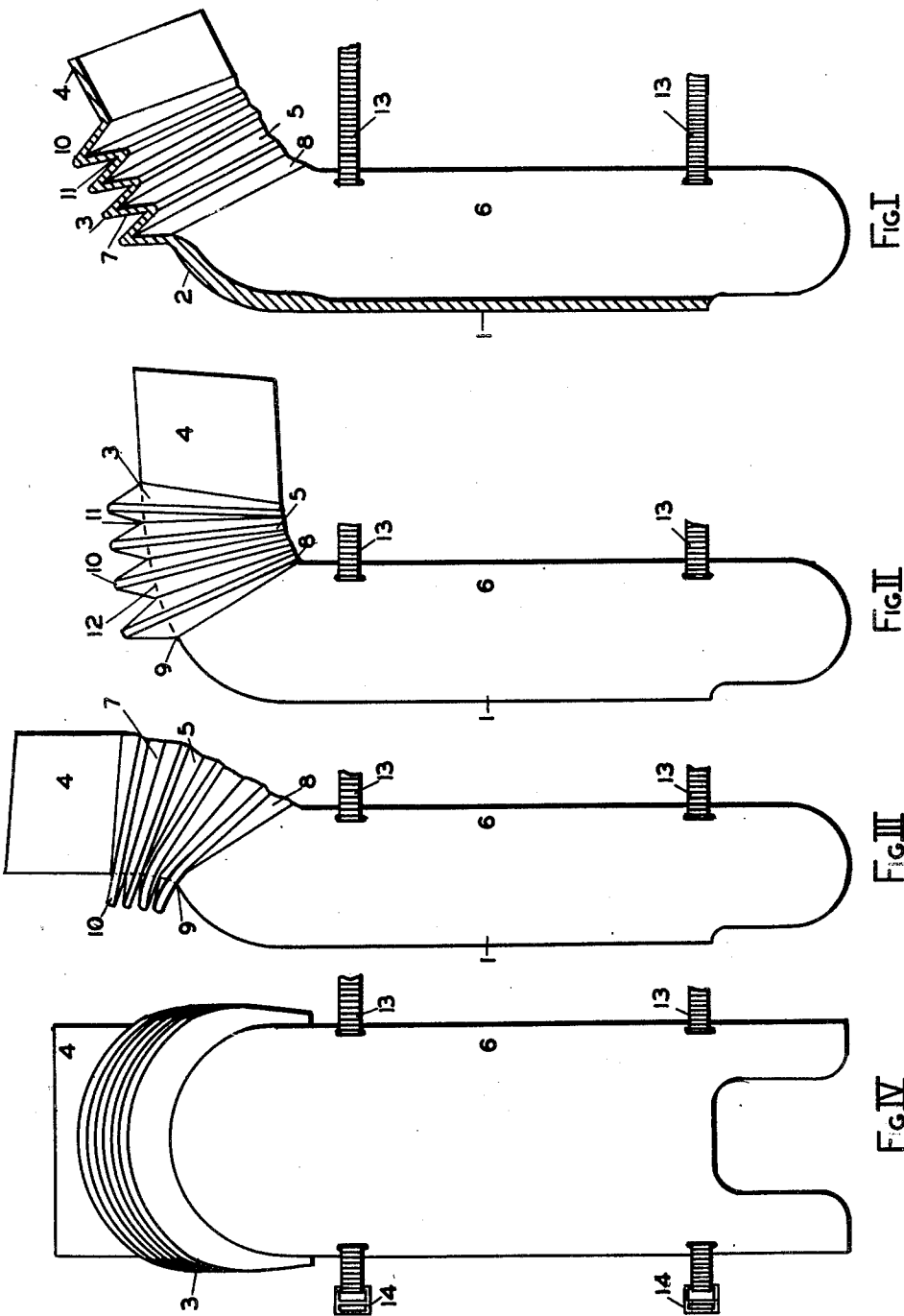


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LIMB PROTECTOR OR GUARD
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LIMB PROTECTOR OR GUARD

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This invention relates to leg or arm protectors and particularly the type which cover the knee or elbow joints.

The normal protectors of this type, as applied for instance to miners' leg guards, comprise a strip of material adapted to be strapped onto the leg and shaped to conform to the shape of the shin and knee, or alternatively with the portion covering the knee extended to provide a protective covering for the lower portion of the thigh. In the former case the upper portion of the protector moves away from the corresponding portion of the leg when the latter is bent, thus allowing for the ingress of stones or other material between the leg and the protector. In the latter case the protector causes discomfort and loss of freedom of movement due to the fact that it cannot conform to the surface of the leg in both the straight and bent positions. The action of the arm protectors is similar and has corresponding disadvantages.

The object of this invention is to provide a limb protector which will completely cover the corresponding portions of the limb in all normal positions of the latter without causing loss of freedom of movement to the wearer.

According to this invention the protector comprises a pair of guards adapted to be attached respectively to the upper and lower portions of the limb and connected by a resiliently extensible member adapted to cover the portion of the limb between the pair of guards.

A preferred embodiment of the invention is, as applied to miners' leg protectors, illustrated in the accompanying drawings in which

Fig. I is a sectional side elevation of the protector in the normal unextended position,

Figs. II and III are side elevations of the protector in different positions, and

Fig. IV is a front elevation of the protector in the position shown in Fig. I.

