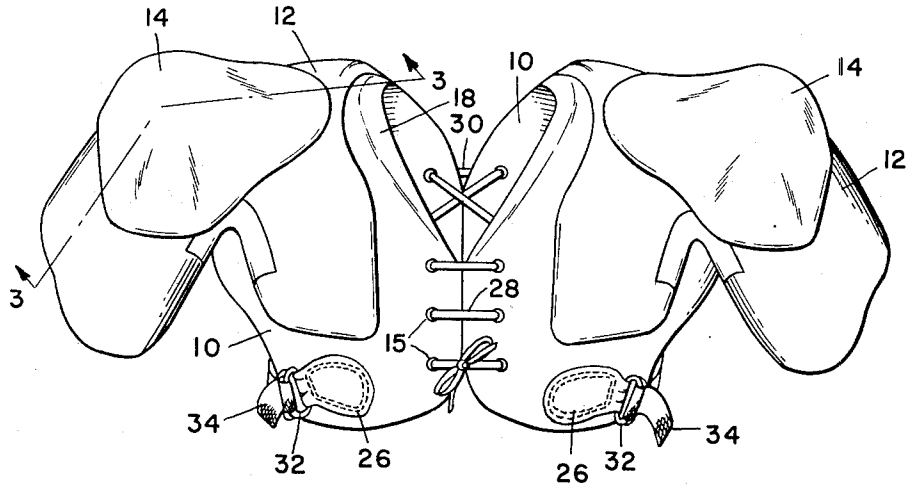
Sept. 1, 1964 F. J. KAVANAGH 3,146,461

ATHLETIC EQUIPMENT

Original Filed May 8, 1957 2 Sheets-Sheet 1

FIG. 1



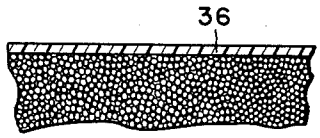


FIG. 2

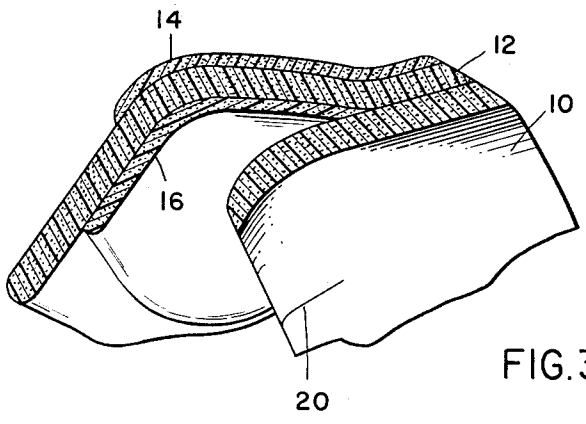


FIG. 3

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ATHLETIC EQUIPMENT

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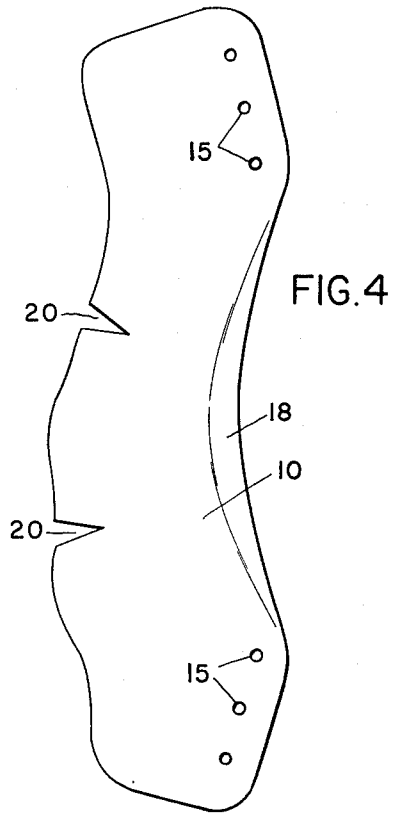

