

Dec. 7, 1965

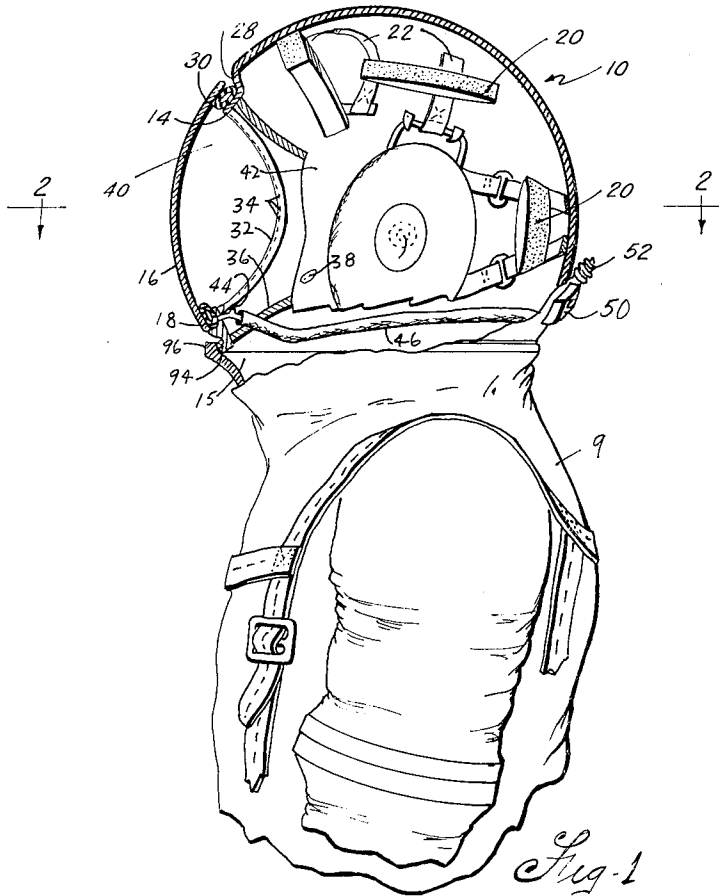
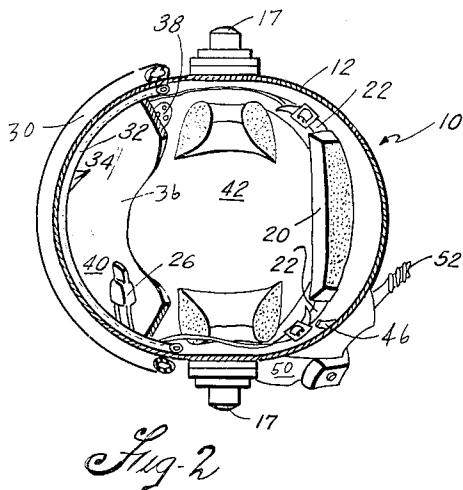
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3,221,339

NECK SLEEVE FOR CONNECTING A HELMET TO A LIFE VEST

Original Filed Oct. 25, 1962

3 Sheets-Sheet 1



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Fig-5

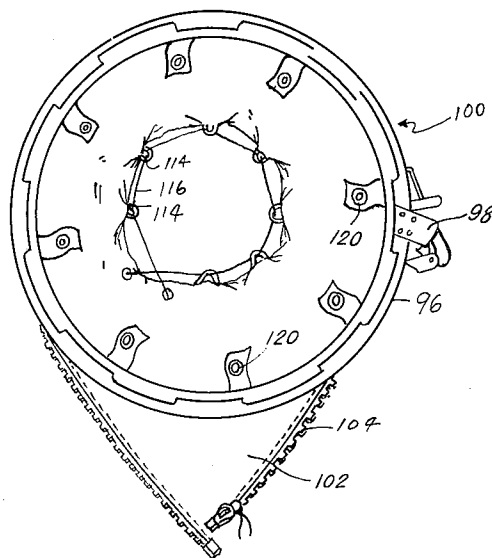
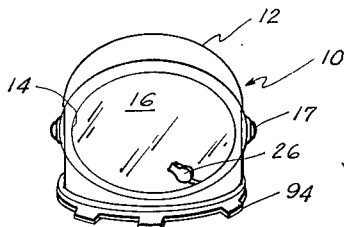
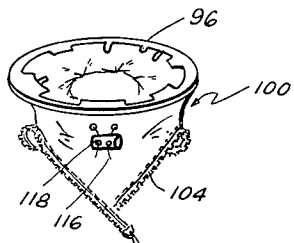
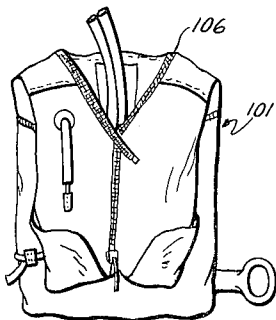


