Oct. 14, 1952 M. E. SCHAEFER 2,613,520

KNITTED FOOTWEAR

Filed March 2, 1950

FIG. 1.

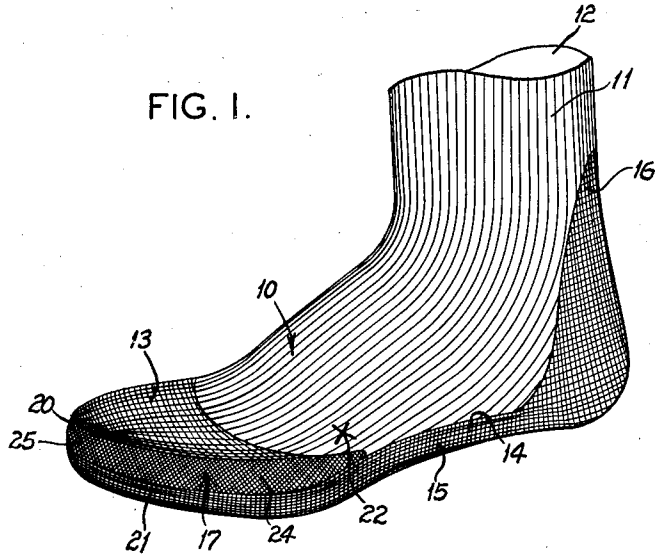


FIG. 4.

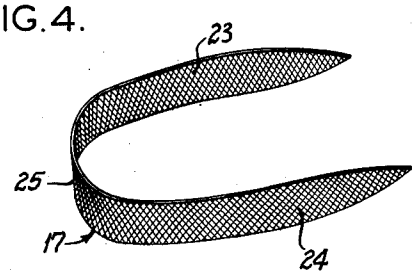


FIG. 2.

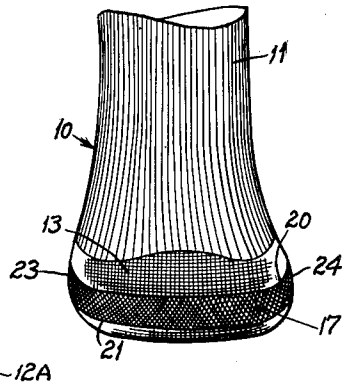


FIG. 3.

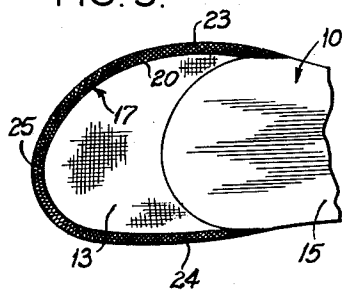


FIG. 5.

INVENTOR,
MARGARET E. SCHAEFER,
BY Terry & Cohn
ATTORNEYS.

Patented Oct. 14, 1952

2,613,520

UNITED STATES PATENT OFFICE

2,613,520

KNITTED FOOTWEAR

Margaret E. Schaefer, St. Louis, Mo.

Application March 2, 1950, Serial No. 147,248

13 Claims. (Cl. 66—178)

1

This invention relates to improvements in knitted footwear, and more particularly to such improvements therein as conduce to greater comfort and better fit of all parts of the foot portion, and by extension of the features to the ankle and leg portions, similarly conduce to added comfort and better fit, in the latter regions of the hosiery.

This applicant is aware that certain attempts have heretofore been made toward the introduction of a specially formed panel, insert or gusset, in various parts of the foot portion of a stocking or sock, whereby to augment the resilience of certain isolated regions of the hosiery. Such earlier attempted improvements have, however, not come into any particular favor in the trade, and as far as is known from extensive investigation, none of such older improvements has been regarded as materially alleviating the usual sources of foot discomfort. It is accordingly a general major objective of the present improvements to enhance greatly the comfort to the wearer, particularly of the foot portion of the unit, such as a stocking or sock, and with further particularity, to enhance the comfort of knit footwear through the forepart of the foot portion around the toes, and at each side of the foot and rearwardly at least through the metatarsal region.