FIG.4

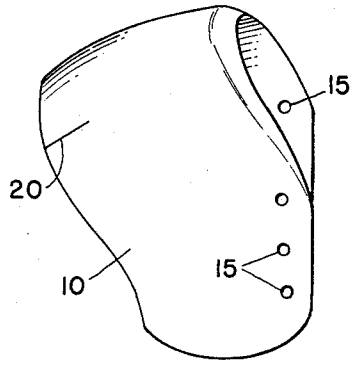

FIG.5

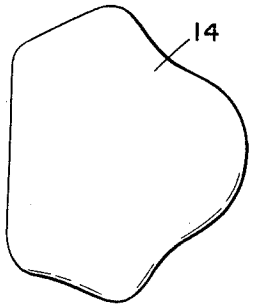

FIG.6

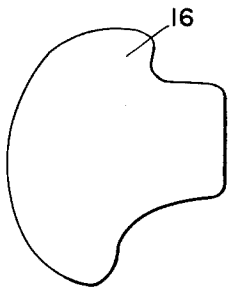

FIG.7

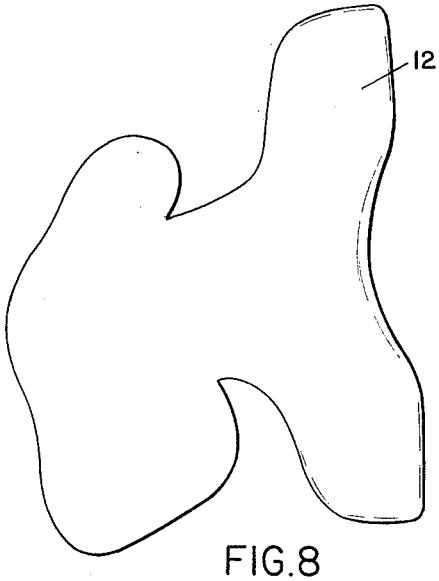

FIG.8

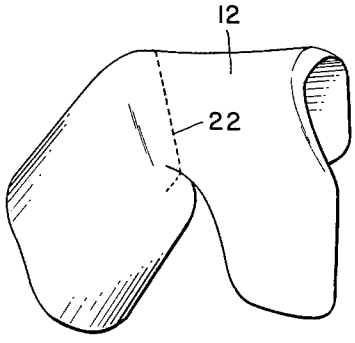

FIG.9

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3,146,461
ATHLETIC EQUIPMENT

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Continuation of application Ser. No. 657,771, May 8, 1957. This application Nov. 20, 1962, Ser. No. 239,872
5 Claims. (Cl. 2—2)

This invention relates to athletic equipment and, more specifically, to protective equipment adapted to be worn by athletes for the prevention of injury, one object being the provision of more satisfactory equipment of this nature.

Protective equipment, such as helmets, shoulders pads, hip pads, shin guards, and the like, are commonly worn by athletes engaging in a great variety of sports involving bodily contact where the danger of injury is present. Such equipment has heretofore comprised a relatively hard outer shell of leather, vulcanized fiber, or other material of this nature, and an inner layer of soft padding material. The hard outer layer received the shock and served to spread the impact over a large area where it was absorbed and cushioned by the soft material underneath.

Many sports involve violent bodily contact between the players. In cases of this sort, the hard outer shell of conventional equipment often causes injury to opposing players, particularly if an unprotected part of their body should come into violent contact with the hard portion of the opponent's equipment. For this reason, it is desirable to provide protective equipment having no hard outer surface and consisting entirely of soft padding material, and the provision of such equipment is another object of this invention.

While protective equipment consisting entirely of soft cushioning material has heretofore been known, such equipment has not proved satisfactory because of the inability to protect the wearer from impact delivered in a small area by a relatively sharp object such as an opponent's foot or knee. When such a blow is delivered on conventional soft protective equipment, the padding cannot spread the impact over a larger area, and therefore absorb the localized impact, and consequently inadequate protection is afforded. It is another object of this invention to remedy these shortcomings of known soft, protective equipment by providing equipment having high resistance to localized impact.

