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PROTECTIVE HEADGEAR

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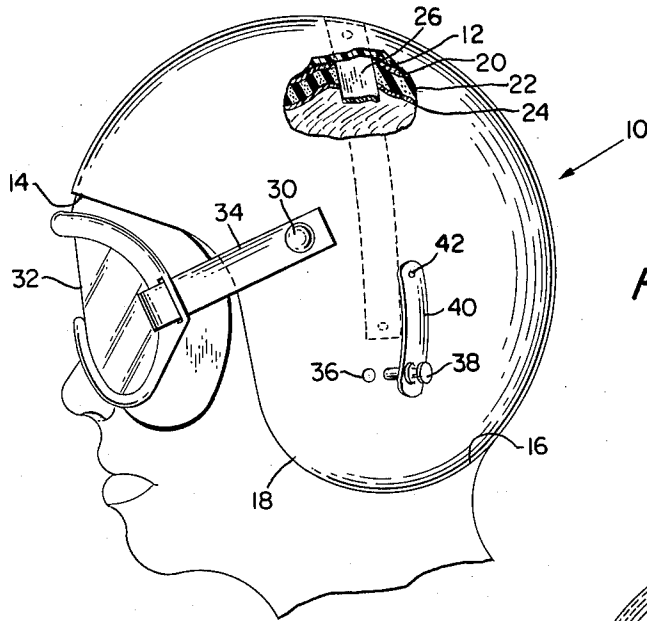


Fig. 1

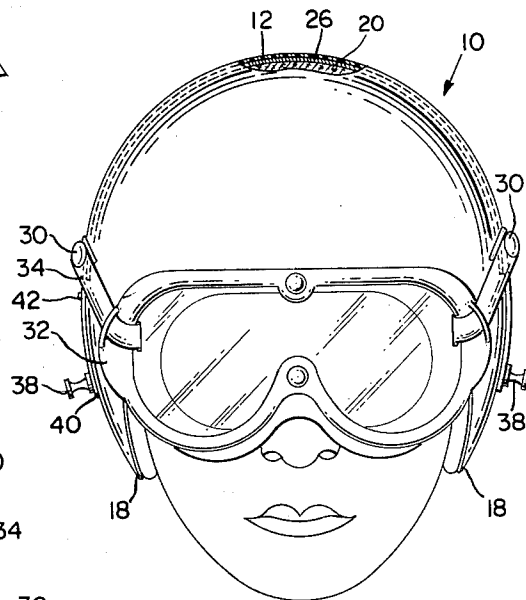


Fig. 2

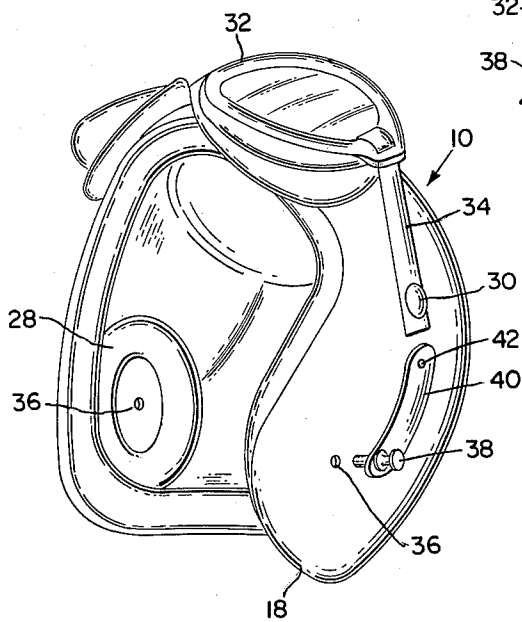


Fig. 3

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PROTECTIVE HEADGEAR

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1 Claim. (Cl. 2—6)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to protective headgear. In a preferred embodiment, the concept is directed to a so-called crash helmet particularly adapted for use by individuals in an environment where they may be subjected to head injuries, such, for example, as on the flight deck of an aircraft carrier.

Many types of protective helmets are now known, these articles invariably incorporating a rigid outer shell designed to intercept a blow directed at the head of the wearer. In order that the energy in this blow be dissipated and its effect thereby minimized, it is necessary that the outer shell be spaced from the head of the wearer. This has heretofore been customarily effected by providing the helmet with a liner of some fabric arranged in the form of a harness or webbing, which allows a certain amount of free movement of the outer shell so that any blow received thereby is largely absorbed and the shock imparted to the wearer reduced. However, the necessary looseness of such a webbing or harness creates a tendency for the individual cords or straps to become entangled, so that in some cases time must be consumed by the wearer in placing this liner in proper condition prior to use. When emergencies arise, the helmet is often worn with the liner so disarranged that it is uncomfortable to the wearer. It would be highly desirable to eliminate this particular portion of the headgear while at the same time retaining its shock-absorbent characteristics.

