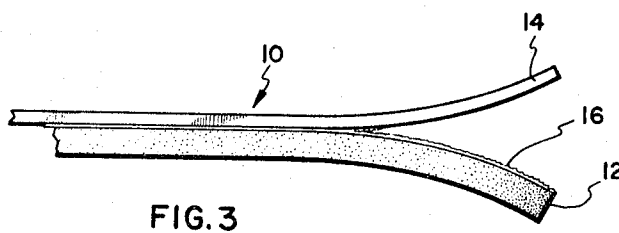
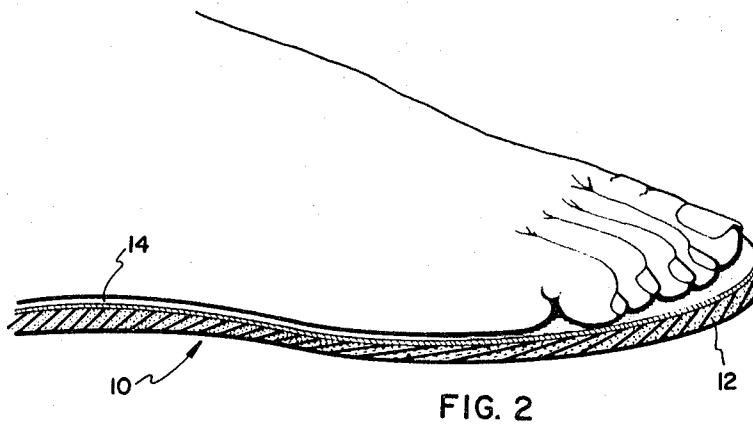
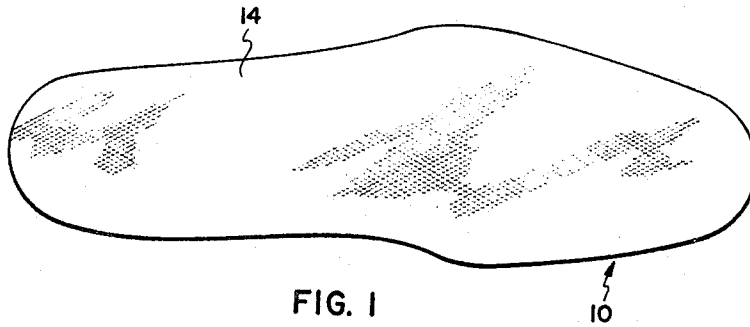


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PROTECTIVE INNER SOLE
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PROTECTIVE INNER SOLE

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7 Claims

ABSTRACT OF THE DISCLOSURE

An inner sole which includes an elastic closed cell foam base having a maximum compression set of less than 50 percent and a two-way linear elongation of $\frac{1}{16}$ to $\frac{1}{2}$ inch which has one face bonded with a rubbery adhesive to a two-way stretch fabric or fiber.

This invention relates to a protective pad, and in particular, to an inner sole used to prevent blisters and sores caused by friction.

It is well known that blisters and other similar sores, common to mammals, are formed when a portion of the mammal's body is subjected to friction which causes shearing between skin layers. Particularly in the case of athletes, such as basketball players and the like, who are required to rapidly change the direction of their movement, foot blisters are very common because of the excessive friction on the sole of the athlete's foot at the maximum force points which are commonly under the metatarsal head and under the great toe. Attempts have been made to overcome this problem through the use of pads and the like, commonly referred to as inner soles, placed in the athlete's shoes. While the pads provide a horizontal cushion they do not eliminate transverse or longitudinal friction on the sole of the foot which causes the blisters.

Accordingly, it is the principal object of this invention to provide a protective pad for mammals which prevents blisters and sores.

Another object of this invention is to provide an inner sole for shoes which increases the comfort of the shoes while preventing blisters and foot sores.

Still another object of this invention is to provide a protective pad for mammals that is simple in design, inexpensive to construct, and durable in its wear.

Still further objects of this invention will become apparent to those skilled in the art as the invention is better understood by reference to the detailed description appearing hereinafter.

Briefly, the invention comprises a protective pad having a closed cell foam base with a two-way stretch fabric bonded to at least one face of the base with a rubbery adhesive. To use the pad of this invention it is placed with its fabric side against the portion of the mammal's skin subjected to lateral shear caused by friction on the skin. Preferably, the foam base has a compression set of less than fifty percent, a linear elongation of one-eighth to one-half inch. In the most preferred embodiment of this invention, the protective pad is used as an inner sole which is shaped to fit within a shoe such as a conventional athletic shoe to prevent foot blisters and sores.

So that the invention may be more readily understood and carried into effect, reference is made to the accompanying drawings, which are offered by way of example only and are not to be taken as limiting the invention, the scope of which is defined by the appended claims, which obviously embrace equivalent structures and processes.

In the drawings:

FIG. 1 is a plan elevation view of an inner sole formed from the protective pad of this invention.

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FIG. 2 is a partial pictorial sectional view of protective pad illustrating the stretch of the pad as pressure is applied to it.

FIG. 3 is a partial side view of the pad of this invention with a portion of the two-way stretch fabric lifted away from the closed cell foam base showing the rubbery adhesive used to bond the fabric and the base together.

