Nov. 20, 1962 W. H. BIRD 3,064,456

ELASTIC SURGICAL STOCKING

Filed Nov. 29, 1957 2 Sheets-Sheet 1

Fig. 1.

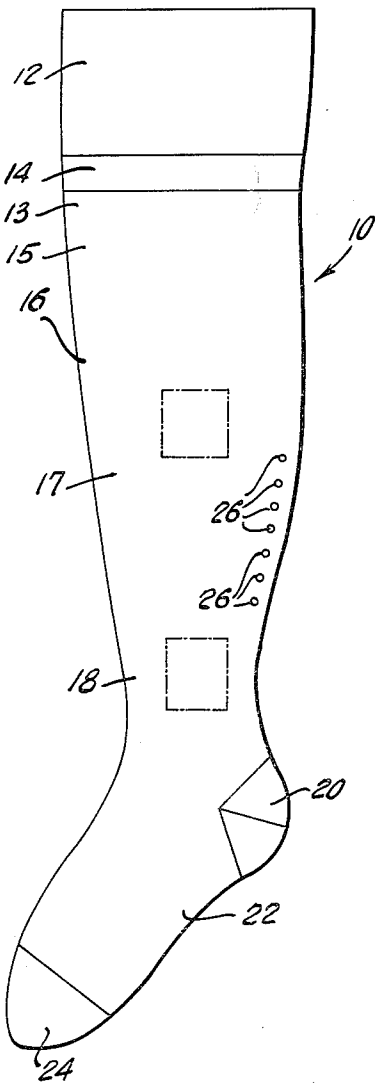


Fig. 2.

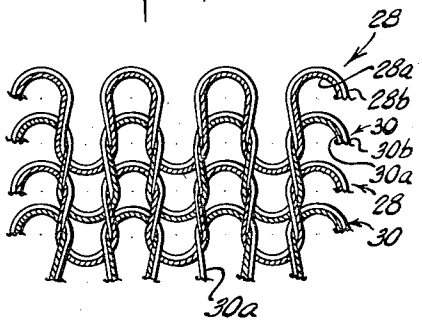
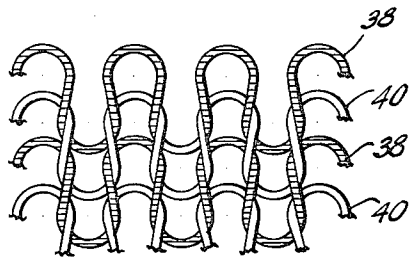


Fig. 3.



INVENTOR
WILLIAM HENRY BIRD.
BY
Alexander T. Kardos
ATTORNEY

Nov. 20, 1962 W. H. BIRD 3,064,456

ELASTIC SURGICAL STOCKING

Filed Nov. 29, 1957 2 Sheets-Sheet 2

Fig. 4.

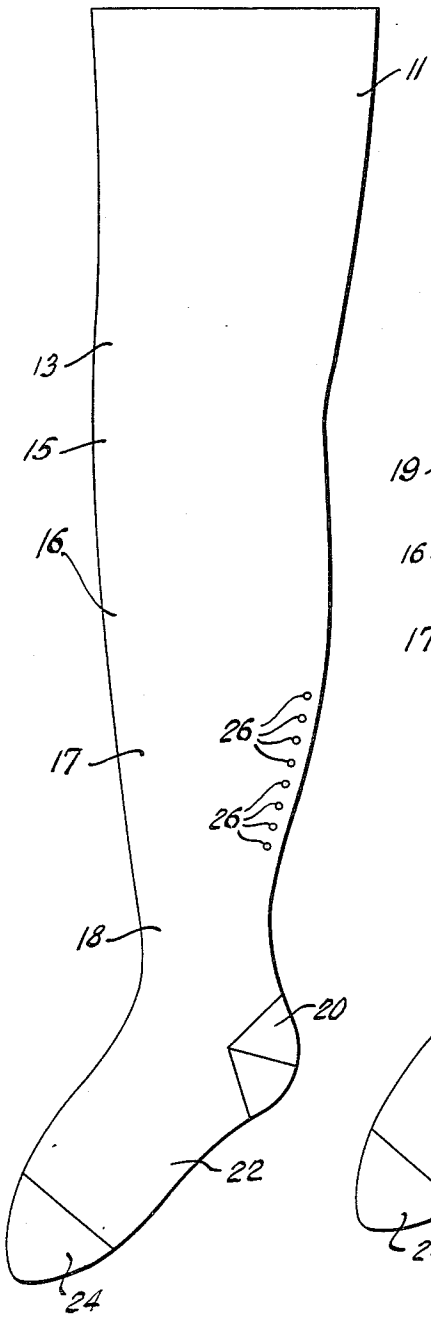


Fig. 5.