Another feature of helmets of this general type is that they customarily require a chin strap which the wearer can adjust and thereby preclude the helmet from becoming disengaged when a severe blow is received thereby. The presence of such a chin strap has heretofore been considered as essential despite the fact that an additional movement is required of the wearer to affix it in position. It has been found, however, that this element can be dispensed with, while at the same time ensuring that the helmet remains in place on the wearer even under the most adverse environmental conditions.

In certain situations it is necessary to protect personnel from the effects of extreme noise. For example, on aircraft carriers the flight deck personnel are exposed to the blast of jet engines, and unless some precautions are taken an individual's hearing can be temporarily impaired and possibly permanently damaged. At the present time such personnel are required to wear ear plugs or "ear-phone" type sound attenuators, but these are often uncomfortable and this fact discourages constant use. Some form of simple and effective sound protection which can readily be tolerated by the wearer is therefore needed.

To overcome the above-mentioned disadvantages of known devices of this type, the present concept provides an improved form of protective headgear which is not only of compact design and consequently inexpensive to manufacture, but which also eliminates the necessity for employing a separate fabric liner and in addition is spring-biased to closely conform to the head of the wearer so that it remains in position without a chin strap even when subjected to a strong blow. The protective headgear of the present invention also includes a pair of sound-deadening members which are either formed integrally with the helmet's inner lining or securely affixed thereto so as to obviate the necessity for separate "ear cups."

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Furthermore, these sound deadeners are composed of such a material that they exert no uncomfortable pressure on the head of the wearer even when the helmet is worn for extended periods of time.

One object of the present invention, therefore, is to provide an improved form of protective headgear.

Another object of the invention is to provide a so-called crash helmet adapted to be worn by personnel in an environment where they may be subjected to head injuries, such helmet incorporating therein spring-biasing means for causing the helmet to remain on the wearer without the benefit of a chin strap even under impacts which would otherwise result in the helmet becoming dislodged.

An additional object of the invention is to provide a protective headgear of the type described wherein sound-deadening means is built into the shock-absorbent lining and forms an integral part thereof.

A still further object of the invention is to provide a protective helmet of the type described in which an arcuate biasing member, which in one example may comprise a band of spring steel, is built into the helmet and lies between the inner surface of the rigid shell and the shock-absorbent liner.

Other objects, advantages, and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings, wherein:

FIG. 1 is a side elevational view, partly broken away, of a preferred form of protective headgear designed in accordance with the principles of the present invention, also showing the manner in which a pair of goggles may be detachably secured thereto;

FIG. 2 is a front elevational view of the protective headgear of FIG. 1 showing the manner in which the sides thereof are configured to closely conform to the head of the wearer; and

FIG. 3 is a one-quarter view of the headgear of FIGS. 1 and 2, showing the interior thereof and particularly the manner in which the shock-absorbent material with which the headgear is lined is contoured in thickness, as well as illustrating one of the doughnut-shaped sound attenuators which are intended to overlie the ears of the wearer.

Referring now to the drawings, the invention is illustrated as embodied in a crash helmet of the type particularly adapted to be worn by naval personnel located in the vicinity of aircraft takeoff and landing operations. This crash helmet, generally identified in the drawings by the reference numeral 10, is made up of a thin hard outer shell 12 which is generally contoured to the head of the wearer. Purely as an example, the helmet shell 12 may be fabricated of suitable plastic material or fiberglass. It is desirable that this material of which the crash helmet is made be as light in weight as possible consistent with its property of being resistant to crushing or breakage when a severe blow is received thereby. The shell 12 has a face opening 14 and a neck opening 16 which openings are separated by a pair of curved portions 18 which are designed to respectively overlie the ears of the individual by whom the helmet is worn.

The inner surface of the crash helmet 10 is lined first with a thin layer 20 of cork and then with some suitable compressible substance 22 such, for example, as sponge rubber. The latter possesses the property of absorbing shocks received by the shell 12 before such shocks can be transmitted to the head of the wearer. The compressible substance 22 is covered by a sheet 24 of soft, flexible material such as chamois. The thickness of this shock-absorbent lining varies in order to provide maximum protection to those areas of the wearer's head that are particularly susceptible to injury. For example, the crown possesses an extra layer of sponge rubber, as do those

portions which rest directly on the wearer's forehead, at the back of the wearer's skull, and around the edges of both the face opening 14 and the neck opening 16.

