Fig. 1.
This invention relates to flying helmets particularly those of the fully pressurized type as disclosed in our co-pending application Serial No. 178,844, filed March 12, 1962. Such helmets when used in conjunction with fully pressurized suits allow the wearer to continue normal flight even after sudden cockpit decompression, for example, after breakage of the canopy at high altitude.

Helmets of this sort are provided with visors for sealing the opening in the front of the helmet to make it pressure tight and also with the usual equipment such as oxygen masks, and ear-buns which are acoustically connected to the radio equipment of the aircraft. All this equipment within the helmet means that care is needed when putting it on since this is essentially a time consuming operation. Under circumstances in which it is essential for the aircraft to leave the ground as quickly as possible it will be a help if the pilot is able to put his helmet on quickly and easily.

According to the present invention the oxygen mask and ear-buns are mounted within the pressure helmet so that they are biased outwards from the center of the helmet and are connected to control means outside the helmet so that they may be moved into position against the head of a person when the helmet is properly fitted onto the person.

The wearer can put a helmet according to the invention on like a hat, since the oxygen mask and ear-buds are held away from his face, and when the helmet is properly secured to the suit, can draw the mask into position over his mouth, and the buns onto his ears, merely by operating easily accessible control means outside the helmet. It will thus be seen that a helmet according to the invention can be put on much more quickly than those in which the oxygen mask and ear-buds are fixed.

Tensioning of the mask and ear-buds against the face also has further advantages. The oxygen pressure within the mask is usually greater than the pressure outside so that by so tensioning the mask the possibility of leakage of oxygen from the mask is much less. When the visor of the helmet is open, the round insulation of the wearer's head is of course reduced and then the tensioning of the ear-buds against the wearer's head will tend to offset the effect of this and insulate his ears to sound other than from the earphones within the buns.

The wearer must be free to turn his head and this usually means turning the helmet as well. The movement could be transmitted through the oxygen mask and ear-buds but there is a danger of displacing them, and therefore helmets are usually fitted with a pair of pads which fit over the wearer's temples to transmit this movement.

In a helmet according to the invention normally mounted temple pads would impede the ease with which the helmet is fitted, so that preferably the temple pads too are loosened and tensioned, and have control means for moving them into position. The same may apply to a pad which, when the helmet is being worn is in contact with the back of the wearer's head.

Preferably the oxygen mask and ear-buds are adjusted by a first common control and the temple pads and back pad by a second common control member although it is possible to provide four separate control members, or one common one.

The advantage of separate control is that when the visor of the helmet is open the oxygen mask and ear-buds should be pressed against the wearer's head more tightly than when its is closed, whereas the temple pads need to be pressed more tightly against the head when the visor is closed and the helmet pressurized since the resistance to turning the helmet is greater under those conditions.

A helmet according to the invention will now be described in more detail by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a schematic side elevation partly in section of the helmet when being worn;

FIGURE 2 is a schematic plan view partly in section and showing parts of the helmet; and

FIGURE 3 is a view similar to FIGURE 2 but showing different parts of the helmet.

In considering the drawings it should be noted that a combination of FIGURES 2 and 3 represents a plan view of the helmet as shown in FIGURE 1. The mountings and controls for the oxygen mask and the ear-buds are shown in FIGURE 2 while those for the temple pad and back pad are shown in FIGURE 3 and the drawings have been prepared in this way purely for clarity of illustration and description.

In all of the drawings those parts of the helmet not directly concerned with the invention are shown in broken lines and as will be seen from the figures comprises an outer shell 1 having an opening 2 in the front and provided with a visor 3 for closing this opening when pressurization is necessary. The lower edge 4 of the visor moves into contact with a ledge formed on a forward projection 5 of the lower part of the shell and this ledge is equipped with a sealing ring (not shown) which when the lower edge of the visor comes into contact with. When not in use the visor can be pivoted upwardly and stored in a space 6 at the top of the helmet formed between the shell 1 and an inner partition 7. Although details are not shown the helmet is fitted with means for locking and sealing it to a fully pressurized flying suit and this locking means is preferably as described in co-pending application Serial No. 178,844, filed March 12, 1962.

The shell is formed with a rigid projection, not shown in detail, in front of the wearer's mouth and fixed to this projection is an oxygen mask 8. The usual details of construction of the mask with its inlets and outlets and of the projection are not shown and it is sufficient to know that the mask is connected to the projection by a flexible neck 9. This neck is of such a length that it is relaxed so that the oxygen mask is held forward of the position in which it is shown in FIGURE 1 and in addition the body of the mask is formed of a resilient material which tends to stand away from the face of the wearer.

