April 7, 1964 O. SCHUELLER 3,127,616

TRANSPARENT HEMISPHERICAL HELMET FOR PRESSURIZED SUIT

Filed Nov. 14, 1962 4 Sheets-Sheet 1

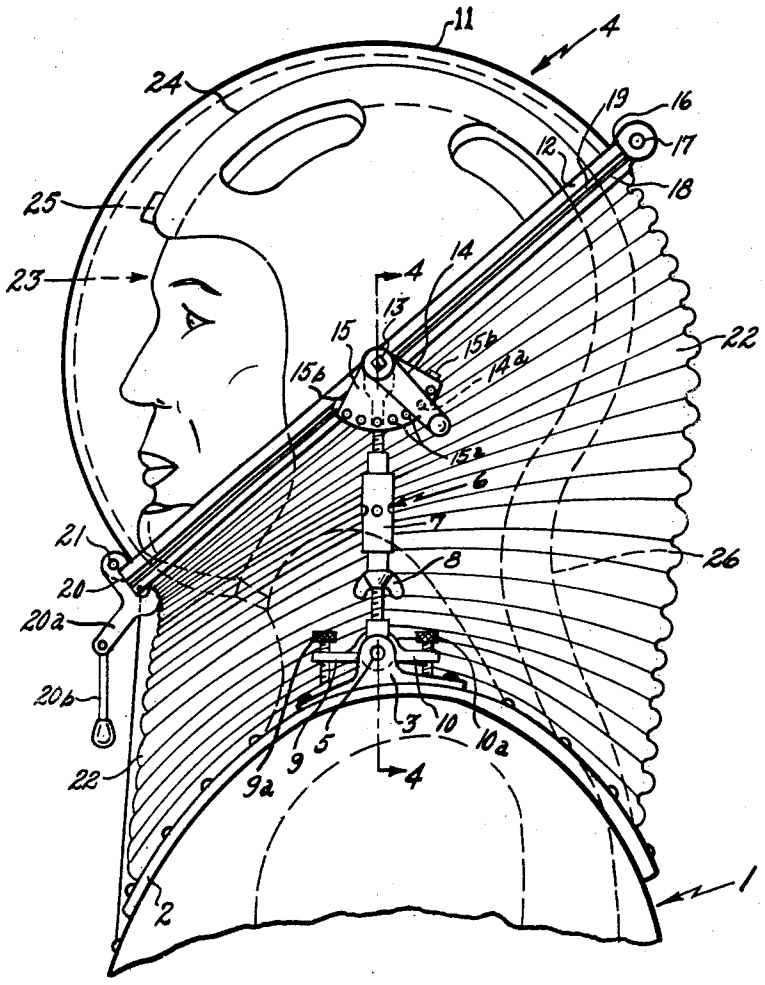


Fig-1

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TRANSPARENT HEMISPHERICAL HELMET FOR PRESSURIZED SUIT

