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(54) **Protector and article of sportswear using the same.**

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EP-A- 0 083 454 DE-A- 2 809 009
FR-A- 2 366 809 GB-A- 2 177 892
US-A- 3 208 080 US-A- 3 574 861
US-A- 4 525 875

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Description

The present invention relates to a protector and an article of sportswear using the same and more particularly but not exclusively relates to a protecting pad which is adapted to be mounted to an article of sportswear and an article of sportswear having such a protecting pad attached thereto.

Usually, protectors are put on bodies of athletes in various hard sports, such as skiing, baseball and motorcycling, for effectively protecting them from unexpected impact. Conventional protectors include, for example, a one-piece synthetic resin protector, a protector pad, inserted in pants cloth, such as a knee pad of ski pants, an inner protector, such as used by baseball umpires, and a shinguard used by a catcher.

However, conventional protectors are disadvantageous in that provision of flexibility to them for fully following various movements of a body of the wearer rather deteriorates rigidity thereof. The rigidity or hardness of the protectors is required for protecting the wearer against damages due to external excessive impact. Thus, conventional protectors do not fully meet these conflicting requirements. The prior art covers protectors over an article of sportswear and fails to provide an integral type of protecting garment, in which protectors and the garment are integrally formed, except ski pants having knee pads of a flexible plastic plate incorporated into them. The knee pads of the ski pants are poor in rigidity for fitting the body of the wearer and hence they are not sufficient as protectors for hard sports. DE-A-28 09 009 discloses a protective device comprising a cushioning pad having an inner face adapted to be mounted over a garment and a plurality of spaced, substantially parallel rigid formations mounted on the outer surface of the cushioning pad to protect the cushioning pad from being damaged by external impact.

In this case, the cushioning pad essentially comprises a layer of foam integrally moulded over a fabric sleeve so as partially to penetrate the sleeve.

The present invention is mainly characterized in that the cushioning pad comprises a plurality of closed, elongate air cushion chambers.

With this construction, the protector has a high degree of flexibility which facilitates its comfortable fitting over the relevant body part, and permitting freedom of movement, but at the same time provides a very high degree of protection by buffering external impacts due to partial compression of the air chambers.

The invention also provides an article of sportswear incorporating such as a protector.

Some embodiments of the invention will now be described by way of example, with reference to

the accompanying drawings, in which:

Fig. 1 is a perspective view of an article of sportswear having protecting pad according to the present invention;

Fig. 2 is a rear view of the article in Fig. 1;

Fig. 3 is an enlarged fragmentary perspective view of each protecting pad in Fig. 1;

Fig. 4 is a fragmentary cross-section of the protecting pad of Fig. 3;

Fig. 5 is a fragmentary cross-section of another modified form of the protecting pad in Fig. 3;

Fig. 6 is a fragmentary cross-section of another embodiment of the present invention;

Fig. 7 is a fragmentary cross-section of another modified form of the protecting pad in Fig. 3;

Fig. 8 is a front view of a leg protector using a protecting pad of the present invention;

Fig. 9 is a rear view of the leg protector of Fig. 8;

Fig. 10 is a front view of a shin guard using a protecting pad of the present invention;

Fig. 11 is a perspective view of a shoulder protector using a protecting pad of the present invention;

Fig. 12 is a fragmentary front view of a chest protector using a protecting pad of the present invention;

Fig. 13 is a front view of a backbone protector using a protecting pad according to the present invention;

Fig. 14 is a side view of a helmet according to the present invention;

Fig. 15 is a perspective view of a knee protector of the present invention;

Fig. 16 is a perspective view of a hand phalanges protector according to the present invention;

Fig. 17 is a plane view of a protecting pad using two protecting units of the present invention;

Fig. 18 is a plane view of another protecting pad using two protecting units according to the present invention; and

Fig. 19 is a plane view of still another protecting pad, having zigzag rigid ribs, according to the present invention.

Referring to the drawings, like reference characters designate corresponding parts throughout views and description thereof is omitted after once given.

Referring to Figs. 1 and 2, the reference numeral 1 indicates an article of skiwear for contests. The garment 1 has a plurality of protectors or protecting pads 2 mounted on its shoulders 1a, 1a, chest 1b, elbows 1c, 1c, waist 1d, legs 1e, 1e, back 1g and front portions of ankles 1g, 1g and wrists 1h, 1h, and the protecting pads 2 are mounted on optimum positions of the garment according to the kind of sport in question. As illustrated in Figs. 3 and 4, each protecting pad 2 includes a cushioning

sheet 5 for resiliently cushioning external impact applied to it, and a plurality of rigid ribs 3 jointed to the upper face of the cushioning sheet 5 to be substantially parallel to each other with equal intervals. The cushioning sheet 5 is corrugated, and rigid ribs 3 are bonded to respective tops 51 of the sheet 5 as shown in Fig. 4. The cushioning sheet 5 and the rigid ribs 3 may be integrally jointed by heating them. Preferably, the rigid ribs 3 are made of a rigid vinyl chloride resin. The cushioning sheet 5 is preferably made of a soft vinyl chloride resin, ABS resin, urethane resin, nylon resin, and silicon resin.

