June 22, 1965 D. F. SIMS 3,189,917

PROTECTIVE DEVICE

Filed Feb. 16, 1962

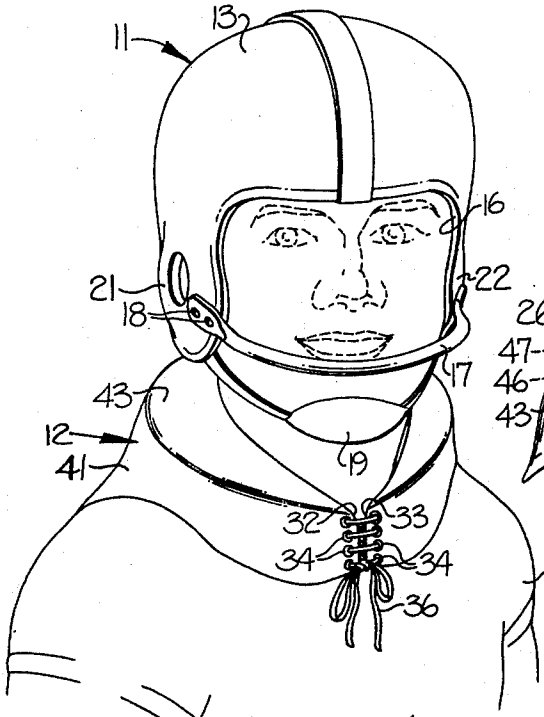

Fig-1

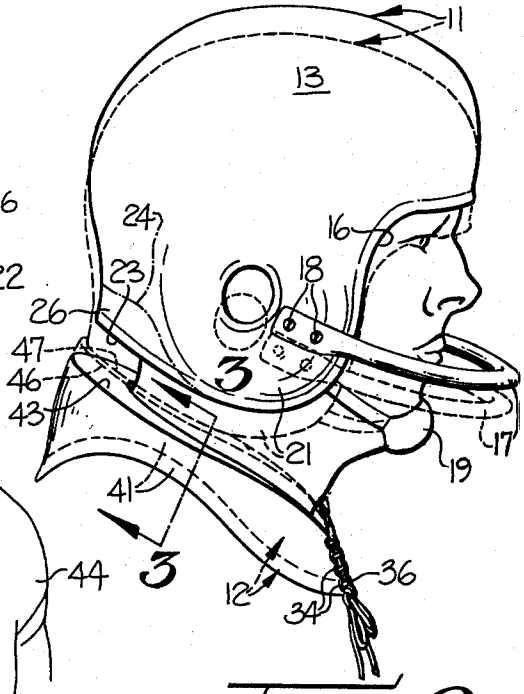

Fig-2

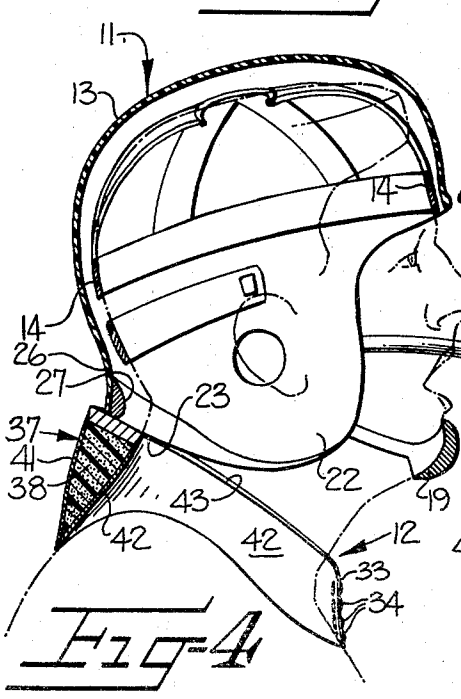

Fig-4

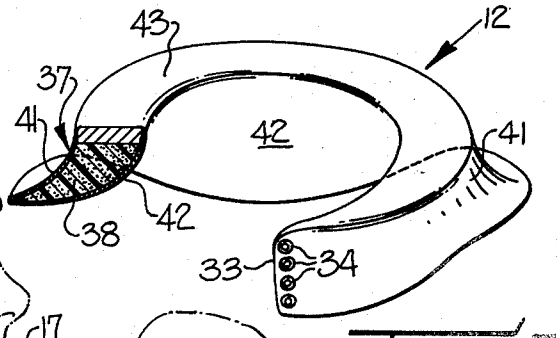

Fig-3

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PROTECTIVE DEVICE

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This invention relates to devices for protecting parts of the human body from forces applied thereto and more particularly to an assembly for protecting the neck and adjacent areas of a player from the hazards incident to body contact activities such as football or the like.

