June 17, 1952 B. LIEBOWITZ 2,601,035

ANTICURL DEVICE FOR COLLARS

Filed Oct. 14, 1950 2 SHEETS—SHEET 1

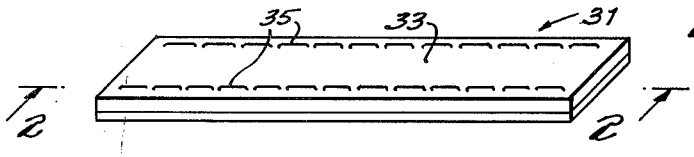


FIG. 1.

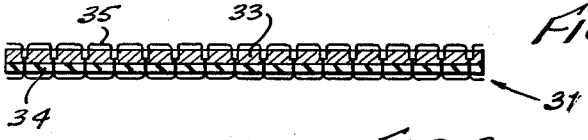


FIG. 2.



FIG. 3.

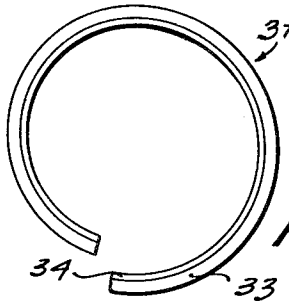


FIG. 4

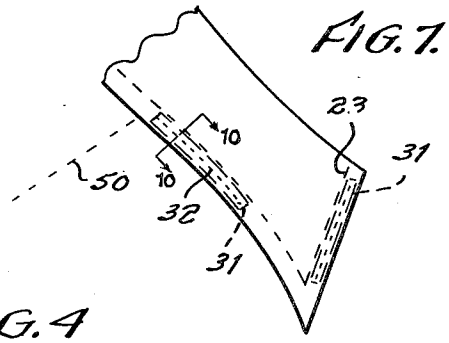


FIG. 7.

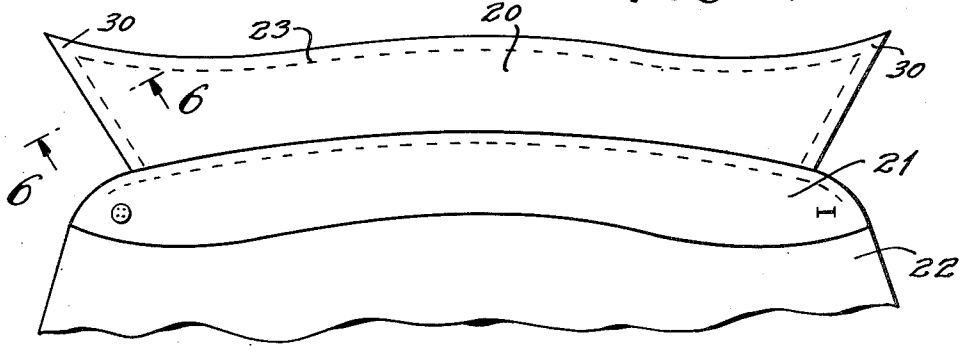


FIG. 5.

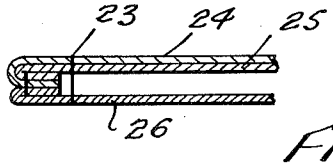


FIG. 6.

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FIG. 8.

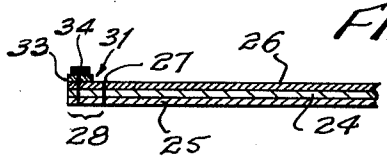


FIG. 11.

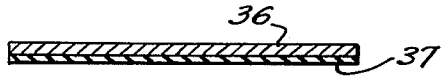


FIG. 9.

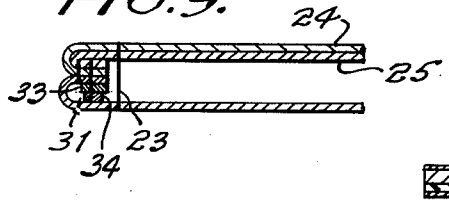
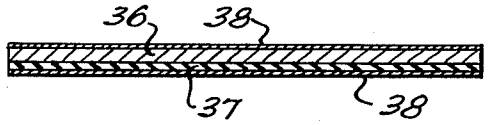


FIG. 12.



