Nov. 25, 1952 C. A. CUSHMAN 2,618,780

PNEUMATIC HELMET

Filed July 21, 1950

Fig. 1.

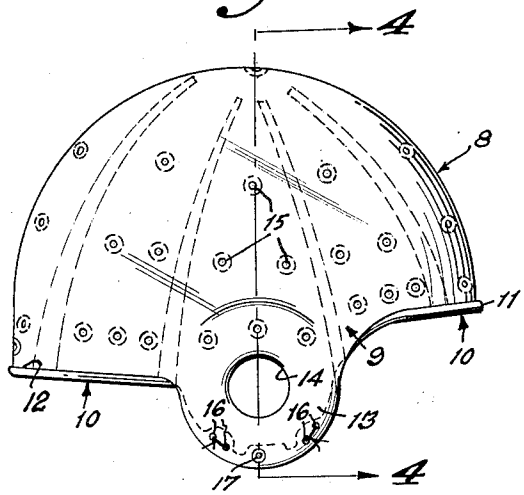


Fig. 2.

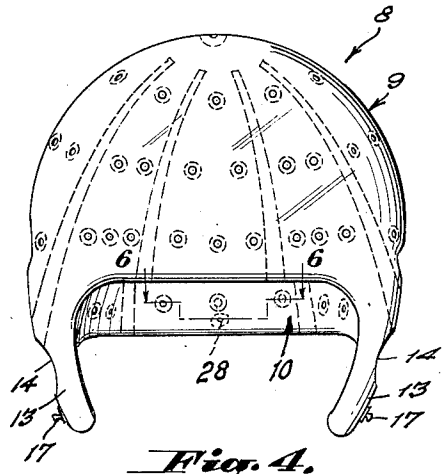


Fig. 3.

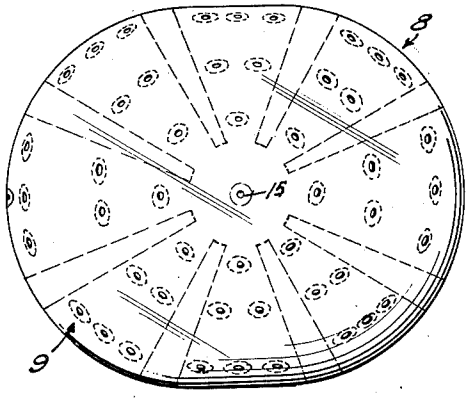


Fig. 4.

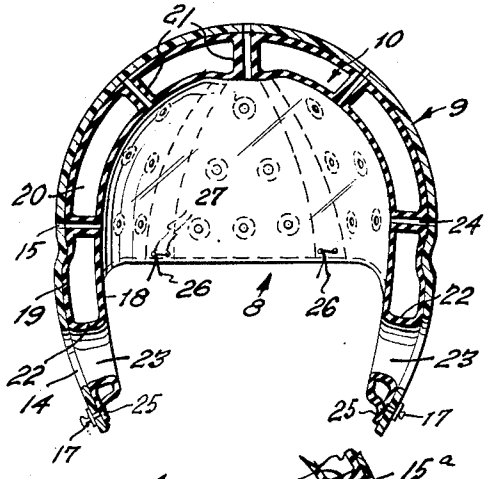


Fig. 5.

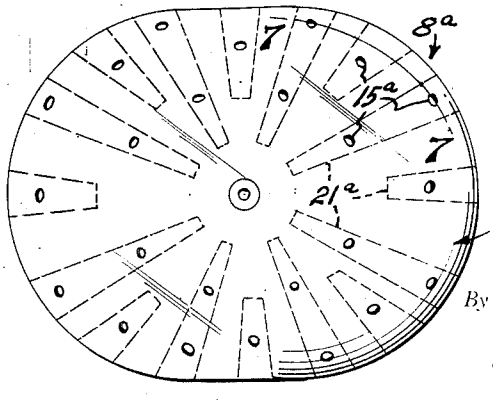


Fig. 6.

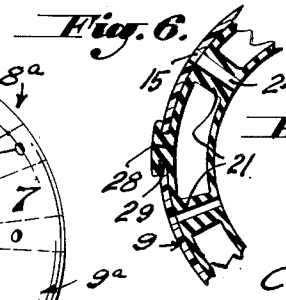
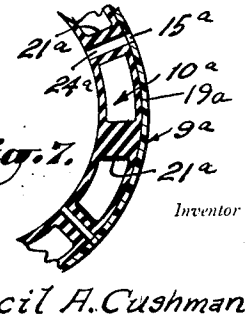


Fig. 7.



