prevents the knitted fabric from running, this material may be sewed like ordinary textile material without producing runs where the sewing needle pierces the material.

It will be seen from the foregoing that one important feature of the present invention resides in a knitted fabric, such, for example, as a plain knitted fabric having applied to what is commonly known as the face thereof, a sufficient quantity of fluid rubber compound or rubber dispersion to prevent the formation of runs, without at the same time causing the dispersion to strike through to the opposite surface of the fabric or show appreciably from said opposite surface.

Another feature of the invention resides in a

laminated sheet material having the above mentioned treated fabric adhesively secured to a rubber sheet so that the surface of the fabric treated with the rubber dispersion is secured to the rubber sheet. The effect of this is to prevent the occurrence of runs, increase the bond between the knitted fabric and rubber sheet, and cause what is usually known as the back of the knitted fabric to be exposed in the laminated sheet. Still another feature of the present invention resides in a bathing garment formed of such run-resisting laminated elastic material.

The above and other features of the invention will be further understood from the following description when read in connection with the accompanying drawing illustrating good practical forms of the invention, and wherein

Fig. 1 is a plan view of the face of a piece of plain knitted fabric shown on an enlarged scale.

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view of a laminated elastic sheet material constructed in accordance with the present invention, and showing the knitted fabric at each face of the rubber sheet as severed along the wales;

Fig. 4 is a front view of a bathing suit constructed of the laminated elastic material of Fig. 3; and

Fig. 5 is a side view of the bathing suit shown in Fig. 4.

The fabric illustrated in Fig. 1 is a plain knit fabric of usual construction and is formed of a series of loops consisting of the linear components 10 forming the face of the fabric and the curved components 11 lying at the back of the fabric. It should be noted that part of this fabric shown in Fig. 1 has been stippled to indicate that the linear components 10 in this portion of the fabric have been coated with a rubber compound or dispersion 12, but this dispersion, it should be noted, does not penetrate deep enough to reach the curved components 11.

The rubber coating 12 applied to the outer surface of the linear components 10 may constitute various forms of fluid rubber composition, such, for example, as solvated rubber or an aqueous dispersion of rubber such as latex. Latex is in most cases preferable because of its high solids content which cause one coating thereof to possess sufficient body to hold the knitted loops so as to prevent runs.

The fluid rubber composition such as latex is preferably applied to the face of the fabric, or to the linear components of the loops thereof so that it will not penetrate to the opposite surface of the fabric or show appreciably at said opposite face. Other knitted fabrics than plain knit may be treated in accordance with the present invention, but the desired run-resisting action is secured by a minimum penetration of the rubber when the coating is applied only to the linear component of the loops, as shown in Figs. 1 and 2, wherein it will be noted that the coating material 12 does not extend far enough around the linear components 10 to show at the back of the fabric. This coating material, however, does serve to form a bond between the loops at the points when one loop passes through another.

The laminated elastic sheet material herein contemplated may have the knitted fabric applied to one or both faces of the rubber sheet 13, and this rubber sheet is preferably provided with small holes or apertures 14 to permit the passage of air therethrough. In the construction illustrated in Fig. 3 of the drawing the rubber sheet 13 is sandwiched between two plain knit fabrics such as shown in Fig. 1. It will be noted that in Fig. 3 each knitted fabric has the face thereof which has been treated with latex or other rubber composition adhesively secured to the rubber sheet 13. This placing of the latex treated face next to the rubber sheet causes the adhesive 15 provided between the fabric and rubber sheet to afford a better bond therebetween, and it also causes each exposed or outer surface of the laminated elastic sheet material to be free from latex or other form of rubber.

The laminated elastic material of Fig. 3 may be given substantially any desired range of stretch up to 200% or more by so securing the knitted fabrics to the rubber sheet 13 while it is stretched that each fabric will be held in a relaxed or condensed condition when the rubber sheet is free from tension. This condensing of the fabric may be secured by retaining the rubber sheet 13 stretched in one or both directions while the fabric is being secured thereto by its adhesive binder 15. Then when the tension upon the rubber sheet is relieved its contraction will serve to condense the knitted fabric. In this manner the laminated elastic sheet material may be made capable of stretching from the relaxed condition of the rubber sheet to the limit of the extensibility permitted by the textile fabrics.

The rubber coating material 12 is preferably so applied to the fabric that it does not close the apertures of the fabric or appreciably reduce its porosity. This is secured in the construction shown in Fig. 1 by so applying the rubber coating that it does not bridge the space between the linear components 10.

The film or coating of latex or other fluid rubber composition may be applied to the linear components only of the knitted fabric, as herein contemplated, by placing a thin film of the coating material upon a belt, roll or table and by then applying the face or surface of the knitted fabric formed of the linear components against this film so that the threads of the fabric lying at this surface will pick up the coating material 12 as shown in Figs. 1 and 2. The fabric should be removed from this coating film before the fabric has picked up a sufficient quantity of rubber to bridge the apertures of the fabric, or show appreciably from the opposite surface of the fabric. The treated fabric may then be heated to dry the coating material 12, whereupon the fabric will be found to be highly run resistant or run-proof.