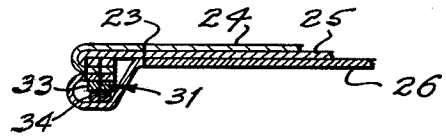
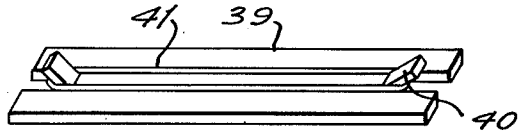


FIG. 10.

FIG. 13.



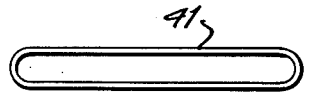


FIG. 14.

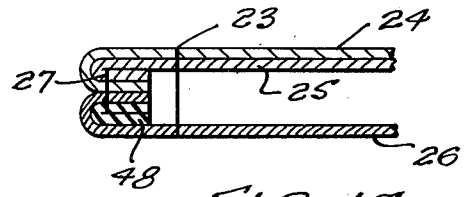


FIG. 15.

FIG. 17.

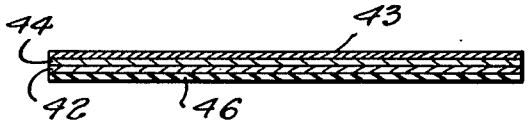
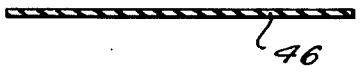


FIG. 16.



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Patented June 17, 1952

2,601,035

UNITED STATES PATENT OFFICE

2,601,035

ANTICURL DEVICE FOR COLLARS

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Application October 14, 1950, Serial No. 190,092

13 Claims. (Cl. 2—137)

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This invention relates to collars for men's and boys' shirts and has for its main objective the prevention or minimizing of the tendency of the points of such collars to "curl," i. e. to bend away from the wearer.

This tendency of the collar points to "curl" represents one of the most longstanding problems in the industry. While it is true that on some individuals collars do not show much tendency to curl, nevertheless on most individuals they do. Known means for overcoming the tendency, such as the use of stays or buttons as in the "button-down" collar are of limited applicability and have certain disadvantages besides. For more than a decade much or most of the collars manufactured in the United States have been of the so-called fused type and on such collars, although semi-stiff, no adequate means has been hitherto found to prevent curling.

The objective of this invention, viz., to eliminate or minimize this curling tendency, is achieved in a very simple way by introducing a counter-curling or anticurling tendency by means of a structure which will hereinafter be referred to as a bi-elastic structure. In its simplest form, this bi-elastic structure comprises a strip of flexible but compression-resistant fabric and a permanently stretched elastic member, e. g. a rubber strip, these two members being fastened together at a common interface by stitching or cementing. A simple bi-elastic element comprising, e. g. a single layer of stiffened fabric and a thin layer of stretched rubber sewn thereto face to face will curl up into a spiral cross-section when left to itself. When such bi-elastic elements are sewn into a collar at suitable locations, with the stretched elastic element towards the wearer, an inward curling tendency is produced. With proper selection of the materials and of the initial stress of the elastic element, the said inward curling tendency can readily be made strong enough to keep the front regions of the collar against the body of the wearer without at the same time causing such a severe inward curling tendency as to produce undesirable effects. To achieve enough anticurling tendency without having too much requires a proper balance of the various materials and forces involved, but this balance is obtainable without difficulty after some experimental work.

Attempts which have hitherto been made to achieve this objective may be illustrated by reference to Patents No. 2,186,356 and No. 2,183,242. These attempts were based on the use of a differential shrinkage and failed because after a very few washings the collar settled down to the dimensions demanded by the more shrinkable element and thereafter showed no anti-curling tendency. In the present invention, however, this cannot happen because the initial stretch of the elastic element is made sufficiently large so that it exerts a tension which endures adequately throughout the life of the collar. Of course, to maintain this tension the collar structure must be sufficiently resistant to compression where the tension is applied so as not to shorten materially under the sustained action of this tension when the collar is repeatedly washed.

