

[54] KNEE BRACE

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[51] Int. Cl. **A61f 3/00**

[58] Field of Search 128/80 C, 85, 87, 88, DIG. 14; 2/22; 287/12, 14; 85/50 R, 32 R

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Primary Examiner—Richard A. Gaudet

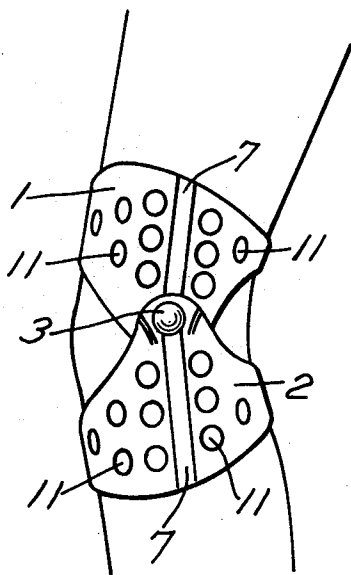
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[57] **ABSTRACT**

A knee brace having perforated upper and lower members coated with a soft plastic material and adapted to take the form of and to be secured to the leg of a user above and below the knee. A semi-ball joint attaches the upper and lower members and provides free pivotal rotation while restricting lateral rotation. Reinforcing ribs are formed on the upper and lower members to provide rigidity along a line parallel to the leg.