Fig-3

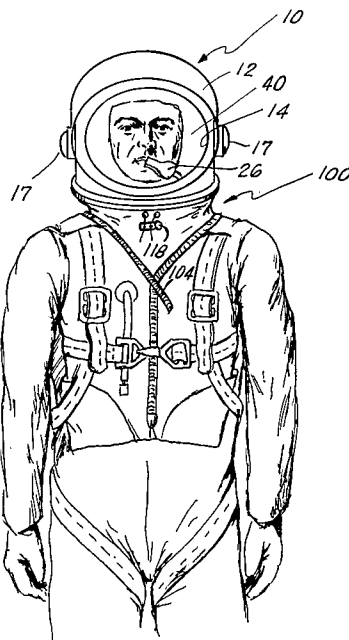


Fig-4

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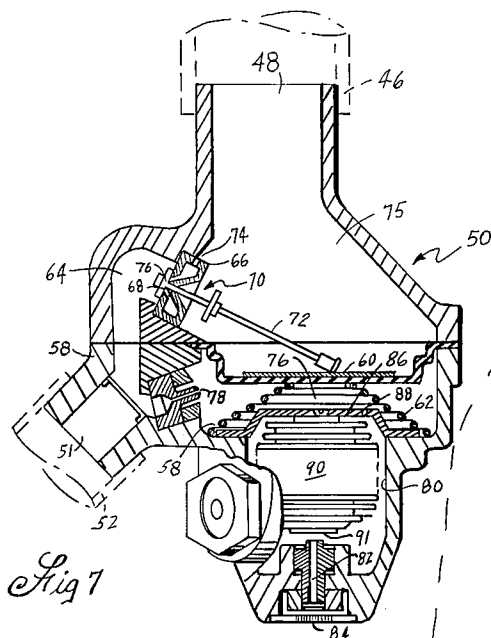
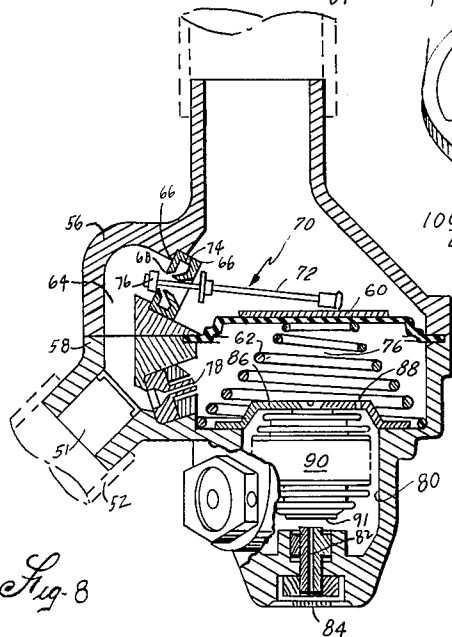
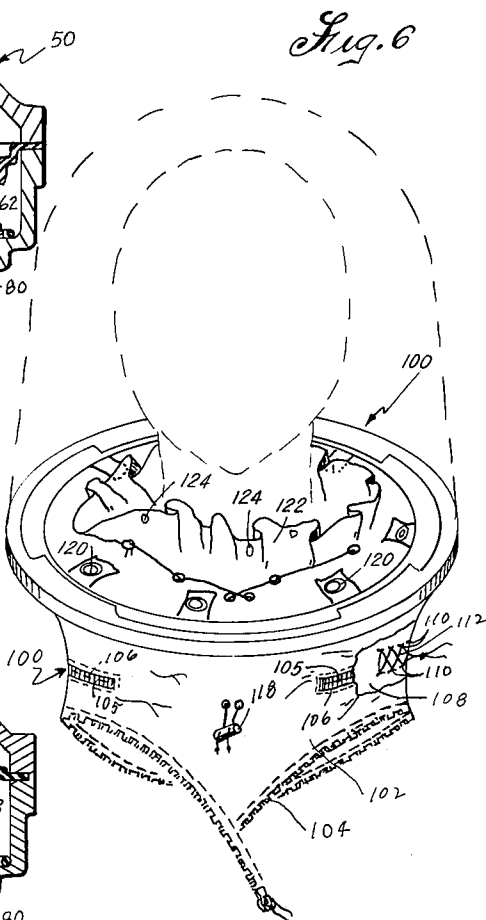
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NECK SLEEVE FOR CONNECTING A HELMET TO A LIFE VEST

