

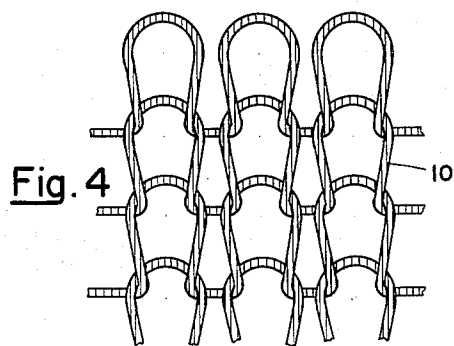
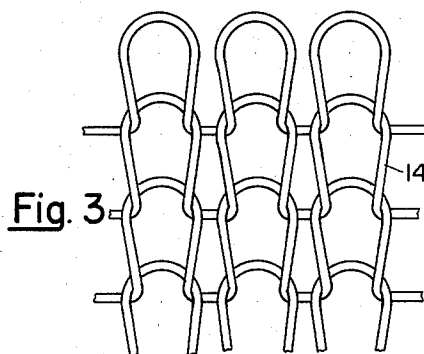
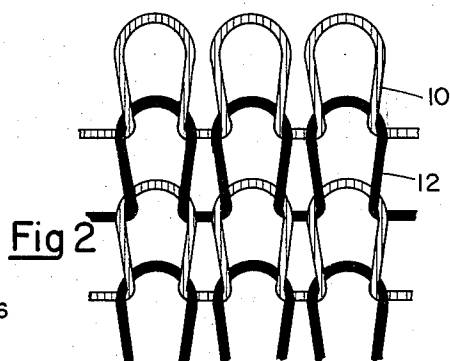
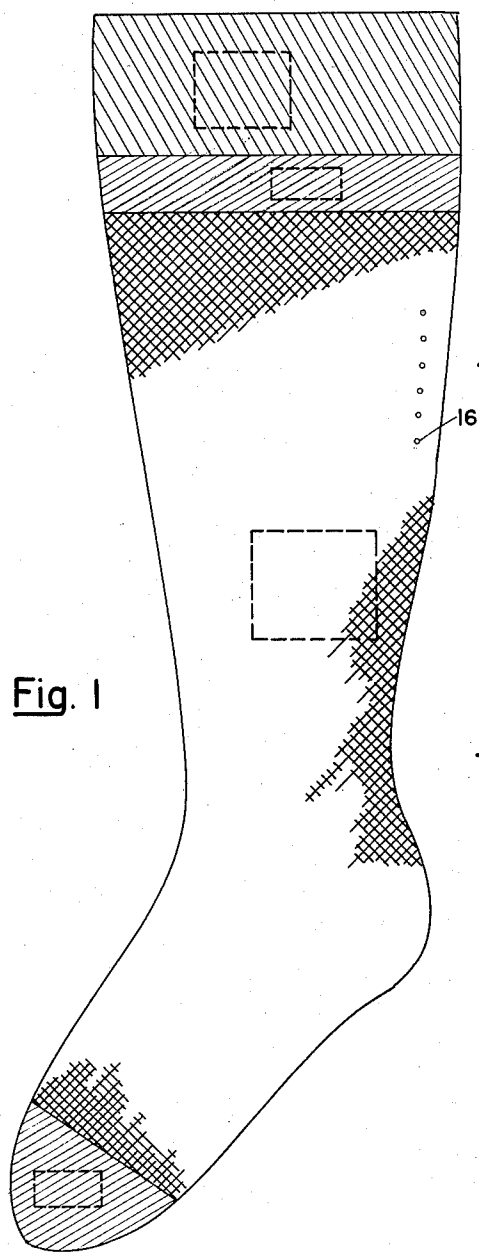
March 1, 1955

J. J. PURCELL

2,702,998

SURGICAL STOCKING

Filed Oct. 28, 1954



INVENTOR
JAMES J. PURCELL
BY

Louis Necho
ATTORNEY

1

2,702,998

SURGICAL STOCKING

James J. Purcell, Wyomissing, Pa.

Application October 28, 1954, Serial No. 465,297

10 Claims. (Cl. 66-178)

Surgical stockings are worn on the foot or the leg for the purpose of rendering support in the event of a sprain, or because of some pathological condition of the circulatory system and for other reasons.

In all cases a surgical stocking must be elastic and must produce a restricting or compressing effect and, to this end, many types of such stockings have heretofore been made.