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This compression-resistance can be obtained in various ways. In the first place, when the elastic element is applied to a plurality of collar fabrics which are relatively stiff or at least form a relatively stiff fabric structure when sewn together by one or more rows of stitches, these assembled fabric elements of the collar may themselves provide the compression-resisting element, provided that the tension of the elastic element is not too large. In fused collars, if the elastic element is sewn to a group of plies which are subsequently stiffened by the fusing operation, these plies definitely can provide the compression-resisting element to sustain practical usable tensions due to the stretched elastic element. But when the bi-elastic structure is applied to a soft collar then, at least in many instances, it is preferable to use a separate stiffened fabric or fabric structure as the compression-resisting element. When the bi-elastic structure is applied to fused collars then in this case at least there is a compensatory action which takes place on repeated launderings, viz., the collar tends to get softer, thereby creating a greater tendency to curl inward, but at the same time if the elastic element is made of a properly selected rubber its tension will tend to decrease so that a substantially uniform anti-curling tendency is produced throughout the life of the collar.

Again referring to fused collars, in which the fused fabric is sufficiently stiff to provide the necessary compression-resistance, it may still be desirable to use a pre-fabricated bi-elastic element comprising a stiffened fabric and a stretched elastic element. In the first place it is preferable to incorporate the bi-elastic element inside the collar, rather than externally, hence the bi-elastic element is best applied to the collar before fusing. If the stretched elastic element alone is sewn directly to the plies of the collar in the course of fabrication of the collar, that is, before the final fusing operation,

the fabric will not be stiffened at the stage when the stretched elastic element is sewn thereto and hence the application to the collar of the stretched elastic element at this stage may readily cause undesirable distortions. In the second place, bi-elastic elements, in strip form at least, can be readily pre-fabricated and are simpler to attach to the collar at the proper stage of manufacture than an elastic member which has to be stretched in the process of sewing to the collar. Thus, a pre-fabricated bi-elastic element is preferable both from the standpoint of avoiding distortions and also from the standpoint of ease of manufacture. It is to be noted, however, that where the bi-elastic structure is applied to a soft collar the compression-resisting element should be permanently stiffened so as to be permanently compression-resistant whereas in a fused collar the compression-resisting element of the prefabricated bi-elastic structure may be either permanently or temporarily resistant to compression, since the plies of such collars when ultimately fused can provide in most cases adequate resistance to compression.

A preferred form of bi-elastic elements is in the form of strips and a preferred location for these strips is in the seamed edges of the collar between the actual edges of the collar and the so-called top stitching, as will be described. It will be understood, however, that such bi-elastic elements can be used in other locations, e. g. as a diagonal strip which more or less bi-sects the angle at the point of the collar.

Such bi-elastic strips may take a variety of forms and may be prepared in a variety of ways. A clearer understanding of the invention will be obtained by reference to the accompanying drawings which, it will be understood, are intended to be purely diagrammatic and are not intended to provide any quantitative information.

In these drawings:

Fig. 1 is an isometric view of a portion of a bi-elastic strip in straightened condition;

Fig. 2 is a cross-section on the line II—II of Fig. 1;

Fig. 3 is a cross-section through the elastic element of Fig. 2, before it is stretched;

Fig. 4 is a side view showing the curled form taken by the bi-elastic strip when relaxed;

Fig. 5 is a plan view of a conventional collar attached to a shirt;

Fig. 6 is a cross-section on the line VI—VI of Fig. 5;

Fig. 7 is a plan view of an end of the collar indicating the location of the bi-elastic strips in the edges thereof;

Fig. 8 is a cross-section through a collar after the stage of manufacture known as "running" but before "turning" and indicates how the bi-elastic strip may be sewn to the edge which is subsequently turned inward;