A plane resilient cushion lining 11 is bonded to the inner face 5B of the cushioning sheet 5 at the bottom 52 of the latter to define closed parallel air cushion chambers 12A, 12A, 12A,..... between the cushioning sheet 5 and the resilient lining 11. Opposite ends 54, 54 of each air cushion chamber 12A are closed although only one end is seen in Fig. 4. With such air cushion chambers 12A, air in the chambers buffer external impact applied to the rigid ribs 3, so that an excellent cushion effect is given to the protector.

The protecting pads 2 thus prepared may be sewn to respective parts of the garment 1 by a sewing machine or may be attached to them through adhesive tapes. The parts 1a-1h of the garment 1 are selected according to the kind of the sportswear. It is preferable to attach protecting pads 2 to the garment 1 at portions where external impact is liable to be applied and where bending and stretching thereof occur frequently in use. The protecting pads 2 are attached to the garment 1 so that each rigid rib 3 extends transversely to a general bending plane, e.g. a plane 20 for a shoulder 1a in Fig. 1, although the plane 20 is shown by a line, which is placed on it, for illustration purpose. The cushioning sheet 5 has a groove formed in its upper surface at the periphery as shown in Fig. 3. The cushioning sheet 5 is sewn along the groove 7, so that stitches are received within the groove 7. Thus, the groove 7 provides a good appearance to the cushioning sheet 5 and protects the sewn thread.

The cushioning sheet 5 may be jointed at its periphery to the garment 1 by heat bonding under pressure with an adhesive and further it may be sewn to it. With such a garment 1, the user may put the pads 2 on by merely wearing the garment, and may be fully protected since the pads 2 are mounted to optimum portions of the garment 1 according to suit the sport in question. In use, pads 2 are deformed by bending of the cushioning sheets 5 to follow movement of the body of the wearer. This is smoothly performed since the rigid ribs 3 are arranged across respective general bending planes 20. Rigid ribs 3 are subjected to

most external impact and protect the garment 1 from being damaged, and cushioning sheet 5 buffer external impact applied to associated rigid ribs 3.

Fig. 5 illustrates a modified form of the protecting pad, in which adjacent parallel closed air cushion tubes 13, 13, 13, made of a resilient material such as a rubber, are bonded to each other to form pairs of air cushion tubes 13A, 13A, ... and each pair 13A is bonded to the inner face 5B of a corresponding bottom 52 of the cushioning sheet 5, thereby forming a cushion chamber 12A. Each adjacent pair of air cushion tubes 13 define an additional air cushion chamber 14. Thus, in this modified protecting pad there is provided double cushion chambers 12A, 14.

Another embodiment of the present invention is illustrated in Fig. 6, in which the cushioning sheet 5 of the protecting pad in Figs. 3 and 4 is replaced by a plurality of parallel closed air cushion tubes 55 bonded to adjacent air cushion tubes 55. Rigid ribs 3, 3,... are bonded to tops of respective air cushion tubes 55 to extend along the axes of the latter.

Another modified form of the protecting pad of Figs. 3 and 4 is diagrammatically illustrated in Fig. 7, in which a plurality of rigid ribs 3, 3, are jointed at their upper portions by means of a rigid plate member 16 to form a reinforced protecting portion, such as a reinforced chest protecting portion 1b' (Fig. 1), a reinforced back protecting pad 1f' (Fig. 2), a reinforced knee protecting portion 1i' (FIG. 15 or a reinforced hand phalanges protecting portion 1j' (FIG. 16). Such reinforced protecting portions provide wide and positive protection to corresponding portions of the body of the wearer which portions have relatively small movements. The rigid plate member 16 may be integrally formed with the rigid ribs 3.

FIGS. 8 and 9 show a leg protector 18 for sport contests such as ski contest. The leg protector 18 includes a plurality of parallel semicircular rigid ribs 3 arranged at equal intervals, and a cushioning sheet 5 on which the rigid ribs 3 are mounted, the cushioning sheet 5 covering the front part 23 of the leg of the wearer. The opposite lateral edges 24, 24 of the cushioning sheet 5 are jointed to corresponding opposite lateral edges 28, 28 of a tightening member 26 for covering the rear part 30 of the leg, thereby forming a tubular protector covering the leg around the knee. The tightening member 26 has an upper part 32 and a lower part 34 and a zipper 36 for connecting these parts 32 and 34, the zipper 36 extending from a position at a right portion of the upper edge 37 of the upper part 32 to a position b at a left portion of the lower edge 38 of the lower part 34. The tightening member 26 is made of an expansible cloth or textile, and

preferably made of the latter. As the cloth, those made of spandex thread or rubber core thread may be used. To wear the leg protector, the zipper 36 is opened for separating the upper and lower parts 32, 34, then the protector is placed over the leg around the knee, and finally the zipper 36 is closed. The zipper 36 extend around the calf in a curved manner without extending straight between the two positions a and b, and hence it does not prevent bending and stretching of the leg and provides ease in movement of the leg.

FIG. 10 illustrates a shinguard 40 for a catcher of baseball according to the present invention. As in the leg protector in FIG. 8, curved rigid ribs 3 are mounted in parallel to each other on a cushioning sheet 5 which is to cover the shin. A plurality, four in this embodiment, of reinforcing members 42, curved to correspond to respective rigid ribs 3, are mounted to upper portions of the latter. The reinforcing members 42 are substantially equal in strength to the rigid ridges 3. The reinforcing members 42 may be integrally formed with respective rigid ribs 3 or they may be welded to the latter by heating. The shinguard 40 may be provided with the tightening member 26 as in the leg protector in FIG. 14.

