

May 20, 1952

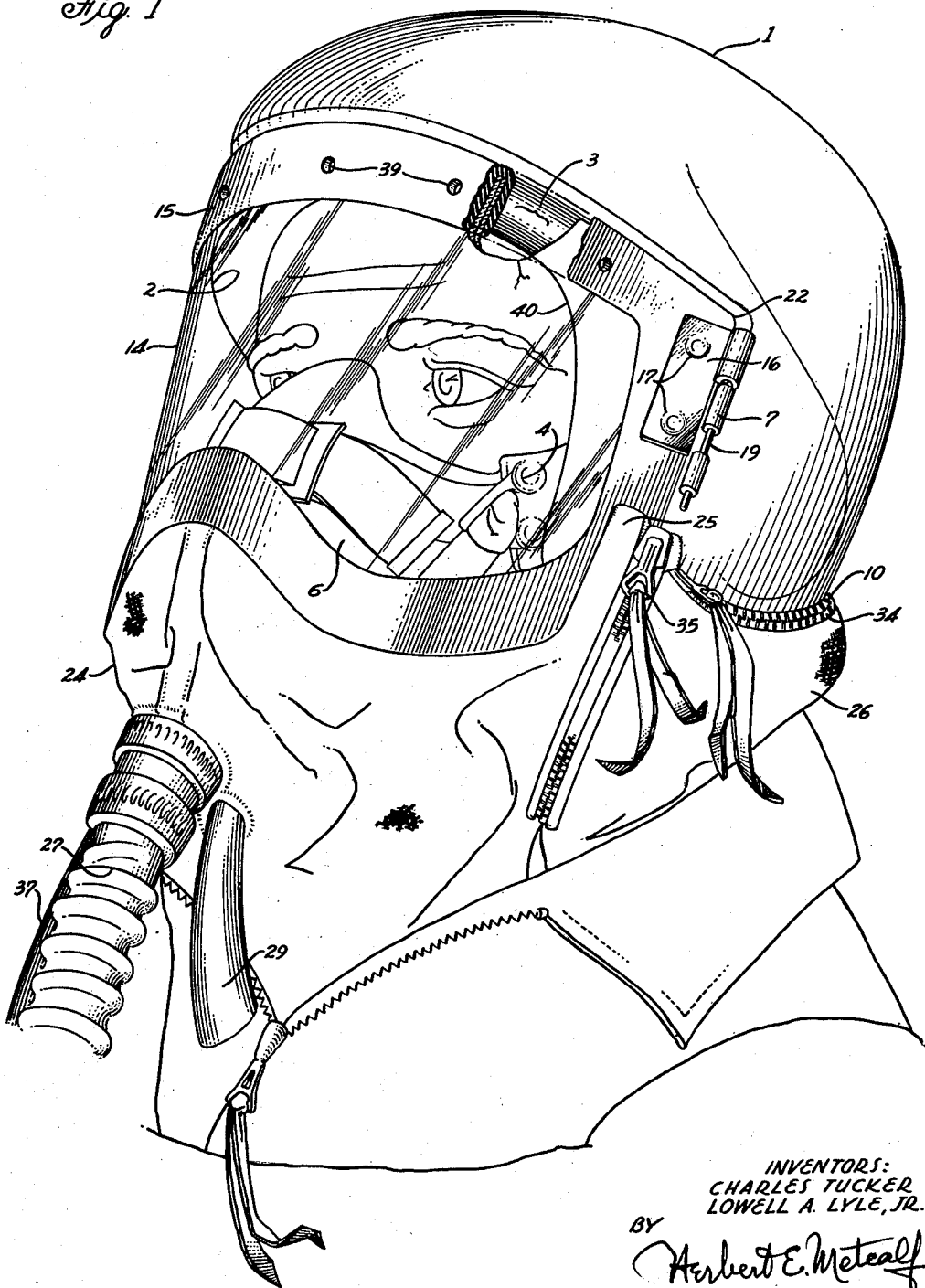
C. TUCKER ET AL
CRASH HELMET

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3 Sheets-Sheet 1