In body contact activities such as team sports the protection of the player's body from injury is of primary concern but at the same time it is highly desirable to permit the player as much fredom of movement as possible. For instance, in the game of football, the contact forces between players have called for a maximum of protection for the player but the freedom of movement of the player must still be given primary consideration. While great strides have been made in protecting the football player and in particular certain areas of the body more susceptible to injury than others, such as the head, the area of the neck has been relatively ignored due probably to the desire for freedom of head movement, a key requirement in the game of football.

Considerable success in protecting the head and shoulders of the player with the use of scientifically designed helmets and shoulder pads respectively has been obtained but the area of the neck still remains a primary source of injury. Moreover, it has been recognized that successful efforts in helmet design, face guards and helmet suspensions have contributed somewhat to the alarming increase in neck injuries as a result of the transfer of forces applied to the helmet directly onto the neck. For instance, when the conventional helmet with its face guard is struck frontally with a blow, the helmet pivots rearwardly and the sharp lower edge of the rear of the helmet strikes the back of the neck producing severe injuries and on occasion fatalities. In addition, forces applied to other areas of the helmet must be borne by the neck which in reality is a relatively fragile member. For instance, a heavy blow or force applied to the top of the helmet results in a severe compressive force on the neck often resulting in disastrous injurious results.

As forces during the game of football are generally applied to the player's helmet from any and all directions, the neck is therefore subjected to a variety of stresses including compression, flexing, extension, bending, torsion and the like. When these forces are excessive or when a lack of training and conditioning of the player is present, injuries frequently result such as damage to the vertebrae and disc in the neck and to ligaments, nerve damage and strained muscles and tendons. These injuries, which on occasion can be fatal, manifest themselves in other forms both permanent and otherwise such as headaches, paralysis, neuritis, neuralgia, constant or intermittent pain, nausea, fainting, weakness, neck stiffness and the like.

Accordingly, a primary object of this invention is to provide a new and novel device for protecting a player's neck from injury during participation in a body contact sport such as football.

Another object of this invention is to provide a new and novel head and neck protective assembly which functions cooperatively to transfer forces applied to a helmet to the shoulders of a player participating in a game of football or the like and which permits the use of a helmet of conventional construction.

A further object of this invention is to provide a new and novel head and neck protective assembly for use by a football player which includes a helmet of novel construction which eliminates injuries to the neck by the helmet and which at the same time provides the required

degree of freedom of movement of the player required by the game.

Still another object of this invention is to provide a new and novel neck protective device which protects the neck against injury by forces applied to the helmet worn by a football player, by the player's shoulder pads and from direct blows which may be applied to the neck.

This invention further resides in the provision of a new and novel head and neck protective assembly which permits the utilization of either a novel helmet construction or a helmet of conventional construction and a cooperating neck collar which is simple, lightweight, and inexpensive in construction, which may be worn comfortably by a football player without irritation, which distributes the blows to the helmet throughout the shoulders of the player and which in no way interferes with the freedom of movement of the player.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings.

The objects stated above and other related objects of this invention are accomplished by providing a neck protecting collar substantially annular in shape for encircling the neck of the wearer. The underside of the collar is preferably contoured so as to be supported comfortably on the shoulders of the wearer and has an upper edge portion extending around the neck in substantially uniform spaced relationship with the bottom edge of a helmet which may be of conventional construction. The clearance space between the helmet bottom edge and the upper edge portion of the neck collar permits the player complete freedom of head movement for engaging in playing of sports such as football. The helmet bottom edge and the neck collar upper edge portion are movable into mutual engagement by an elevation of the wearer's shoulders or a movement of the helmet or by a combination of both the collar and helmet movement whereby a force applied to the helmet from virtually any direction is transmitted to the collar and from the collar to the player's shoulders without subjecting the neck to excessive strains or impact which could result in injury.

The novel features which are believed to be characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation may be best understood by reference to the following description taken in conjunction with the accompanying drawing in which:

FIGURE 1 is a front view of a player wearing the invention;

FIGURE 2 is a side view of the player of FIGURE 1 showing the invention in the inoperative position in solid lines and in the operative position in broken lines;

FIGURE 3 is an isometric view partially in section taken substantially along line 3–3 of FIGURE 2 in the direction of the arrows; and

FIGURE 4 is a view similar to FIGURE 2 partially in section illustrating the invention in one operative position.