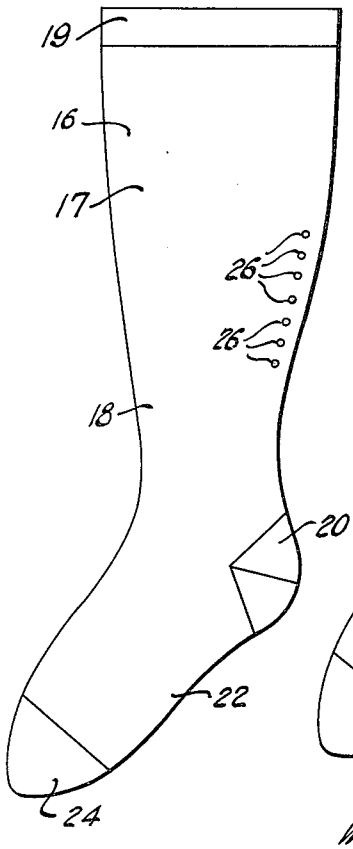
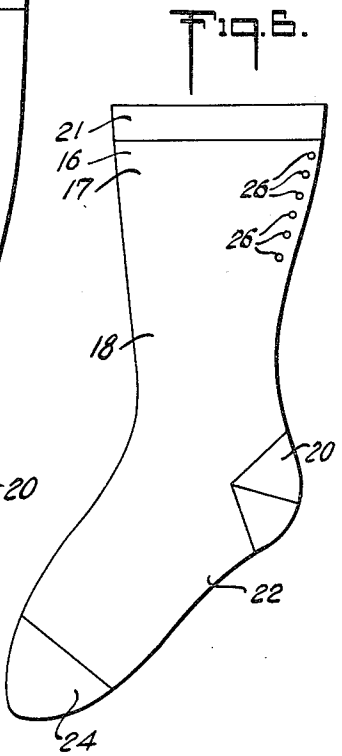


Fig. 6.



INVENTOR
WILLIAM HENRY BIRD
BY
Alexander T. Kardos
ATTORNEY

United States Patent Office

3,064,456

Patented Nov. 20, 1962

3,064,456

ELASTIC SURGICAL STOCKING

William Henry Bird, Bound Brook, N.J., assignor to Johnson and Johnson, a corporation of New Jersey

Filed Nov. 29, 1957, Ser. No. 699,638
11 Claims. (Cl. 66—178)

The present invention relates to improved elastic surgical stockings and to methods of making the same. More specifically, the present invention is concerned with improved elastic surgical stockings which are capable of exerting the required restricting and compressive force on the leg of the wearer over extended periods of use.

Elastic surgical stockings have been made in the past and many of these stockings have found considerable commercial success in the industry. When these stockings are placed on the legs of the wearer requiring support because of physical or pathological conditions, immediate relief is usually afforded to some degree due to the restricting or compressive force exerted on the legs by the elastic surgical stockings.

Unfortunately, some of these stockings, and particularly those containing synthetic thermoplastic yarns, such as nylon, even if properly fitted and correctly proportioned at the outset, tend to become wrinkled, loose and baggy during wear because of the usual flexing and bending of the stocking at the knee and the ankle during walking, sitting, kneeling, and other physical activities. This is true especially in the case of circular-knit stockings which are not fully fashioned to conform to the shape of the leg and, to a lesser extent, in the case of full-fashioned stockings which conform more closely to the shape of the leg.

When these wrinkles, looseness and bagginess develop, the wearer usually seeks to make adjustments therefor by pulling the top or thigh portion of the stocking upwardly to stretch it in the lengthwise direction and then anchoring it in this higher position by having the usual garter or girdle connections or other fasteners reach down to lower anchoring points on the stocking welt. This will usually take care of the wrinkles, looseness and bagginess at knee and upper calf areas. In some cases, this has also afforded some temporary or partial removal of the wrinkles, looseness and bagginess at the ankle area of the stockings but, in other cases, it has not improved the situation at the ankle area at all. In these latter cases, continued pulling and stretching upwardly has merely introduced the possibility of ripping or tearing the stocking before the wrinkles, looseness and bagginess are removed from the ankle area. Additionally, continued pulling upwardly of the stocking tends to increase the compressive force on the higher portions of stocking to a point wherein the free circulation and flow of blood is restricted.