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Original application Oct. 25, 1962, Ser. No. 233,165. Divided and this application Dec. 30, 1963, Ser. No. 334,676

3 Claims. (Cl. 2—2.1)

(Granted under Title 35, U.S. Code (1952), sec. 266)

This is a divisional application of my copending application Serial Number 233, 165 filed October 25, 1962, now abandoned.

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.

This invention relates to aviators' helmets.

The type of helmet worn by a pilot depends upon the aircraft's flight configuration. A crash helmet with goggles to protect the head and eyes is normally worn for high speed, low altitude flights, since pilot ejection from the aircraft is a possibility. For intermediate altitudes, as at 30,000 feet elevations, where oxygen is required, an oxygen mask covering the nose and mouth is added to the pilot's gear. For high altitude flights, in the neighborhood of 40,000 feet, the crash helmet, goggles and oxygen mask are replaced by a pressure suit with its attached head piece.

This invention provides means whereby one helmet may be worn under all the conditions referred to above without the use of goggles and oxygen mask, thus eliminating visual obstruction through wearing them and yet providing head protection and permitting the supply of oxygen to the wearer.

The manner in which this is accomplished will become apparent from reading the detailed description of the invention in conjunction with the drawing, wherein:

FIG. 1 is a side elevational view of a helmet of the invention, with parts broken away, attached to a pressure suit;

FIG. 2 is a section view through the helmet taken along line 2—2 of FIG. 1;

FIG. 3 is an exploded view of the helmet, a life vest and a neck sleeve for joining them;

FIG. 4 is similar to FIG. 3 but shows the parts joined together;

FIG. 5 is a top end view of the neck sleeve;

FIG. 6 is a perspective view of the neck sleeve with parts broken away;

FIG. 7 is a longitudinal section of a regulator used in the helmet;

FIG. 8 is a similar view showing the regulator open for the passage of fluid through it.

Referring to the drawing, FIG. 1, 10 indicates, in general, a pilot's helmet. It has a hard shell 12 that covers the head of the wearer with a cut-out 14 for the face and a head opening 15 through which the helmet is donned. Shell 12 is made of some suitable material, as plastic, usual for this type head gear, and has, basically, a spherical shape. A visor 16 of transparent, unbreakable plastic material is pivotally secured by studs 17 to the sides and on the outer surface of the shell 12. It is adapted to completely cover the face cut-out 14 and can be swung upwardly over the top of the head and away from the face. Stops 18, FIG. 1, are suitably installed for retaining the visor in a desired position.

Padding 20 of resilient material, preferably sponge rubber, is secured by the adjustable straps 22 shown at ap-

propriate areas within the shell 12 to space and cushion the shell 12 from the wearer's head, as is common to this type helmet. A microphone 26, FIGS. 3 and 4, ear-phones, and other equipment may also be appropriately incorporated within shell 12 as needed or desired.

The marginal edge of shell 12 around the upper side of cut-out 14 is indented, at 28, and an endless sealing tube 30, with a portion placed in the indentation 28, is secured around the cut-out 14. The placement of the portion of the sealing tube 30 in the indentation 28 allows ready movement of visor 16 over it without binding in this area. Sealing tube 30 has a normally flat or oval shape in cross-section, but it expands, upon inflation, into a circular shape. When the face visor 16 is positioned over the cut-out 14, the sealing tube 30 is between visor's inner surface and the outer surface of shell 12. Inflation of sealing tube 30 expands it into contact with the visor and shell 12 to seal the joint between them.