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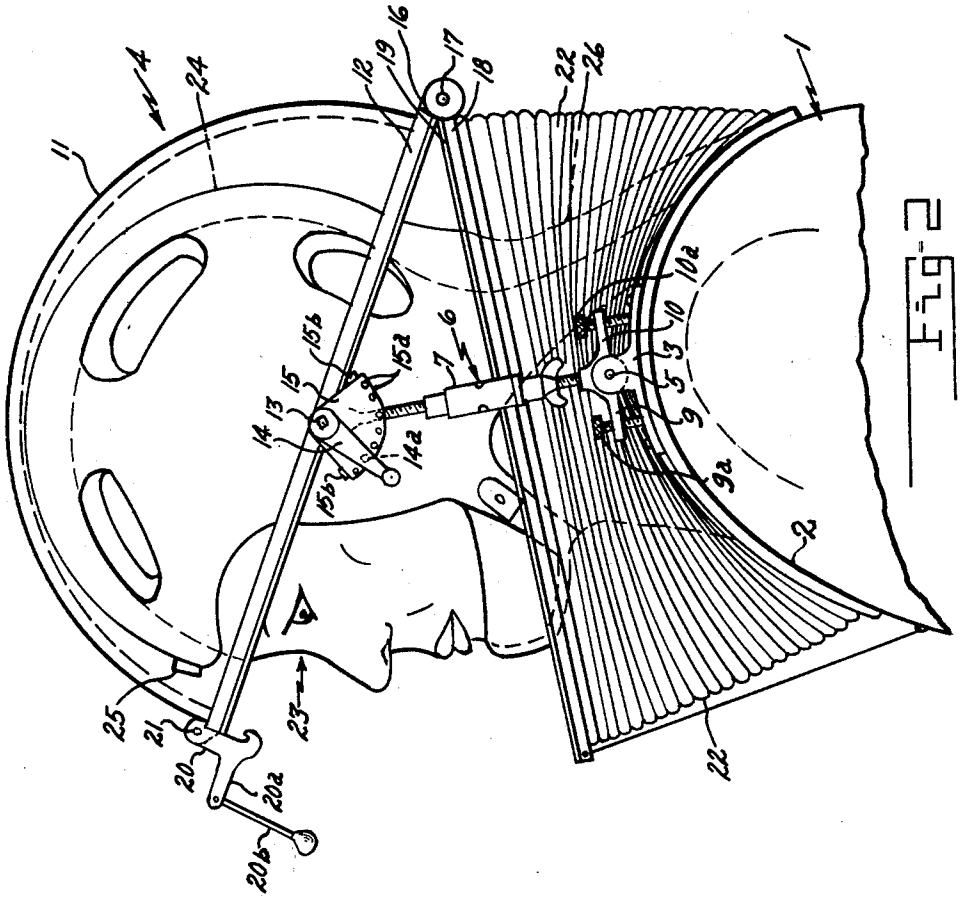


Fig. 2

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TRANSPARENT HEMISPHERICAL HELMET FOR PRESSURIZED SUIT

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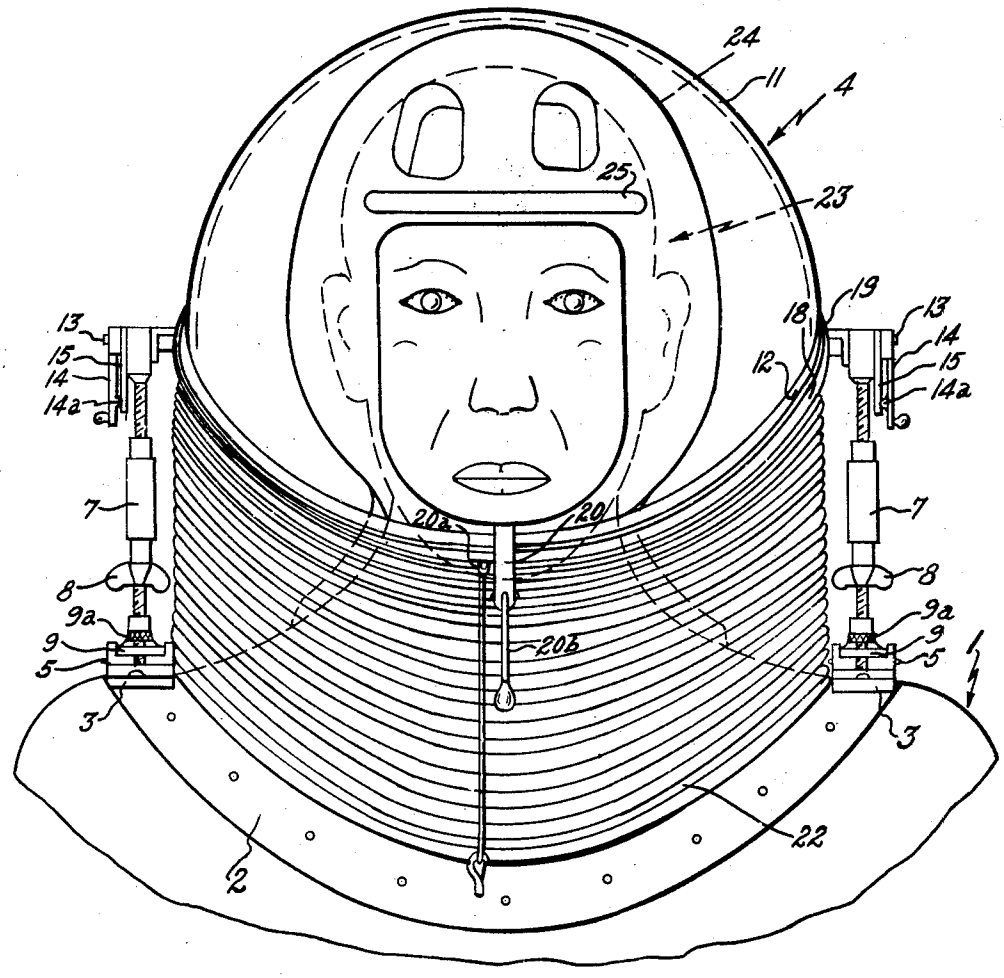


