Dec. 2, 1952 E. HENDLER 2,619,639

PROTECTIVE HELMET FOR HIGH-SPEED AIRCRAFT

Filed Dec. 1, 1949 2 SHEETS—SHEET 1

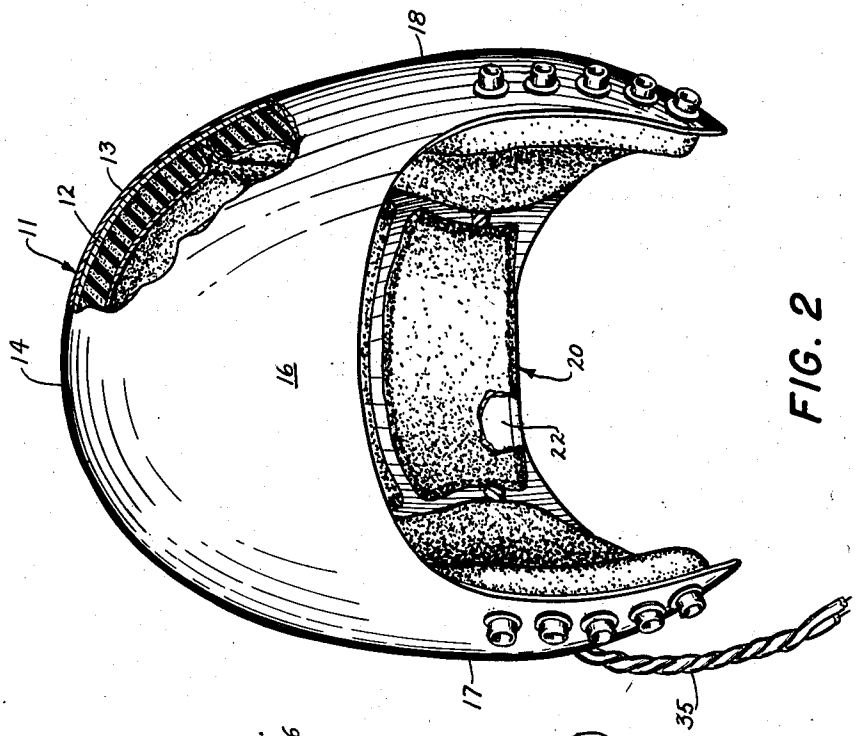

FIG. 2

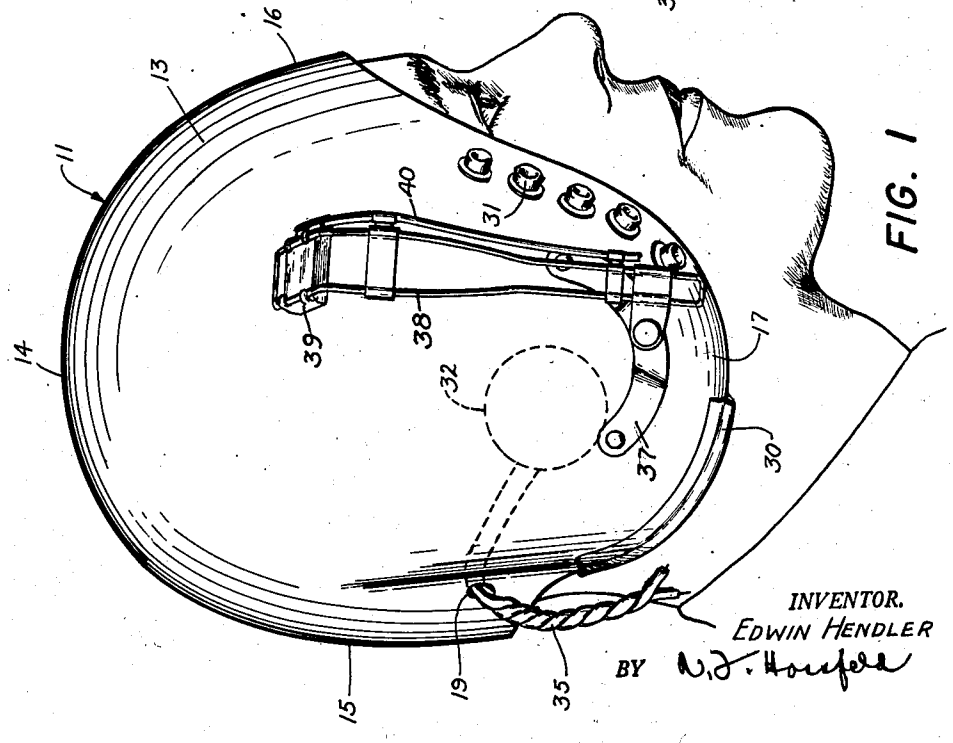

