June 7, 1938. N. W. MATHEY 2,120,107

FOOTWEAR

Filed June 2, 1937

Fig. 1

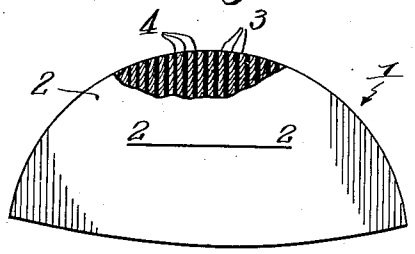


Fig. 2

Fig. 3

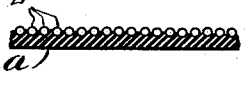


Fig. 4

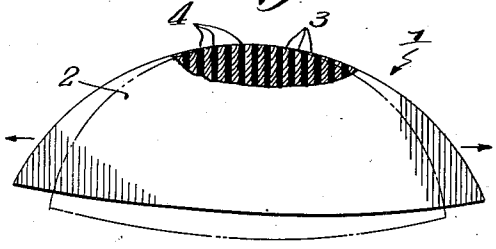


Fig. 7

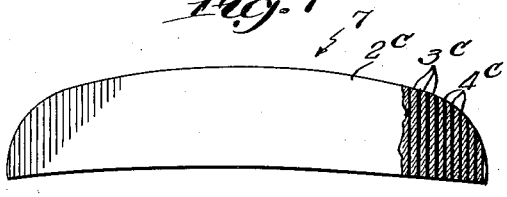


Fig. 10

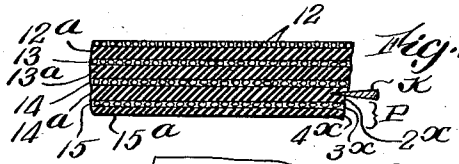
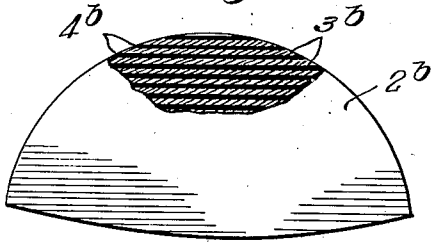


Fig. 5



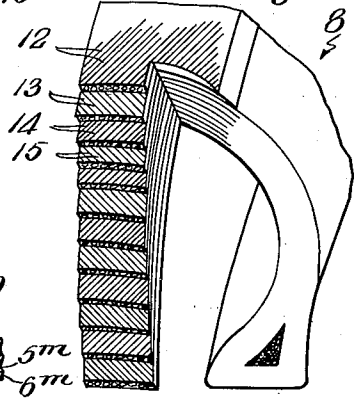


Fig. 9

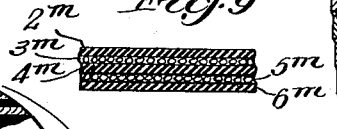


Fig. 6

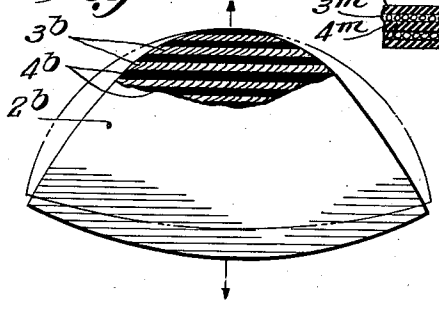


Fig. 8

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2,120,107

FOOTWEAR

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Application June 2, 1937, Serial No. 145,954

9 Claims. (Cl. 12—146)

This invention pertains to footwear, and more especially to a stiffener for use in the manufacture of boots and shoes, and to a method of making such a stiffener, and is herein illustrated in its application to a stiffener for the toe or heel portion of a shoe upper, although not limited to this particular use.

Various materials have heretofore been proposed from which to make toe and heel stiffeners, among them fibrous sheet material impregnated with a thermoplastic binder or sheet material of or including a cellulosic derivative, for example cellulose acetate, etc., but while such materials are extensively used, they are not altogether satisfactory either from the standpoint of the maker or the user of the shoe. For instance, thermoplastic materials require the use of heat to make them sufficiently flexible for lasting; they tend to soften when exposed for example to solar heat in the shop window or by too close contact with heating apparatus, for example steam radiators during wear, and thus sag and become permanently deformed; and they are usually too stiff and heavy for use in the so-called plain-toe shoes (that is, those having no toe cap). On the other hand, stiffeners comprising cellulosic derivatives must be softened prior to lasting by the use of an appropriate solvent, for example acetone, usually of highly inflammable character,—and, after incorporation in the shoe, are so stiff and brittle as to crush and break when subjected to abnormal pressure.