The neck passes through a hole 10 in a resilient pad 11 which passes round the outside of the oxygen mask in the region of the wearer's mouth. Each end of the pad is forked and the upper and lower pads 12 and 13 on the left-hand side of the mask are connected respectively to two cords 14 and 15 joined together at 16. The lower fork 17 on the right-hand side of the mask is connected to a similar cord 18 and a further cord 19 leads to the upper of the two forks on the right-hand side. The cords 18 and 19 are joined together at 20 in a similar manner to the joint 16.

The helmet is provided with a pair of ear-buds 21 and 22 which, as shown in the drawings, are pressed against the wearer's ears when the helmet is being worn. Each ear-bud has a pair of spring arms such as 23 and 24 fixed thereto and it by means of a clamping bar 25. These arms are fixed at 26 in the crown of the helmet and are such that when in their relaxed position the ear-buds are held at a greater distance from the center of the helmet than that...
shown in the drawings. On the outside of each ear-bun there is a guide 27 and 23 respectively and a further cord 29 is joined to the cords 14 and 15 at 16 and passes through the guide 27 while a cord 30 is joined to cords 16 and 17 and passes through the guide 23. The cord 29 continues from the rear of the guide to an eyelet 31 fixed to the inside of the back of the shell of the helmet and also through a further eyelet 32 fixed in a similar position on the other side of the helmet. The cord 30 when leaving the rear end of the guide 28 also passes through the eyelet 32 and the two cords 29 and 30 are joined to a further cord 34. The cord 34 passes through an eyelet 35 fixed on the inside of the shell at the right-hand side of the helmet and is anchored at its end to a capstan 36. The capstan is carried on the inner end of a shaft 37 which is journaled in a bearing housed in the shell of the helmet. This shaft is surrounded by a sealing ring where it passes through the shell so that when the helmet is pressurized there will be no leakage of internal air. At its outer end the shaft 37 carries a gear wheel 38 which meshes with teeth formed on a section 39 within a hand wheel 41 mounted on a further shaft 40 which also journaled for rotation in the shell of the helmet. The hand wheel has projections 42 so that it can easily be gripped by the wearer of the helmet. It will be seen that when the hand wheel 41 is turned in an anti-clockwise direction as seen from the right-hand side of the helmet the cord 34 will be raised while the capstan 36. When this is done both cords 29 and 30 will be drawn towards the rear of the helmet and will act on the outside of the ear-buns 21 and 22 to force them towards the head of the wearer. They will also act through the cords 14, 15, 18 and 19 on both sides of the resilient pad 11 and thus will force the parts of the body of the oxygen mask against the face of the wearer and will stretch the neck so that the oxygen mask as a whole is pulled towards the center of the helmet and thus into closer contact with the face of the wearer. Only a light bias is needed for both the ear-buns and the oxygen mask and the friction in the gear 38 and sector 39 and the respective axes is found to be such that they can hold the ear-buns and the mask in the position shown in the drawings without a positive lock. The lock can, however, be provided if it is thought necessary. As shown in FIGURES 1 and 3 the helmet is hinged with a pair of pads 43 and 44 fitting over the temples of the wearer. Each of these pads is mounted on the end of two leaf springs 45 which are fixed within the partition 7 at 46 similarly to the spring arms 23 and 24. The leaf springs are biased away from the center of the helmet so that when the helmet is not being worn the pads are in a position nearer the shell than the position in which they are shown in FIGURE 3. At the back of the helmet there is a further pad 47 for pressing against the back of the wearer’s head and this pad is mounted on two leaf springs 48 and 49 which act to bias it to a position nearer the back of the helmet than the position in which it is shown in the drawings. A webbing harness made up of three straps 50, 51 and 52 pass around the back of the pad 47 and are joined to a ring 53 at the left-hand side of the helmet and a ring 54 at the right-hand side of the helmet. An inelastic cord 55 is fixed at one end to the ring 53, passes through further rings 55, 56, 57, 58 and 59 and is fixed at its other end to the ring 54. The ring 55 is freely suspended from the crown of the helmet by a piece of webbing 60 which is fixed at both ends to the inside of the partition 7. Alternatively this ring could be attached directly to the partition. The rings 57, 58 and 59 are fixed to the inside of this partition. The cord 55 passes over trolleys pads 61 and 62 formed on the outer surfaces of the temple pads 43 and 44 respectively. Further cord 63 is fixed at one end to the ring 56, passes through rings 64 and 65 fixed on the inside of the partition 7 and is anchored at its other end to a capstan 66 similar to the capstan 36 but positioned on the opposite side of the helmet. The capstan 66 is connected through gear 72 and sector 73 similar to gear 38 and sector 39 to a hand wheel 67 so that when the hand wheel 67 is rotated in an anti-clockwise direction as is seen from the left-hand side of the helmet the cord 63 is wound onto the capstan so pulling the ring 56 down and drawing the rings 53 and 54 forwards so the back pad 47 is pressed into contact with the back of the wearer’s head and also bearing on the rubbing pads 61 and 62 to force the temple pads into contact with the wearer’s temples. 30 and 30 are joined to a further cord 34. The cord 34 passes through an eyelet 35 fixed on the inside of the shell at the right-hand side of the helmet and is anchored at its end to a capstan 36. The capstan is carried on the inner end of a shaft 37 which is journaled in a bearing housed in the shell of the helmet. This shaft is surrounded by a sealing ring where it passes through the shell so that when the helmet is pressurized there will be no leakage of internal air. At its outer end the shaft 37 carries a gear wheel 38 which meshes with teeth formed on a section 39 within a hand wheel 41 mounted on a further shaft 40 which also journaled for rotation in the shell of the helmet. The hand wheel has projections 42 so that it can easily be gripped by the wearer of the helmet. It will be seen that when the hand wheel 41 is turned in an anti-clockwise direction as seen from the right-hand side of the helmet the cord 34 will be raised while the capstan 36. When this is done both cords 29 and 30 will be drawn towards the rear of the helmet and will act on the outside of the ear-buns 21 and 22 to force them towards the head of the wearer. They will also act through the cords 14, 15, 18 and 19 on both sides of the resilient pad 11 and thus will force the parts of the body of the oxygen mask against the face of the wearer and will stretch the neck so that the oxygen mask as a whole is pulled towards the center of the helmet and thus into closer contact with the face of the wearer. Only a light bias is needed for both the ear-buns and the oxygen mask and the friction in the gear 38 and sector 39 and the respective axes is found to be such that they can hold the ear-buns and the mask in the position shown in the drawings without a positive lock. The lock can, however, be provided if it is thought necessary. As shown in FIGURES 1 and 3 the helmet is hinged with a pair of pads 43 and 44 fitting over the temples of the wearer. Each of these pads is mounted on the end of two leaf springs 45 which are fixed within the partition 7 at 46 similarly to the spring arms 23 and 24. The leaf springs are biased away from the center of the helmet so that when the helmet is not being worn the pads are in a position nearer the shell than the position in which they are shown in FIGURE 3. At the back of the helmet there is a further pad 47 for pressing against the back of the wearer’s head and this pad is mounted on two leaf springs 48 and 49 which act to bias it to a position nearer the back of the helmet than the position in which it is shown in the drawings. A webbing harness made up of three straps 50, 51 and 52 pass around the back of the pad 47 and are joined to a ring 53 at the left-hand side of the helmet and a ring 54 at the right-hand side of the helmet. An inelastic cord 55 is fixed at one end to the ring 53, passes through further rings 55, 56, 57, 58 and 59 and is fixed at its other end to the ring 54. The ring 55 is freely suspended from the crown of the helmet by a piece of webbing 60 which is fixed at both ends to the inside of the partition 7. Alternatively this ring could be attached directly to the partition. The rings 57, 58 and 59 are fixed to the inside of this partition. The cord 55 passes over trolleys pads 61 and 62 formed on the outer surfaces of the temple pads 43 and 44 respectively. Further cord 63 is fixed at one end to the ring 56, passes through rings 64 and 65 fixed on the inside of the partition 7 and is anchored at its other end to a capstan 66 similar to the capstan 36 but positioned on the opposite side of the
mounting said back pad within said shell and biasing said back pad away from the center of said shell; a second connecting means outside said shell; second connecting means connecting said pads and said back pad to said second control means, said second control means being actuable to move said pads and said back pad towards said center of said shell against said leaf spring means and said resilient biasing means respectively.