Fig. 1



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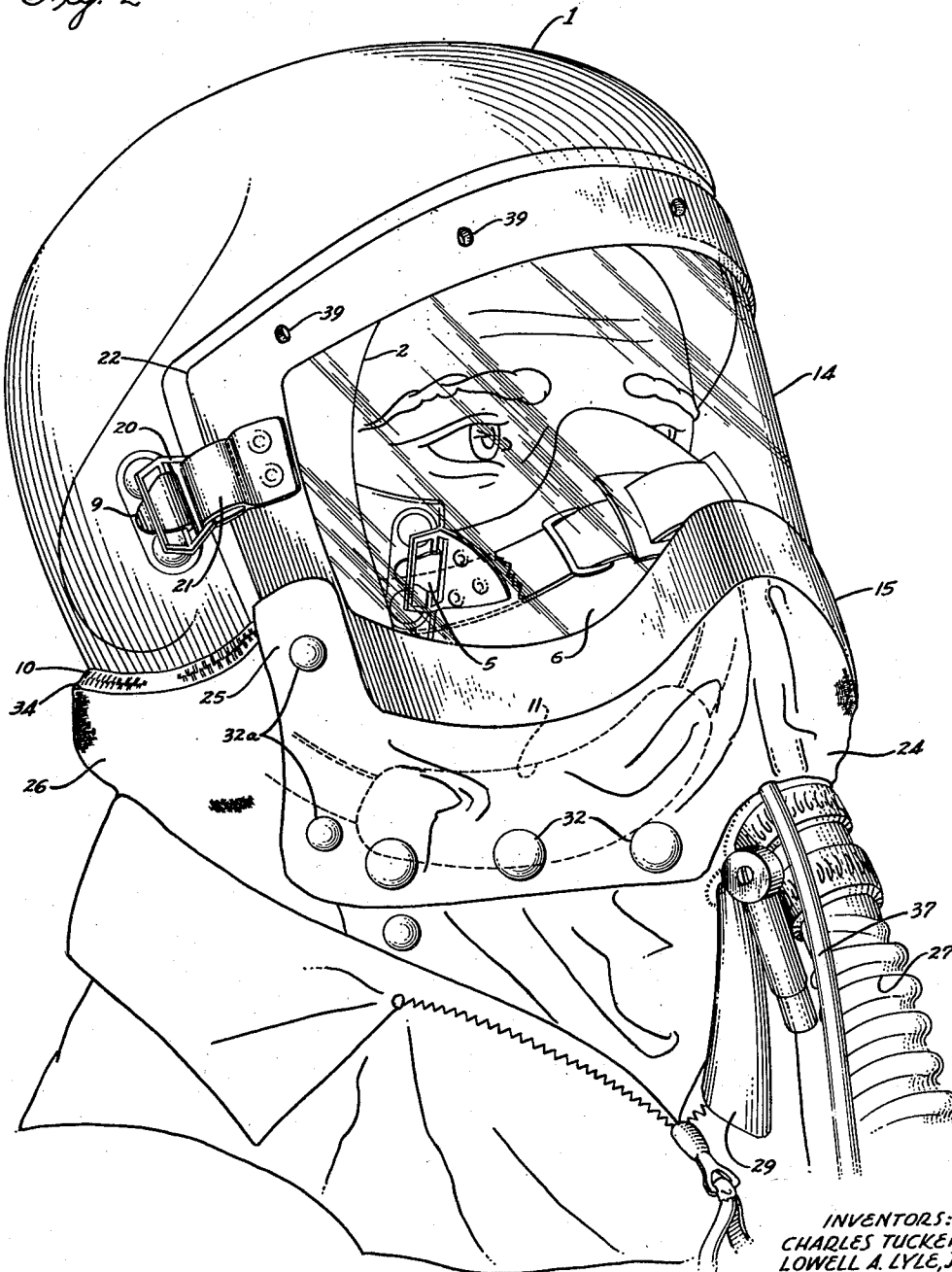
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Fig. 2