FIGS. 11 to 14 show various protectors according to the present invention: FIG. 11 illustrates a shoulder protector 50 with reinforcing members 42; FIG. 12 a chest protector 60; FIG. 13 a backbone protector 70 which is attached to the wearer by strings 72; and FIG. 14 a helmet 80. In FIGS. 11 and 13, rigid ribs 3 are arranged to be perpendicular to main bending planes 20. The chest protector 60 in FIG. 12 has the rigid ribs 3 arranged vertically along the curve of the chest of the wearer. The helmet 80 in FIG. 14 has a hemispherical cushioning sheet or cup 5 having a pair of terminal discs 82 mounted on its edge 84 symmetrically about the its center although only one terminal disc 82 is shown therein. Eleven rigid ribs 3 which are curved to correspond to the head are mounted on the cushioning cup 5 to extend between the opposite terminal discs 82 at regular angular intervals about the terminal discs 82.

FIGS. 17 to 19 illustrate various rectangular protector units which may be used in the previous embodiments and modifications.

In FIG. 17, two square protector units 90, 90, each having parallel rigid ribs 3, are jointed at sides of their cushioning sheets 5, 5 to form a united protector pad 92 so that they are perpendicular to each other in the direction of rigid ribs 3.

In FIG. 18, square protector units 100 have diagonally extending rigid ribs 3 and they are jointed to form a united protector pad 102 so that rigid ribs 3 thereof meet at sides of their cushioning sheets 5, 5 at which sides they are united.

FIG. 19 illustrates a rectangular protector unit 110 having rigid ribs 3 being parallel to each other and extending on the cushioning sheet 5 in a zigzagged manner.

Claims

1. A protector comprising a cushioning pad (2) for buffering external impact, the cushioning pad (2) having an inner face adapted to be mounted over a garment and a plurality of spaced substantially parallel, rigid formations mounted on the outer face of the cushioning pad (2) to protect the cushioning pad from being damaged by external impact, characterized in that said cushioning pad (2) comprises a plurality of closed elongate air cushion chambers (12A, 12B, 14, 15) therein.
2. A protector according to claim 1 in which said the cushioning pad comprises a corrugated cushioning sheet (5) and a plane cushion lining (11), said cushion lining (11) being sealingly attached to the cushion sheet (5) to define the air cushion chambers (12A).
3. A protector according to claim 1 in which said cushioning pad comprises two corrugated cushion sheet (5), which are sealingly attached to each other at their mating ridges to define the said air cushion chambers (12B).
4. A protector according to claim 1 in which said cushioning pad comprises a corrugated cushion sheet (5) and a cushion layer, the cushion layer comprising a plurality of parallel closed tubes (13) for defining air cushion chambers (14) therein, adjacent tubes being attached to each other, and the cushion layer is sealingly attached to a corrugated cushion sheet (5) to define additional air cushion chambers (12A).
5. A protector according to claim 1 in which the cushioning pad comprises a plurality of parallel closed tubes (55) defining air cushion chambers (15) therein, adjacent tubes being attached to each other.
6. A protector according to any preceding claim in which the rigid formations comprise rigid ribs (3) extending substantially parallel to each other, the rigid ribs extending substantially perpendicularly to a main bending plane of part of a body of a wearer to facilitate movement of the body part, wherein the movement of the body part mainly occurs along the main bending plane.

7. An article of sportswear incorporating one or more protectors in accordance with any preceding claim.

Patentansprüche

1. Schutzvorrichtung, umfassend ein federndes Kissen (2) zum Dämpfen eines äußeren Stoßes, wobei das federnde Kissen (2) eine Innenseite, die über einem Kleidungsstück angebracht werden kann und eine Anzahl von mit Abstand angeordneten, im wesentlichen parallelen steifen Formationen aufweist, die auf der Außenseite des federnden Polsters (2) angebracht sind, um das federnde Polster gegen Beschädigung durch Schlag von außen zu schützen, dadurch **gekennzeichnet**, daß das federnde Polster (2) eine Anzahl von geschlossenen, langgestreckten Luftpolsterkammern (12A, 12B, 14, 15) darin umfaßt.
2. Schutzvorrichtung nach Anspruch 1, bei der das federnde Kissen eine gerippte dünne Polsterlage (5) und eine ebene federnde Auskleidung (11) umfaßt, wobei die federnde Auskleidung (11) abdichtend an der dünnen Polsterlage (5) befestigt ist, um die Luftkissenkammern (12A) zu begrenzen.
3. Schutzvorrichtung nach Anspruch 1, bei der das federnde Polster (2) rippenversehene dünne Polsterlagen (5) umfaßt, die abdichtend aneinander an ihren zusammenpassenden Leisten angebracht sind, um die Luftkissenkammern (12B) zu begrenzen.
4. Schutzvorrichtung nach Anspruch 1, bei der das federnde Polster (2) eine rippenversehene dünne Polsterlage (5) und eine Polsterlage umfaßt, wobei die Polsterlage eine Anzahl von parallelen, geschlossenen Schläuchen (13) umfaßt, um darin Luftpolsterkammern (14) zu begrenzen, wobei benachbarte Schläuche aneinander befestigt sind und die Polsterlage abdichtend an einer rippenversehene dünnen Polsterlage (5) angebracht ist, um zusätzliche Luftkissenkammern (12A) zu begrenzen.
5. Schutzvorrichtung nach Anspruch 1, bei der das federnde Kissen eine Anzahl von parallelen, geschlossenen Schläuchen (55) umfaßt, die darin Luftpolsterkammern (15) begrenzen, wobei benachbarte Schläuche aneinander befestigt sind.
6. Schutzvorrichtung nach einem beliebigen vorhergehenden Anspruch, bei der die steifen Formationen steife Rippen (3) umfassen, die