An oxygen supply tube 32 is also secured around the face cut-out 14, similarly to tube 30 but on the inner surface of the shell 12. It is endless in form and has a number of apertures 34 spaced throughout its length from which oxygen may issue. Apertures 34 are so directed that the oxygen from them sprays over the visor 16. In so doing, it defogs the visor as well as provides the wearer with oxygen; and, furthermore, eliminates inhalation noise otherwise known to occur.

The oxygen issuing from tube 32 is restricted to the face of the wearer by an internal partition 36 of flexible material, for example, sponge rubber. Partition 36 is tubular in form and is adhered near one of its ends to the inner surface of shell 12 around the face cut-out 14. Its other end extends inwardly into contact with the wearer's face. An exhalation valve 38 of the type used in the usual pressure suit helmets is secured in partition 36 to provide a one direction passage for the exhaled breath from the facial or oxygen compartment, 40, into the chamber, 42, at the back of the partition 36 from which it may be exhausted through the helmet's neck hole 15.

Both endless tubes, the sealing tube 30 and oxygen supply tube 32, are connected by a Y-type fitting 44 to a hose 46. The latter element passes through the shell 12 and is connected to the outlet end of an oxygen regulator 50, secured on the outer surface and at the back of the shell. A conduit 52 extends from the inlet of the regulator 50 for connection to a source of oxygen not shown.

A suitable regulator is portrayed schematically in cross-section in FIGS. 7 and 8. It has an upper body part 56 with an outlet, 48, to which hose 46 is attached, and a lower body part 58 with an inlet, 51, connected to conduit 52 from the source of oxygen. Both body parts are joined by bolts, not shown, and clamp between a disk-like diaphragm 60 which is normally urged upward into the upper body part by a helical spring 62 seated in the lower body part 58. The outlet and inlet, 48 and 51, are connected by a passage 64 having a restrictor 66. The orifice 68 in restrictor 66 carries a demand valve 70 having a stem 72 with its free end resting on diaphragm 60. Movement of the diaphragm cants the stemmed demand valve 70, FIG. 8, so as to open a portion of orifice 68 and permits fluid flow from passage 64 through orifice 68 and injector slots 74, in the restrictor, into chamber 75 of the upper body part 56 from which it may exit by outlet 48.

Inlet 51 is also connected to chamber 76 in the lower body part 58 under diaphragm 60 by a bleed orifice 78, and there is a counter bore 80 in the lower body part 56 with a vent hole 82 covered by a screen 84. A support plate 86, having apertures 88, is secured to the bottom of chamber 76 in the lower body part over the top of counter bore 80 from which an aneroid bellows 90 is suspended.

The lower end 91 of aneroid 90 is disposed over vent 82 and is adapted to close the vent at predetermined altitudes which cause expansion of the aneroid.

In the functioning of the regulator 50 at the lower altitudes, oxygen, under pressure from the unshown source, continually passes through the bleed orifice 78 to the lower body part or aneroid chamber 76 and is exhausted through the vent 82. Since the vent 82 is small, the flow is minute and the pressure in the aneroid chamber 76 is essentially that of ambient. The force urging diaphragm 60 upward to open the stemmed valve 70 is then that of spring 62, whereas the pressure above diaphragm 60, which is that in the oxygen or face compartment 40, since they are communicatively connected, is in opposition and tends to close the stemmed valve. An unbalance of pressures on either side of diaphragm 60 causes its movement.

With inhalation, the pressure in the chamber 75 on the outlet side of the diaphragm decreases. This permits spring 62 to move the diaphragm 60 upwardly, the stemmed valve 70 cants and oxygen flows past the stemmed valve 70 into the helmet. Exhalation, on the other hand, causes an increase in pressure in face compartment 40 and therefore the outlet side of the diaphragm. This moves the diaphragm downwardly and allows the stemmed valve 70 to close, as in FIG. 7.