FIG. 1

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PROTECTIVE HELMET FOR HIGH-SPEED AIRCRAFT

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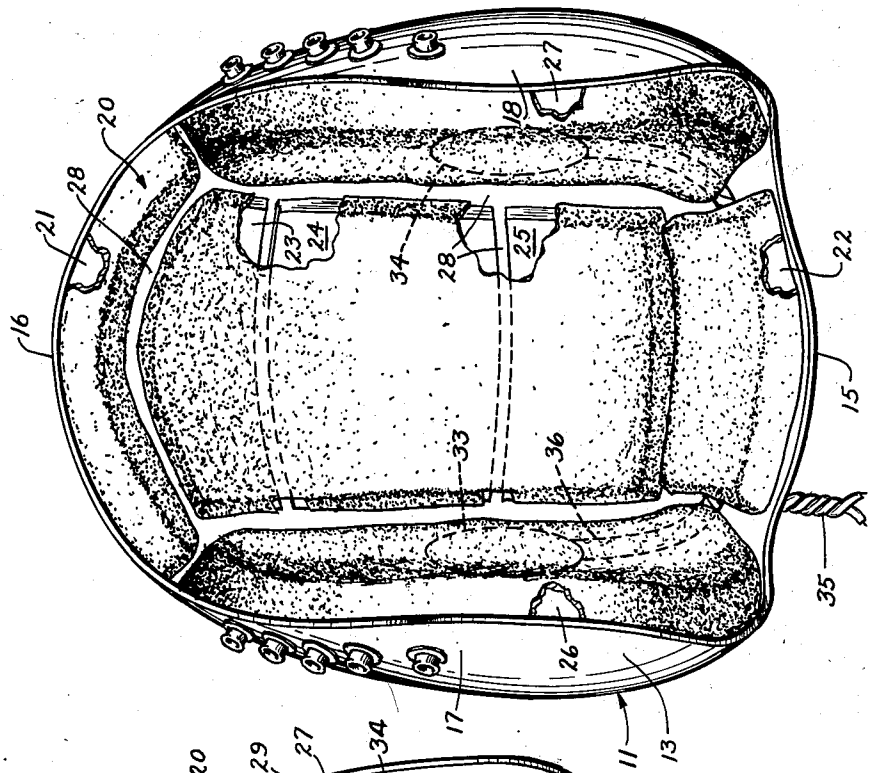