As shown in the drawings, there is provided a shin guard 1 having an upper concave extension 2 conforming to the shape of the knee cap. This latter portion is normally subjected to the greatest amount of abrasion and wear and may accordingly be suitably thickened, and if desirable provided with a relatively soft inner lining so as to minimise any discomfort to the wearer.

The concave extension or knee guard 2 is connected by a resiliently extensible member 3 to an arcuately shaped sheet forming a guard 4 for the lower portion of the thigh.

In the preferred form of the invention the resiliently extensible member 3 is in the form

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of an arcuately shaped sheet 5 corrugated transversely to the length of the leg protector 6 in the form of accordion pleats 7 or otherwise puckered so that it may be extended or compressed by an accordion-like action. The depth of the pleats 7 increases from the sides 8 of the protector 6 towards the front or centre 9 where the maximum extension occurs, and thus prevents unnecessary bunching of the extensible sheet at the sides 8. The pleats 7 are preferably made so that they have a saw tooth shape in section. The extensible member 3 is preferably shaped so that it is in its unstressed position midway between the normal terminal positions of the thigh guard 4 relative to the knee guard 2. In this position, as shown in Fig. I and Fig. IV, the pleats 7 on the extensible member 3 are neither compressed nor extended and the peaks 10 and valleys 11 of adjacent pleats 7 are spaced apart throughout the full length of the same.

When the thigh guard 4 is moved to a position approximately at right angles to the shin guard 1 as shown in Fig. II, the pleats 7 are extended at the front 9 and compressed at the sides 8. This will be the normal position of the protector 6 when the leg is bent at right angles. The pleats 7 at the sides 8 should be sufficient in number and/or depth and sufficiently spaced apart to ensure that they do not close to such an extent as to cause the sides of the member 3 to bulge inwardly or outwardly to any substantial extent in this position.

When the thigh guard 4 is moved to a position where it is at a slight angle to the shin guard 1, the pleats at the front 9 are compressed and extended at the sides 8 as shown in Fig. III. This will be the normal position of the protector 6 when the leg to which it is attached is straight.

It will be noted that the valleys 11 of the pleats 7 do not extend below the curve (indicated by dotted line 12) joining the adjacent ends of the guards 1, 4. This is desirable to ensure that the pleats 7 do not pinch the limb when the former are compressed. The shin and thigh guards, 1, 4, are provided with suitable straps 13 and clips or buckles 14, to attach them to the leg. Alternatively, due to the fact that member 3 as illustrated does not pull on the guards 1, 4, to any large extent, the latter may be made resilient and merely clipped or sprung into position around the leg.

The protector 6 is preferably made of rubber, plastic or similar mouldable material and may be moulded in a single piece. Alternatively, the shin and knee guards 1, 2, may be moulded in

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one section and the extensible connecting member 3 and thigh guard 4 in another section. In the latter case the extensible member 3 has a plain arcuate extension adapted to fit over the knee guard 2 and be detachably secured thereto. This will allow for replacement of the upper portion of the protector 6 in case of wear.

In use the extensible connecting member 3 will extend to take up any bending of the leg without causing any substantial loss of freedom of movement, while at the same time the fore part of the protector 6 is sealed in all positions thus preventing the ingress of stones or other material. Said connecting member 3 may be sufficiently extensible to allow for the movement of the knee guard 2 away from the leg when the latter is bent or alternatively its amount of extension may be limited so that it will pull the knee guard 2 in towards the knee cap when the leg is bent beyond a certain degree. The normal flexure of the rubber forming the shin guard 1 will allow for this movement, but in this case it is advisable that the protector 6 be attached to the limb by straps.

The invention has been described as applied to miners' leg protectors, but it will be understood that it is also applicable to other forms of leg protectors, for instance those used in sports such as cricket and hockey. It may also be advantageously applied to arm protectors and where necessary it may be duplicated and suitably shaped to enclose the front and rear of the limb and not merely the front part as illustrated.

What I claim as new and desire to secure by Letters Patent is:

1. A limb protector comprising separate and arcuately shaped guards for the upper and lower parts of a limb, an arcuately shaped resiliently extensible member connecting said guards together and transverse corrugations formed in said extensible member having a depth increasing from the sides of said member to the centre thereof.

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2. A limb protector as claimed in claim 1 in which the valleys of the corrugations in the extensible member do not project below the adjoining inner surfaces of the guards.

3. A limb protector comprising separate and arcuately shaped guards for the upper and lower parts of a limb, an arcuately shaped resiliently extensible member connecting said guards together and transverse accordion pleated corrugations having a saw tooth shape in section formed in said extensible member, said corrugations having a depth increasing from the side of said member to the centre thereof and extended or compressed by an accordion-like action.

4. A limb protector as claimed in claim 3 in which the extensible member is made of resilient material and shaped to be in the unstressed position midway between the normal terminal positions of the upper limb guard relative to the lower limb guard.

5. A limb protector comprising separate arcuate guards for the upper and lower parts of a limb and a resiliently extensible member of arcuate shape connecting said guards together; said upper limb guard, lower limb guard and extensible member moulded in one piece from mouldable material and transverse corrugations formed in said extensible member having a depth increasing from the sides of said member to the centre thereof.

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