At altitudes where pressure breathing is needed, above 35,000 feet, the aneroid expands toward the vent 82. This causes the oxygen entering the aneroid chamber 76 through bleed orifice 78 to build up and back load the aneroid side of the diaphragm 60. The unbalance of the diaphragm, actuates the stemmed valve 70 and admits oxygen to the face compartment 40 in the helmet, as previously described. When the pressures on either side of the diaphragm 60 are equal, the stemmed valve 70 closes until there is, once again, an unbalance, as is caused by inhalation. By this action, pressure is maintained in the helmet for various altitudes including those where pressure breathing is required.

To secure the helmet, at the base of the hard shell 12, that is, around the neck hole 15, there is, FIG. 1, a metallic fastening ring 94 which is adapted to be connected with a mating ring 96 secured around the neck hole of pressure suit 9. The coupling is of the bayonet type common to conduit connections. The male ring 94, is on the helmet, whereas the female or lugged member, ring 96, is on pressure suit 9. A latch 98 such as is shown in FIG. 5, is used to prevent uncoupling. It is a common piece of hardware in this type gear and therefore will not be described.

To facilitate wearing the helmet without a pressure suit, that is for the lower altitudes heretofore referred, provision is made for attaching it to a garment normally worn by a pilot, such as a life vest 101, FIG. 3, worn by Naval aviators flying from aircraft carriers. For this purpose, a neck sleeve 100 is shown in FIG. 3 by which the helmet may be secured to the life vest. It is of fabric, two-ply, and tubular in shape so that the head may be inserted through it. The upper end of the neck sleeve 100 has a fastening ring 96 similar to that found on the pressure suit of FIG. 1; it attaches to the helmet in a like manner. The lower end has a slide fastener 104 that joins with a fastener 106 furnished around the neck hole of the life vest. Joining the neck sleeve 100 to the helmet and the vest 101 holds the helmet in place, even against removal by an air stream like that which occurs during ejection of the pilot from an aircraft.

The outer ply 102 of the neck sleeve 100, FIG. 6, has a pair of horizontal slits, 105, on the outer sides of the

neck provided with closures in the form of slide fasteners 106. The inner ply 108, opposite the slits 105, has two vertically separated rows of horizontally spaced loops 110 through which a lace 112 is threaded. The neck sleeve 100 may be adjusted, shortening its length, with tightening of the lace 112 to suit the wearer's neck.

In order to reduce the diametrical size of the neck sleeve 100, it has a plurality of circumferentially spaced loops, 114, FIG. 5, on its inner surface through which a lacing 116 is threaded; it has its ends extend to the outer side of the sleeve and through a slide bar 118. Secured to the inner surface of the neck sleeve above the loops 114, there are a number of tabs with snap buttons 120. A tubular liner 122 with matching snap buttons 124 at its upper end attaches to the snap buttons 120. It is of water impervious material, as plastic and provides a bearing surface for the lace 116. Pulling the ends of the lace 116 outwardly and sliding the bar 118 toward the neck sleeve reduces the hole within the neck sleeve and draws the liner tightly around wearer's neck. This construction is desirable when the life vest, with the neck sleeve, is worn over an all-weather suit with the usual high collar and a seal around the wearer's neck is required to prevent water entering the suit. The neck sleeve is shown in FIG. 4 as it would appear attached to the helmet and a life vest.

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.

What is claimed is:

1. A device for connecting a pressure suit helmet having a bayonet-type connecting ring around the neck hole thereof with a pilot's life vest having a slide fastener around the neck opening, said device comprising:
 - a pliable fabric sleeve for encircling the neck of the wearer, said sleeve being two ply, the outer ply having a slit with a closure therefor;
 - a bayonet-type connecting ring at one end of said sleeve for joining said sleeve to said helmet;
 - a slide fastener around the other end of said sleeve for connecting said sleeve to said life vest;
 - a plurality of vertically spaced loops secured to the inner ply of the sleeve under the slit in the outer ply of the sleeve;
 - and means threaded through said loops for reducing the length of said sleeve.
2. The device of claim 1 including a ring of loops secured to the inner surface of said sleeve,
- and a lacing means threaded through said loops for reducing the diameter of said sleeve.
3. The device of claim 2 including a ring of snaps secured around the upper end and within said sleeve,
- and a water impermeable liner in said sleeve having snaps for securing thereof to said snaps on said sleeve.

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