Fig. 9 is a cross-section corresponding to Fig. 8 showing how the bi-elastic strip appears in position after the collar is turned;

Fig. 10 is a cross-section along line 10—10 of Figure 7, corresponding to Fig. 9 but applies to a fused collar after it is fused;

Figs. 11 and 12 are longitudinal cross-sections corresponding to Fig. 2 but showing a modification thereof;

Fig. 13 is an isometric view of still another modification;

Fig. 14 shows the elastic member of Fig. 13 before stretching;

Fig. 15 is a longitudinal cross-section through a bi-elastic element having a relatively stiff permanently stiffened compression-resisting member; and

Fig 16 shows the elastic element of Fig. 15 before it is stretched.

Fig. 17 is a cross-section corresponding to Figure 10 of still another modification.

Referring to the drawings, Figure 1 is an isometric view of a bi-elastic element 31 comprising a stiffened fabric 33 which serves as the compression-resisting element, a stretched elastic element 34 and stitches 35 holding the two elements together. Two rows of stitches 35 are shown. This is preferable for most purposes. One row allows the elastic element to curl around the row of stitches and more than two rows of stitches are generally unnecessary so far as bi-elastic strips are concerned.

Figure 2 is a cross-section on the line II—II of Figure 1 showing how the compression-resisting element 33 is sewn to the stretched elastic element 34.

Figure 3 shows the elastic element 34 of Figure 2 before it is stretched and indicates the extent to which the elastic element is stretched when it is sewn to the compression-resisting element 33.

The bi-elastic structure 31 of Figures 1 and 2 is shown in the straightened form. Actually when such strips are left to themselves, i. e. relaxed, they take a curve or spiral form such as indicated in Figure 4. The degree of curvature assumed by such bi-elastic strips 31 depends on the stiffness of the compression-resisting element 33 and the amount of tension exerted by the stretched elastic element 34.

Figure 5 is a plan view of a conventional collar having a collar top 20, a collarband 21 which is sewn to the shirt 22 along the lower edge thereof. The collar top 20 is generally made by first superimposing three plies of fabric, to wit, a face ply 24, a lining ply 25 and a back ply 26. These three plies are sewn together by the so-called running stitch indicated by 27 in Fig. 8. After the collar is seamed along its edges by the stitch 27 (except the collar-banding edge) the assembly is turned inside out to the form indicated in Figure 6 so as to bring the face ply 24 uppermost, the back ply 26 lowermost and the lining ply 25 in between. It will be understood that Figure 6 refers to the most popular type of conventional collar currently produced. After the collar plies are turned to bring them into the form of Figure 6 the so-called top stitch is applied which is indicated by the reference character 23 in Figures 5 and 6.

Figure 7 is a plan view corresponding to Figure 5 showing one end of the collar top of Figure 5 with the bi-elastic elements 31 in preferred location indicated by dotted lines. 32 indicates the stitch used to hold the bi-elastic elements 31 in position. The approximate relative location of the shoulder seam of the shirt is indicated by 50.

Figure 8 shows how the bi-elastic element 31 may be sewn to the collar assembly by the stitch 32 after running but before turning. The region indicated by 28 between the running stitch 27 and the edge of the collar is the part of the collar material which is subsequently turned inward. It is to this region 28 that I prefer to attach the bi-elastic strip 31.

As mentioned above, it is preferable to use sometimes two rows of stitches, and therefore

reference character **32** is intended to indicate one or more such rows.

Figure 9 indicates the position taken by the bi-elastic strip **31** in the collar after the same has been turned inside out to the form shown in Figure 6. If the collar is a fused collar then after fusing the cross-section of the collar will look substantially as indicated in Figure 10.

It will be understood that the stretched elastic element of the bi-elastic structure must be in proper location in order to effect the curling tendency in the desired direction. In a collar the elastic element must lie in a plane which is closer to the wearer than the "neutral plane" of the entire collar structure in the region where the elastic element is applied.