Athletic protective equipment, particularly used in schools, is often worn by different persons. This interchange of equipment often causes the spread of infection from one wearer to another. For this reason, it is another object of this invention to provide protective equipment which may be easily cleaned and disinfected in order to prevent the spread of contagion between different players.

Protective equipment worn by athletes engaged in strenuous athletic activities presents a considerable impediment to free motion. For this reason, a further object of this invention is the provision of protective equipment of relatively light, compact and flexible nature which will offer the least possible impediment to free action on the part of the players.

Players engaged in strenuous athletic activities tend to perspire rather freely. Conventional protective equipment, composed of cloth, felt, hair or other similar fibrous material, tends to absorb large quantities of perspiration which adds considerably to their weight and makes such equipment unpleasant to wear. For this reason, it is a still further object of this invention to provide athletic protective equipment having an impervious, moisture-proof surface, which will not absorb perspiration during use.

This application is a continuation of my pending application, Serial No. 657,771, filed May 8, 1957, and now abandoned.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

FIG. 1 is a set of shoulder pads embodying the present invention;

FIG. 2 is an enlarged, fragmentary, schematic cross-sectional view of the plastic material used in this invention;

FIG. 3 is an enlarged fragmentary cross-sectional view taken substantially along lines 3—3 of FIG. 1;

FIG. 4 is a top plan view of a blank of the shoulder piece of the pads of FIG. 1;

FIG. 5 is a view of the blank of FIG. 4 after folding it and forming;

FIG. 6 is a top plan view of a blank of an outer reinforced member;

FIG. 7 is a top plan view of a blank for an inner reinforcing member;

FIG. 8 is a top plan view of a blank for an arm piece; and

FIG. 9 is a view of an arm member after forming.

Athletic protective equipment embodying this invention and herein described for purposes of illustration, preferably comprises one or more pads cut from foam plastic material, formed to conform to the portion of the body to be protected, and coated with an impervious vinyl plastic coating.

The material used for forming the equipment of the present invention preferably comprises a closed-cell foam material which is soft, has the property of high impact resistance, and relatively slow recovery to its initial shape. Foamed vinyl plastic material, such as that sold commercially by the United States Rubber Corporation under the name "Ensolite" has been found satisfactory for this purpose. Such material is shown in schematic cross section in FIG. 2. This material is composed of a large number of small closed non-interconnected cells each filled with a suitable gas. These cells each form an individual resilient cushion, which forms a shock absorbing mass. However, the relatively non-elastic nature of the vinyl plastic imparts a certain amount of "deadness" to the entire mass which absorbs and dissipates impact energy and prevents the plastic from rapidly returning to its initial form. This combination of properties forms a structure that is soft, and readily absorbs and dissipates shock. While the foam plastic as described above presents a porous surface, the pores are not interconnected, and thus, the gas trapped in each individual cell is compressed by shock and forms a resilient, shock absorbing cushion.

Referring to the drawings, FIG. 1 shows a set of shoulder pads made in accordance with this invention. The shoulder pad of FIG. 1 comprises elongated shoulder members **10** (FIGS. 4 and 5), arm pieces **12** (FIGS. 8 and 9), and outer and inner reinforcing members **14** and **16** (FIGS. 6 and 7, respectively). Shoulder members **10** are elongated strips of foam plastic, as shown in FIG. 4, each having a tapered section **18** along its inner edge and a pair of triangular darts **20** cut into the other or outer edge. A plurality of eylet holes **15** are punched along one or both inner edges for the reception of laces, as hereinafter described. Members **10** are folded in a substantially U-shape as shown in FIG. 5, and the edges of the darts **20** are cemented together to make the pieces conform to the natural curve of the wearer's shoulder. Tapered area **18**, which is adjacent to the wearer's

neck, improves the smoothness of the fit, and allows greater freedom for movement.

Arm pieces **12** are cut from a sheet of foam material in the irregular indented shape shown in FIG. 8. These pieces are folded into a substantially U-shaped form as shown in FIG. 9, and the edges of the indentations are adhesively fastened together at **21** to produce a shape as shown in FIG. 9. These pieces may be reinforced by a line **22** of stitching running up the front, across the top, and down the back as shown in the figure. Further reinforcement may be provided by strips of tape **24** (FIG. 1) applied to the lower edges.