This situation is all the more serious when it is realized that the restricting and compressive force of the stocking is most seriously needed at the ankle area. Thus, the elastic stockings become not only wrinkled, loose, unsightly and ill-appearing after a relatively short period of use but also become relatively inefficient and ineffectual in the most critically needed ankle area.

It is believed that the difficulties of removing the wrinkles, looseness and bagginess at the ankle areas is due primarily to the fact that such areas are removed a greater distance from the anchorage points near the tops of the stockings and thus require greater stocking-stretching forces. Added to this is the fact that upward movement of the stocking at the ankle area requires circumferential expansion of the stocking in order for it to actually move upwardly into the lower calf area which normally possesses greater girth than the ankle area and consequently resists such upward movement.

It has now been found that the wrinkles, looseness and bagginess may be avoided in the ankle and lower calf area by means of an improved stocking construction of the present invention.

More specifically, it has now been found that the previously mentioned disadvantages and defects of prior art stockings may be avoided by knitting (1) the upper portion of the stocking which normally comprises the thigh, the mid-thigh, knee, upper calf areas with a balanced construction of alternating courses of (*a*) right-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments and (*b*) left-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments, and then knitting (2) the lower portion of the stocking which normally comprises the lower calf, ankle and foot areas with a balanced construction of alternating courses of textile yarns of which at least one course is a rubber or an elastomeric yarn having an initial elastic stretch of from about 150 to about 600 percent of its original unstretched length and the capability of returning substantially instantaneously to its original unstretched length after being so stretched.

The word "monofilament" is not used in its narrow restricted sense to cover only synthetic filaments containing a single heavy strand but is intended to cover yarns containing from one to about four strands of monofilaments, each of sufficient size as to be capable of functioning as a yarn in normal textile operations. This conforms with A.S.T.M. definition stating: Monofilament—a single filament of sufficient size to function as a yarn in normal textile operations. A.S.T.M. designation: D123–55.

The term "right-twist-tendency and left-twist-tendency yarns" is intended to describe those yarns which were twisted originally during their manufacture and acquired a more or less permanent set in that twisted state but which have become untwisted to some degree from that twisted state and hence possess a tendency to return thereto. In other and more specific words, a yarn which, for example, received 20 right twists per inch during its manufacture and had become more or less permanently set in that 20 right twists per inch condition, and which was then untwisted so that it had less than 20 right twists, or no twist, or even a left twist, would be considered a "right-twist-tendency yarn" inasmuch as it possesses a strong tendency to revert to its prior 20 right twist condition.

It is to be observed in passing that this tendency to revert to the original set twisted condition is accompanied by a corresponding tendency to shorten in over-all length whereby these twist-tendency yarns, when knitted into an elastic surgical stocking, tend to shorten in length and thus impose restricting and compressive forces on the legs within the stockings. The exertion of these forces is a feature of the present invention and the use thereof will become clearer from the further discussion of the inventive concept.

The lower portion of the elastic surgical stocking which normally comprises the lower calf, ankle and foot areas thereof is knitted of a balanced construction of alternating courses of textile yarns of which at least one course is a rubber or elastomeric yarn having an elastic stretch of from about 150 to about 600 percent of its original unstretched length and the capability of returning substantially instantaneously to its original unstretched length after being so stretched.

Such a construction in the lower portion of the stocking avoids the development of wrinkles, looseness and bagginess in the ankle area whereby the necessity of pulling the stocking upwardly by the wearer is obviated completely. At the same time, sufficient restricting and com-

pressive force is present to afford support and relief to such wearers suffering from physical and pathological conditions such as varicose veins.

In some instances, the upper portion and the lower portion do not blend together well and a visible joint is created at the line where they meet. This is due primarily to the fact that the rubber yarns used in the lower portion normally are heavier and have a larger diameter than the right- and left-twist-tendency yarns normally used in the upper portion of the stocking. In such a case, it is preferable that a camouflage yarn be used in conjunction with the right- and left-twist-tendency yarns to match or balance the bulk appearance of the rubber yarn so that both upper and lower portion present are blended visually to the same appearance, thereby avoiding the creation of a visible joint or line of junction of the two portions. This, of course, is almost a necessity when the stockings are worn in view of the general public but are not necessary when the stockings are worn under other garments or in privacy.