Among the objects of the present invention is to provide a stiffener which is not brittle nor subject to sagging or deformation by exposure to heat; which may be thin and light in weight and thus appropriate for use in high-grade shoes; whose use ensures the preservation of the smooth lines of the last without bulging of the upper and which are thus applicable to plain-toe shoes; and which will yield, when pressed, but which return automatically to shape when pressure is released.

Most of the materials heretofore employed for stiffening shoe uppers require to be softened prior to lasting, as above described, in order that they may be conformed to the wood of the last, or else are so expensive as to be of limited utility. A further object of the invention is to provide a stiffener of permanently resilient, yieldable character which does not require softening treatment prior to lasting in order that it may be conformed to the last; which provides the desired degree of resilient stiffness in the completed shoe; and which at the same time is so cheap as to make it readily available to manufacturers of even the lower grades of shoe.

As the result of much experiment with the latter object in particular in view, it has been discovered that stiffener material possessing all of the above desirable characteristics may be made from old automobile tires, blow-out patches, etc., which, as is well known, consist of a plurality of superposed plies each comprising a layer of substantially parallel, independent, unwoven cords embedded in a layer or layers of vulcanized rubber. Old tires are available in almost unlimited quantities and form a very cheap source of material. In preparing the stiffener in accordance with the present invention, such a tire may be separated into plies of suitable thickness, each such ply comprising one or more layers of cords and one or more layers of rubber, as desired, in accordance with the intended use of the stiffener and the mode employed in separating the plies.

Other objects and advantages of the invention and a specific mode of carrying it into effect will be pointed out in the following more detailed description and by reference to the accompanying drawing, wherein—

Fig. 1 is a plan view of a toe stiffener blank embodying the present invention, a part of the rubber layer being broken away to show the interior construction;

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

Fig. 3 is a section similar to Fig. 2, but illustrating a slight modification;

Fig. 4 is a view similar to Fig. 1, but illustrating the elastically stretchable character of the material;

Fig. 5 is a view similar to Fig. 1, showing a toe stiffener blank so prepared that its constituent cords extend transversely of the blank;

Fig. 6 is a view similar to Fig. 5, showing the effects of stretching the blank of Fig. 5;

Fig. 7 is a plan view, to small scale, showing a heel stiffener embodying the present invention;

Fig. 8 is a fragmentary perspective view, partly in section, showing a tire adapted to constitute a source of material from which the improved stiffener may be made;

Fig. 9 is a view similar to Fig. 2, showing a further modification; and

Fig. 10 is a diagrammatic view illustrating a method of separating the tire fabric into plies.

Referring to the drawing, the numeral 1 designates a toe stiffener blank embodying the present invention and useful in stiffening the toe or tip portion of the upper of a shoe or other article

of footwear. This improved stiffener blank comprises a layer of substantially parallel cords 3 interposed between and embedded in layers 2 and 4 of vulcanized rubber or material having similar characteristics,—in particular resiliency and ability to withstand the effects of moisture and heat. As illustrated in Fig. 1, the cords 3 are normally disposed quite close together and extend substantially parallel to the front-to-rear axis of the stiffener blank, so that in the lasted shoe these cords will run from front to rear. These cords will usually be twisted cords of cotton, each cord consisting of a plurality of spun yarns twisted together. Such a blank as that shown in Fig. 1 is capable of stretching substantially in a transverse direction (as illustrated in Fig. 4) the cords 3 separating more or less as the elastic rubber layers in which they are embedded yield to the stretching force, but when this force is released the blank tends to resume its normal dimensions.