The shoulder pads are assembled by cementing arm-pieces **12** to shoulder member **10**, as shown in FIGS. 1 and 3. Outer and inner reinforcing pieces **14** and **16** are then cemented in place as shown in the figure. Tabs **26** are sewn to the front and rear of mombers **10** for the reception of buckles as hereinafter explained.

The assembled halves of the shoulder pad are then coated by spraying with an impervious vinyl plastic coating material which will bond to the foam plastic and produce a smooth, resilient, and impervious surface **36** (FIG. 2). Two half shoulder pads are then assembled by means of lacing **28** and **30** inserted in holes **15**, and buckles **32** are fastened to the free ends of tabs **26**. Suitable straps **34** are then attached to buckles **32** for reinforcing and holding the lower portion of the shoulder pads together. While the components of the shoulder pads and other protective equipment embodying this invention may be cut from sheet material as described above, it is contemplated that these pieces may be made by molding or any other known method of forming plastic foam material.

An important feature of this invention is the omission of any hard outer shell members of leather, fiber, or the like material, which form a prominent feature of conventional shoulder guards heretofore known in the art. Since the closed-cell vinyl plastic used in the manufacture of the equipment of the present invention has high impact resistance, the wearer is completely protected, while the omission of hard members prevents injury to opponents who may come into violent contact with the wearer. Thus, equipment herein disclosed not only affords complete protection for the wearer, but also serves to protect the other players from possible injury.

The protective equipment herein disclosed is lighter than conventional equipment, and therefore, tends to minimize the fatigue suffered by players in active sports. The flexible nature of this equipment and the omission of rigid members affords a more comfortable fit and greater freedom of action than that afforded by conventional equipment. The impervious surface makes this equipment easier to clean and maintain, and minimize the danger of infection when such equipment is worn by more than one player. At the same time the non-absorbent nature of the impervious coating prevents the absorption of perspiration which materially adds to the weight of conventional padded equipment comprising fibrous materials.

While this invention has been herein illustrated in terms of a set of shoulder pads, this construction is equally applicable to any other type of protective equipment whether of a non-piece nature, such as shin, thigh and arm guards, or equipment built up of a number of members such as hip guards and the shoulder guards described above. In each case, the omission of hard outer shell members, and the shock absorbing qualities of the material used, and the impervious nature of the coating have all the advantages described above.

It will thus be seen that the invention accomplishes its objects and while it has been herein disclosed by reference to the details of preferred embodiments, it is to be understood that such disclosure is intended in an illustrative, rather than a limiting sense, as it is contemplated that various modifications in the construction and arrangement of the parts will readily occur to those skilled in the art, within the spirit of the invention and the scope of the appended claims.

I claim:

1. In athletic protective equipment, a jacket comprising a pair of members each consisting of a one-piece body of flexible, closed-cell vinyl material adapted to extend over a shoulder and around the adjacent upper portion of the wearer's body, said members having edges adapted to extend adjacent each other at the front and back of the wearer with portions thereof cut away to provide a neck opening and said adjacent edges being formed with lacing eyelets, lacing means for adjustably securing said adjacent edges together, a one-piece pad of said material having a part extending over and cemented to the shoulder portion of each member and a part for covering and protecting the upper portion of the arm with the opposite edges of said parts extending inwardly to form a hinge therebetween, reinforcing strips of tape enclosing and cemented to said hinge edges, and reinforcing and cushioning layers of said closed-cell vinyl material cemented to the surfaces of said pads, said members and their parts and cushioning layers being covered with a continuous coating of impervious plastic material to render the same impervious to moisture and dirt.