Fig-3

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TRANSPARENT HEMISPHERICAL HELMET FOR PRESSURIZED SUIT

Filed Nov. 14, 1962 4 Sheets-Sheet 4

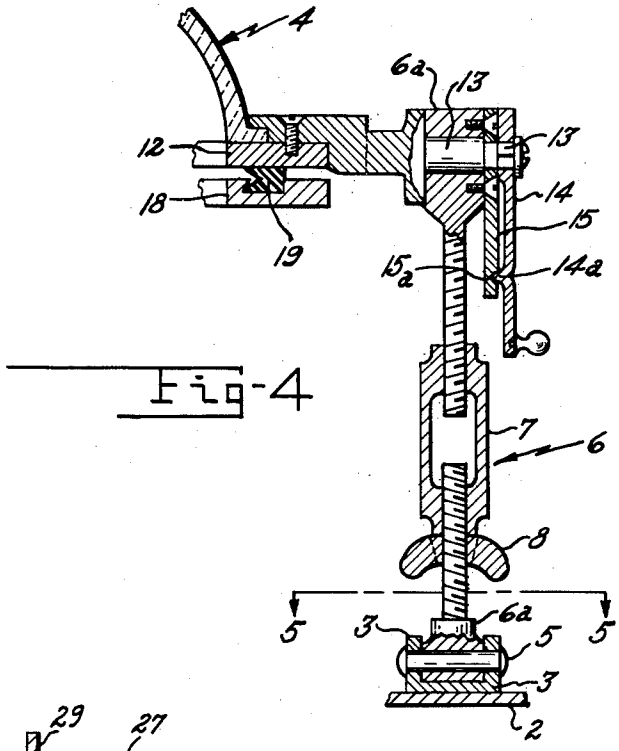


Fig-4

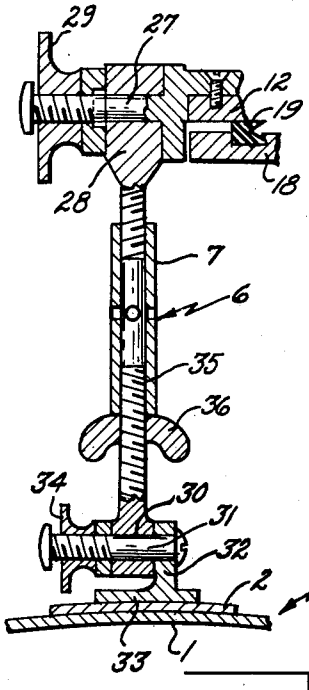


Fig-6

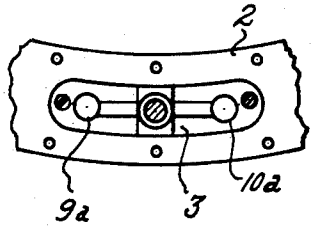


Fig-5

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United States Patent Office 3,127,616 Patented Apr. 7, 1964

3,127,616

TRANSPARENT HEMISPHERICAL HELMET FOR PRESSURIZED SUIT

Otto Schueller, Dayton, Ohio, assignor to the United States of America as represented by the Secretary of the Air Force

Filed Nov. 14, 1962, Ser. No. 237,773
12 Claims. (Cl. 2—6)
(Granted under Title 35, U.S. Code (1952), sec. 266)

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

This invention relates to aviator's pressurized suits and, more particularly, to improvements in helmets for pressurized suits and the like, and has for an object the provision of the advantages of the former fully transparent hemispherical "fish-bowl" types of helmets with those of the present visored pressure suit helmets, and the elimination of their deficiencies.