2 Claims, 4 Drawing Figures



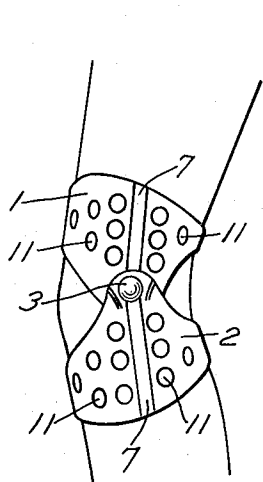


FIG. 1

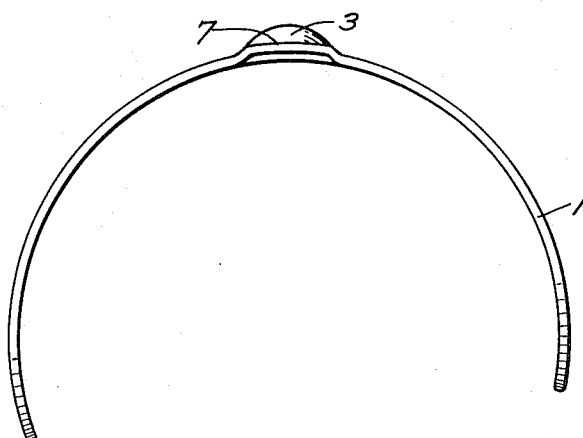


FIG. 2

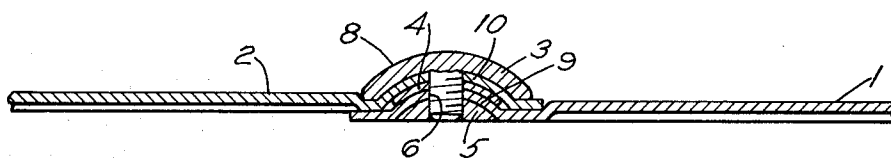


FIG. 4

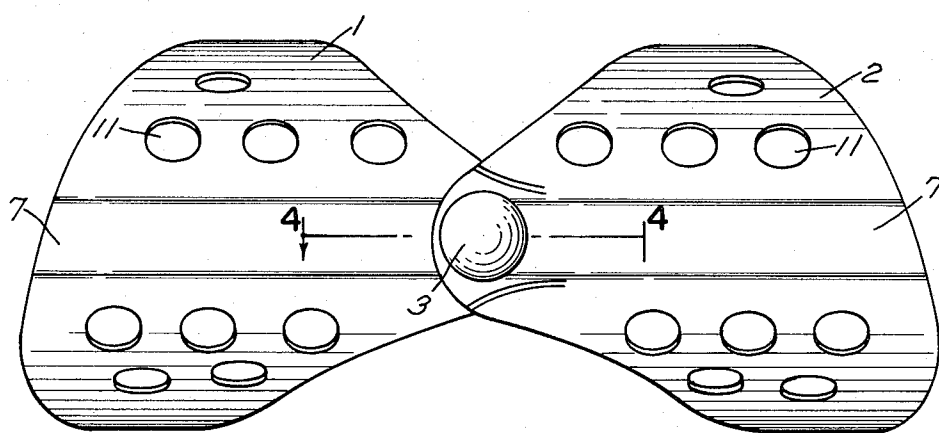


FIG. 3

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KNEE BRACE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to protective devices and more particularly to a knee brace for preventing injury to a knee and for aiding in the healing of an injured knee.

2. Description of a Prior Art

Heretofore knee braces for protecting a knee from injury have been extremely bulky and had a tendency to interfere with the natural movement of the knee. The braces of the prior art have been excessively heavy and have suffered from an inability to remain in their proper position adjacent the knee of a user. The knee braces of the prior art had a tendency to slip out of place and severely interfere with the proper and natural action of the knee. The prior art knee braces also had a tendency to chafe the skin and cause bruises.

SUMMARY OF THE INVENTION

The present invention contemplates a knee brace having an upper and lower member formed of a semi-soft material such as aluminum. The portions are coated with a soft plastic material that prevents chafing and bruising of the skin. The upper and lower members have perforations formed therein which serve a dual function. Firstly, the perforations add to the malleability of the soft aluminum so that the upper and lower portions may be shaped to fit the contour of the leg. Secondly, the perforations assist in stabilizing the knee brace when it is secured to a leg. Each perforation provides a pocket through which a small portion of the skin and flesh protrude to prevent movement of the knee brace over the skin. A reinforcing rib is formed on each member and extends in a direction parallel to the leg to add rigidity to the brace and to protect against lateral blows.

A uniquely structured semi-ball joint allows free and unrestricted pivotal rotation but severely limits lateral rotation thereby protecting the knee from lateral blows while allowing the knee to bend naturally.

The knee brace wraps around the leg below the knee cap where the brace forms a slight radius to protect the knee cap.

Thus, the present invention provides a lightweight knee brace that allows free mobility in the normal rotational direction of the knee while providing for a very slight amount of lateral rotation so that an athlete is assured full use and mobility of his knee. The knee brace may be shaped to fit any leg and the perforations assure that the brace remains in a position on the leg without slipping. The soft plastic coating eliminates the chafing and bruises associated with devices of the prior art.

One objective of the present invention is to provide a knee brace that gives the athlete full use of the natural knee mobility.

Another objective of the present invention is to provide a lightweight knee brace that is sufficiently strong to protect against lateral blows.

Another objective of the present invention is to provide a knee brace that does not slip and move out of place once it is secured to the leg of a user.

Another objective of the present invention is to provide a knee brace that provides some degree of protection to the knee cap.

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The foregoing and other objectives and advantages of the invention will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawings wherein one embodiment of the invention is illustrated by way of example. It is to be expressly understood, however, that the drawings are for illustrative purposes only and are not to be considered as defining the limits of the invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 shows the knee brace of the present invention positioned on the leg of an athlete.

FIG. 2 is an end view of the knee brace of the present invention.

FIG. 3 is a plan view of the knee brace of the present invention.

FIG. 4 is a partial sectional view taken along line 4-4 of FIG. 3.

DESCRIPTION OF THE INVENTION

Referring to FIG. 1 there is shown the knee brace of the present invention having an upper member 1 and a lower member 2 connected by a semi-ball joint 3. Member 1 is adapted to be secured to a position on the leg of an athlete above the knee and member 2 to a position on the leg below the knee. The upper and lower portions are formed of malleable aluminum, having a thickness of 0.050 to 0.063 of an inch, such as No. 50-52 aluminum. Perforations 11 are formed in both the upper and lower members to increase the malleability of the aluminum and to anchor the knee brace on the leg in a manner which will be described subsequently. Because of the malleability of the aluminum, which is enhanced by the perforations, the members of the knee brace may be shaped to perfectly fit the contour of the leg of a user.