With reference to the drawings:

FIGURE 1 is a schematic showing of one form of an elastic surgical stocking embodying the present inventive concept;

FIGURE 2 is an enlarged detail view of the knitted construction of the stocking in the upper portion thereof;

FIGURE 3 is an enlarged detail view of the knitted construction of the stocking in the lower portion thereof;

FIGURE 4 is a schematic drawing of a full-length "leotard" elastic surgical stocking embodying the present inventive concept;

FIGURE 5 is a schematic drawing of a "knee-high" elastic surgical stocking embodying the present inventive concept; and

FIGURE 6 is a schematic drawing of a "half-hose" elastic surgical stocking embodying the present inventive concept.

In FIGURE 1, a stocking **10** is shown comprising a welt **12**, an after-welt **14**, a mid-thigh portion **13**, a knee portion **15**, an upper calf portion **16**, a lower calf portion **17**, an ankle portion **18**, a heel **20**, a foot **22**, and a toe or toecap **24**. Narrowing marks **26** will, of course, be present if the stocking is full-fashioned.

The welt **12**, the after-welt **14**, the heel **20** and the toe **24** are knitted in the usual manner known to the art and no further description thereof is believed required.

A full length "leotard" elastic surgical stocking is shown in FIGURE 4 and is basically similar in construction to the surgical stocking **10** illustrated in FIGURE 1 except that there is a long thigh portion **11** but normally no welt or after-welt portion. Such stockings are popularly used for theatrical and terpsichorean purposes and are held in place either by elastic means or by more secure physical means such as garters, drawstrings, or other hose fastening means.

As elastic surgical stocking of the "knee-high" type is shown in FIGURE 5 and it is to be noted that the construction is basically the same as the regular surgical stocking shown in FIGURE 1 except that there is no knee portion **15** therein and that an elastic portion **19** is preferably provided to hold the knee-high stocking in place below the knee.

An elastic surgical stocking of the "half-hose" type is shown in FIGURE 6 and is basically similar to the construction shown in FIGURE 5 except that the upper calf portion **16** therein is shorter and that an elastic portion **21** is preferably provided to hold the half-hose in place on the calf.

The invention will be further described with particular reference to the "leotard" full length stocking of FIGURE 4 but it is to be appreciated that such stocking has been selected merely because it basically possesses all the required portions of the stocking constructions shown. Such selection is made primarily for illustrative purposes and is not to be construed as limitative of the inventive concept.

The complete thigh portion **11**, the knee portion **15** and the upper calf portion **16** are knitted of a balanced construction of alternating courses of right-twist-tendency-synthetic thermoplastic yarns **28**, **28** and left-twist-tendency synthetic thermoplastic yarns **30**, **30**. This is shown in FIGURE 2 which illustrates a preferred embodiment of the inventive concept. The right-twist-tendency yarns **28**, **28** are composite yarns and contain (1) a right-twist-tendency synthetic thermoplastic yarn **28*a*** and (2) a crinkled, set thermoplastic synthetic yarn **28*b***, which functions as a camouflage or blending yarn.

The right-twist-tendency synthetic thermoplastic yarn **28*a*** forming the first component of the composite yarn **28** is preferably a 1- to 4-strand monofilament which has been so made and is so knitted as to possess the requisite right-twist-tendency. Substantially any synthetic thermoplastic yarn may be employed for the yarn **28**, provided it can develop the required right-twist-tendency characteristics. Within the more commercial aspects of the present invention, nylon polyamide and "Dacron" polyester filaments, or equivalents thereof, have been found preferable.

The crinkled, set synthetic thermoplastic yarn **28*b*** which forms the second component of composite yarn **28** is inserted for camouflage or blending purposes and may be any yarn having such crinkled, set properties but is preferably of the nylon polyamide type or the "Dacron" polyester type, or equivalents thereof which has been crinkled and set preferably by the "Helanca" process disclosed in U.S. Patents 2,019,183; 2,019,185; 2,564,245 and 2,585,518.