sich im wesentlichen parallel zueinander erstrecken, wobei sich die steifen Rippen im wesentlichen senkrecht zu einer Hauptbiegeebene eines Teils eines Körpers eines Trägers erstrecken, um eine Bewegung des Körperteils zu erleichtern, wobei die Bewegung des Körperteils hauptsächlich entlang der Hauptbiegeebene erfolgt.

7. Sportbekleidungsartikel, in dem eine oder mehrere Schutzvorrichtungen gemäß einem beliebigen vorherigen Anspruch enthalten sind.

Revendications

1. Un élément de protection comprenant un coussin amortissant (2) pour amortir les chocs externes, le coussin amortisseur (2) ayant une face interne adaptée pour être montée sur un vêtement et une pluralité de formations rigides espacées, sensiblement parallèles, montées sur la surface externe du coussin amortisseur (2) pour empêcher le coussin amortisseur d'être abîmé par un choc externe, caractérisé en ce que ledit coussin amortisseur (2) comprend à l'intérieur une pluralité de chambres allongées fermées de coussin d'air (12A, 12B, 14, 15).
2. Un élément de protection selon la revendication 1, dans lequel ledit coussin amortisseur comprend une plaque amortissante ondulée (5) et une garniture amortissante plate (11), ladite garniture amortissante (11) étant fixée de façon étanche à la plaque amortissante (5) pour définir les chambres de coussin d'air (12A).
3. Un élément de protection selon la revendication 1, dans lequel le coussin amortissant comprend deux plaques amortissantes ondulées (5), qui sont fixées de façon étanche entre elles sur leur arête de jointure pour définir lesdites chambres de coussin d'air (12B).
4. Un élément de protection selon la revendication 1, dans lequel ledit coussin amortissant comprend une plaque amortissante ondulée (5) et une couche d'amortissement, la couche d'amortissement comprenant une pluralité de tubes parallèles et fermés (13) pour y définir les chambres de coussin d'air (14), les tubes adjacents étant reliés entre eux, et la couche d'amortissement étant - fixée de façon étanche à une plaque amortissante ondulée (5) pour définir des chambres de coussin d'air supplémentaires (12A).

5. Un élément de protection selon la revendication 1, dans lequel le coussin amortissant comprend une pluralité de tubes parallèles fermés (55) qui y définissent des chambres de coussin d'air (15), les tubes adjacents étant fixés entre eux. 5
6. Un élément de protection selon l'une quelconque des revendications précédentes, dans lequel les formations rigides comprennent des nervures rigides (3) s'étendant de façon pratiquement parallèle entre elles, les nervures rigides s'étendant de façon pratiquement perpendiculaire à un plan principal de pliure d'une partie du corps d'un utilisateur pour faciliter le mouvement de la partie du corps, dans lequel le mouvement de la partie du corps a principalement lieu le long du plan principal de pliure. 10 15
7. Un article de vêtement de sport incorporant un ou plusieurs éléments de protection selon l'une quelconque des revendications précédentes. 20