The first fishbowl types of pressure suit helmets permitted free head mobility inside, together with a wide visible field of view, however, they could not be opened and attempts to provide means for opening them by providing hinges at the rear neck portion resulted in an undesirable increase in height and bulk when opened, which would have necessitated the provision of an increase in the height in the cockpit enclosures for pilots using them.

An object of the present invention therefore is the provision of a hemispherical or "fishbowl" type of helmet for pressurized suits which provides for maximum unobstructed visibility in substantially all directions, together with an arrangement for opening the helmet without increasing the overall height at the top when open or closed.

A further object of the invention includes the provision of means, in an openable type of fishbowl helmet, which provides greater safety and comfort with an improved vertical visual field and the elimination of the problem of "sizing" and change in the overall height when open, together with a reduction of cost over conventional helmets, particularly the fishbowl types.

A further object is the provision of an openable fishbowl type of helmet in which means are provided for adjustably and pivotally supporting a transparent hemispherical fishbowl portion thereof in predetermined elevations above the shoulders of the wearer, in which the transparent fishbowl portion is tiltable on an axis extending substantially through the diameter of the fishbowl portion, transverse to the fore and aft directions, relative to the wearer.

A further object is the provision of a fishbowl type of helmet having a substantially hemispherical transparent upper portion including transversely spaced pivotal supporting means at the diametrical opposite sides thereof for supporting the transparent fishbowl portion in predetermined spaced tiltable relation to and above the shoulders of the wearer for fore and aft tilting movement about the axes of said transversely spaced pivotal supporting means, relative to the head of the wearer, and the provision of a flexible neck enclosure portion between the base of the transparent hemispherical fishbowl portion and the top portion of a pressure suit to permit said fore and aft tilting adjustment of said hemispherical transparent upper portion.

Another object includes the provision of an annular rigid reinforcing ring member secured to the base of said upper transparent hemispherical portion, and a lower complementary annular rigid reinforcing ring member secured to the upper end of the flexible neck enclosure portion and disposed for movement into annular sealing contact with the first-mentioned reinforcing ring member, with the provision of means for releasably securing the first-mentioned annular ring member to the complemental ring, whereby the transparent upper hemispherical portion and the complemental annular ring member may be separated to open the helmet.

A still further object of the invention includes the provision of pivotal connecting means between the rear portion, relative to the head of the wearer, of the annular reinforcing ring member on the base of the upper transparent hemispherical portion and the rear of the lower complemental ring member, together with latch means between the front portions of the rings for releasably holding the ring members in contiguous sealed relation, whereby the lower complemental ring member may be lowered and the upper hemispherical portion tilted rearwardly about its transversely spaced pivotal supporting means to open the helmet.

A further object is the provision of longitudinally adjustable rigid supporting link means between the opposite shoulder portions of the suit of the wearer and the opposite sides of the annular reinforcing ring member on the upper hemispherical portion which are pivoted at their lower ends for fore and aft swinging adjustment adjacent the shoulder of the wearer and pivoted at their upper ends to the opposite sides of the upper annular reinforcing ring member on the base of the hemispherical fishbowl portion to provide for fore and aft bodily adjustment of the fishbowl portion and fore and aft tilting adjustment thereof about the axes of the transversely spaced pivot means thereon.

A still further object includes the provision of annular resilient sealing means between the adjacent faces of the upper and lower annular reinforcing ring members.

Still another object includes the provision of position adjusting means between the upper ends of the transversely spaced link members and the upper annular reinforcing ring member for releasably holding the upper annular ring member in different adjusted planes relative to the longitudinal axes of the link members, and the provision of adjustable positioning means between the lower ends of the link members and the opposite shoulder portion of the pressurized suit, for adjusting the link members to dispose the longitudinal axes thereof in different fore and aft adjusted angular relations, for adjustably displacing the pivotal axis of the fishbowl portion to different fore or aft positions relative to the head of the wearer.

Other objects and advantages of the invention will become apparent from the following description and accompanying drawings in which like reference characters refer to like parts in the several figures.

FIG. 1 is a side elevation of the upper portion of a pressure suit, illustrating my improved hemispherical transparent openable fishbowl type helmet incorporated thereon, showing the helmet in closed position.