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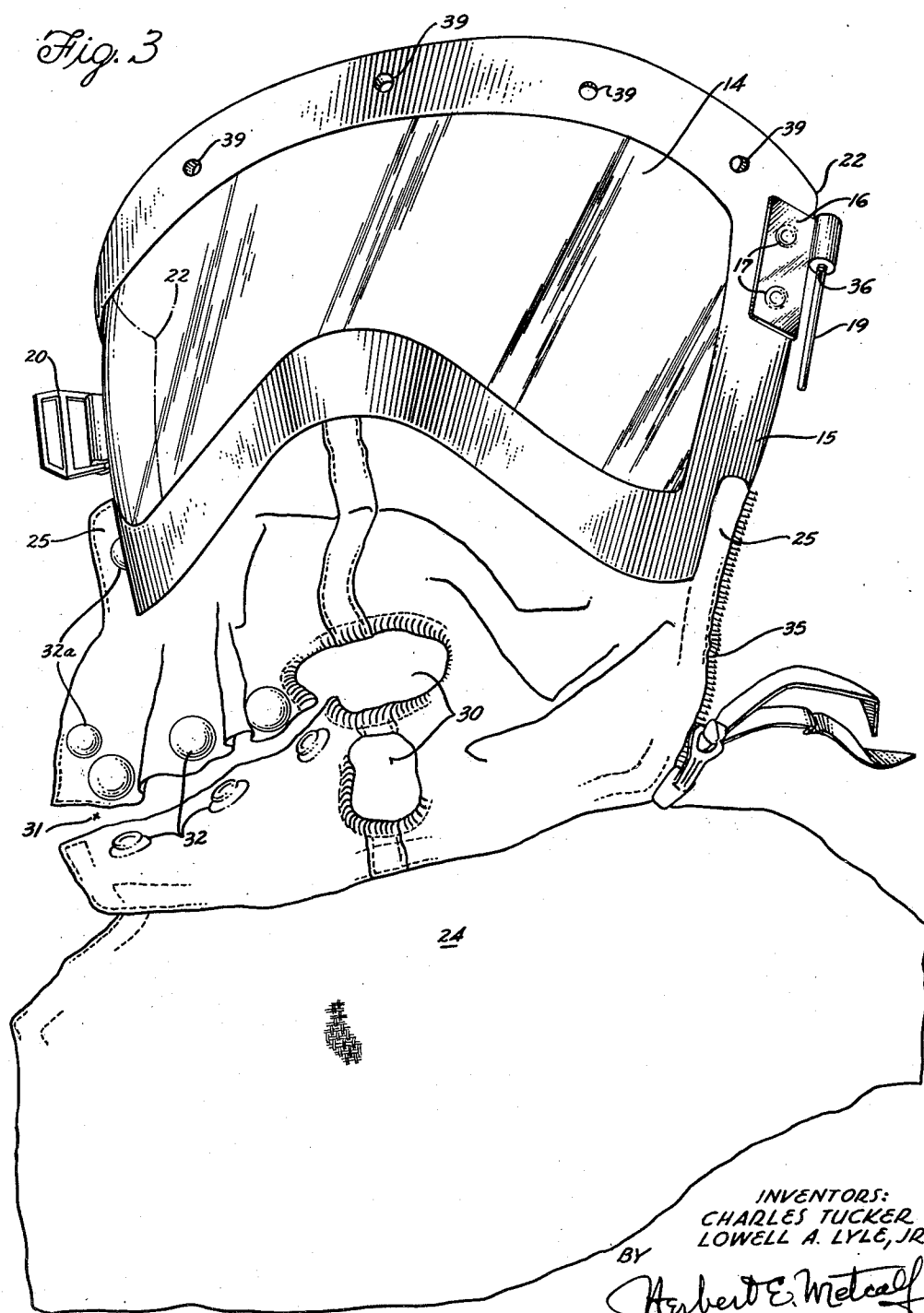
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3 Sheets-Sheet 3



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2,597,764

CRASH HELMET

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2 Claims. (Cl. 2—3)

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Our invention relates to crash helmets, and more particularly to helmets suitable for use by pilots of high speed airplanes equipped with pilot ejection seats.