In the past it has been usual to make surgical stockings on circular knitting machines which produce a tubular but non-fashioned body with the result that the stocking may be too confining on one part of the foot or leg or not sufficiently confining on another part. In the case of surgical stockings, these characteristics are especially critical since it is not merely a matter of appearance, and the desired therapeutic objectives may be endangered. Accordingly, a preferred object of the invention is to produce a flat knit full-fashioned surgical stocking which will also overcome the disadvantages of the prior art stockings.

As far as I am aware, all surgical stockings, regardless of the type of machine on which they are made, were formed by using rubber yarn throughout the entire stocking or by interspersing courses made of rubber with courses of non-elastic yarn, in any desired order. Such stockings not being made to order, or to specific measurements, were either too confining or not confining enough. For example, if a stocking is made wholly of rubber yarn, it is bound in most, if not all, cases to be too loose or too tight. Nor does a mixture of rubber with non-elastic yarn fare any better because the non-elastic yarn sets a limit on the extent to which the rubber yarn can stretch so that, except for spacing the points or areas of the leg or foot on which pressure is applied, stockings made of interspersed courses of rubber and non-elastic yarn, suffer from the same handicaps as those made wholly of rubber yarn. Furthermore, stockings made wholly of rubber yarn are heavy and unsightly, are unventilated and are relatively uncomfortable all around.

According to my invention, I overcome these difficulties by knitting a fabric of some of the courses of rubber yarn and by interspersing said courses with other courses knit of an elastic textile but non-rubber yarn.

More specifically, I use a yarn which is crinkled throughout its length and I knit this yarn under no tension so that the length of yarn used in each course will, if stretched out straight, be far in excess of the length of the course. By this arrangement, the courses knit of this type of yarn can stretch with the stretching of the courses knit of the rubber yarn, and they will return to their initially contracted crinkled condition with the contraction of the courses formed of rubber yarn without materially increasing the over-all confining effect of the stocking. The net effect is to reduce the weight of the stocking, to improve the feel and appearance of the stocking, to space the areas of the foot or leg on which pressure is exerted and to do all this without limiting the capacity of the rubber yarn to stretch. Furthermore, I preferably manufacture my improved stocking on a full-fashioned machine whereby the blank is narrowed and widened at the appropriate places, the same as in ordinary full-fashioned stockings.

In the accompanying drawings:

Fig. 1 is a diagrammatic view of a surgical stocking embodying my invention.

Fig. 2 is a view of the fabric bracketed in the leg portion of the stocking.

2

Fig. 3 is a view of the fabric bracketed in the welt of the stocking.

Fig. 4 is a view of the fabric bracketed in the after welt and in the toe of the stocking.

In the drawings, the plain yarn is unshaded, the rubber yarn is shaded black, and the crinkled yarn is cross-hatched.

As will be seen from Fig. 2, the leg of the stocking is formed of courses of rubber yarn 12 and courses of crinkled yarn 10 so that, as the rubber yarn stretches, the crinkled yarn stretches with it. The yarn 10 is crinkled and set in the crinkled condition so that, in the absence of tension, it will contract. The courses knit of the crinkled yarn improve the appearance of the stocking, reduce its weight, allow for some ventilation and reduce the total area of the leg on which the confining action of the stocking is exerted. In Fig. 2, the courses of rubber yarn alternate with courses of the crinkled yarn, but it is within the scope of my invention to use one rubber course to more than one course of the crinkled yarn and vice versa.

As will be seen from the narrowing marks at 16 in Fig. 1, the stocking is preferably made on a flat, full-fashioning knitting machine so as to produce a better fit which, in cooperation with the method of forming the stocking as above described, produces a comfortable, properly confining stocking and one which is not objectionable as to appearance, weight or feel.

Yarn 10 is of synthetic origin and is preferably of the type which is thermo-plastic or can be heat-set, e. g. a synthetic super-polyamide or synthetic super-polyester. By the term "heat-set" is meant a yarn which can be bent, curled or placed in any desired shape or form and which, when heated to near its fusing point and allowed to cool, will return to said shape, contour or configuration. Super-polyamides, or polyamides or nylon as they are frequently called, are of two types, those derived from polymerizable monoaminocarboxylic acids, or their amide-forming derivatives, and those derived from suitable diamine-dibasic acid mixtures or their equivalents. The polyester yarns may be synthetic linear condensation products of a dibasic acid and a dihydric alcohol, the fiber being known commercially as "Dacron."

Although polyamides and polyesters have been mentioned specifically, other fiber-forming synthetic linear condensation polymers are within the preferred scope of the invention. To obtain products useful in the textile field, however, the melting point of the polymers should be preferably above 110° C. so that they can be washed with boiling water. The most useful products are obtained from polymers having a melting point above 220° C. As examples of other fiber-forming synthetic polymers, there might be mentioned polyanhydrides, polyacetals, polyethers polyester-polyamides, and other copolymers.