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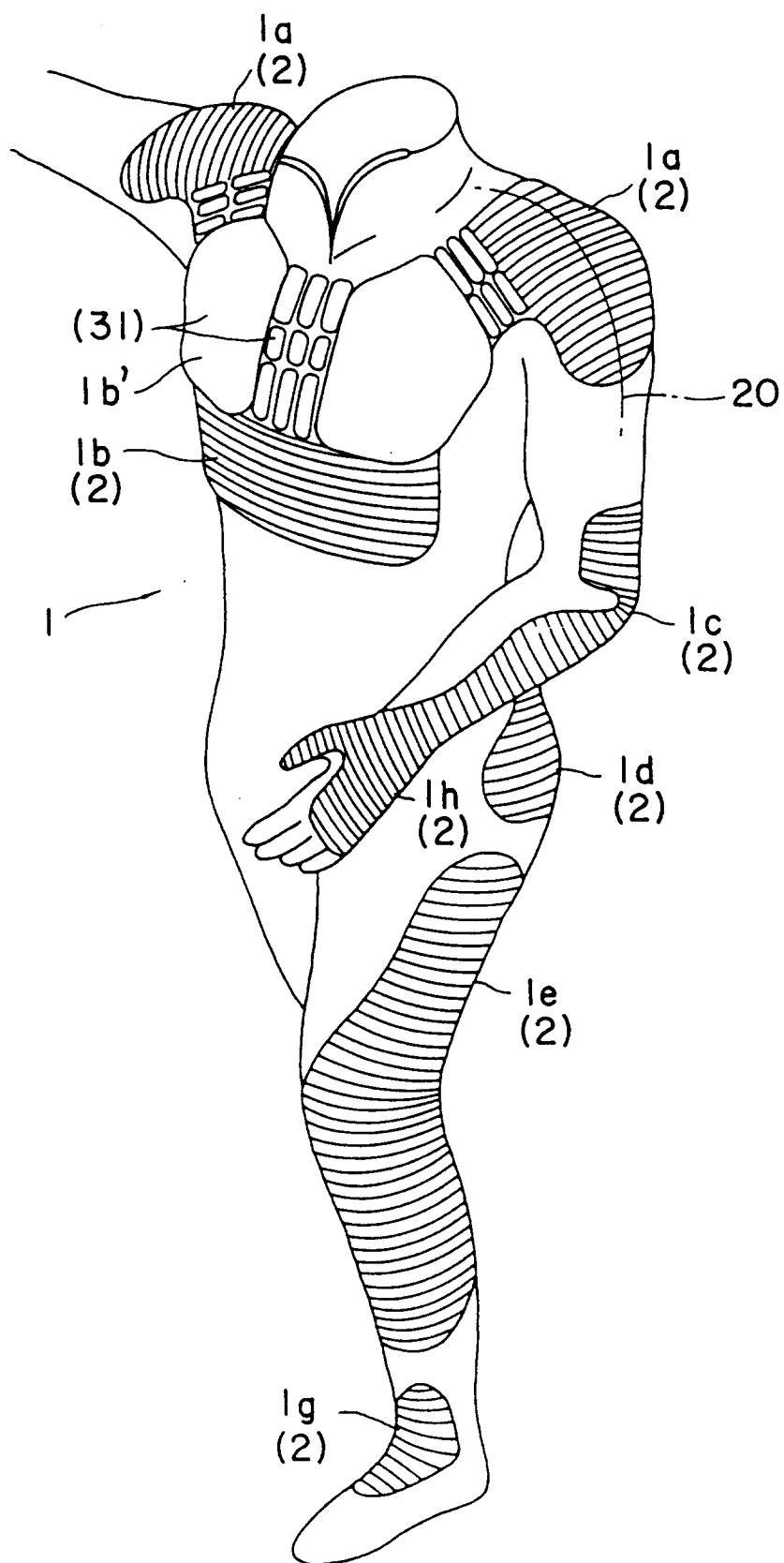