FIG. 4

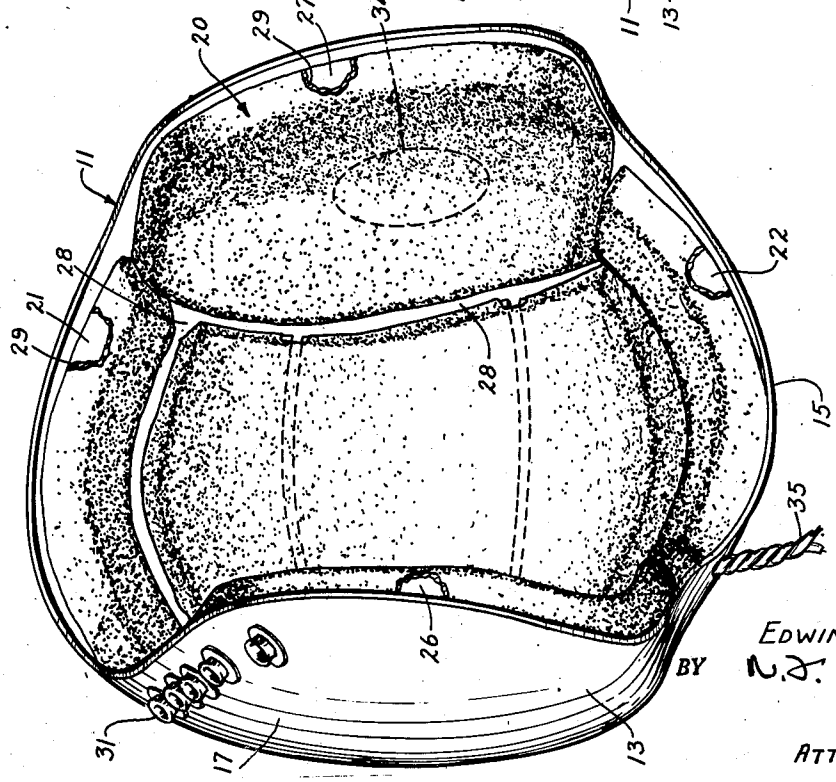

FIG. 3

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PROTECTIVE HELMET FOR HIGH-SPEED AIRCRAFT

Edwin Hendler, Philadelphia, Pa.

Application December 1, 1949, Serial No. 130,576

3 Claims. (Cl. 2—6)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The present invention concerns a protective helmet and in particular concerns a helmet for use by pilots of jet aircraft to protect the head from externally applied forces due to buffeting or crashing and also to protect the head from low temperatures, wind blast and flash burn.

The increasing number of jet planes and other high-speed aircraft has resulted in a growing need for more adequate head protection for those engaged in flying such planes. This type aircraft intensifies the possible effect of head injuries that may occur during accelerated take-offs, violent acrobatic maneuvers, flights through turbulent air masses, attempts at emergency escape and crashes. One method of providing the additional head protection needed is to furnish protective helmets that are able to reduce or eliminate the effects of external forces applied to this most vulnerable portion of the body.

An object of the invention is to provide a helmet having a shell construction of materals highly resistant to externally applied force.

Another object is to provide a helmet having a padding capable of cushioning the head from blows and maintaining the correct position of the helmet upon the head.

Another object is to provide a helmet having an exterior finish that provides thermal protection.

Another object is to provide a helmet having a streamlined shape closely following the contours of the head.

Another object is to provide a helmet having a design and attachments assuring proper integration with other flying gear.

Further objects and advantages of this invention as well as its construction, arrangement and operation are apparent from the following description and claims in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of a preferred form of the helmet.

Fig. 2 is a front elevation of the helmet of Fig. 1 with the microphone attachment not shown.

Fig. 3 is a bottom view of the helmet of Fig. 1 with the microphone attachment not shown.

Fig. 4 is a bottom view partly in section of the helmet of Fig. 1 with the microphone attachment not shown.

There is shown a shell 11 formed of a "fiberglas" base 12 that preferably is laminated in about three complete layers and built up in thickness at the top area to about six layers. Preferably the "fiberglas" is laminated under

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pressure of less than 100 pounds per square inch with polyester resin. "Fiberglas" has a high strength to weight ratio that is in excess of most metals, including stainless steel, aluminum and magnesium. It also has desirable electrical and thermal insulating properties, is weather resistant, has dimensional stability and an impact resistance greater than that of most metals when compared on a strength-weight or equal thickness basis. Because of its resistance to the propagation of cracks, it tends to keep material failures localized. In addition, it has been found to be relatively inert, either within or upon body tissues.

The outer surface of "fiberglas" base 12 is finished with a sprayed coat of white lacquer 13. The external finish of the helmet shell is of considerable importance in determining thermal protection afforded to the head of the wearer. The white lacquer sprayed helmet is very effective in terms of percentage insulation and reflection and in terms of quantity of radiation absorbed. In addition, the white exterior surface reduces radiant heat absorption from the sun, while permitting longer wave length radiation to the cold sky or surroundings. The helmet offers excellent thermal protection relative to the high temperatures in the cockpits of jet planes.

The shape of the shell 11 is such that it closely follows the general contours of the head. Shell 11 has a crown 14, back 15 extending to the bottom of a wearer's skull, front 16 to cover a wearer's forehead, and sides 17, 18 that depend to cover a wearer's ears. A small outlet hole 19 is provided in back 15 to receive a headset cord 35 thereinafter described. The shape of helmet shell 11 is an important factor in determining its reaction to wind blast. In addition, the shape of shell 11 bears a definite relationship to its bulk, its integration with other flying gear and its esthetic attraction to the wearer. Because the helmet fits the head closely with contours following the general shape of the head it offers less resistance to wind blast than a helmet seated loosely upon the head and having prominent bulges over the ears. In the limited space of the modern cockpit, any reduction in the bulk of flight clothing, and especially in that of a protective helmet, facilitates and augments the otherwise restricted movements of the pilot. The weight of shell 11 is about 0.5 pound. The maximum external dimensions of shell 11 are about 8.2 inches width,

about 8.9 inches height and about 9.0 inches from front to back.