When such a blank is used as a stiffener in a shoe, it may be introduced as usual between the lining and the outer elements of the shoe upper prior to lasting, but it requires no preliminary treatment, before lasting, to soften it or make it flexible, such as is commonly required in the use of stiffeners of more usual types. During the lasting operation the stiffener is conformed to the shape of the toe portion of the last, and after lasting, and after the last has been drawn from the shoe, this shaped stiffener blank, by reason of its inherent resiliency, adequately supports the tip portion of the shoe upper in its lasted form. If during the wear of the shoe the toe portion be crushed inwardly, the resilient character of the stiffener immediately causes the upper to spring out again, and since the material of this stiffener is not readily affected by moisture or such heat as a shoe is ordinarily subjected to, it retains the upper material of the shoe in proper shape and condition throughout the life of the shoe.

While, as illustrated in Figs. 1 and 2, the flexible material, of which the stiffener blank is made, comprises a single layer 3 of the parallel woven cords, with a layer of rubber at each side, it is contemplated that, as illustrated in Fig. 3, the blank may comprise but a single layer of rubber. Thus as shown in this figure the material from which the blank is cut consists of one layer of parallel cords 2^a, and a single layer 4^a of rubber, in which the layer of cords is embedded. It is to be noted that in the arrangement shown in Figs. 1, 2 and 3, the material of the blank is freely extensible or stretchable in a direction perpendicular to the axes of the cords 2, but is substantially inextensible in a direction parallel to the cords.

In Figs. 5 and 6 a stiffener blank is shown comprising the rubber layers 2^b and 4^b and the interposed layer of cords 3^b, but in this instance the cords 3^b, which are parallel to each other and unwoven, as in the previously described material, extend transversely of the front-to-rear axis of the stiffener blank. This blank can be extended or stretched in a front-to-rear direction, as indicated in Fig. 6, the cords 3^b then being spaced more widely apart than in the normal arrangement, but when the stretching force is released the blank resumes its normal dimensions. Under some conditions it may be preferable to employ a blank having the cords disposed as in Figs. 5 and 6, rather than as shown in Figs. 1 and 4.

In Fig. 7 a heel stiffener blank or counter member 7 is illustrated, such blank comprising the rubber layers 2^c and 4^c with the interposed layer of parallel cords 3^c. As shown, the cords 3^c extend parallel to the shorter dimension of the blank, but it is contemplated that they may run parallel to the longer dimension of the blank or in any other way, if preferred.

As a matter of fact, many of the advantages of the invention are to be obtained regardless of the direction in which the cords extend in the blank, and as illustrated, for example, in Fig. 9, it may under some circumstances be desirable to use a blank embodying more than one layer of cords in which event the blank may be substantially inextensible in any direction. Thus, as shown in Fig. 9, the material or ply from which a blank is made comprises a layer 2^m of rubber, a layer 3^m of parallel cords extending in a given direction, a layer 4^m of rubber, a second layer 5^m of parallel cords (the cords of the latter layer running substantially perpendicular to the cords of the layer 3^m) and a third layer 6^m of rubber.

The material used in making the stiffener blanks above described is conveniently obtained from old automobile tires or blow-out patches. A portion of such a tire is indicated diagrammatically at 8 in Fig. 8. Such tires are commonly built up of superposed layers of rubber and parallel cords, the arrangement being such, for example, as is indicated in Fig. 8, wherein the cords 12 of one layer extend in a given direction, the cords 13 of the next cord layer extend substantially perpendicular to those of the first layer; the cords 14 of the next successive cord layer extend parallel to those of the layer 12; then the cords 15 of the next cord layer extend parallel to those of the layer 13, etc., it being understood that the layers of cords are embedded in interposed layers of vulcanized rubber.

At this point it may be mentioned that while vulcanized rubber and textile cords are the common material now used in tires for imparting the desired resiliency and wearing qualities to automobile tires, it is contemplated that the present invention is broadly inclusive of any materials having these general characteristics and such as may now or hereafter be employed in the manufacture of automobile tires or the like, and that when in the appended claims, reference is made to "rubber" and "cords", these terms are to be considered as broadly inclusive of equivalents.