FIG. 1

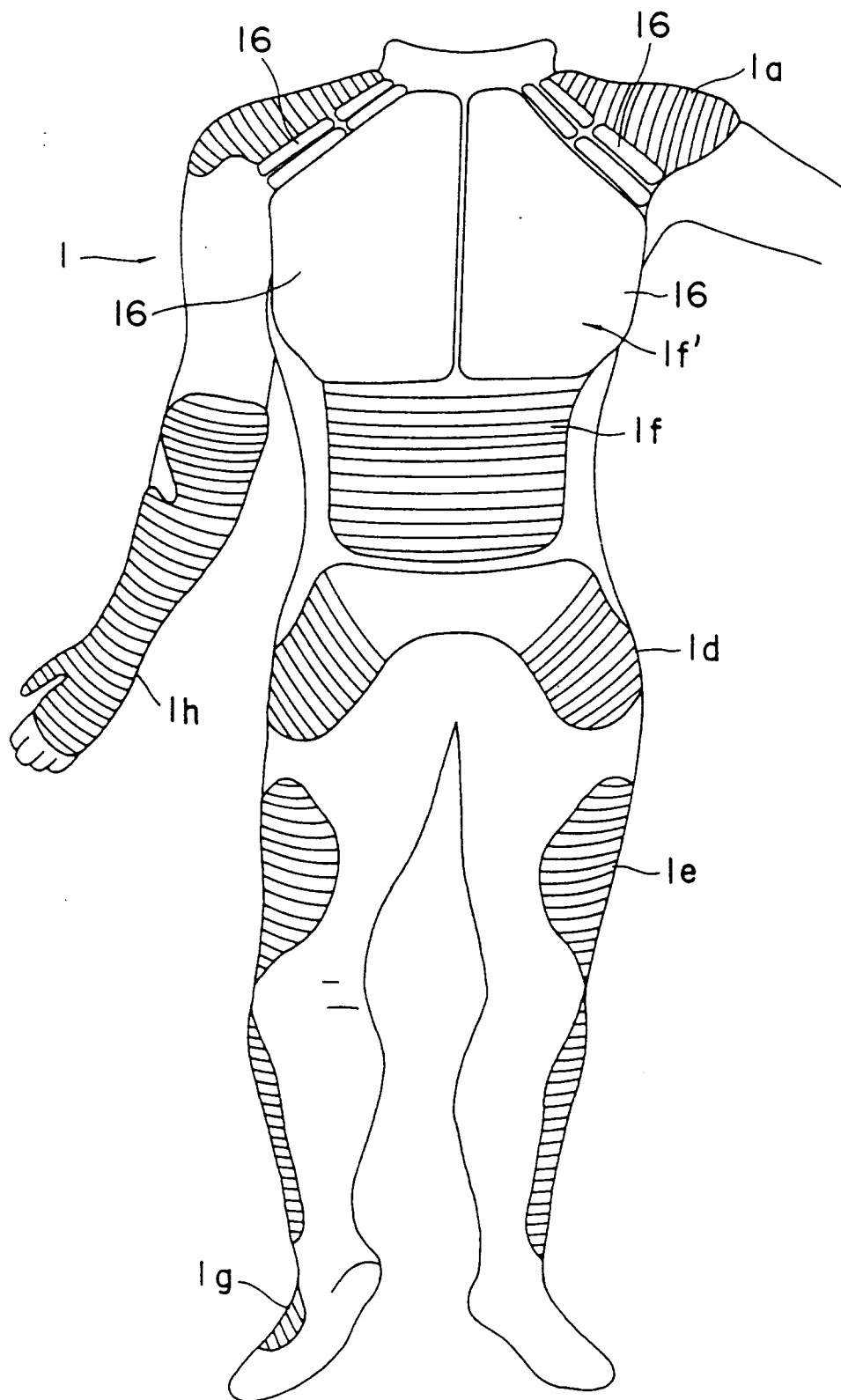


FIG. 2

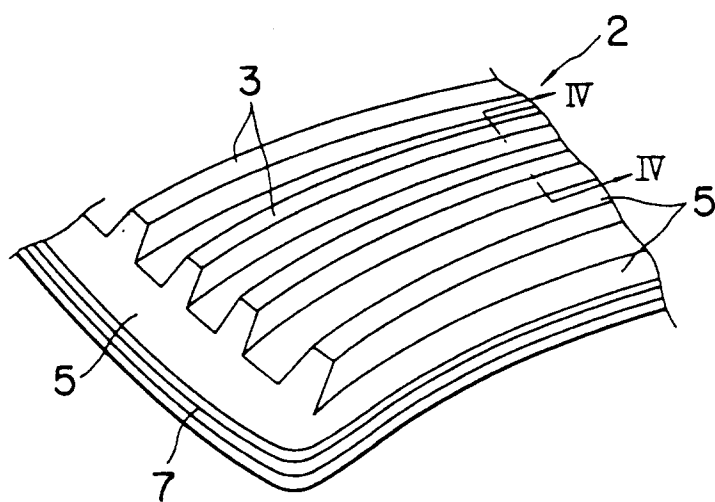


FIG. 3

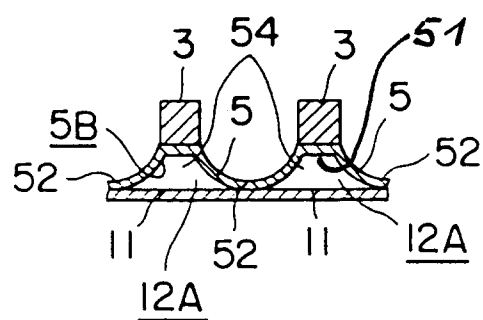


FIG. 4

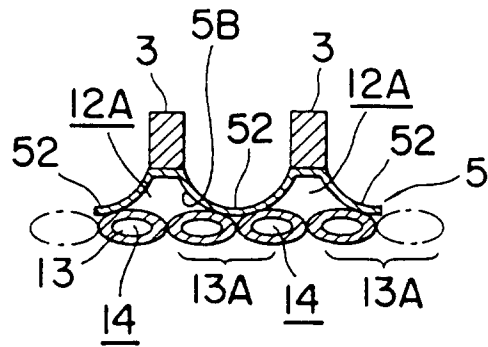


FIG. 5

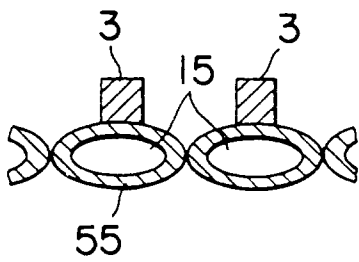


FIG. 6

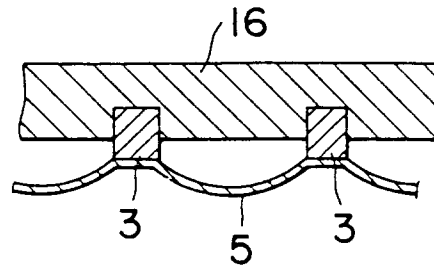


FIG. 7