The present invention may perhaps best be summarized by a brief description of a currently preferred embodiment thereof as applied to the foot region of the stocking: A knitted frontal toe gusset depthwise connecting the upper element of the foot-body portion and the sole element thereof, constitutes in effect a front wall of a box toe enclosure around the front and sides of the foot. Such wall structure is, by great preference, set into the stocking with the courses or wales of the inset distinctly inclined with respect to those of the body portion and sole, and is joined to the sole portion and to the upper foot element either by a continuous knitting process, not per se forming a part of the presently claimed invention, or alternately by the use of suitable lines of stitching of such nature as to avoid ridges or ridge lines, or protuberances of any appreciable order, either internally or externally of the stocking. Such toe formation serves to keep in a comfortable, depthwise-spaced relation, the sole element and the upper element of the foot portion from the tips of the toes rearwardly at least to the instep, and thus serves to relieve all of the toes of any constricting pressures, whether in directions longitudinally of the foot, transversely

2

thereof, or in a depthwise direction. A novel kind and augmented degree of elasticity is provided in the gusset or inset by disposing the knitted courses or wales of same so that they lie at a substantial acute angle to the horizontal, which serves to bring them in effect, in a bias relation to the normally horizontal sole portion, and are similarly related to the knitted portion overlying the top part of the foot.

In its most complete and advanced embodiment, the present improvements realize a highly comfortable, snug, form-fitting effect of the hose about the ankle and upwardly along the leg portion of the wearer, by extending a special gusset at least from the ankle region upwardly along one and preferably each side of the leg, to or through the top band of the hose. This improvement, it will be noted, may be utilized either independently of, or in combination with the toe gusset above described.

Further objects and advantages realized by the present improvements may be noted, not necessarily in the order of their importance nor to the exclusion of others, as resulting in a definite three-dimensional elasticity particularly of the foot portion of the hose, this expression having reference to a greatly enhanced facility of the hose to stretch in a lengthwise direction, and similarly to be stretched without deformation of the hose or discomfort to the wearer in a direction across the foot, and likewise in a depthwise direction.

Yet another objective of importance is realized in the formation of the inset, panel or gusset and the combination thereof with the foot of the hose, such that there results what may be referred to as a box toe construction of the hose, greatly enhancing the comfort and prolonging the life of the forepart of the foot portion of the knit element.

A further valuable objective incident to application of the special gusset to one or both sides of the leg portion of the hose, is realized in a snug and comfortable fit of such portion, so that the hose closely clings to the ankles and thereabove closely engages the leg of the wearer. As applied to men's hose, this feature obviates the necessity for added supporting appliances such as the usual garters or the like.

The foregoing and numerous other objects and advantages will more clearly appear from the following detailed description of certain preferred embodiments of the invention, particularly when considered in connection with the accompanying drawing, in which:

Fig. 1 is a side elevational view of the foot

and ankle portion of a sock or stocking to which the present improvements are applied;

Fig. 2 is a front elevational view of the article of knitted footwear, shown by Fig. 1;

Fig. 3 is a top or plan view of a frontal portion of the sole and the special frontal gusset attached to the sole, and from which the remainder of the stocking has been removed for clearness;

Fig. 4 is an elevation in perspective showing diagrammatically a form of the special gusset element when formed separately of the foot body of the hose, and prior to stitching or otherwise assembling same, and

Fig. 5 is a side elevational view similar in nature to Fig. 1, but showing an extension of the gusset from the sole line of the stocking outwardly over the instep, ankle and leg portion.

In order to render more meaningful certain of the description and terminology hereinafter utilized for brevity in both specification and claims, it is noted that the term "stocking" is employed in a broad sense as inclusive of knitted hosiery for men, women and chilren, and in fact is used to denote knitted footwear generally, irrespective of size, purpose or specific thread or yarn employed in knitting same.

Since it is a distinct preference to employ in some of the elements of the stockings as embodying the present improvements, one or more portions thereof which are characterized by more or less definite angularity or trend of the several wales or courses of the knitted structure, it is here noted by way of explanation that wherever the expression "true bias" is employed, same shall be taken to indicate that each of the courses or wales of the special knit inset portion, is set into the stocking at an angle approximating 45 degrees to a horizontal plane, which may be taken as that of the sole of the stocking. The term "bias" as used herein, denotes generally an acute-angled relation of the knit courses, to others referred to. Since one of the features of the present improvements in their currently most advanced form, realizes a "three-dimension stretch," this term as herein utilized, defines an extraordinary elasticity of the foot portion of the stocking, first in a longitudinal direction, secondly in a transverse direction or across the foot, and thirdly in a direction depthwise of the foot or stocking. By reason of a marked preference for a foot-fitting forepart in the region of the toes and somewhat rearwardly thereof, by way of accentuating the differences in this portion of the stocking in comparison with usual hosiery shaping, the term "box-toe" is sometimes herein employed. Such term is used in the sense of indicating a lack of any marked convergence of those portions of the forepart of the stocking foot, toward the front end thereof; in fact, a slight divergence of such portions and the connection of the side toe elements through a widely convex frontal wall element is intended to be covered by the description of the stocking as of box-toe shape or styling.