5. A flying helmet as claimed in claim 1, wherein said first control means is mounted at one side of said shell and said second control means is mounted at the opposite side of said shell.

2. A flying helmet as claimed in claim 1, wherein said resilient mounting means for said oxygen mask comprises a flexible neck of a relaxed length such that said mask is biased to a greater distance from said center of said shell than the required distance when said mask is being worn.

3. A flying helmet as claimed in claim 1, wherein said second connecting means comprises: third and fourth cords; means fastening a first end of said third cord to one side of said back pad; means fastening a second end of said third cord to the other side of back pad; guide means on each said temple pad over which said third cord passes; means fastening a first end of said fourth cord to said third cord at a point intermediate its ends; and means fastening a second end of said fourth cord to said second control means.

4. A flying helmet as claimed in claim 1, wherein said first connecting means comprises: first and second cords, each associated with one side of said helmet; means fixing a first end of each of said cords to the respective sides of said oxygen mask; guide means for one of said cords on the outside of each said earbud; and means fixing a second end of each of said cords to said first control means.

5. A flying helmet as claimed in claim 1, wherein said second connecting means comprises: third and fourth cords; means fastening a first end of said third cord to one side of said back pad; means fastening a second end of said third cord to the other side of back pad; guide means on each said temple pad over which said third cord passes; means fastening a first end of said fourth cord to said third cord at a point intermediate its ends; and means fastening a second end of said fourth cord to said second control means.

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