Inventor

Cecil A. Cushman

By John N. Randolph

Attorney

Patented Nov. 25, 1952 2,618,780

UNITED STATES PATENT OFFICE

2,618,780

PNEUMATIC HELMET

Cecil A. Cushman, Redlands, Calif.

Application July 21, 1950, Serial No. 175,173

2 Claims. (Cl. 2—3)

1

This invention relates to a novel construction of helmet adapted for use in protecting the head and neck of football players, aviators, race drivers and others requiring a protective helmet.

More particularly, it is an aim of the present invention to provide a helmet which will be lighter in weight than conventional helmets now being worn to protect the head yet which will afford a greater degree of protection.

Still another object of the invention is to provide a helmet which will protect the nose and back of the neck from injuries occurring when a blow is directed toward the front or rear of the helmet as frequently occurs in football and which frequently results in the helmet being thrown forward or backward either injuring the nose or back of the neck.

Still a further object of the invention is to provide a helmet which will afford the maximum protection to the head against a blow or force against the outer side of the helmet and wherein the amount of protection afforded by the helmet may be varied to afford a greater protection in the areas of the head most likely to receive a direct blow.

Still another object of the invention is to provide an inflated or pneumatic helmet whereby the force of any blow directed against the outer side of the helmet will be distributed to an extent over the entire head instead of being borne only in the vicinity of the blow, thereby minimizing the possibility of injury from a direct blow against the helmet.

Still a further object of the invention is to provide a helmet which may be readily accommodated to heads of different sizes by increasing or decreasing the amount of air in the inflated portion thereof.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawing, illustrating presently preferred embodiments thereof, and wherein:

Figure 1 is a side elevational view of one embodiment of the helmet constructed in accordance with the invention;

Figure 2 is a front elevational view thereof;

Figure 3 is a top plan view of the same;

Figure 4 is a cross sectional view thereof taken substantially along a plane as indicated by the line 4—4 of Figure 1;

Figure 5 is a top plan view of a slightly modified form of the invention;

Figure 6 is a horizontal sectional view taken substantially along a plane as indicated by the line 6—6 of Figure 2, and

Figure 7 is a sectional view taken substantially along a plane as indicated by the line 7—7 of Figure 5.

Referring more specifically to the drawing, and

2

first with reference to the embodiment thereof as illustrated in Figures 1 to 4 and 6, the helmet designated generally 8 includes an outer shell, designated generally 9, of a conventional shape, as for example, a shape corresponding to a conventional football helmet, and an inflatable or pneumatic liner, designated generally 10, of substantially the same over-all shape as the shell.

The outer shell 9 may be formed of leather, fiber, plastic or other suitable hard substance but is preferably formed of a relatively hard transparent plastic and is provided with a front edge portion 11 which is disposed above the level of its rear edge portion 12 and between the ends of said edge portions 11 and 12, the shell 9 is provided with ear portions 13 having relatively large openings 14, all as is conventional in football helmets and similar head protective helmets worn by other sports competitors and aviators to protect the head. The shell 9 is also preferably provided with a plurality of vent openings 15, a plurality of lace receiving openings 16, and the ear portions 13 thereof are each preferably provided with a snap fastener portion 17 by means of which a chin strap, not shown, may be detachably connected at its ends to the bottom part of said ear portions 13.

The inflatable liner 10 may be formed of any suitable material which is airtight such as a plastic or rubber, but is preferably formed of a plastic, due to the fact that such material possesses less inherent elasticity than rubber so that the liner will more readily retain its proper shape and thickness. The liner 10 includes an inner wall 18 and an outer wall 19 which walls are connected or integrally formed along the bottom edge of the liner 10. The walls 18 and 19 combine to form therebetween an air chamber 20. The walls 18 and 19 are additionally connected by a plurality of integral portions 21 which extend therebetween and which may be of any desired size and shape and which provide means for properly spacing the wall portions 18 and 19 with respect to one another and so that certain complementary parts of the walls 18 and 19 will be spaced greater distances apart than other portions thereof. The liner 10 is provided with integral annular portions 22 defining openings 23 which extend through complementary portions of the liner 10 and which are adapted to register with the openings 14 of the shell 9. The connecting portions 21 and 22 are so arranged that all portions of the chamber or air pocket 20 are in communication. Some or all of the connecting portions 21 are provided with bores extending therethrough and through the inner and outer walls 18 and 19 to provide vent passages 24 which register with the vent openings 15 of the shell 9. The liner 10 is also provided with flattened edge portions 25 formed by parts of the inner and outer

walls 18 and 19 being secured or sealed together and in which openings are provided which register with the openings 16 for receiving laces 26 by which the liner 10 can be detachably secured in the shell 9. The connecting portions 21 of the liner 10 preferably also include strips which extend from adjacent the top of the liner to adjacent its edge and certain of which strips may also be provided with similar openings 27, as seen in Figure 4, to register with other openings 16 of the shell 9 for receiving additional ties or laces 26. If desired, the liner 10 may be secured to the shell 9 by any other suitable means such as snap fasteners, not shown.