The bi-elastic element may take a variety of forms and be prepared in a variety of ways other than those indicated in Figure 2. For instance, I may use a bias or braided tape **36** of the type shown in Figure 11 which is stretchable and fasten to it either by a stitch or cementing a strip of rubber **37**, both being shown in this figure in relaxed or unstretched condition. After this, I may stretch the assembly the desired amount as shown in Figure 12 and then maintain it in stretched condition by appliyng a temporary stiffening layer or layers as indicated at **38**.

Figures 11 and 12 are in such relationship as to indicate in a rough way the amount of stretching before the application of the stiffening layers **38**.

For most purposes it is desirable to fasten the compression-resisting member and the tension-creating elastic member of the bi-elastic structure together at a common interface more or less continuously all along said interface. For some purposes, however, it is sufficient to attach the elastic element to the compression-resisting element only at the ends as indicated in the modification of Figures 13 and 14. In these figures, **39** indicates a stiffened fabric which has tongues punched at the ends as indicated at **40**. A rubber band shown at **41** in Figures 13 and 14 is then stretched over these tongues to produce the composite bi-elastic structure of Figure 13.

Figure 14 indicates the length of the rubber band before it is applied to the compression-resisting element **39**.

It has been mentioned above that depending on the field of application the compression-resisting element may be either temporarily stiffened or permanently stiffened. For temporary stiffening I may use one or more layers of heavily starched fabric or fabric treated with an equivalent substance which is removable on washing, e. g. hydroxyethylcellulose of medium viscosity preferably mixed with a small percentage of urea. There are other substances which may conveniently be used for such temporary stiffening. For more permanent stiffening I may use strips of so-called "fusing" lining either singly or fused together. These linings are used in the shirt industry for the manufacture of fused collars and comprise a fabric which is coated with a relatively insoluble substance, e. g. cellulose acetate. Such fabrics, either singly or in multiple layers, are adequate for providing permanent resistance to compression for bi-elastic elements suitable for collars. Or, instead of using the so-called coated linings, I may use the so-called interwoven linings in which cellulose acetate yarns are interwoven with cotton; such interwoven linings are generally used in the better grade of fused collars.

Figure 15 indicates a sandwich made of a layer of fabric **43**, a fusing lining **44**, and another layer of fabric **42**, all of which are fused together by methods well known in the shirt trade. The lining **44** may be either "coated" or "interwoven." Attached to this composite structure is the stretched elastic element **46**.

Figure 16 shows the elastic element **46** before stretching.

As mentioned above, under certain circumstances, particularly where the plies of fabric to which the elastic strip is attached, taken together, have sufficient resistance to compression—the bi-elastic structure requires no additional compression-resisting material. In such case the elastic member, e. g. a thin strip of suitable rubber, may be sewn to the collar assembly by means of the running stitch itself, provided proper attention is paid to stretching the elastic member to the right extent in the act of sewing it in place. Figure 17 is a cross-section showing an elastic element **48** held in place by the running stitch **27** and folded back on itself like an ordinary ply of fabric when the collar is turned.

As another modification it may be mentioned that a bi-elastic strip may be prepared by taking a strip of rubber, stretching it to the required amount and then, while the rubber is in stretched condition, depositing on one face thereof a layer of viscous material such as a resin or cellulose acetate, and then maintaining the rubber in the stretched condition until the substance then deposited dries into a permanently compression-resisting film. Furthermore, if desired, it is also possible to coat the stretched rubber strip itself with a temporarily compression-resisting film and to apply, e. g. by sewing, the thus stiffened stretched rubber strip to a collar, particularly to a collar the plies of which are fused to each other after application of the rubber strip.

It will be understood that in all figures the amount of stretch is not quantitatively indicated by the relative lengths in Figures 2 and 3 or 11 and 12 or 13 and 14 or 15 and 16. But, to give a specific example, I have found that using so-called dental dam rubber, which is a highly elastic sheet rubber material with a thickness of about 0.007 inch, strips approximately one-quarter inch wide and stretched to approximately 120 to 135% of their length, when sewn into the position indicated at **31** in Figure 10 provide a satisfactory anti-curling tendency without causing too much tension.