This treated fabric may then be used for various purposes in its present condition, but since the fabric in this condition will show the rubber coating upon one face thereof and will cause this face to present the feel of rubber rather than textile, it will be desirable in many cases to conceal this rubber treated face by securing it to a rubber sheet 13 as illustrated in Fig. 3.

The laminated elastic sheet material 16 of Fig. 3 constitutes a two-way stretch material having any desired range of stretch longitudinally and transversely, and such an elastic material is well adapted for use in corsets, girdles and the like but is particularly well adapted for use in bathing garments such as the bathing suit shown in Fig. 4. In such articles, the fabric may be sewed together along the stitched seams 17 as shown in Fig. 5, without the occurrence of runs that may result from cut threads. An important advantage of a bathing suit made of this mate-

rial resides in the fact that the stretch characteristics of the material are nearly the same when the suit is wet or dry.

In making a bathing suit of this material it is desirable to so employ the elastic laminated material that it will have a greater range of stretch in the body encircling direction than up and down, and from an appearance standpoint it is deemed advisable to have the ribs or wales of the fabric run lengthwise of the garment.

The non-run feature secured by the present invention makes it possible to sew the present laminated material like ordinary textile material without causing defects to appear adjacent the holes formed by the sewing machine needle. Furthermore this run resistant property greatly reduces the tendency for runs to occur anywhere in the material, and by sandwiching the rubber sheet between two knitted fabrics as shown in Fig. 3, the resulting laminated material closely resembles a two-way stretch knitted fabric in feel and appearance.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A plain knit fabric formed of a series of loops consisting of curved components at the back of the fabric and linear components which form the face of the fabric, and means for preventing runs in said loops, comprising a fluid rubber component applied as a coating only to the face of the fabric so as not to strike through to the back of the fabric or show appreciably at the back but to prevent the linear components from slipping through the curved components.

2. Laminated elastic sheet material comprising a rubber sheet and a run resisting knitted fabric adhesively secured to the rubber sheet, the knitted fabric being formed of a series of loops consisting of curved components and linear components, all of said linear components being one one side of the fabric, said fabric having a fluid rubber composition applied as a coating only to the surface of the fabric formed of the linear components so as not to strike through to the opposite side of the fabric but to prevent runs, the fabric having the surface to which the rubber composition is applied secured to said rubber sheet.

3. Laminated elastic ventilated sheet material comprising a porous rubber sheet and a run resisting knitted fabric adhesively secured to the rubber sheet, the knitted fabric being formed of a series of loops consisting of curved components and linear components, all of said linear components being on one side of the fabric, said fabric having a rubber dispersion coating applied only to the surface of the fabric formed of the linear components so as not to strike through to or show at the opposite side of the fabric but to prevent runs, the fabric having the surface to which the rubber dispersion coating is applied secured to said rubber sheet.

4. A reversible laminated ventilated sheet material comprising a porous rubber layer and a run resisting knitted fabric adhesively secured to each face of the rubber layer, each knitted fabric being formed of a series of loops consisting of curved components and linear components, all of said linear components being on one side of the fabric, said fabric having a rubber dispersion coating deposited, only upon the surface of the fabric formed of the linear components so as not to close the interstices in the fabric or strike through to the opposite side of the fabric but to prevent runs, each fabric having its face to which the rubber dispersion coating is applied secured to said rubber layer.

5. A run resistant knitted fabric faced bathing garment having substantially the same stretch characteristics whether wet or dry and having a stitched seam construction, and constructed of a laminated sheet material comprising a rubber sheet and a run resisting knitted fabric adhesively secured to the rubber sheet, the knitted fabric being formed of a series of loops consisting of curved components and linear components, all of said linear components being on one side of the fabric, and said fabric having a fluid rubber composition applied only to the surface of the fabric formed of the linear components so as not to strike through to the opposite side of the fabric, the fabric having the surface to which the rubber composition is applied secured to said rubber sheet and adapted to avoid the formation of runs at the seams of the garment adjacent the needle holes.

6. A run resistant knitted fabric faced bathing garment having substantially the same stretch characteristics whether wet or dry and having a stitched seam construction, and constructed of a ventilated laminated sheet material comprising a perforated rubber sheet and a run resisting knitted fabric adhesively secured to the rubber sheet, the knitted fabric being formed of a series of loops consisting of curved components and linear components, all of said linear components being on one side of the fabric, and said fabric having a rubber dispersion coating applied only to the surface of the fabric formed of the linear component so as not to close the interstices of the fabric or strike through to the opposite side of the fabric, said fabric having the surface to which the rubber dispersion is applied secured to said rubber sheet and adapted to avoid the formation of runs at the seams of the garment adjacent the needle holes.

VICTOR H. HURT.