2. In athletic protective equipment, a jacket comprising a pair of members each consisting of a one-piece body of flexible, closed-cell vinyl material adapted to extend over a shoulder and around the adjacent upper portion of the wearer's body, darts cut into the outer edge of each member with the edges of said darts cemented together to conform each member to the wearer's shoulder, said members having inner edges adapted to extend adjacent each other at the front and back of the wearer's body with portions thereof cut away to provide a neck opening and said adjacent edges being formed with lacing eyelets, lacing means for adjustably securing said adjacent edges together, a one-piece pad of said material having a part extending over and cemented to the shoulder portion of each member and a part for covering and protecting the upper portion of the wearer's arm with the opposite edges of said parts extending inwardly to form a hinge therebetween, reinforcing strips of tape enclosing and cemented to said hinge edges, and reinforcing and cushioning layers of said closed-cell vinyl material cemented to the upper and lower surfaces of said pads, said members and their pads and cushioning layers being covered with a continuous coating of impervious plastic material to render the same impervious to moisture and dirt.

3. In athletic protective equipment, a jacket comprising a pair of members each consisting of a one-piece body of flexible, closed-cell vinyl material adapted to extend over a shoulder and around the adjacent upper portion of the wearer's body, said members having inner edges adapted to extend adjacent each other at the front and back of the wearer's body with portions thereof cut away to provide a neck opening and said adjacent edges being formed with lacing eyelets, lacing means for adjustably securing said adjacent edges together, a one-piece pad of said material having a part extending over and cemented to the shoulder portion of each member and a part for covering and protecting the upper portion of the wearer's arm with the opposite edges of said parts extending inwardly to form a hinge therebetwen, reinforcing strips of tape enclosing and cemented to said hinge edges, reinforcing and cushioning layers of said closed-cell vinyl material cemented to the surfaces of said pads, tabs of plastic sheet material secured to the outer edge of each member adjacent the outer ends thereof, and buckle and strap means adjustably connecting said tabs and the outer ends of each member for reinforcing and adjustably holding together the lower outer ends of each member to conform the same to the wearer's body.

4. In athletic protective equipment, a jacket comprising a pair of members each consisting of a one-piece body

of flexible, closed-cell vinyl material adapted to extend over a shoulder and around the adjacent upper portion of the wearer's body, darts cut into the outer edge of each member with the edges of said darts cemented together to conform each member to the wearer's shoulder, said members having inner edges adapted to extend adjacent each other at the front and back of the wearer's body with portions thereof cut away to provide a neck opening and said adjacent edges being formed with lacing eyelets, lacing means for adjustably securing said adjacent edges together, a one-piece pad of said material having a part extending over and cemented to the shoulder portion of each member and a part for covering and protecting the upper portion of the wearer's arm with the opposite edges of said parts extending inwardly to form a hinge therebetween, reinforcing strips of tape enclosing and cemented to said hinge edges, reinforcing and cushioning layers of said closed-cell vinyl material cemented to the upper and lower surfaces of said pads, tabs of plastic sheet material secured to the outer edge of each member adjacent the outer ends thereof, and buckle and strap means adjustably connecting said pads and the outer ends of each member for reinforcing and adjustably holding together the lower outer ends of each member to conform the same to the wearer's body, said members and their pads and cushioning layers and tabs being covered with a continuous coating of impervious plastic material to render the same impervious to moisture and dirt.

5. In athletic protective equipment, a jacket comprising a body of flexible closed-cell vinyl material adapted to extend over the shoulders and around the adjacent upper

portions of the wearer's body to enclose and protect the same, said body having an opening at one side with the edges thereof arranged to extend into proximity with each other, means for releasably securing said edges together, said body having portions thereof cut away to provide a neck opening, a pair of pads of said material each having a part extending over and cemented to one of the shoulder portions of said body, each of said pads having a part for covering and protecting the upper portion of one of the arms of the wearer with the opposite edges of said parts extending inwardly to form a hinge therebetween, reinforcing strips of tape enclosing and cemented to said hinge edges, and reinforcing and cushioning layers of said closed-cell vinyl material cemented to the surfaces of said pads, said body, said pads and said cushioning layers being covered with a continuous coating of impervious plastic material to render the same impervious to moisture and dirt.

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