FIG. 2 is a similar side elevation showing the helmet in open position.

FIG. 3 is a front elevation, showing the helmet in closed position.

FIG. 4 is a fragmentary detail sectional view of the left hand portion of my improved helmet device, taken about on the plane indicated by line 4—4 in FIG. 1, looking in the direction of the arrows.

FIG. 5 is a fragmentary detail sectional view of one form of fore and aft angular adjustment means for the transversely spaced supporting link members, taken about on the plane indicated by line 5—5 in FIG. 1, showing a portion of the annular shoulder engaging band at or for the upper portion of a pressurized suit.

FIG. 6 is a fragmentary vertical sectional view through one of the link members showing a slight modification of the adjustment features thereof between the upper ends

thereof and the shoulder band 2 and the reinforcing band at the base of the fishbowl hemisphere 11.

Referring to the drawings, the reference numeral 1 denotes the shoulder or upper portion of a pressure suit having a neck and head receiving opening therein which is surrounded by a form-fitting flat annular band 2, extending fore and aft, from the chest to the back of a wearer and conforming substantially to his shape, particularly over the shoulders, the band 2 being securely fastended and sealed to the neck opening of the suit portion 1.

At the transverse sides of the band 2, substantially at the top portion of the suit, over the shoulders of a wearer, are spaced brackets 3, preferably bifurcated, which carry and support my improved transparent hemispherical or fishbowl helmet member, indicated generally at 4.

Pivoted at 5 on each of the transversely spaced brackets 3 is an upstanding axially adjustable link member 6, somewhat similar to turnbuckles, having a turnbuckle portion 7 rotatable thereon for lengthening or shortening the link members, together with a jam nut or other means 8 for retaining the axial or longitudinal adjustment after it has been made. The helmet supporting link members are also angularly adjustable fore and aft, relative to the head of the wearer by any suitable means, for example, forwardly and rearwardly extending arms 9 and 10 may be provided at the lower pivotal end of the link members 6, each having an adjusting screw, such as 9*a* and 10*a*, with their lower extremities engaging or impinging the opposite ends of the brackets 3 substantially as shown, or single ear brackets may be used to which the links are pivoted and the pivot pins provided with a tightening wing or thumb nut at one end, for friction tightening the lower ends of the links against the sides of the upstanding ears of the brackets.

The upper ends of the adjustable supporting link members 6 each have pivot bearings 6*a* formed thereon, on which is supported for tilting movement a hemispherical transparent upper or fishbowl member 11, disposed for tilting in a fore and aft plane relative to the wearer, being tiltable about an axis extending diametrically across the base of the hemispherical fishbowl and through the pivot bearings 6*a* aforesaid.

An annular or circular reinforcing ring 12 is secured and sealed to the base or periphery of the fishbowl member 11, having oppositely extending trunnion members 13 which extend into the pivot bearings 6*a*, such as shown in FIG. 4. The outer end of one (or both) of the trunnion or shaft members 13 has fixed thereon a spring detent arm or lever 14, extending downwardly as shown, for manual tilting adjustment of the inclination of the fishbowl supporting ring 12, the detent arm 14 having a suitable slight projection 14*a* for detaining engagement in spaced detent depressions 15*a* between stop lugs 15*b* on the segmental plate 15, which is fixed to the upper end of the link member 6. Outward movement of the lower end of the spring arm 14 disengages the projection 14*a* from the depression 15*a* whereby the fishbowl supporting ring 12 may be tilted about the axis of the trunnions or shafts 13 to tilt the fishbowl 11 through any desired angle, such as, for instance, shown in FIG. 1 or 2.

The rear (central) portion of the upper or fishbowl supporting ring 11 is provided with a bracket extension 16 on which is pivoted at 17 a lower or complemental sealing ring 18, the adjacent faces of the upper ring 12 and the lower ring 18 being disposed to substantially lie in contacting relation with each other when the helmet is closed, as seen in FIG. 1, or to separate from each other about the pivot 17 (when released) and the upper ring is tilted clockwise and the lower ring 18 is dropped downwardly about the pivot 17, as seen in FIG. 2.