Referring now to FIGURE 1, there is shown a player partially attired in protective equipment which equipment includes the invention suitable for participation in the game of football. More specifically, the player of FIGURE 1 is shown wearing a helmet designated generally by the numeral 11 of substantially the same helmet construction as is presently used in the game of football. The player is also equipped with means constructed in accordance with the invention for protecting the neck referred to hereinafter as a neck collar and designated generally by the numeral 12. As will be explained hereinafter, the collar 12 is arranged to cooperate with the helmet 11 during participation in the game of football by the player so as to protect the neck and associated

areas from the severe stresses such as blows to the helmet and helmet face guard as are commonly encountered during the game.

As is well known, the helmet 11 includes a shell 13 constructed of any suitable rigid material such as plastic or the like which conforms generally to the shape of the head. Suitable suspension means such as sponge rubber, straps or the like are preferably provided within the interior of the helmet for supporting the helmet on the head and which permit the helmet to move relative to the head such as downwardly in a "recoil" action when force is applied to the helmet. The suspension means may be of any conventional construction and one form includes a head strap 14 positioned within the interior of the helmet and as can be seen centers the helmet 11 on the head.

The helmet is provided with a frontal opening 16 for the player's face across which is positioned a face guard 17 such as a rigid rod formed of a suitable material such as plastic or the like. The guard 17 is secured on opposite sides of the helmet across the face opening 16 by means such as rivets 18. A chin strap 19 is secured at each end to helmet portions 21, 22 which lie over the player's ears and the helmet extends downwardly to a position adjacent the level of the chin to form a bottom edge 23 extending completely around the helmet and terminating adjacent each side of the helmet face opening 16.

As shown in FIGURE 2, the helmet 11 can be distinguished from a conventional helmet by the dash dot line 24 shown therein which dash dot line marks the terminating lower edge of the conventional helmet base. The helmet 11 is extended below the dash dot line 24 as shown to form in a slightly outwardly flaring portion 26 the lower edge of which forms one portion of the helmet continuous lower edge 23. As shown in FIGURE 4 this helmet portion 26 has preferably secured thereto a layer of soft resilient material 27 such as foam rubber or the like to absorb and distribute any force applied by the helmet base to the back of the neck of the player.

It should be understood that although the helmet 11 differs slightly from the conventional football helmet, it is within the scope of the invention to employ a conventional helmet the outline of which is defined by the dotted line 24 as the novel results of the invention can be similarly attained.

Referring now to FIGURES 1, 3, the collar 12 of the invention, which is substantially annular in shape for encircling the neck of the wearer, is preferably contoured along its underside 42 to fit snugly on the shoulders, back and chest of the player so as to be securely supported comfortably thereon. The collar 12 is separated or divided at the front to form corresponding edge portions 32, 33 which can be laced together by means of openings 34 and laces 36 to make it relatively easy for the player to put on and take off the collar.

The collar 12 may be formed from resilient material such as foam rubber or in the form of an inflatable device but in the specific embodiment as shown, the collar 12 is formed of a padded construction including a shell 37 the interior of which is stuffed with suitable material or stuffing 38 and is of substantially wedge-like cross sectional shape. The shell 37 may be of any suitable material such as leather, plastic or the like.

In the preferred embodiment the outer wall 41 of the shell is of a relatively slick material such as leather or the like so as to permit the inner edge of shoulder pads (not shown) worn by the player to contact and slide freely on the surface. The inner wall 42 of the shell is preferably formed of a soft material such as soft leather and may be padded if desired so as to be non-irritating and comfortable to the wearer.

The collar 12 contains an upper edge portion which is arranged in spaced parallel relationship with the lower edge 23 of the helmet 11 when the helmet 11 and collar

12 are worn as shown in FIGURE 1. This permits complete freedom of movement of the player's head. In the specific embodiment illustrated, the upper edge portion of the collar 12 includes a ledge 43 which as shown best in FIGURE 2 slopes forwardly somewhat similar to that of a conventional collar and tapers forwardly towards the opposed edges 32, 33 of the collar.

It should be understood that it is within the scope of the invention to provide a collar having upper edge portions of various configurations but preferably the ledge 43 gives the best results as contemplated by the invention. The ledge 43 is preferably formed of relatively stiff material such as leather or plastic.

In the use of the invention, the collar 12, with the laces 36 loosened or removed, is positioned on the shoulders of the player and the laces 36 tied to hold the collar in the position shown around the neck of the player. If desired, the player may wear an undershirt 44 or the like so that the underside 42 of the collar 12 is in contact with the upper portion of the undershirt. The remaining parts of the football uniform may then be put on including the shoulder pads and the helmet 11. As can be understood, the central opening in the shoulder pads permits the collar 12 to be worn as shown and the edge portions of the shoulder pads defining this central opening may contact the side wall 41 of the collar 12 without injury to the player's neck.