The right-twist-tendency synthetic thermoplastic yarn **28*a*** and the crinkled, set synthetic thermoplastic camouflage yarn **28*b*** which comprise the composite yarn **28** are laid in the same course in the stocking by one yarn carrier of the usual type known to the art. These yarns are so laid in that course that they lie in side by side, substantially parallel relationship, as shown in FIGURE 2. This may be accomplished by drawing the right-twist-tendency synthetic thermoplastic yarn **28*a*** and the crinkled, set synthetic, thermoplastic yarn **28*b*** from separate supply-cones and joining them by means of suitable apparatus known to the art in parallel relationship in the yarn carrier which brings them to the knitting elements. If desired, the two yarns may be coned together prior to knitting whereby they will come from one cone and carried together in substantially parallel relationship to the knitting elements.

The "right-twist-tendency" characteristic is developed by using yarns which were originally right twisted and which were more or less permanently set in that condition. Some degree of "right-twist-tendency" may be developed merely by originally winding the cone in such a direction that the drawing of the yarn during knitting from the end of the cone untwists the yarn one twist for each complete turn drawn from the cone. Increased twist tendency can be obtained by originally twisting the yarn highly, setting the yarn in that highly twisted state, then partially or completely removing the high twist and coning the yarn in the untwisted state under tension. The yarn may be temporarily sized in its "right-twist-tendency" condition to prevent kinking during the knitting operation, if so desired. Additional untwisting may be accomplished by rotating the cone in a left-hand direction as the yarn is being drawn off its end during knitting, or by other untwisting means.

In any event, the total amount of untwisting should be sufficient to develop the "right-twist-tendency" required of the yarns in the completed stocking. In the preferred embodiment of the invention, substantially all the twist is removed so that the twist-tendency yarns are practically twistless and the individual strands thereof are substantially parallel to each other in the final knitted product.

The "left-twist-tendency" yarns **30**, **30** are prepared,

twisted, coned and knitted in the same general fashion as the "right-twist-tendency" yarns, although naturally of opposite hand and opposite twist. Twist-tendency synthetic thermoplastic yarns 30*a* are used which possess a left-twist-tendency characteristic. These yarns 30*a* may also be used with crinkled, set synthetic thermoplastic camouflage yarns 30*b* and, if they are so used, the yarns 30*a* and 30*b* also may come from separate cones and are laid in together simultaneously in substantially parallel relationship in a single course by a second yarn carrier. Again, if desired, these yarns may be coned together in substantially parallel relationship prior to knitting and come from one cone to the knitting elements.

It is to be noted that the right-twist tendency yarns and the left-twist-tendency yarns, in adidtion to their tendency to shorten and exert restricting and compressive forces on the leg of the wearer, exert an opposing force on each other which opposes and pulls against the other yarn and thereby tends to increase synergistically the restricting and compressive force above the numerical sum of the restricting and compressive force of each one individually.

The thigh, mid-thigh, knee and upper calf portions 11, 13, 15 and 16 are knitted in this balanced alternating course construction to the point at which it is desired to start the lower portion of the stocking containing a different course construction. The lower calf portion 17 usually marks the beginning of the lower portion and its position will vary depending upon the style, fashioning and general construction of the stocking 10. In most cases, however, it may be assumed to end at the middle or the lower end of the narrowing marks 26 shown in FIGURE 4.

The twist tendency yarn used in the manufacture of the thigh, knee and upper calf portion normally has a total denier in the range of from about 15 to about 40, with lower deniers than 15 being of use where increased sheerness is desired and with higher deniers than 40 being of use where heavier service weights are to be made. From 1 to about 4 strands of monofilaments may be used, with the individual denier of each monofilament ranging from about 4 to about 30.

In the thigh, knee and upper calf portions, the crinkled, set thermoplastic synthetic yarn 30*b* normally has a denier in the range of from about 20 to about 40, with lower deniers than 20 being capable of use where lighter stockings of greater sheerness are desired and with higher deniers than 40 being capable of use where heavier stockings of greater service are required.

It is not necessary that the crinkled, set synthetic thermoplastic yarns be used at all and, if they are used, it is not necessary that they be used in every course. They may be used in alternation in predetermined courses, as desired. It is also to be noted that more than one crinkled, set synthetic thermoplastic yarn may be used in a course and up to about three are so utilizable. As described previously, the primary function of these yarns is as camouflage or blending yarns to hide or obscure the line or junction created when shifting from one combination of course constructions to another.