An annular pressure seal 19, for instance an O-type ring is suitably carried by one or the other of the upper or lower ring members 12 or 18 to provide a pressure seal between the adjacent contiguous faces thereof when the helmet is closed.

At the front side of the helmet opposite the pivot bracket 16, a manually releasable snap latch member 20 is pivoted at 21 to the upper or fishbowl reinforcing and supporting ring member 12 for latching engagement, substantially as shown, with the lower annular ring member 18. This latch member 20 is preferably spring tensioned and has an operating handle or arm 20*a* to which may be attached a lanyard 20*b* for convenient release actuation by the wearer.

Suitably sealed at its lower end to the neck opening of the suit 1 or the annular shoulder supporting band 2, is a flexible reinforced annular neck enclosure member or collar 22 which is also securely fastened and sealed to the lower annular or circular ring member 18, it being somewhat accordian pleated to permit flexibility and tilting of the ring 18, tilting of the fishbowl member 11 on its trunnion pivots 13 when the helmet is closed, as well as fore and aft bodily adjustment of the fishbowl due to angular adjustments of the link members 6 about their pivots 5, and also provides for vertical adjustments of the fishbowl structure 4 due to axial adjustment of the turnbuckle portions 7 of the link members 6. The neck enclosure member or collar 22 is sealed pressure tight against the escape of pressure from within the suit 1 and is preferably provided with annular reinforcing wire rings to prevent radial expansion of this neck portion by internal pressure within the same.

In the drawings, the reference numeral 23 denotes the head of a wearer or aviator having an antibuffeting cap 24. Also, the cap may be provided with a simple windshield wiper 25 for defogging the helmet to the extent that fogging is not prevented by a stream of dry oxygen guided through suitable distributor nozzles located in the forward lower part of the fishbowl portion 11 and supplied from a suitable source through a perforated conduit extending around the inner lower front portion of the fishbowl member 11. The wearer's neck may also be protected by a cushion extension, such as indicated at 26. Also, the fishbowl and neck portions are preferably large enough to provide space for an oxygen mask to be worn by the aviator and tilting of the head in the helmet.

Vertical vision field is widely increased by turning or tilting the fishbowl portion on the pivots or trunnions 13, also the vision may be additionally extended by fabricating the encircling neck portion 22 of a transparent impervious material such as, for instance, Mylar. Also, it can be designed as a bendable joint by using convoluted or one way stretch material. Also, the fishbowl 11 can be made of soft transparent material as well as laminated Plexiglas and can additionally be protected against damage by a wire screen. A slight modification of the pivotal supporting vertical adjustment means is shown in the sectional view of FIG. 6 in which the fishbowl trunnions or pivots are indicated at 27 and pass through eyes in the upper ends 28 of the turnbuckles 6*c*, the trunnions 27 being screw threaded at their outer ends to receive clamping thumb nuts 29.

The brackets 33 for the lower eyes 30 are journalled on trunnions or bolts 31 passing through upstanding arms 32 on the brackets or plates 33 which are fixed over the shoulders of the wearer, on the annular shoulder plate or band 2, the trunnions or bolts 31 being fixed against rotation in the arms or plates 32. The outer ends of the trunnions or bolts 31 are threaded and receive clamping thumb nuts 34.

The fishbowl 11 is thus frictionally held for resistive tilting by the nuts 29, while the turnbuckle link members 6*c* are frictionally held against fore and aft angular adjustment on the brackets 32 by the nuts 31, and rotative adjustment of the turnbuckle portion 35 permits vertical adjustments of the fishbowl portion to different elevations for wearers of different heights, the tightening of the jam nut 36 securing this adjustment. Splined washers may be

splined on the trunnions or shafts 27 and 31 (not shown) to prevent undesired release or reduction or tightening of the clamping pressure of the nuts 29 and 34 during tilting movement of the fishbowl 11 and/or fore and aft adjustments thereof.

It will be observed from FIGS. 1 and 2 that the fishbowl or transparent hemispherical portion 11 may be rocked about the side pivots 13, or opened, without a change in the overall height of the structure, also the overall height of the structure is adjustable for pilots or wearers of different heights by the turnbuckle members 7, and the fishbowl portion may be moved forwardly or aft for the convenience of the wearer.