Modern airplanes capable of reaching airspeeds of 500 M. P. H. or more, are commonly equipped with ejection seats, which, after the cowlings covering the pilot has been jettisoned, can be projected outwardly away from the airplane, together with the pilot.

When ejection occurs at high speeds, the pilot's body is subjected to the forces developed by the airstream, and as far as possible the pilot must be protected from adverse action of these forces. In addition, most high speed airplanes land at relatively high speed and in case of a crash in landing, the pilot's body again must be protected as far as possible from injury. Both of the above procedures can subject the pilot to extremely high decelerations, and it is an object of the present invention to provide a helmet for the use of airplane pilots giving maximum protection to the face of the pilot.

Crash helmets heretofore utilized by the pilots of high speed airplanes equipped with ejection seats, offer good protection to the head and skull of the pilot, but very little protection to the face. The pilot generally wears an oxygen mask and sometimes goggles, both of these devices being supported mainly on the face, and merely positioned by attachment to the helmet.

In case of loads imparted to the pilot in the facial region, the oxygen mask, the goggles, or both could be forced against the face with injurious results. Furthermore, when a pilot is projected into the airstream at high speeds, the airstream usually will hit the pilot in the face. Much of the facial skin area may be exposed even when mask and goggles are worn, and this exposed skin may well be injured upon exposure to airstreams of high velocities. Again, the use of a crash helmet having an open facial portion, permits high velocity air to penetrate between the helmet and the head, tending to tear the helmet from the head. Even if the helmet body attachments are strong enough to resist these forces, the loads created thereby must be absorbed by the pilot's body. The high velocity airstream experienced during ejection from an airplane also tends to tear loose the exposed oxygen mask which is a vital necessity at high altitudes.

It is another object of the present invention to provide a helmet suitable for airplane use providing complete protection around the face, but which at the same time provides adequate vision.

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In cases of emergency during flight which would make any covering over the face a hazard, such as a flash fire, for example, which might blacken the face covering and thus prevent vision through it, it is desirable that the pilot may be able to clear his face of the protector.

It is therefore still another object of the invention to provide a helmet having a transparent load bearing portion that can readily be separated from the remainder of the helmet.

Briefly stated, the helmet of the present invention comprises a hard, strong, and cushioned member generally fitting the head, this member being provided with a facial opening. A detachable transparent shield is bridged across the facial opening in immovable contact with the helmet to form a solid covering over the front, and a suitable cloth member attached to the transparent shield is arranged to complete the enclosure around the wearer's chin and neck. The front cloth member also provides an opening, accessible from one side, for the passage of oxygen tubing to a helmet-mounted oxygen mask for which space is allowed back of the transparent shield.

This invention may be more fully understood from the following detailed description of a preferred embodiment thereof, and by reference to the accompanying drawings, shown by way of illustration and not limitation, wherein:

Figure 1 is a left front perspective view of the present crash helmet, showing the complete assembly.

Figure 2 is a right front perspective view showing further details of the same helmet assembly.

Figure 3 is a perspective view showing the helmet face shield and a front bib attached thereto.

Referring first to Figures 1 and 2 for description of a specific example, the helmet proper comprises an outer shell 1 of hard material and a padded lining 2 contoured to fit the pilot's head. This helmet is preferably constructed to conform to any commonly used type of crash helmet offering good protection to the head, such as an outer shell of laminated glass fabric impregnated with resin, a protective layer of cellular cellulose acetate, a thin padding of sponge rubber, and a lining of sueded leather, for example. At the two sides and top of the facial opening, the outer shell construction provides a recess to form a shield bearing surface 3 which is inset from the exterior surface. The helmet configuration around the facial opening is very important for reasons to be discussed later.