The total denier of the composite yarn in the thigh, knee and upper calf portions therefore ranges from as low as about 35 to as high as about 200 or more and the selection of a particular total denier will depend upon the weight of stocking desired, upon the yarns used in the lower portions of the stockings, upon the gauge of the knitting machine used and upon the ability of the knitting elements thereof to handle the yarns.

When the thigh, knee and upper calf portions have been completed, the two yarn carriers containing the "right-twist-tendency yarn" and the "left-twist-tendency yarn" become inoperative and other yarn carriers begin knitting the lower calf portion 17, the ankle portion 18 and the foot portion 22.

As shown in FIGURE 3, the lower calf, ankle and foot portions 17, 18, 22 are knitted of a balanced construction of alternating courses of textile yarns of which at least one or all are elastic, stretchable yarns 38, such as rubber or elastomeric yarns having an initial elastic stretch of from about 150 to about 600 percent of its original unstretched length and capable of quick elastic recovery with a minimum of permanent deformation. The yarn 40 used in the balanced alternating course construction with the rubber or elastomeric yarn 38 may be a similar rubber or elastomeric yarn or it may be a synthetic yarn such as a crinkled, set nylon polyamide or "Dacron" polyester, cellulose acetate, regenerated cellulose, vinyl or acrylic fibers, polyethylene fibers, or natural fibers such as cotton, silk or wool. The course construction used in the lower calf portion 17 and ankle portion 18 extends from the lower end of the upper calf portion 16 to at least the heel 20 and preferably all the way through the foot portion 22 to the beginning of the toe or toe cap 24.

The elastic stretchable yarns 38 included in the ankle and lower calf portion 18 (which may also include the foot portion 22) are preferably natural rubber threads but may be any synthetic or elastomeric yarn having similar stretching capacity (150–600% of original unstretched length prior to covering) and the other properties and characteristic of rubber required for the present use.

The size or gauge of such elastic stretchable yarn is that equivalent to a guage size for rubber yarns of from about 115 to about 150 for a service weight stocking and from about 160 to about 250 for a sheer stocking. These rubber yarns are usually helically wound or wrapped by one, two or more relatively inelastic yarns such as nylon, cotton, silk and the like having a weight equivalent to a denier of about 10, 20 or 30. A coated rubber yarn may be used in lieu of the helically wound rubber yarn. The total denier of the wrapped or coated yarn is in the range of from about 65 to about 300.

The yarn 40 which is used in alternation with the rubber or elastomeric yarn may be another rubber or elastomeric yarn of the same weight or may be a natural or synthetic yarn having a weight equivalent to a denier in the range of from about 20 to about 70 for a sheer stocking and from about 100 to about 300 for a service weight stocking. The synthetic yarns so used may be monofilaments or multifilaments, as desired.

Inasmuch as the elastic stretchable yarns 38 possess considerable restricting and compressive force by themselves, it is not necessary that any twist-tendencies be developed in the yarns present in the ankle portion. These yarns may therefore be twisted to any desired degree or be twistless, if so desired.

The invention will be further illustrated in greater detail by the following specific examples. It should be understood, however, that although these examples may describe in particular detail some of the more specific features of the invention, they are given primarily for purposes of illustration and the invention in its broader aspects is not to be construed as limited thereto.

Example 1

An elastic surgical stocking such as illustrated in FIGURE 1 is made on a standard 51-gauge knitting machine to illustrate the invention. The welt is made of 80 denier regular sylon. The after-welt is also made of 80 denier regular nylon and is knitted with the usual anti-run back or run-stop feature. The knee and upper calf areas are knitted of balanced alternating courses of (1) right-twist-tendency synthetic thermoplastic yarns of 4-strand 20 denier nylon monofilament polyamide yarns and 30 denier crinkled, set nylon polyamide "Helanca" multifilament yarns, and (2) left-twist-tendency synthetic thermoplastic yarns of 4-strand 20 denier nylon monofilament polyamide yarns and 30 denier crinkled, set nylon polyamide "Helanca" multifilament yarns. In the knitting of all these yarns, the original twisting, coning and drawing from the cone is such that the yarns are substantially

twistless in the completed stocking and are substantially parallel to each other in each course.