By release of the latch 20 and elevation thereof, the ring 12 can be tilted as the lower ring 18 drops, to open the helmet as seen in FIG. 2. Also, the interior of the helmet, as seen in FIG. 3, is conveniently large enough to easily permit rearward and transverse rotative head movement of the head of the wearer, whereby vision in almost any direction is possible with the helmet closed or open.

Having thus shown and described my invention in connection with one embodiment for exemplary purposes, it is obvious that minor variations may be made therein over those specifically shown and described without departing from the spirit and scope of the invention as it is defined in the following claims.

I claim:

1. A transparent helmet for pressure suits and the like comprising, a substantially hemispherical imperforate transparent head enclosure portion for receiving the head of a wearer therein having an annular base portion, pivot means at the opposite sides of said base portion of said hemispherical enclosure for tilting adjustments thereof in a fore and aft plane, relative to the wearer, elongated supporting means at opposite sides of said base portion and the said fore and aft plane, pivoted to said annular base portion and extending downwardly therefrom, means at their lower ends for connection to the opposite sides of the shoulder portions of the pressure suit, an annular flexible imperforate neck enclosure portion connected to the said base portion and extending downwardly therefrom adapted to be connected to the shoulder portion of the pressure suit to permit said fore and aft tilting movements of said transparent hemispherical enclosure about the axes of said pivot means.

2. A fishbowl type openable helmet and supporting means therefor for connection to the shoulder portion of a pressure suit comprising, a transparent upper hemispherical head enclosure, an annular reinforcing ring member sealed to the periphery of the base portion of said hemispherical head enclosure, transversely spaced link members each pivoted at one end to said annular supporting ring member at opposite sides thereof, extending downwardly in spaced parallel relation at opposite sides of said hemispherical head enclosure, means at the lower ends of said link members for pivotal connection thereof to the top of the opposite shoulder portions of a pressure suit at opposite sides of a neck opening therein, a complemental annular ring member pivoted to said reinforcing ring member for downward swinging movement away from said reinforcing ring member in a plane substantially normal to a plane through the pivotal axes between the reinforcing ring member and the link members to permit downward swinging movement of said complemental ring member away from said reinforcing ring member, to open the helmet, releasable fastening means between said ring members for retaining said ring members in adjacent contiguous relation to close the helmet, annular sealing means between the ring members, a flexible imperforate annular neck enclosure member sealed at one end to said complemental ring member adjacent the periphery thereof, to receive the lower portion of the head and neck portion of the wearer, extending downwardly from said complemental ring member adapted to be connected in sealed relation at its opposite end around the neck enclosure opening at the shoulder portion of the pressure suit.

3. In a pressure suit having a shoulder portion formed with a wearer's head and neck receiving opening therein, an encircling supporting shoulder band extending around said opening adapted to rest over the chest, shoulders and back of the wearer substantially conforming to the shape thereof, transversely spaced link members pivoted to said band over the shoulder portions thereof for parallel swinging adjustment in fore and aft directions, relative to the wearer, a transparent hemispherical fishbowl helmet portion having a base pivotally connected to the upper ends of said link members at opposite sides of said base portion of the said hemispherical helmet portion for fore and aft tilting adjustments about the axis of the latter pivotal connections, an annular complemental reinforcing ring member complementary to said base portion for sealing engagement therewith, pivoted to said base portion at the aft side thereof for downward swinging movement of said complemental reinforcing ring member away from said base portion to open the helmet portion, releasable securing means between said base portion and said complemental ring member at the fore side thereof for releasably retaining said complemental ring member in contiguous sealing contact with said base portion, a flexible extensible tubular pressure tight neck enclosure member having an upper end periphery secured and sealed to the peripheral portion of said complemental reinforcing ring member and having a lower peripheral end portion secured and sealed to said suit around the periphery of said head and neck receiving opening therein.

4. An openable head and neck enclosure for pressure suits substantially as set forth in claim 3, in which the base portion of the hemispherical transparent head enclosing helmet portion includes an annular reinforcing ring member to which the upper ends of said link members and the complemental reinforcing ring member are pivoted.

5. An openable head and neck enclosure for pressure suits as set forth in claim 4 in which said link members are longitudinally adjustable to raise or lower the pivotal connections between the upper ends of the link members and said base portion, relative to the shoulder portion of the suit.