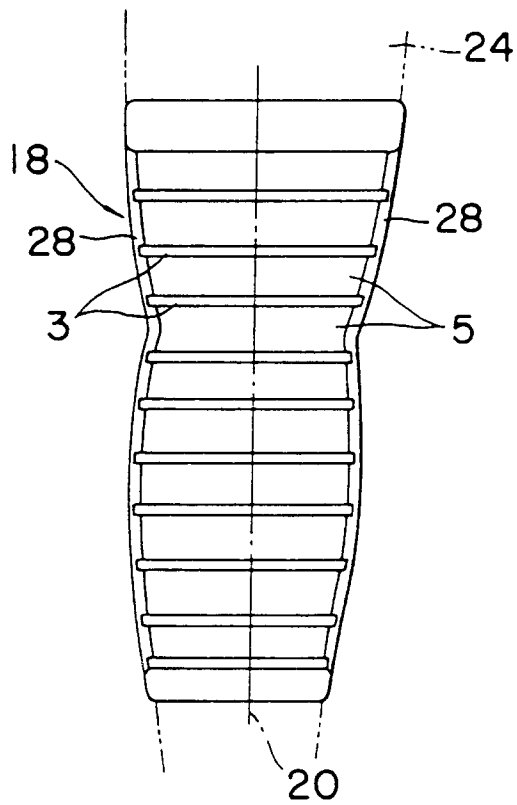


FIG. 8

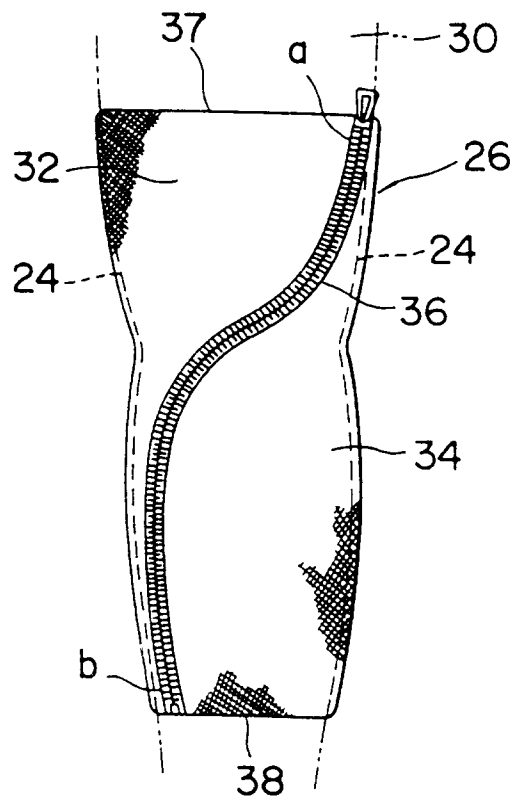


FIG. 9

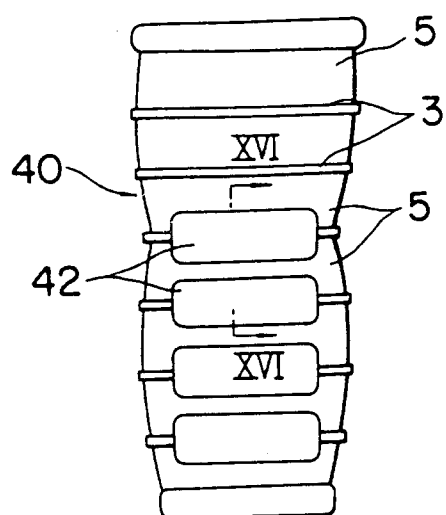


FIG. 10

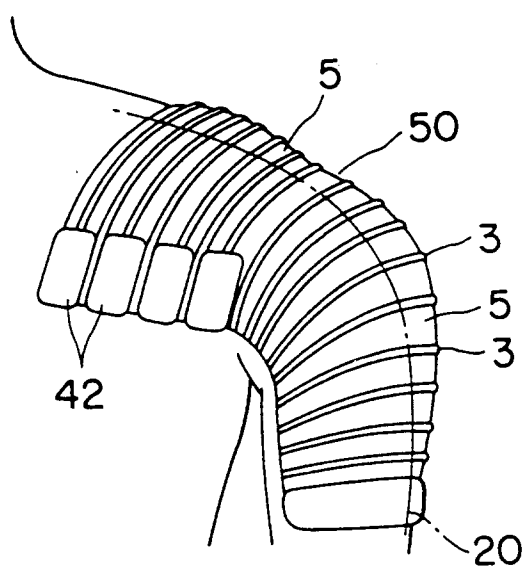


FIG. 11

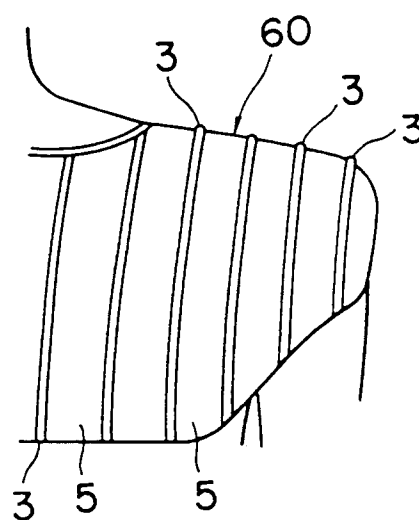


FIG. 12

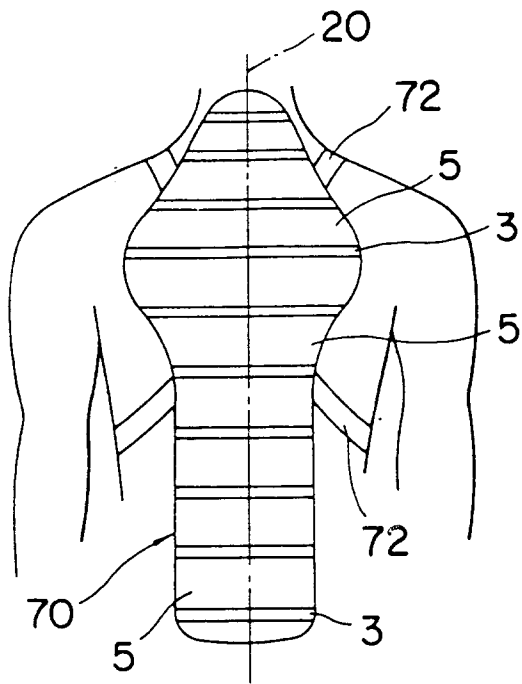


FIG. 13