At the end of knee and upper calf portions and just after the end of the narrowing operation, the lower calf, ankle and foot portions are then knitted of balanced alternating courses of (1) 160 gauge rubber yarns wrapped with one right-twist 20 denier nylon regular yarn and one left-twist 20 denier nylon regular yarn and (2) 60 denier nylon polyamide regular monofilament yarns.

The stocking blank is then inspected, looped, seamed and completed in the usual manner known to the art. The resulting full-fashioned elastic surgical stocking is satisfactory and acceptable to the industry and affords relief to those suffering from pathological conditions of the circulatory system such as varicose veins.

Example 2

The procedures set forth in Example 1 are followed substantially as set forth therein with the exception that the knee and upper calf areas are knitted in alternating courses of two right-twist-tendency composite yarns and two left-twist-tendency composite yarns. The resulting stocking is comparable to the stocking of Example 1.

Example 3

The procedures set forth in Example 1 are followed substantially as set forth therein with the exception that, in the ankle and lower calf areas, an 80 denier nylon polyamide multifilament yarn is used rather than the 60 denier monofilament yarns. The resulting stocking is comparable to the stocking of Example 1.

It is also to be noted that, although the "balanced alternating course construction" for the upper and lower portions of the stocking is illustrated and described primarily with reference to a one-and-one alternating construction of the two different yarns, such is not to be construed as limitative of the present inventive concept. Other constructions, such as two-and-two or three-and-three alternations or various other balanced combinations, for example, may be used provided the resulting fabric possesses a stable, balanced, relatively curl-or-kink-free nature.

Although several specific examples of the inventive concept have been described, the same should not be construed as limited thereby nor to the specific constructions and materials mentioned therein but to include various other equivalent constructions and materials as set forth in the claims appended hereto. It is understood that any suitable changes, modifications and variations may be made without departing from the spirit and scope of the invention.

I claim:

1. In an elastic stocking, an upper calf portion and a lower calf and ankle portion, said upper calf portion having a balanced construction of alternating courses of (*a*) right-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments and (*b*) left-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments, and said lower calf and ankle portion having a balanced construction of alternating courses of yarns of which at least one of the alternating courses is an elastic yarn having a stretch capacity of from 150 to 600 percent of its original unstretched length and capable of returning substantially intantaneously to its original unstretched length after being so stretched, whereby, when said stocking is on the leg of a wearer, said lower calf and ankle portion exerts a substantially greater restraining pressure on the portion of the wearer's leg covered thereby than the restraining pressure exerted by said upper calf portion.

2. In an elastic stocking, an upper calf portion and a lower calf and ankle portion, said upper calf portion having a balanced construction of alternating courses of (*a*) right-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments and a camouflage yarn and (*b*) left-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments and a camouflage yarn, and said lower calf and ankle portion having a balanced construction of alternating courses of yarns of which at least one of the alternating courses is an elastic yarn having a stretch capacity of from 150 to 600 percent of its original unstretched length and capable of returning substantially instantaneously to its original unstretched length after being so stretched, whereby, when said stocking is on the leg of a wearer, said lower calf and ankle portion exerts a substantially greater restraining pressure on the portion of the wearer's leg covered thereby than the restraining pressure exerted by said upper calf portion.

3. An elastic surgical stocking as defined in claim 1 wherein the synthetic thermoplastic yarns are nylon.

4. An elastic surgical stocking as defined in claim 1 wherein the elastic yarn is rubber.

5. An elastic surgical stocking as defined in claim 1 wherein said stocking is of sufficient length to extend over the knee of a wearer and in which the construction of said stocking from the knee thereof down to and including the upper calf portion thereof is the same, said like constructed portion exerting a restraining pressure when said stocking is worn that is substantially less than the restraining pressure exerted by the lower calf and ankle portion of said stocking.

6. An elastic surgical stocking as defined in claim 1 wherein said stocking is of sufficient length to extend over the knee and a substantial portion of the thigh of a wearer and in which the construction of said stocking from at least a portion of the thigh down to and including the upper calf portion thereof is the same, said like constructed portion exerting a restraining pressure when said stocking is worn that is substantially less than the restraining pressure exerted by the lower calf and ankle portion of said stocking.

7. An elastic surgical stocking as defined in claim 1 wherein the foot of the stocking, with the exception of the toe and heel, has the same knitted construction as the lower calf and ankle portion and wherein said foot, ankle and lower calf portion exert substantially more restraining pressure, when said stocking is worn, than the remainder of said stocking.