The word "compression-resistant" is used throughout this specification and the following claims in the sense that the object in question will not buckle or tend to shorten continuously under the compressive force induced by the stretched elastic element. For example, ordinary lightweight fabrics would not be compression-resistant in this sense because they would tend partly to buckle and more important would tend to shorten permanently after repeated washings. In this sense such lightweight ordinary fabrics are not compression-resistant. However, the compression-resistant element may yield substantially under the compressive force induced by the stretched elastic element and still come within the ambit of the meaning of the expression "compression-resistant" as used herein. For instance, a practical way, for certain purposes, to make a bi-elastic element is to employ two strips of rubber one of which is properly stretched

before cementing or otherwise applying it to the other. The other strip of rubber, which acts as the compression-resistant element, should preferably be thicker than the stretched elastic member or it should be made of a rubber of higher durometer hardness, or both. It is understood that the term "compression-resistant member" is intended to cover also substances of the sort which, after having once been initially compressed by the initial tension of the stretched elastic member, will not subsequently tend to shorten to any material extent, and will not, moreover, tend to buckle.

The invention described above is partially disclosed in my U. S. patent applications Serial No. 199,317, filed December 5, 1950, Serial No. 217,341, filed March 24, 1951, and Serial No. 247,910, filed September 24, 1951.

What I claim is:

1. In a collar consisting of one or more fabric plies, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible permanently compression-resistant element located in the neighborhood of said collar point in substantially fixed relation to said collar point; and an elastic strip-shaped element incorporated in said collar in permanently stretched tension-creating condition and secured in such condition to said flexible permanently compression-resistant element in the neighborhood of said collar point extending at least approximately toward the same and located between said flexible permanently compression-resistant element and the inner collar face.

2. In a collar consisting of one or more fabric plies, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible permanently compression-resistant element located in the neighborhood of said collar point in substantially fixed relation to said collar point; and an elastic strip-shaped element incorporated in said collar along the long external edge thereof in permanently stretched tension-creating condition and secured in such condition to said flexible permanently compression-resistant element in the neighborhood of said collar point extending toward the same and located between said flexible permanently compression-resistant element and the inner collar face.

3. In a collar consisting of one or more fabric plies, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible compression-resistant element located in the neighborhood of each collar point in substantially fixed relation to said collar point; and two elastic strip-shaped elements symmetrically incorporated in said collar in permanently stretched tension-creating condition, each of said elastic strip-shaped elements being secured in such condition to the flexible permanently compression-resistant element in the neighborhood of the respective collar point extending at least approximately toward the same and located between said flexible permanently compression resistant element and the inner collar face.

4. In a collar consisting of one or more fabric plies, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible compression-resistant element located in the neighborhood of each collar point in substantially fixed relation to said collar point; and two elastic strip-shaped elements symmetrically incorporated in permanently stretched tension-creating condition in said collar along the front edges thereof, respectively, each of said elastic strip-shaped elements being secured in such condition to the flexible permanently compression-resistant element in the neighborhood of the respective collar point extending toward the same and located between said flexible permanently compression-resistant element and the inner collar face.

5. In a collar consisting of one or more fabric plies, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible compression-resistant element located in the neighborhood of each collar point in substantially fixed relation to said collar point; and two elastomer strips symmetrically incorporated in said collar in permanently stretched tension-creating condition, each of said elastomer strips being secured in such condition to the flexible permanently compression-resistant element in the neighborhood of the respective collar point extending at least approximately toward the same and located between said flexible permanently compression-resistant element and the inner collar face.

6. In a collar consisting of several collar plies sewn to each other along the edges of the collar so as to form along said edges inwardly turned stiffening seam portions, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible permanently compression-resistant strip-shaped element incorporated in said collar along the front edge thereof and between the stiffening seam portion along said front edge and the inner collar ply in substantially fixed relation to said collar point; and an elastic strip-shaped element incorporated in permanently stretched tension-creating condition in said collar along said front edge thereof and secured in such condition to said permanently compression-resistant strip-shaped element located between the same and the inner collar ply.