It has been brought out above that one of the principal features of the present disclosure lies in the provision of means for insuring that the crash helmet of the invention remains on the head of the wearer without the use of a chin strap even under the most severe conditions. This is accomplished by the inclusion in the helmet body of an elongated flexible member 26 of such material as spring steel which member also serves to reinforce shell 12. This flexible member 26 is of generally arcuate configuration, and is disposed so as to arch over the crown of the helmet from the region of one ear covering to the other. A preferred location for this member 26 is best shown in FIG. 1, with a portion of the shell 12 being broken away to show the manner in which member 26 lies adjacent the inner surface of the shell 12 and preferably riveted thereto. The tension of the member 26 acts to urge inwardly the two ear-covering portions 18 of the crash helmet so that these portions will fit snugly against the side of the wearer's head. The particular degree of tension possessed by the member 26 is chosen partly in accordance with the head size of the individual to whom the helmet is issued, such that the inward pressure developed by the member 26 is just sufficient to hold the helmet 10 on the wearer's head under adverse conditions while at the same time not being excessive to the point where it would cause the wearer any pronounced discomfort. It will be noted from FIG. 1 that the member 26 does not directly contact the head of the wearer, since it is covered by the shock-absorbent material with which the interior of the crash helmet is lined.

The two sections 18 of the helmet which overlie the ears of the wearer are each provided with an inner sound-deadening member 28 (as best shown in FIG. 3) in the form of a doughnut-shaped ring of some compressible material such as sponge rubber. The rings 28 are of a size to respectively encircle the ears of the wearer and to prevent sound from entering therewithin even when the latter is in the immediate vicinity of a jet aircraft, for example. The ring-shaped members 28 are secured to the helmet lining in any suitable manner, such as by a permanent adhesive, or they may be molded with the lining as a unit.

In many working environments it is necessary that an individual possess eye protection, and this is customarily done by employing goggles formed of some non-shatterable transparent plastic. The present invention provides such eye protection by locating a pair of snap fasteners 30 on the outer shell 12 of the crash helmet 10, to which a pair of goggles 32 may be secured by means of an elastic strap 34. The goggles or eye shields 32 are readily removable from the helmet 10 by disengaging the snaps 30, thereby permitting rapid switching of the goggles in accordance with the particular visibility conditions prevailing at the time.

With many types of previously known headgear, it is necessary for the wearer to remove the helmet in order to receive instructions or other communications given orally. As an alternative, the information could be received by one or more earphones built into the headgear, which of course necessitated the use of a telephone wire. This was frequently inconvenient, and the wire was susceptible of becoming entangled in surrounding equipment. It furthermore required attention from the wearer to ensure he was not exceeding the maximum length of wire available to him. The present concept does away with the limitations imposed by such previous designs by providing means whereby communication with the wearer of the headgear may be carried out without his removing the helmet, while at the same time eliminating the necessity for any electrical equipment. In a preferred design, the helmet 10 has formed therein a pair of openings 36 respectively located in those portions of the shell 12 which overlie the ears of the wearer when the helmet is in position shown in FIGS. 1 and 2. These openings 36 extend through the

liner, so that oral communication may readily be had with an individual wearing the helmet when the openings 36 are unobstructed.

To retain the sound-deadening characteristics of the headgear in environments where the noise level is high, means are provided whereby the openings 36 may be closed by the helmet wearer with a single quick movement of each hand. These means include a pair of ear plugs 38 which are adapted for respective manual insertion in the openings 36, one of the plugs 38 being associated with each opening. As best shown in FIGS. 1 and 3, each ear plug 38 is attached to one end of a flexible band 40 the other end of which is riveted or otherwise secured to the helmet shell 12 at a point designated by the reference numeral 42. The plugs 38 thus hang loosely from the ends of the bands 40, but remain in the immediate region of their respective openings 36 so that, when the occasion arises, the wearer of the helmet need only place each hand in the general vicinity of the openings 36 in order to grasp the plugs 38. Such a design facilitates quick insertion of the plugs 38 into, or removal from, their respective openings as changing environmental conditions may dictate.

It has been found in practice that the protective headgear described herein possesses the additional advantage of precluding the entry of moisture into the interior thereof. This is primarily due to the raised edging of the helmet, which extends completely around the face opening 14 and the neck opening 16. This raised edging, by exerting pressure upon the neck and forehead of the wearer creates a partial vacuum within the helmet which tends to aid the action of the spring member 26 in urging the sides of the helmet toward the head of the wearer and thus assist in maintaining the helmet in position in the face of forces which would otherwise tend to result in its becoming dislodged. Members 28 preclude loss of the partial vacuum when ear plugs 38 are removed.