8. In an elastic surgical stocking containing an upper leg portion including the section adapted to fit over the upper calf areas of a wearer's leg and a lower leg portion including the section adapted to fit around the ankle and areas adjacent thereto, the improvement comprising (1) said upper portion having a balanced construction of alternating courses of (*a*) right-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments and a crinkled, set thermoplastic synthetic yarn and (*b*) left-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments and a crinkled, set thermoplastic synthetic yarn, and (2) a lower portion having a balanced construction of alternating courses of yarns of which at least one of the alternating courses is an elastic yarn having a stretch capacity of from about 150 to about 600 percent of its original unstretched length and capable of returning substantially instantaneously to its original unstretched length after being so stretched, whereby when said stocking is worn a substantially greater restraining pressure is exerted on the lower calf and ankle of the wearer than on the upper part of the wearer's leg beginning with the upper calf portion.

9. In an elastic surgical stocking containing an upper leg portion including the section adapted to fit over the upper calf areas of a wearer's leg and a lower leg portion including the section adapted to fit around the ankle and areas adjacent thereto, the improvement comprising (1) said upper portion having a balanced construction of alternating courses of (*a*) right-twist-tendency synthetic thermoplastic yarns containing from one to four

monofilaments and a crinkled, set thermoplastic synthetic yarn and (*b*) left-twist-tendency synthetic thermoplastic yarns containing from one to four monofilaments and a crinkled, set thermoplastic synthetic yarn, and (2) a lower portion having a balanced construction of alternating courses of (*a*) elastic yarns having a stretch capacity of from about 150 to about 600 percent of their original unstretched length and capable of returning substantially instantaneously to its original unstretched length after being so stretched and (*b*) thermoplastic synthetic polymeric yarns, whereby when said stocking is worn a substantially greater restraining pressure is exerted on the lower calf and ankle of the wearer than on the upper part of the wearer's leg beginning with the upper calf portion.

10. In an elastic surgical stocking containing an upper leg portion including the section adapted to fit over the upper calf areas of a wearer's leg and a lower leg portion including the section adapted to fit around the ankle and areas adjacent thereto, the improvement comprising (1) said upper portion having a balanced construction of alternating courses of (*a*) right-twist-tendency synthetic thermoplastic nylon yarns containing from one to four monofilaments and a crinkled, set thermoplastic synthetic yarn and (*b*) left-twist-tendency synthetic thermoplastic nylon yarns containing from one to four monofilaments and a crinkled, set thermoplastic synthetic yarn, and (2) a lower portion having a balanced construction of alternating courses of (*a*) elastic rubber yarns having a stretch capacity of from about 150 to about 600 percent of their original unstretched length and capable of returning substantially instantaneously to its original unstretched length after being so stretched and (*b*) thermoplastic synthetic polyamide yarns, whereby when said stocking is worn a substantially greater restraining pressure is exerted on the lower calf and ankle of the wearer than on the upper part of the wearer's leg beginning with the upper calf portion.

11. In an elastic surgical stocking containing an upper leg portion including the section adapted to fit over the upper calf areas of a wearer's leg and a lower leg portion including the section adapted to fit around the ankle and areas adjacent thereto, the improvement which comprises the lower leg portion having a substantially greater elastic stretch capacity than the elastic stretch capacity of the upper leg portion said stocking, when placed on a wearer's leg, exerting a substantially greater restraining pressure on the ankle and lower calf area of the wearer's leg than on the upper portion of the wearer's leg including the upper calf portion.

References Cited in the file of this patent

UNITED STATES PATENTS

1,822,847	Adamson	Sept. 8, 1931
2,169,203	Hinchliff	Aug. 8, 1939
2,218,413	Bell	Oct. 15, 1940
2,702,998	Purcell	Mar. 1, 1955
2,714,757	Leath et al.	Aug. 9, 1955
2,720,097	De Mond	Oct. 11, 1955
2,736,945	Burleson et al.	Mar. 6, 1956
2,771,758	Weller	Nov. 27, 1956
2,807,073	Stuewer	Sept. 24, 1957
2,841,971	Bird et al.	July 8, 1958

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,064,456 November 20, 1962

William Henry Bird

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 30, strike out '"Helanca"'.

Signed and sealed this 7th day of January 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWIN L. REYNOLDS
Acting Commissioner of Patents