7. In a collar including an outer collar ply, an inner collar ply and an interposed lining ply, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible permanently compression-resistant element incorporated in said collar located in the neighborhood of said collar point between said lining ply and said inner ply of said collar in substantially fixed relation to said collar point; and an elastic strip-shaped element incorporated in said collar in permanently stretched tension-creating condition and secured in such condition to said flexible permanently compression-resistant element in the neighborhood of said collar point extending at least approximately toward the same and located between said compression-resistant element and the inner collar ply.

8. In a collar including an outer and an inner collar ply, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means comprising a flexible permanently compression-resistant element incorporated in said collar located between said collar plies in the neighborhood of said collar point in substantially fixed relation to said collar point; and an elastic strip-shaped element incorporated in said collar in permanently stretched tension-creating condition and secured in such condition to said flexible permanently compression-resistant element in the neighborhood of said collar point extending at least approximate-

ly toward the same and located between said compression-resistant element and the inner collar ply.

9. In a collar consisting of several collar plies sewn to each other along the edges of the collar so as to form along said edges inwardly turned stiffening seam portions, means for opposing the tendency of a collar point to curl away from the body of the wearer, said means being incorporated in said collar and including an elastic strip-shaped element secured in permanently stretched tension-creating condition to an inwardly turned stiffening seam portion in the neighborhood of said collar point extending toward the same and located between said inwardly turned seam portion and the inner collar ply.

10. In a collar having two collar points and consisting of several fabric plies, in combination, means forming a pair of elongated narrow pockets extending along the front edges of said collar between said fabric plies; and means for opposing the curling tendency of a collar point located in each of said elongated narrow pockets, each of said means composed of a flexible permanently compression-resistant strip-shaped element and of an elastic strip-shaped element secured in permanently stretched tension-creating condition to said flexible permanently compression-resistant element, and arranged in said pocket extending in direction of the same and with said flexible compression-resistant strip-shaped element facing the outer collar face and said elastic strip-shaped element facing the inner collar face.

11. In a collar having two collar points and consisting of several fabric plies, in combination, a pair of spaced parallel seams extending along each of the front edges of said collar and forming a pair of elongated narrow pockets extending along said front edges of said collar between said fabric plies; and means for opposing the curling tendency of a collar point located in each of said elongated narrow pockets, each of said means composed of a flexible permanently compression-resistant strip-shaped element and of an elastic strip-shaped element secured in permanently stretched tension-creating condition to said flexible permanently compression-resistant element, and arranged in said pocket extending in direction of the same and with said flexible compression-resistant strip-shaped element facing the outer collar face and said elastic strip-shaped element facing the inner collar face.

12. In a collar having two collar points and consisting of several fabric plies, in combination, means forming a pair of elongated narrow pockets located in the neighborhood of each collar point extending toward the same; and means for opposing the curling tendency of a collar point located in each of said elongated narrow pockets, each of said means composed of a flexible permanently compression-resistant shaped element and of an elastic strip-shaped element secured in permanently stretched tension-creating condition to said flexible permanently compression-resistant element, and arranged in said pocket extending in direction of the same and with said flexible compression-resistant strip-shaped element facing the outer collar face and said elastic strip-shaped element facing the inner collar face.

13. In a collar having two collar points and consisting of several fabric plies, in combination, means forming a pair of elongated narrow pockets located in the neighborhood of each collar point extending toward the same; and means for opposing the curling tendency of a collar point located in each of said elongated narrow pockets, each of said means composed of a flexible stiffened permanently compression-resistant fabric strip and an elastomer strip secured in permanently stretched tension-creating condition to said flexible stiffened permanently compression-resistant element, and arranged in said pocket extending in direction of the same and with said flexible stiffened compression-resistant fabric strip facing the outer collar face and said elastomer strip facing the inner collar face.

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