From the preceding description of applicant's invention, it will be recognized that the herein-described headgear possesses a number of major advantages. The primary benefit which accrues to the wearer of such a helmet is that he is no longer compelled to adjust a chin strap in order to retain the headgear in position. Even without this strap, the presence of the arcuate spring member urges the sides of the helmet into firm contact with the head of the wearer. This action, however, is not so strong as to prevent the wearer from easily removing the headgear by merely placing his hands against the sides thereof and exerting an upward force thereon.

The manner in which the helmet is constructed results in an extremely light weight article which, apart from the goggles (the use of which is optional) is of unitary design with no separate parts which would require adjustment by the wearer. The ring-shaped sound attenuators, which may be formed integrally with the helmet lining, are unusually effective, since they are of such size as to enclose the ears of the wearer and are urged against the sides of the wearer's head by the action of the arcuate spring member. However, the ear plugs provide means whereby communication may be carried out with an individual wearing the helmet of the present invention without requiring that the helmet be removed. By a single quick motion of his hand, the wearer can pull the ear plugs from their respective openings in order to receive oral communications, with the plugs remaining adjacent to the openings so that they may be subsequently reinserted without difficulty. As above mentioned, the goggles are optional, and may be readily connected and disconnected from the helmet by manipulating the snap fasteners. Various forms of eye protection may thus be used in order to adapt to the particular light conditions which prevail.

While it has been mentioned that the lining of the helmet 10 may include some compressible material such as sponge rubber covered by a sheet of chamois, it will be

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recognized that this particular form of construction represents only one manner by which the shock-absorbing action of the helmet can be achieved. If desired, the entire lining may be molded as a single piece for insertion into the shell at the time the headgear is fabricated. Other techniques for lining the helmet are likewise considered to be within the scope of the invention.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

I claim:

In a protective helmet intended to remain in position on the head of a wearer without the benefit of a chin strap in spite of strong forces tending to cause its dislodgement, the combination of:

a rigid shell contoured to conform generally to the head of the wearer, and having face and neck openings as well as curved extending portions respectively designed to overlie the ears of the wearer;

a shock-absorbent liner for said helmet, said liner being securely affixed to the inner surface of said shell so as to cushion blows received by said shell before they can be transmitted to the head of the wearer;

a band of resilient material interposed between the inner surface of said shell and the said liner, said band being generally arcuate in configuration and extending over the crown of said helmet, with the two ends thereof respectively terminating in those regions of the helmet which are intended to overlie the ears of the wearer when said helmet is in place to thereby exert a bias force inwardly and bring the ear-covering portions of said helmet into tight engagement with the sides of the wearer's head;

said helmet lining including a pair of ring-shaped members of compressible material respectively located in those regions of said helmet intended to overlie the ears of the wearer, said ring-shaped members being adapted to respectively encircle the ears of the wearer when said helmet is in position to thereby

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preclude the reception by said wearer of any sounds originating externally of said helmet;

said helmet shell being formed with a pair of openings respectively formed in the said two ear-covering portions thereof, said liner also being formed with a pair of openings extending therethrough and respectively aligned with the openings in said shell to thereby permit passage of sound originating exterior of said helmet to said wearer when said openings are unobstructed;

a pair of ear plugs loosely attached to the outer surface of said shell in the respective regions thereof where said openings are located, said ear plugs being respectively receivable in said openings and being capable of immediate insertion or removal upon manipulation thereof by the wearer of said helmet;

a set of goggles having a pair of straps located on the respective sides thereof, each strap having on its outer extremity one portion of a snap fastener; and a pair of mating fastener portions affixed to the outer surface of said helmet shell and on the respective sides thereof;

whereby said goggles may be selectively attached to, and removed from, said helmet by the wearer thereof upon a connection or disconnection of said snap fasteners.

References Cited by the Examiner

UNITED STATES PATENTS

1,522,024	1/1925	Nixon	2—3
1,879,353	9/1932	Levi	2—6
2,215,198	9/1940	Silbert	2—68
2,753,561	7/1956	Mauro	2—3
2,903,700	9/1959	Finken et al.	2—10
3,186,004	6/1965	Carlini	2—3
3,190,657	6/1965	Johnson	46—90

FOREIGN PATENTS

848,011 9/1960 Great Britain.

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