Referring now by characters of reference to the drawing, the foot portion of the stocking includes a body portion or foot body generally indicated at **10**, and formed as by knitting, and above which extends in somewhat the usual relation, an ankle fitting portion **11** upwardly beyond which is a leg portion **12**, only a minor portion of which is shown. Connected to the foot-body portion **10** at the forward end thereof there is optionally included a toe cap **13**, while the

rear side margins of the portion **10** are connected along lines of juncture **14** with a sole portion **15**. The sole portion is brought upwardly about and thence beyond the heel region to constitute a heel point **16**.

An important feature of a stocking embodying the present improvements, is found in a special inset, panel or gusset generally indicated at **17**, the wales or courses of which as knitted, or at least as set into the stocking, lie by preference, on a true bias, the term "bias" being employed for brevity and convenience of description because of similarity in effect and in structure, to a bias inset of woven fabric sometimes utilized in garment construction. Such bias gusset is joined along its upper and lower margins indicated respectively at **20** and **21**, to the toe cap **13** and rearwardly thereof to the foot-body portion **10**, while the margin **21** is similarly connected to the sole element **15** of the stocking along the forward margins thereof.

By way of further discussion of the juncture lines such as **14**, **20** and **21**, it should be understood that the gusset **17** may be knitted separately from some or all of the remaining elements of the stocking foot, and in such case joined thereto along the lines **20**, **21** as by a flat stitch, or alternately, by a crocheted stitch or other forms of so-called invisible stitching, the desideratum being in all such cases the avoidance of any appreciable ridge, welt or other internal or external protuberances along these lines. Alternately and as currently preferred, the bias gusset **17** may be formed integrally with at least some, and by further preference with each of the adjacent portions of the stocking foot. While it is appreciated that rarely will the bias-like gusset **17** lie perfectly along a uniform curve, its courses will nevertheless approximate such a position, and so may be considered as a highly elastic front wall element of the toe of the stocking. The width of the gusset **17** is so selected that it will approximate the depth or maximum thickness of the toes of the wearer, thus avoiding any depthwise constriction of the digits and avoiding any pressure at the top and bottom or against the tips of the several toes, thus conducing to maximum comfort.

The shaping of the gusset element **17** will appear from Figs. 1, 2 and 4 and its linear extent from Fig. 3, from which it will be seen that, considering Fig. 4 as a separate gusset element to be set into the foot of the stocking as by stitching, and considering such element in relation to the showing of Fig. 1, the gusset will have its point of origin on one side, slightly rearwardly of the joint of the large toe, or otherwise expressed, somewhat rearwardly of the ball region of the foot, whence it extends first in a relatively linear trend, thence in a widely convex portion over the tips of the several toes, thence around on the opposite side of the foot, at least to but preferably slightly beyond the cuboid region of the foot. The approximate location of the cuboid bone will of course vary somewhat between individuals, but is approximately indicated by the point X (Fig. 1) and reference thereto is made by the numeral **22**. As will best be seen from Fig. 4, when the stocking is in position on the foot and thus normally shaped, the bias-like gusset, whether knitted integrally with the remainder of the foot of the stocking or whether formed as a separate element, is of a generally U shape in plan, and comprises the two side or arm portions **23** and **24** together with the widely

convex bight portion **25**. The peripheral extent of the toe gusset will also appear from Fig. 3, and the relatively divergent presentation of the sides **23** and **24** is best seen in the front view of Fig. 2. The latter reveals the box-toe character of the stocking and its shaping such as to avoid any noticeable degree of constriction of either the foot proper or the toes, across, lengthwise or depthwise of the foot.