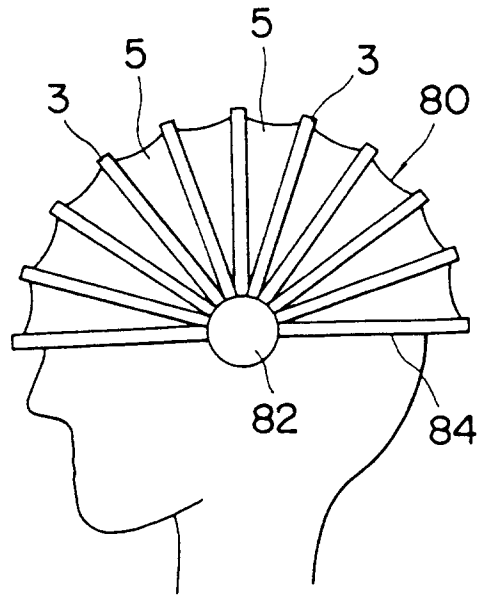


FIG. 14

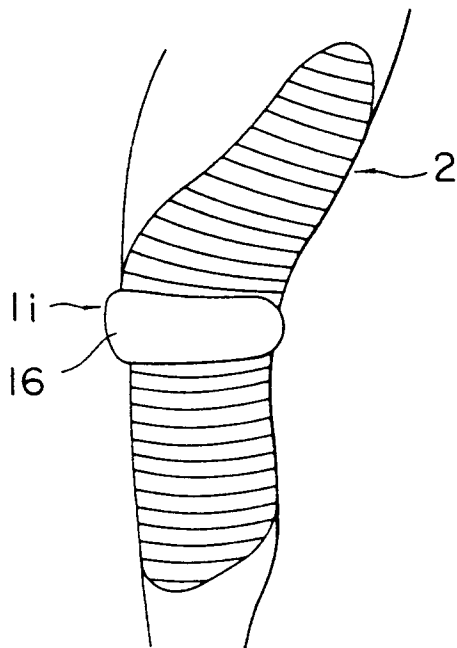


FIG. 15

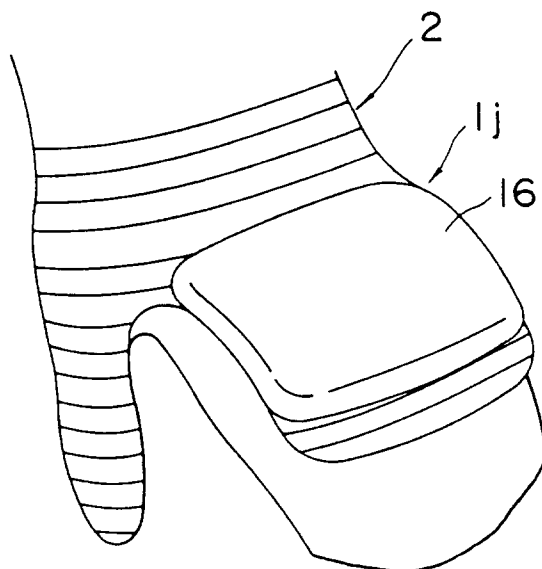


FIG. 16

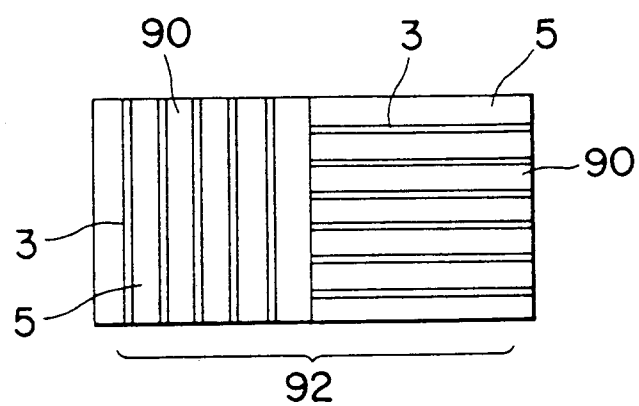


FIG. 17

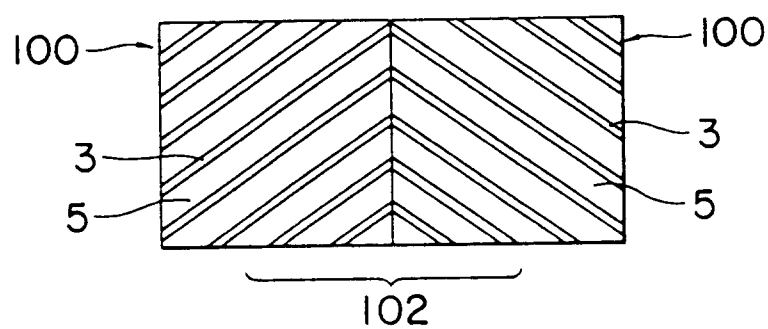


FIG. 18

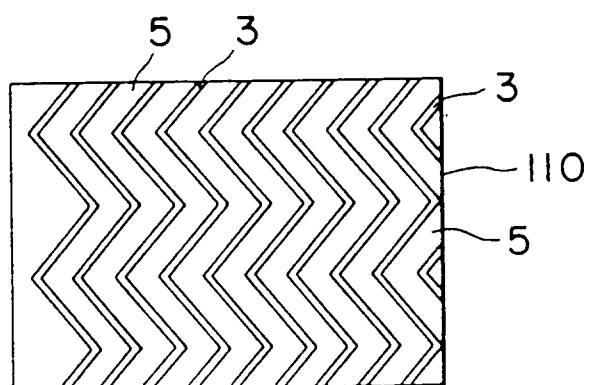


FIG. 19