During play, the player is subjected to blows from all directions in the vicinity of the neck and head and typical blow which contributes heavily to neck injuries is shown in FIGURE 4 of the drawing. Here the arm 45 of an opposing player strikes the face guard 17 of the player pivoting the helmet rearwardly as shown.

It is well known physiological fact that the player in body contact sports will instinctly or by reflex action hunch or raise his shoulders when contact is imminent. As can be seen, this hunching of the shoulders raises the collar 12 towards the lower edge 23 of the helmet 11. Furthermore, in many positions of the player such as when he is in a bent forward position the shoulders will rise naturally to move the collar 12 towards the helmet. Thus when the helmet is moved rearwardly as shown in FIGURE 4, the base portion 26 of the helmet strikes the collar ledge 43 so that the force of the blow on the face guard 17 is transmitted to the collar and from the collar to the shoulders of the player avoiding excessive stress on the neck and preventing injury.

As is frequently the practice with a football player, the player intentionally elevates his shoulders to move his shoulders closer to his helmet when anticipating contact and this practice can be employed to advantage in the subject invention. A football player can be trained to use the collar 12 in such a manner so that although reflex action will generally produce the desired function of the invention, the invention can be even more effectively employed when the player intentionally moves the collar upwardly by means of the shoulders closer to the helmet lower edge 23.

It can be seen that the layer 27 of resilient material adds to the traction between the helmet bottom edge 23 and the collar ledge 43 so that slipping between these parts is held to a minimum. The level to which the collar 12 rises is generally indicated by the broken line 46 in FIGURE 2. It should be understood that it is not always necessary that the collar 12 be moved upwardly as described above as frequently the helmet bottom edge 23 will contact the collar ledge 43 even when the collar is in the position of FIGURE 1.

The invention also protects against blows applied to many other parts of the helmet. For instance, when a force is applied to the top of the helmet, the helmet moves downwardly as indicated by the broken line 47 and the collar 12 rising to meet the helmet produces a contact between the collar and the helmet as shown by the dotted lines 46, 47 in FIGURE 2 extending around

the helmet and collar. Blows applied in other areas of the helmet such as a blow to the side of the helmet can similarly produce a contact between portions of the helmet lower edge portion 23 and the collar ledge 43 thereby similarly transmitting the force from the helmet through the collar to the shoulders of the player.

As referred to above, while the invention contemplates the use of the helmet of the type shown including the extended rear portion 26 it is within the scope of the invention to employ a helmet of conventional construction in which the base of the helmet terminates at the point indicated by the dot dash line 24. Contact between the conventionally constructed helmet and the collar is obtained by means of the lower edge portion of the ear covering helmet portions 21, 22 and the collar ledge 43 achieving some degree of protection but not to the extent contemplated by the helmet construction of the invention.

It can be seen that there has been provided with the novel construction of the invention a protecting device for football players and the like which offers outstanding protection to a heretofore neglected area of the body without hampering the player's freedom of movement. The neck collar of the invention permits the force of blows applied to the player's helmet to be transmitted to the shoulders of the player which are capable of absorbing far greater forces than the fragile area of the neck. The striking of the back of the neck by the base of presently employed helmets, a frequent cause of injury, is prevented with the use of the invention and blows applied to other areas of the helmet which heretofore had to be absorbed by the neck are now absorbed by the shoulders. The high incident of injuries to the neck and attendant permanent disability to the player frequently resulting in death can now be prevented so that encouragement to the game is provided so that the sportsmanlike qualities engendered by the game may continue to operate without needless debilitating injuries and fatalities which are being sustained with the use of present day equipment.