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On the inner side of the padded lining 2, a standard oxygen mask fastener 4 is provided on one side of the facial opening, and an oxygen mask hook 5 on the other side. These fittings allow an oxygen breathing mask 6 to be attached in place over the pilot's nose and mouth when the helmet is worn.

The left side of the outer shell 1 carries a vertical hinge receiver 7 at the rear side of the facial opening and the right side of the outer shell carries a shield hook 9 to the rear of the facial opening. The shield hook 9 may be the same type as the oxygen mask hook 5, for simplicity. A helmet zipper-half 10 is secured around the lower edge of the outer shell 1 for attachment of a cloth bib to be described later. This zipper-half 10 (stitched to a cloth strip) is sewed to the helmet through holes provided therein. A chin strap 11 (Figure 2) is preferably provided on the helmet to fasten under the pilot's chin.

A transparent face shield 14, as shown in Figure 3, is formed of plastic, preferably laminated with two outer layers of 0.1-inch acrylic material and a .05-inch inner layer of buticite to make the shield shatterproof. The edges of the face shield 14 are provided with a rim 15 consisting of glass fiber cloth folded over the plastic shield for equal widths on each side and cemented securely with a suitable plastic cement. This rim 15 prevents the edges of the shield 14 from being chipped, and prevents the formation of cracks which would likely spread across the shield.

On the left side of the face shield 14, a hinge 16 is attached with two rivets 17. The hinge 16 includes a hinge pin 19 aligned parallel with the rear edge of the shield and attached to the hinge 16 at the top only. Thus the face shield 14 is connected to the helmet by inserting the hinge pin 19 into the receiver 7 from the upper end thereof while the face shield is in the open position. The shield is then closed by swinging it to cover the facial opening in the helmet and securing it by means of the shield hook 9 and a shield clasp 20 located at the right-hand rear edge of the shield 14. In the embodiment illustrated, the shield clasp 20 is identical with the oxygen mask clasp, and is attached by a short elastic strap 21 to the face shield 14.

It will be especially noted that when the face shield 14 is in the closed position, it bears solidly on the shield bearing surface 3 around the upper edge and along each side. The forward edge of the outer shell 1 extends farther forward than the usual crash helmet for the purpose of forming a surface which will resist forces tending to deflect, twist, or move the face shield 14 in any direction except toward the open position. A substantially square corner 22 is made at the upper rear sides of the shield to give a tighter, more solid, fit. Also, the shield is thus enabled to rest flush with the outer surface of the shell 1.

To prevent a high velocity airstream from entering under the face shield 14 and tending to blow the helmet or oxygen mask off, a front bib 24 is attached to the lower edge of the shield to be placed under the pilot's jacket. The front bib 24, preferably of nylon cloth, is trimmed to the desired shape along the top and cemented to the fiberglass rim 15, leaving a narrow band 25 unattached at each side, for purposes of flexible attachment to a rear bib 26 when the complete assembly is donned. The rim 15 and the outer shell 1 may now be finished in any desired manner or color.

Provisions for an oxygen breathing tube 27 and

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an exhalation tube 29 to pass through the front bib 24 comprise two holes 30 in the center of the bib, the upper one having access to the unhinged side of the shield 14 by means of a slit 31 carrying snap fasteners 32 on each side.

The rear bib 26, similar to the front bib 24, covers the back of the pilot's neck and is provided with a bib zipper 34 to mate with the helmet zipper-half 10. In addition, extra snap fasteners 32a are installed for a short distance along the right side to fasten to the right side of the front bib 24, and a quick-release zipper 35 is installed near the top of the left side of both the front and rear bibs to close the gap at this point. The lower end of the rear bib 26 is placed under the flying jacket like the front bib 24.