The synthetic super-polymer yarns are preferably crimped by a process known as the "Helanca" process which is disclosed in U. S. P. 2,019,183, 2,019,185, 2,564,245 and 2,585,518. According to this process artificial yarns are provided with increased elasticity and curliness by providing a high number of twists to the yarn, setting the twists and thereafter untwisting the yarn. Similar procedures for imparting a crimp of a high order are described in U. S. P. 2,641,914 and 2,679,739. Other methods of crimping synthetic linear condensation polymers, particularly polyamides, are disclosed in U. S. P. 2,287,099. According to the latter patent, one method consists in subjecting filaments, regardless of their method of preparation, to a short heat treatment, preferably while wet, with an agent having a mild swelling action on the filaments. Another method consists in spinning the filaments from melt under special conditions. Methods other than those described above for imparting a permanent curliness or crimp to the synthetic fibers may be utilized.

The welt of the stocking may be made of any conventional yarn 14 in any conventional manner as shown in Fig. 3. However, if desired, the welt can be formed of rubber and crinkled textile yarns, as shown in Fig. 2, or it can be made wholly of crinkled textile yarn, as shown in Fig. 3. The after welt is preferably formed wholly

3

of the crinkled yarn 10 so as to stretch around the knee area and to make a gradual transition from the relatively heavy fabric of the leg to the relatively sheet fabric of the welt. This minimizes the tendency of the fabric to wrinkle at the junction of the welt with the leg. The toe portion is also preferably made of crinkled yarn 10 so as to allow for ventilation and comfort in the toe area where most of the sweating and chafing occur. The stocking illustrated is intended for use when the leg and foot areas need support or confinement and on the assumption that the other portions of the leg and foot, and knee need no support.

This application is a continuation-in-part of my co-pending application Ser. No. 405,575, filed January 22, 1954.

The word "alternating" as used in the claims is intended to cover a fabric in which the courses of rubber yarn and the courses of synthetic yarn are interspersed throughout the fabric in any desired order and is not intended to be limited to a fabric in which each course of rubber yarn is followed, in regular or uniform manner, with a course of synthetic yarn.

What I claim is:

1. A knit fabric formed of alternating courses of rubber yarn and courses of a thermoplastic synthetic yarn which is crinkled and set prior to being knit, said synthetic yarn being knit in its relaxed condition.

2. A stocking having its leg portion formed of the fabric defined in claim 1 and having one or more other portions formed of said synthetic yarn, said synthetic yarn being knit in its relaxed condition.

3. A stocking having its leg made of the fabric defined in claim 1, having at least a portion of the welt formed of said synthetic yarn and having at least a portion of its toe formed of said synthetic yarn, said synthetic yarn being knit in its relaxed condition.

4. A full-fashioned stocking formed of alternating courses of rubber yarn and courses of a thermo-plastic synthetic yarn which is crinkled and set prior to being

4

knit into the stocking, said synthetic yarn being knit in its relaxed condition.

5. A full-fashioned stocking having one or more portions thereof knit of alternating courses of rubber yarn and courses of a thermo-plastic synthetic yarn which is crinkled and set prior to being knit, said synthetic yarn being knit in its relaxed condition, other portions of said stocking being knit of said synthetic yarn alone.

6. A knit fabric formed of alternating courses of rubber yarn and courses of a thermo-plastic polymeric yarn which is crinkled and set prior to being knit, said polymeric yarn being knit in its relaxed condition.

7. A stocking having its leg portion made of fabric defined in claim 6 in which said polymeric yarn is a polyamide.

8. A stocking having its leg portion made of fabric defined in claim 6 in which said polymeric yarn is a polyester.

9. A knitted stocking having its leg portion formed of alternating courses of rubber yarn and courses of synthetic yarn, said synthetic yarn having crimps heat-set prior to being knit, said synthetic yarn being knit in its relaxed condition, said crimps being such that when said stocking is stretched said courses of synthetic yarn stretch with said courses of rubber yarn without substantially increasing the over-all confining effect of the stocking, and said synthetic yarn courses return to their initially contracted crimped condition with the contraction of said courses of rubber yarn when said stocking is relaxed.

10. A stocking according to claim 9 in which said synthetic yarn is super-polyamide.

References Cited in the file of this patent

UNITED STATES PATENTS

2,169,203	Hinchliff	Aug. 8, 1939
2,217,225	Lawson et al.	Oct. 8, 1940
2,601,451	Page	June 24, 1952
2,668,430	Laros	Feb. 9, 1954