While there has been described what at present is considered to be the preferred embodiment of the invention, it will be understood by those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is the aim of the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

Having thus described the invention, what is claimed is:

1. A neck protective device adapted for use with a helmet of the type worn by football players having a bottom edge comprising, an annular neck collar for encircling the neck of a wearer and adapted to lie in supported engagement with the shoulders of a wearer, said collar having an underside adopted to conform substantially to the configuration of the shoulders of a wearer, said collar having a substantially wedge-like cross-sectional shape extending upwardly from a wearer's shoulder when supported thereon to a forwardly sloping ledge positioned substantially below the level of a wearer's chin to provide complete freedom of head movement for a wearer, said collar formed substantially of yieldable material for the cushioning of forces applied thereto and for the protection of the neck of a wearer against shoulder pads worn by a wearer, said neck collar also extending laterally outward from a wearer's neck in said supported position to a distance sufficient to position said forwardly sloping ledge in underlying spaced relationship with said helmet bottom edge when the helmet is worn by a wearer, said collar being interrupted to form a pair of adjacent ends for permitting the collar to be readily placed on the wearer's shoulders, means for securing said adjacent collar ends together, corresponding portions of said helmet bottom edge and said neck collar forwardly sloping ledge adapted to be moved into mutual engagement by an elevation of a wearer's shoulders or a movement of said helmet or by a combination of both said collar and helmet movements whereby a force applied to said helmet is distributed over a wearer's shoulders through said collar and injury to the neck is prevented.

2. A neck protective device adapted for use with a helmet of the type worn by football players having a bottom edge comprising, an annular neck collar for encircling the neck of the wearer, said collar having an outer wall and an inner wall adapted to engage the shoulder area of a wearer for supporting said collar in a neck encircling position, cushioning material in said collar between said inner and outer walls, a substantially flat ledge of relatively stiff material on said collar extending a substantial distance outwardly from said inner wall to said outer wall, said ledge being inclined and tapered forwardly downward in said collar neck encircling position, said ledge in said collar neck encircling position being positioned a substantial distance below a wearer's chin and in underlying spaced relationship with said helmet bottom edge when the helmet is worn by a wearer thereby avoiding interference with a wearer's head movement, corresponding portions of said helmet bottom edge and said collar ledge adapted to be moved into mutual engagement by an elevation of a wearer's shoulders or by a movement of said helmet or by a combination of both said collar and helmet movements whereby a force applied to said helmet is distributed over a wearer's shoulders through said collar and injury to the neck is prevented.

3. A neck protective device adapted for use with a helmet of the type worn by football players having a bottom edge comprising, an annular neck collar for encircling the neck of a wearer, said collar having an inner wall having an upper edge and a lower edge adapted to engage the shoulder area of the wearer for supporting said collar in a neck encircling position with said upper edge adapted to terminate substantially at the base of the neck of a wearer, an upper ledge on said collar extending a substantial distance outwardly from said upper edge, said upper ledge on said collar in said neck encircling position being positioned a substantial distance below a wearer's chin and in underlying spaced relationship with said helmet bottom edge when said helmet is worn by a wearer thereby avoiding interference with a wearer's head movement, an outer wall on said collar extending from said upper ledge in downwardly converging relationship with said inner wall throughout the major portion of said collar, corresponding portions of said helmet bottom edge and said collar upper ledge adapted to be moved into mutual engagement by an elevation of a wearer's shoulders or by a movement of said helmet or by a combination of both said collar and helmet movements whereby a force applied to said helmet is distributed over a wearer's shoulders through said collar and injury to the neck is prevented.

4. A neck protective device adapted for use with a helmet of the type worn by football players having a bottom edge comprising, an annular neck collar for encircling the neck of the wearer, said collar having an inner wall having an upper edge and a lower edge adapted to engage the shoulder area of a wearer for supporting said collar in a neck encircling position with said upper edge adapted to terminate substantially at the base of the neck of a wearer, a substantially flat upper ledge on said collar extending a substantial distance outwardly from said upper edge at an angle relative to said inner wall of less than 90° throughout the major portion of said collar, said ledge on said collar in said neck encircling position being positioned a substantial distance below a wearer's chin and in underlying spaced relationship with said helmet bottom edge when said helmet is worn by a wearer thereby avoiding interference with a wearer's head movement, an outer wall on said collar extending from the outer edge of said upper ledge to the lower edge of said inner wall, corresponding portions of said helmet bottom edge and said collar ledge adapted to be

moved into mutual engagement by an elevation of a wearer's shoulders or by a movement of said helmet or by a combination of both said collar and helmet movements whereby a force applied to said helmet is distributed over a wearer's shoulders through said collar and injury to the neck is prevented.

References Cited by the Examiner

UNITED STATES PATENTS

1,510,187	9/24	Martin	2—44 X
1,537,178	5/25	Maynard	2—3
1,757,019	5/30	Mott	2—2
1,970,130	8/34	Dickenson	2—2
2,634,415	4/53	Turner et al.	2—3
2,867,811	1/59	Jones	2—3
2,939,149	6/60	Morgan	2—3
3,008,464	11/61	Atkins	128—163
3,103,014	9/63	Morgan	2—3

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