When it is desired to remove the face shield 14 in an emergency, the snap fasteners 32 and 32a are first separated, and the quick-release zipper 35 is pulled apart. The shield is then unhooked and swung open upon the hinge 16. A slight rearward pressure on the shield when in the open position will snap the hinge pin 19 in two at a shallow notch 36 cut out in the pin just adjacent to its attachment to the hinge piece on the face shield 14. The oxygen mask 6 and tubing are left in place when the face shield 14 and front bib 24 only are removed.

Microphone wires 37 going inside the standard oxygen mask C pass through the front bib 24 just adjacent to the breathing tube 27. Earphone connections (not shown) are routed rearwardly and emerge from the back of the helmet near its lower edge. The shape of the helmet over the ears provides for installation of the built-in earphones in the usual manner.

Normal removal of the face shield 14 is also easy to effect, this being accomplished by merely lifting the hinge apart after unhooking the snap fasteners and opening the shield.

As shown in Figure 3, a series of vent openings 39 may be drilled through the upper part of the face shield rim 15. The upper inside portion of this rim 15 fits snugly against the helmet, but the holes are positioned low enough to allow a small air passage where the edge roll 40 of the padded lining 2 curves inwardly. These vent openings 39 help to keep the air temperature behind the face shield 14 from rising a substantial amount above that of the outside air.

Thus it is seen that maximum face protection is afforded with the present crash helmet, the face shield being built to withstand sharp blows as well as preventing high velocity air from injuring the pilot's face or tending to tear the shield and helmet from the pilot's head. It is also to be noted that the helmet is non-metallic in its construction and that no metal is used in the entire assembly except for the small hinge and shield hook, thus making for a safer unit not susceptible to permanent dents or sharp projections in the event of an accident.

Any other style of shield fastener providing quick detachment may be employed within the scope of this invention, as well as modification in the type of emergency release hinge and bib fasteners.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated and desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the

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principle involved or sacrificing any of its advantages.

While in order to comply with the statute, the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise the preferred form of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

What is claimed is:

1. A crash helmet comprising an interiorly padded shock resisting and absorbing outer shell shaped to fit the head of a wearer and having frontal and lateral edges defining a facial opening, said edges being shaped to form a substantially right-angle recess along the exterior limits thereof; a transparent load-bearing face shield covering said facial opening with said recess contacting said face shield along the peripheral extents of the sides and top thereof as well as along the inside border of said sides and top to confine said face shield against inward, upward, and lateral movement, quick-release hinge means securing one side of said face shield in pivotal relationship to said outer shell, latching means at the other side of said face shield to hold said shield closed against said frontal and lateral edges as recited herein, whereby said shield is prevented from deflecting relative to said outer shell, said quick-release hinge means comprising a hinge pin receiver carried by said outer shell and a cantilever hinge pin carried by said face shield and adapted to engage in said receiver for normal installation and removal of said shield, said pin having a frangible portion of reduced diameter adjacent its carrier, whereby said shield may be removed more quickly in an emergency by opening beyond its normal open position to

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snap said hinge pin in two and thereby break the connection at said hinge means.

2. A crash helmet comprising an interiorly padded shock resisting and absorbing outer shell shaped to fit the head of a wearer and having frontal and lateral edges defining a facial opening, a transparent face shield covering and closing said facial opening, quick-release hinge means securing one side of said face shield in pivotal relationship to said outer shell, latching means at the other side of said face shield to hold said shield closed against said frontal and lateral edges, said quick-release hinge means comprising a hinge pin receiver carried by said outer shell and a cantilever hinge pin carried by said face shield and adapted to engage in said receiver for normal installation and removal of said shield, said pin having a frangible portion of reduced diameter adjacent its carrier, whereby said shield may be removed more quickly in an emergency by opening beyond its normal open position to snap said hinge pin in two and thereby break the connection at said hinge means.

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