The knee brace is coated with a soft foam like plastic material to cushion the knee brace and protect the leg from becoming chaffed and bruised.

Upper and lower members 1 and 2 each have formed thereon a reinforcing rib 7 extending in a direction parallel to the portion of the leg of the user to which it is secured. The reinforcing ribs increase the strength of the knee brace so that it can withstand severe lateral blows to which it will be subjected.

Members 1 and 2 of the knee brace are connected by semi-ball joint 3 which is most clearly shown in FIG. 4. Semi-ball joint 3 comprises a semi-spherical member 8 having semi-spherical outer and inner surfaces and a threaded stud 6 extending from the center of the inner semi-spherical surface. Upper and lower members 1 and 2 have semi-spherical shaped portions 9 and 10 respectively which are overlapped and separated by a semi-spherical self lubricating washer 4 such as Nylon. Washer 4 and portions 9 and 10 have a hole formed therein for receiving stud 6 and a self lubricating member 5 is threaded onto stud 6 to hold washer 4 and portions 9 and 10 in place to form the semi-ball joint. Washer 4 provides a smooth bearing surface between semi-spherical portions 9 and 10 to facilitate ease of pivotal rotation. Likewise member 5 is formed of a self lubricating material to provide a low friction bearing surface between member 5 and semi-spherical portion 9. It is to be understood that the invention is not limited to the use of threaded stud 6 and threaded member 5.

Other locking methods could be used such as a split washer.

The use of self lubricating members such as Nylon provides for a highly efficient pivot point that allows free pivotal rotation about the axis of stud 6 and does not obstruct the natural mobility of the athlete's knee. The semi-ball joint also provides for a slight amount of lateral rotation that approximates the natural lateral rotation of the knee. It is to be understood that this lateral rotation is severely limited so that the brace does provide protection against severe lateral blows.

In use the brace is strapped onto the outer portion of the leg of an athlete in any convenient manner. Conventional adhesive tape may be used or in lieu thereof straps provided with Velcro fasteners may be used. When the brace is secured to the leg of the user the skin and flesh of the leg protrude slightly into perforations 11 and tend to anchor the knee brace in place to prevent slippage. It is to be noted that when the knee brace is in position on the leg of a user the front portion of lower member 2 extends beneath the knee cap and provides a limited amount of protection for the knee cap. Frontal blows will tend to glance off of this portion rather than being absorbed by the knee cap.

Thus, the present invention provides a knee brace that is extremely compact and light in weight and allows for the full natural mobility of an athlete's knee while at the same time providing protection against severe lateral blows. The knee brace is coated with a soft plastic material to prevent chafing and bruising of the athlete's leg. The knee brace is prevented from slipping by the unique use of perforations that anchor the knee brace in place. The perforations also add to the malleability of the knee brace so that it may be shaped to properly fit the leg of the athlete.

What is claimed is:

1. A knee brace comprising upper and lower members adapted to snugly fit on a side of a person's leg above and below the knee, respectively, each of said members having laterally extending portions at opposite sides thereof, said members and their laterally extending portions being curved so as to generally define a semicircle in cross section, whereby when said brace is worn, said lateral portions extend across the front and rear of the wearer's leg above and below the knee, said members being constructed of a malleable metallic material so as to be readily deformable to be shaped to the leg of the wearer, a soft plastic coating covering said metallic material, a plurality of perforations in each of said members of sufficient size to permit the wearer's skin to protrude therethrough and at the same time to enhance the deformability of said members, and means pivotally interconnecting said members to each other, said pivotal means comprising semispherical-shaped overlapping portions on said upper and lower members, a semi-spherical washer formed of a self-lubricating material positioned between said overlapping portions, said overlapping portions and said washer having aligned, centrally located openings, a semi-spherical member overlying the outermost semispherical portion and having a centrally positioned threaded stud extending inwardly through said openings, and a threaded semi-spherical inner member formed of self-lubricating material threadedly engaging said stud to maintain said overlapping portions and said washer in assembled relation.

2. The knee brace of claim 1 further characterized in that each of said members has an imperforate ribbed portion extending from top to bottom thereof at substantially the central portion of said members.

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