To describe somewhat further the preferred inward extent of the special toe gusset, it will appear from Fig. 1 that the inner extremities of the portions **23** and **24** thereof, bring the gusset rearwardly beyond the usual line of break of the foot incident to toe flexure as in walking, and considered further in reference to the instep region of the foot, it will be seen that, in Fig. 1, the inner extremities of the gusset are extended rearwardly substantially over the forward half of the foot to the regions on each side thereof such that if these be connected by a transverse line across the foot, such line would be closely coincident with the usual instep region of the foot. There is thus provided an added elastic facility in the stocking for permitting depthwise expansion thereof, as is sometimes highly desirable in the case of abnormally high insteps.

In Fig. 5 there is illustrated a somewhat modified form of stocking in which the biased gusset is extended upwardly along the sides of the instep region of the foot, whence it is directed vertically over the ankle bones, there being one such extended gusset when this feature is utilized, overlying each of the opposite sides of the ankle, and by preference the gusset being located medially of each side of the ankle region, thence extended vertically upwardly at least to, and with advantage through the top band of the stocking or sock. The feature of improvement identified with the modification of Fig. 5, greatly enhances the comfort of an article of knitted footwear, and at the same time, particularly when utilized in men's socks, and when carried approximately up to or through the top band of the sock, will enable the article of knitted footwear to be worn without the usual men's garters. Although two such gussets are prefered, the practical result is markedly improved by utilizing only a single upwardly extending elastic element.

In the modified form shown by Fig. 5, the same reference characters heretofore utilized are employed to designate comparable portions of the stocking, but in the modification are differentiated by the suffix letter A. Additively to such corresponding elements in both structures, the extended gussets at each side of the foot-body portion **10A** include a sloping portion **30** which merges through a wide arcuate zone of bend **31**, into the ankle-engaging region **32** which latter is continued upwardly in the portion **33** substantially or fully to the top of the stocking.

It will now have appeared that, due to the unusual degree of stretch without set, realized by the bias nature and position of the gusset **17** or **17A**, provision is made for the stocking to accommodate any foot abnormality, for example, a single abnormally elongate toe, or plurality thereof. The gusset will similarly lend itself to comfortable accommodation to an abnormality such as an enlarged great toe joint, or a bunion, calluses or other surficial foot growths, or other protuberances whether natural growths or due to traumatic causes.

An expression has been made by certain hosiery manufacturers of a preference to utilize a somewhat heavier or somewhat more closely knitted construction in the toe gusset, or a gusset of some differing, more elastic material than characterizes the remainder of the foot portion of the stocking, but whether or not such a difference obtains, it will appear that the highly elastic frontal wall provided by the gusset **17**, will relieve the toes of the foot, and particularly the other portions of the foot within the confines of the gusset, of any possible pressure of noticeable extent, by reason of the three-dimensional stretch heretofore described.

It will also have appeared that a stocking formed as hereinabove described, will serve to realize each and all of the major objectives hereinabove expressed, as well as others stated and implied in connection with the more detailed description of the embodiments.

Although the invention has been described by detailed reference to only two currently desirable forms, such detail of disclosure should be understood solely in an instructive, rather than in any restrictive sense, numerous variants being possible within the intended scope of the claims hereunto appended.

I claim as my invention:

1. A stocking including a sole portion, a foot-body portion, and a knitted insert or panel characterized by inclined wales, and extending uninterruptedly along a convex line about the forepart of the foot region of the stocking from a zone close to the ball of the foot at one side thereof, and to the cuboid region on the opposite side of the foot.

2. A stocking including in the foot part thereof, a sole portion, a foot-body portion and a gusset extending uninterruptedly along a widely convex curved line about the forward margin of the foot-body portion of the stocking, from a zone in the ball region at one side of the foot, thence around to the cuboid region of the foot, said gusset being of a knitted material, with its wales at substantial acute angles to the substantially horizontal plane of the sole portion of the stocking foot.

3. A stocking including a foot-body portion, a sole portion and a knit gusset the wales of which are distinctly inclined with respect to the sole portion, the gusset extended uninterruptedly about the forepart of the foot-body portion between the ball and cuboid regions at opposite sides of the foot, the sides of said gusset diverging toward the toe region, thence joined through a widely convex bight extending entirely over the extremities of the toes of the foot.

4. A knit stocking including a foot-body portion, a widely convexly curved knit gusset bounding the forepart of the foot-body portion, and so fit into such portion as normally to be disposed substantially vertically, the width of said knit gusset approximating the normal depth of the toes, and having its wales biased from the vertical, and thus being of a distinctly elastic character.