Referring now more particularly to the drawings, there is shown a protective pad 10 which comprises a closed cell foam base 12 having a two-way stretch fabric 14 bonded to at least one surface of the base with rubbery adhesive 16. The pad can be cut or otherwise shaped for application against any predetermined portion of the body of a mammal. For example, as shown in FIG. 1, it can be shaped for use as an inner sole to be placed within the shoes of an individual. The pad can also be shaped to form a toe pad for ballet shoes, a liner for hand gloves, or it can be positioned around the feet or lower legs of dogs, horses, and the like, which are subjected to friction which causes blisters and sores.

Base 12 is constructed from an elastic closed cell foam, i.e., a foam with individual cells which are out of communication from each other, such as neoprene, closed cell rubber, polyvinyl chloride, rubber latex, vinyl foam, or any other foamed rubber-like material having similar characteristics. In addition to being of a closed cell construction, base 12 preferably has a maximum compression set less than 50 percent and most preferably less than 25 percent. Compression set is a well-established term and is generally defined as the degree of inelasticity of the foam after it has been subjected to a compressive force. Stated in another fashion, compressive set is the extent to which the foam fails to regain its original shape after being subjected to a compressive force. The foam from which base 12 is constructed also has a two-way linear elongation of $\frac{1}{8}$ to $\frac{1}{2}$ inch. Such foams generally exhibit a rotational elongation when compressed of at least 30 degrees, and this is preferred. Linear elongation is defined as the linear lateral shifting of one face of the foam base with respect to the base's opposite face when a lateral force is applied to the one face, and rotational elongation is defined as the rotational movement of the one face of the foam base when a rotational force is applied thereto. Base 12 is preferably used in the form of a sheet having a substantially uniform thickness of about $\frac{3}{32}$ to $\frac{1}{2}$ inch and most preferably, about $\frac{1}{8}$ to $\frac{3}{8}$ inch.

As indicated, two-way stretch fabric 14 is bonded to at least one face of base 12. Said fabric provides a slick surface between the protective pad and the skin of the person using said pad. Any fabric and/or weave can be used having a coefficient of friction lower than that of foam base 12 which is capable of two-way yield or stretch, so that motion is imparted through the fabric to the foam base, and which recovers from deformation. The best example of a fabric of this type which does not impede base movement is stretch nylon, also known as elastic nylon. This form of nylon differs from ordinary nylon in that it has bulky side chains attached to its linear molecular backbone. Another suitable synthetic fiber is polyethylene terephthalate. As indicated, stretch weaves can also be used such as jersey, tricot, milanaise, and the like, which exhibit all-directional or two-way stretch qualities.

Fabric 14 is bonded to foam base 12 with a rubbery adhesive so that the elastic characteristics of the fabric or the foam are not destroyed when the fabric is bonded to base 12. The preferred bonding method is to vulcanize the fabric to the foam base. In addition, many rubbery adhesives are available such as raw rubber solution, gutta-percha, neoprene, and the like, for bonding the fabric to the base. The rigidity of the adhesive can be reduced by

adding small quantities of plasticizers or solvents to it such as copolymers of acrylic nitrile and butadiene, and the like.

In using the protective pad of this invention, the pad is cut to the shape most suited for application against that portion of the body which is to be protected. For example, when the pad is used to prevent blisters and foot sores, it is shaped in the form of an inner sole adapted to fit within a shoe. The pad is positioned so that a fabric covered side is against the body of the user. The fabric has particular utility when the pad is used as an inner sole in that it allows a foot to be easily slipped into a shoe containing the pad and also provides a comfortable surface for the foot to rest upon. A person using the protective pad of this invention in his shoes as inner soles can rapidly change his direction of travel without blisters forming on the soles of his feet since the interior portion of the protective pad moves with the foot rather than requiring the foot to slide over the pad as in the case of conventional inner soles.

Whereas there is here illustrated and specifically described a certain preferred construction which is presently regarded as the best mode of carrying out the invention, it should be understood that various changes may be made and other construction adopted without departing from the inventive subject matter particularly pointed out and claimed.

I claim:

1. An inner sole insert which comprises an elastic closed cell foam base $\frac{3}{32}$ to $\frac{1}{2}$ inch thick having a maximum compression set of less than 50 percent and a two-way linear elongation which allows one face of said base to shift laterally $\frac{1}{8}$ to $\frac{1}{2}$ inch with respect to the other face of said base when a lateral force is applied to said one face and a stretch fabric bonded to one face of said base with a rubbery adhesive.

2. The inner sole insert of claim 1 wherein said elastic closed cell foam base is neoprene.

3. The inner sole insert of claim 2 wherein said stretch fabric is elastic nylon.

4. The inner sole insert of claim 3 wherein said elastic nylon is vulcanized with said rubbery adhesive to said base.

5. In combination with a shoe for an individual's foot, an inner sole, supported on the top surface of the sole of said shoe, which comprises an elastic closed cell foam base $\frac{3}{32}$ to $\frac{1}{2}$ inch thick having a maximum compression set of less than 50 percent and a two-way linear elongation which allows the top face of said base to shift laterally $\frac{1}{8}$ to $\frac{1}{2}$ inch with respect to the base's bottom face in contact with the top surface of the sole of said shoe when a lateral force is applied to said top face of said base and a stretch fabric bonded to one face of said base with a rubbery adhesive.

6. The combination of claim 5 wherein said elastic closed cell foam base is neoprene.

7. The combination of claim 6 wherein said stretch fabric is elastic nylon.

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