6. In a transparent hemisperical helmet for suits as set forth in claim 5, including adjusting means between the upper ends of the link members and the base portion for retaining the transparent hemispherical portion in adjustable tilted positions.

7. In a device as set forth in claim 6, including means between the lower ends of the link members and the encircling supporting shoulder band for swinging adjustments of said link members in fore and aft directions relative to the shoulder portion of said encircling band, to adjust the position of the transparent hemispherical fishbowl helmet portion in fore or aft directions.

8. A hemispherical transparent fishbowl type helmet and supporting means therefore comprising, a transparent hemispherical fishbowl type head enclosure, pivot means depending from the diametrical opposite sides of the periphery of said head enclosure for tilting adjustments thereon, adapted to support the hemispherical head enclosure in predetermined spaced relation above the shoulders of a pressure suit, a flexible tubular neck enclosure member having an upper periphery at one end secured to the periphery of said hemispherical head enclosure and a lower periphery at its opposite end adapted to be secured around the head and neck receiving opening in a pressure suit.

9. A hemispherical transparent fishbowl helmet and adjustable supporting means therefor comprising, a transparent hemispherical fishbowl type head enclosure, extensible supporting means depending from the diametrically opposite sides of the periphery of said hemispher-

ical head enclosure for swinging adjustments thereon in fore and aft directions in adjustable spaced relation above the shoulder portions of a pressure suit, connecting means at the lower ends of said extensible supporting means adapted to be connected to the shoulder portions of a pressure suit for predetermined vertical adjustment of said transparent hemispherical head enclosure above the said shoulder portions of said pressure suit, and a flexible, extensible tubular neck enclosure member adapted to receive the head of a wearer therethrough having an upper periphery secured to the aforesaid periphery of said transparent hemispherical head enclosure and a lower end periphery adapted to be secured to the shoulder portion of a pressure suit around a head and neck receiving opening therein.

10. A transparent hemispherical fishbowl helmet and adjustable supporting means therefor comprising, a transparent hemispherical fishbowl type head enclosure having an annular reinforcing ring member secured around the base of said transparent hemispherical head enclosure, a second complemental reinforcing ring member pivoted at one side to the first-mentioned reinforcing ring member, said ring members having annular complemental adjacent faces, sealing means carried in one of said faces for sealing engagement with the other face when the ring members are brought together, releasable securing means between the sides of said rings opposite the pivotal connection between said rings for separating the two rings from each other to open the helmet, longitudinally adjustable elongated supporting link means pivoted at their upper ends to the opposite sides of the first-mentioned reinforcing ring member in substantially 90° angular relation at opposite sides of the pivotal connection between the rings, and extending downwardly at opposite sides of said hemispherical head enclosure, pivot means at the lower ends of said longitudinally adjustable elongated supporting link means adapted to be secured to the opposite shoulder portions of a pressure suit, having a head and neck receiving opening therebetween, and a flexible longitudinal extensible tubular neck receiving and enclosing member having an upper end periphery secured to said complemental ring member in sealed relation and extending downwardly between said adjustable elongated supporting link members having a lower end periphery adapted to be secured and sealed to the shoulder portion of the pressure suit around the periphery of the head and neck receiving opening in the suit.

11. A transparent hemispherical fishbowl helmet and adjustable supporting means therefor substantially as set forth in claim 10, including adjustable retaining means between the pivotal connections between the upper ends of the adjustable elongated supporting link means and the reinforcing ring member around the base of the transparent hemispherical fishbowl head enclosure, for releasably retaining said fishbowl head enclosure in different tilted positions against unintentional tilting movement thereof.

12. A transparent hemispherical fishbowl helmet and adjustable supporting means therefor substantially as set forth in claim 11, including adjusting means between the lower ends of the longitudinally adjustable supporting link means and the pivot means at said lower ends thereof for adjusting the link means in fore and aft directions relative to the shoulder portions of the suit and releasably retaining said adjustments, whereby said hemispherical head enclosure is tiltably adjustable, bodily adjustable in fore and aft directions, and in elevation relative to the shoulder portions of a pressure suit on which the same is mounted.

No references cited.