The helmet 8*a* as illustrated in Figures 5 and 7 is substantially identical with the helmet 8 except that the liner 10*a* thereof in lieu of being provided with spacing elements 21 of substantially circular cross section is provided with a plurality of spacing strips 21*a* which extend radially from the edge of the liner 10*a* toward its center or apex, as best seen in Figure 5, and which connecting portions 21*a* are provided with vent passages 24*a* to register with vent openings 15*a* of the shell 9*a*.

The outer wall 19 or 19*a* of the liner 10 or 10*a*, respectively, is provided with an integral valve 28 which extends outwardly through an opening 29 in the rear portion of the shell 9 or 9*a* adjacent its bottom edge. The valve 28 may be of any suitable type preferably corresponding to the valve now conventionally used for bladders of footballs, basketballs and the like and through which an inflating needle is adapted to be inserted for inflating the chamber 20 by means of an air pump connected to the inflating needle, not shown.

It will be readily apparent that the air chamber or pocket 20 of the liner 10 or 10*a* may be inflated to any desired pressure and the thickness of the liner between the outer side of its outer wall and the remote side of its inner wall will vary, after inflation of the liner, depending upon the length or thickness of the spacing elements 21 or 21*a* which are disposed between the inner and outer walls of the liner, so that the inflated liner may be thicker adjacent its top or apex where blows of considerable force are more likely to be received than adjacent its side edge portions where direct blows of great force are less likely to be received.

As best illustrated in Figure 1, the forward and rear edge portions of the liner extend downwardly to below the front and rear edges of the helmet shell and since said edge portions of the liner are inflated they will tend to expand outwardly beneath the front and rear edges of the shell to provide a protective cushion for said edges to prevent the front and rear edges of the shell from injuring the nose or back of the neck of the wearer should a blow be directed against the helmet 8 or 8*a* which would tend to force the helmet down in the front or in the back, respectively. It will also be readily apparent that by varying the extent that the liner is inflated, the helmet 8 or 8*a* may be adapted to properly fit heads of different sizes. The shell 9 or 9*a* is preferably formed of a transparent plastic and the liner 10 or 10*a* of a colored plastic so that the colored liner will be visible through the shell and will constitute the color of the helmet and the color of the liners may obviously be varied, as desired. From the foregoing it will be readily apparent that a helmet of relatively light weight has been provided which will afford the user a maximum of protection to the head, which will function to distribute the force of a blow against the helmet over a greater area of the head, thereby minimizing the effective force of the blow on any particular region of the head due to the cushioning action of the inflated air chamber of the liner, and which will allow the liner to yield inwardly at the point directly adjacent where the blow is received while increasing the air pressure in the remainder of the liner to thereby accomplish the distribution of the force of the blow.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A protective helmet comprising an outer shell and a liner disposed within and detachably connected to said outer shell, said shell being formed of a relatively stiff material, said liner constituting an airtight casing defining an inflated air chamber disposed to line the inner side of the shell and having an inner wall defining a head receiving recess, said inflatable casing including inner and outer walls formed of an inelastic plastic having integrally merging edges and a plurality of internal spacing strips extending between and formed integral with said inner and outer walls and spacing said walls different distances apart in different areas of the helmet whereby the inflated air chamber of said liner includes areas of different thicknesses, said shell having vent openings, said liner having bores extending therethrough and through the spacing strips and disposed in registration with the vent openings of the shell, and said liner casing having bottom edge portions extending to below the bottom front and rear edge portions of the shell and projecting outwardly therebeneath to provide inflated cushioning means beneath said edge portions of the shell and disposed therearound to assist in maintaining the liner correctly positioned in the shell with the bores thereof in registration with the vent openings of the shell.

2. A protective helmet as in claim 1, said spacing strips comprising elongated relatively wide and thick bars each having portions of varying widths and thicknesses, said bars extending upwardly from near the bottom edge of the liner in upwardly converging relationship to one another and terminating below and spaced from the apex of the liner.

CECIL A. CUSHMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,886,551	Jones	Nov. 8, 1932
2,150,290	Mulvey	Mar. 14, 1939
2,194,903	Holstein	Mar. 26, 1940

FOREIGN PATENTS

Number	Country	Date
7,870	Great Britain	1895
260,607	Italy	Oct. 3, 1928