In making the stiffener blanks above described, such an automobile tire may be cut into sections, and a suitable piece of this material may then be properly held in a splitting machine and divided into a plurality of plies, each suitable as a material or fabric from which to cut the stiffener blanks. Thus, as illustrated in Fig. 10, a block of the tire material comprising layers 12, 13, 14 and 15, of cords, with interposed layers 12^a, 13^a, 14^a, 15^a, etc. of rubber, is arranged in a splitting machine (having a knife K,—for example an endless band knife or cutter which may, if desired, be lubricated by a stream of water) and the knife and the material are then so relatively moved as to cause the knife to split preferably one of the rubber layers, for example, the layer 14^a, so as to separate from the block of tire fabric a ply P comprising the rubber layers 2^x and 4^x and the interposed layer 3^x of parallel cords. The ply thus produced would be like the material shown in Fig. 2, and this ply may then be cut into blanks such as the blank 1 in any suitable manner, for example, by the use of dies in a dinking machine.

Obviously, the splitting operation may be carried out so as to produce fabric plies like that of

Fig. 2, or like that of Figs. 3 or 9, respectively, or in any other suitable manner according to the use to which the ply material is to be put. Preferably the splitting should be so carried out as not substantially to injure the cord layer, so that the ply material may possess the maximum strength due to the presence of the textile fiber, it being noted that the textile material used in automobile tires is usually of a very high quality, the spun yarns consisting of long staple cotton.

While it has been suggested that material from used automobile tires constitutes a very cheap and abundant source of fabric suitable for use in making the improved stiffener blanks, it is to be understood that in its broader aspects the invention is not necessarily limited to material from such a source, but that material having the desired characteristics may obviously be obtained from any suitable source, or made especially for the purpose if preferred. It is further to be understood that the invention is broadly inclusive of all equivalents either of materials or their relative arrangement, and which fall within the scope of the appended claims.

I claim:

1. A shoe stiffener blank which is substantially inextensible in one direction but which is stretchable and permanently elastic in a direction substantially at right angles thereto, said blank comprising a normally stretchable elastic layer and substantially parallel relatively inextensible cords united to the elastic layer, said cords opposing stretch of the blank in one direction but freely separating from each other when the blank is subjected to stretching stress in a direction transverse of the cords.

2. A shoe stiffener comprising a permanently elastic layer and a layer consisting of substantially parallel, unwoven, normally closely adjacent, flexible strands adherent to the elastic layer.

3. A shoe stiffener comprising a layer of substantially parallel, normally closely adjacent but separable cords, and a pair of layers of vulcanized and elastic rubber between which said layer of cords is interposed.

4. A shoe stiffener blank comprising a layer of substantially parallel, normally closely adjacent but independent and separable twisted cords of textile fiber, and elastic material in which said cords are embedded and by means of which the cords are held in assembled relation.

5. A shoe stiffener blank comprising a layer of substantially parallel, independent unwoven cords disposed in substantially the same plane, and a layer of moisture-resistant elastic material having the general characteristics of vulcanized rubber in which said cords are at least partially embedded.

6. A permanently resilient shoe stiffener blank comprising vulcanized rubber and layers of substantially parallel cords embedded in the rubber, the parallel cords comprised in one layer extending in a different direction from the parallel cords comprised in the adjacent layer.

7. That method of stiffening a shoe upper which comprises separating an automobile tire into plies each comprising a layer of substantially parallel unwoven and independent cords and at least one layer or normally elastic material in which said cords are partially embedded, cutting from such a ply a blank of the desired contour and dimensions, assembling said blank, without further treatment, with other parts of a shoe upper, and lasting the upper together with the assembled blank.

8. That method of stiffening a shoe upper which comprises separating an automobile tire into plies each comprising a layer of substantially parallel unwoven and independent cords and at least one layer of normally elastic material in which said cords are partially embedded, cutting from such a ply a blank of the desired contour and dimensions, so assembling the blank, without further treatment, with other parts of the shoe upper that the constituent cords of the blank lie substantially parallel to the longitudinal axis of the upper, and lasting the upper together with the assembled blank.

9. That method of stiffening a shoe upper which comprises separating an automobile tire into plies each comprising at least one layer of substantially parallel unwoven and independent cords, and layers of vulcanized rubber, one at each side of the cord layer, cutting from said ply a blank of the desired contour and dimensions, assembling such blank with other parts of the shoe upper, and, without further treatment of the stiffener blank, lasting the upper together with the assembled blank.

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