Mounted on the inside of "fiberglas" base 12 by means of suitable adhesive is padding 20 that preferably is formed of foam rubber. Padding 20 comprises a plurality of discrete elements and preferably there are provided front 21, back 22, middle elements 23, 24, 25 and sides 26, 27. Adjacent elements are spaced from each other to form ventilating channels 28 about 0.5 inch or more in width. Exposed surfaces of the discrete elements are covered with chamois skin 29. Preferably middle elements 23, 24 and 25 are covered with a single piece of chamois skin 29 that is open at the ends of the ventilation channels 28. Preferably front 21, back 22 and sides 26, 27 are covered with individual pieces of chamois 29. The foam rubber used in padding 20 is a material of light weight capable of cushioning the head from blows and providing an elastic covering that readily follows the contours of the head. The chamois skin that covers the foam rubber padding 20 is used to absorb sweat and prevent any untoward reaction of the skin when the helmet is worn for extended periods of time. The arrangement of the discrete padding elements inside the shell is designed adequately to protect as much of the head as possible and still maintain ventilation channels. Those channels that are between the discrete elements that are adjacent the rim of the shell 11 communicate with the outer atmosphere. (See Fig. 4.) The padding also serves as a support for the headset receivers and their connecting cord. If desired, ventilation through channels 28 can be aided by forming openings (not shown) from channels 28 through shell 11.

A black rubber beading 30 is cemented around the entire edge of shell 11 as a protection for the wearer and to aid in anchoring the helmet on a wearer. Male snaps 31 are provided for attachment of an oxygen mask.

Mounted in recesses 32 in side pad elements 26 and 27 are headset radio receiver elements 33 and 34 connected by a cord 35. Cord 35 extends in grooves 36 formed in side pad elements 26, 27 and back pad elements 22, and passes through outlet hole 19 in shell 11.

Riveted on the exterior of shell 11 is an anchor plate 37 upon which is swingably mounted an extensible boom 38 carrying at its extremity a microphone 39 provided with a cord 40.

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 claims the invention may be practiced otherwise than as specifically described.

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.

I claim:

1. A helmet comprising a thin, light, rigid shell of laminated "fiberglas" shaped closely to the contour of a human head, said shell having an even outer surface substantially free from bulges,

a smooth coating of white lacquer on the outside of said shell; a plurality of discrete foam rubber pads on the inside of said shell, including a pair of substantially oval pads adapted to cover a wearer's ears, a substantially rectangular front pad adapted to cover a wearer's forehead, a substantially rectangular top pad adapted to cover the top of a wearer's head, and a substantially rectangular back pad adapted to cover the back of a wearer's head, and a covering of chamois skin on the exposed surfaces of said pads, said pads being spaced from each other to form a plurality of intercommunicating ventilation channels.

2. A helmet comprising a thin, light, rigid shell of laminated "fiberglas" shaped closely to the contour of a human head, said shell having an even outer surface substantially free from bulges, a smooth coating of white lacquer on the outside of said shell, a heavy beading of rubber covering the entire edge of said shell; a plurality of discrete foam rubber pads on the inside of said shell including a pair of substantially oval pads adapted to cover a wearer's ears, a substantially rectangular front pad adapted to cover a wearer's forehead, a substantially rectangular top pad adapted to cover the top of a wearer's head, and a substantially rectangular back pad adapted to cover the back of a wearer's head, a covering of chamois skin on the exposed surfaces of said pads, said pads being spaced from each other to form a plurality of intercommunicating ventilation channels.

3. A helmet comprising a thin, light, rigid shell of laminated "fiberglas" shaped closely to the contour of a human head, said shell having an even outer surface substantially free from bulges, a plurality of discrete foam rubber pads on the inside of said shell, including a pair of substantially oval pads adapted to cover a wearer's ears, a substantially rectangular front pad adapted to cover a wearer's forehead, a substantially rectangular top pad adapted to cover the top of a wearer's head, and a substantially rectangular back pad adapted to cover the back of a wearer's head, said pads being spaced from each other to form a plurality of intercommunicating ventilation channels.

EDWIN HENDLER.

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