5. The combination and arrangement of elements of a stocking as recited by claim 4, but further characterized in that said gusset is joined to and merges smoothly into the sole portion of the stocking foot along a line beginning somewhat rearwardly of the ball of the foot, thence linearly toward the toe end, thence being of a widely convex curvature and normally disposed substantially vertically adjacent the toe line of the foot, and thence continuing rearwardly

along the margin of the foot portion of the stocking to a zone rearwardly of the cuboid region of the foot.

6. A stocking of knitted construction including a foot-body portion characterized by a frontal gusset set into the foot-body portion, and extended along a line just forwardly of the toes, and being widely convexly curved so as to constitute, with the adjacent elements of the foot-body portion, a stocking foot of box-toe aspect, the gusset being of a knitted formation with its knit courses all at a substantially acute angle to the vertical, in the normal position of wear.

7. In a knitted stocking, a foot-body portion including a sole, and a knit toe panel with its courses joined in inclined relation to the sole portion and extending upwardly thereof as a frontal wall entirely outwardly overlying the ends of the toes, and extending from the region of the first metatarsal continuously convexly from such zone about the toes and thence rearwardly beyond the cuboid region of the foot.

8. In a knitted stocking, a foot portion including a sole, an upper and a leg portion, a box toe formation constituting a part of the knitted foot portion and consisting of a knitted gusset of a normally substantially vertical disposition in the foot of the stocking as worn, said gusset being joined to the sole element of the foot portion, thence extended sharply upwardly a distance corresponding substantially to the normal depth of the toes, the gusset merging smoothly, without appreciable seam, rib, or protuberance, with the sole along the lower gusset margin, and similarly merged into the upper element of the foot of the stocking along the upper gusset margin, the gusset having its wales inclined, the gusset following, in plan, a widely convex curvature along the toe tips and extended rearwardly from such curved frontal or toe region, to the instep region of the foot and being of an extent linearly of the foot portion of the stocking, approaching half the overall length of such foot portion.

9. A stocking including a foot portion, a connected leg portion, and a knit gusset characterized by knit courses distinctly inclined with respect to those of the adjoining knit portions, the gusset extending upwardly along one side of the leg portion from the angle region at least to the top band of the stocking.

10. A stocking including as knitted elements, a foot-body portion, a connected leg portion and a gusset characterized by biased wales and extending upwardly along at least one side of the leg portion, from the instep region of the foot-body portion, thence upwardly over the ankle region, to the upper part of the leg portion of the stocking.

11. A stocking including as knit elements, a sole portion, a foot-body portion and an insert characterized by a biased arrangement of its courses or wales, relative to the adjoining knit portions, extending uninterruptedly about the forepart of the foot region of the stocking, and rearwardly along the sole line to the ball of the foot on one side and to the cuboid region of the foot on the other side, the insert thence extending upwardly along each opposite side of the leg portion, to the top band of the stocking.

12. A stocking of knitted construction including a foot-body portion characterized by a knit frontal gusset of a generally U shape in plan, set into the foot-body portion, and characterized by an aspect of a generally vertical front wall of the foot-body portion and being widely convexly curved so as to constitute with the adjacent elements of the foot-body portion, a stocking foot of box toe aspect, the gusset being of a knitted material with its knit courses all biased at a substantially acute angle to the horizontal and to the vertical in the normal position of wear, said bias gusset extending rearwardly along the sides of the sole line to a zone substantially intermediate the length of the foot portion thence upwardly along each side of the instep region of the foot-body portion, thence upwardly over the sides of the ankle region, thence upwardly to the top band of the stocking.

13. In a knit stocking, the improvements characterized by a widely convexly curved gusset with distinctly inclined wales, and constituting a frontal toe wall in the stocking, thence extending rearwardly along the sides of the forepart of the foot past the ball region on one side and past the cuboid region on the other side of the foot, the gusset thence extending upwardly over the opposite sides of the ankle region thence upwardly along the sides of the leg of the stocking to a substantial height above the ankle.

MARGARET E. SCHAEFER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,031,432	Sickerott	Feb. 18, 1936
2,302,788	Mendelsohn	Nov. 24, 1942
2,304,052	Kaufman	Dec. 1, 1942
2,395,908	Richter	Mar. 5, 1946
2,422,736	Lambert	June 24, 1947

FOREIGN PATENTS

Number	Country	Date
455,979	Great Britain	Oct. 30, 1936