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G. T. BIXBY

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EAR CUP ASSEMBLY FOR HELMETS

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2 Sheets-Sheet 1

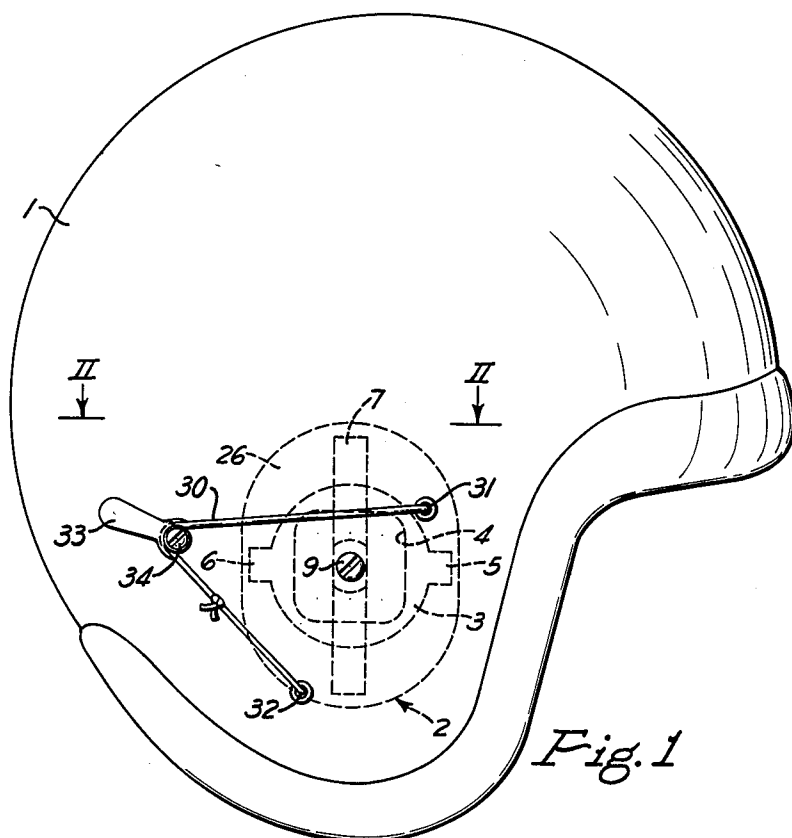


Fig. 1

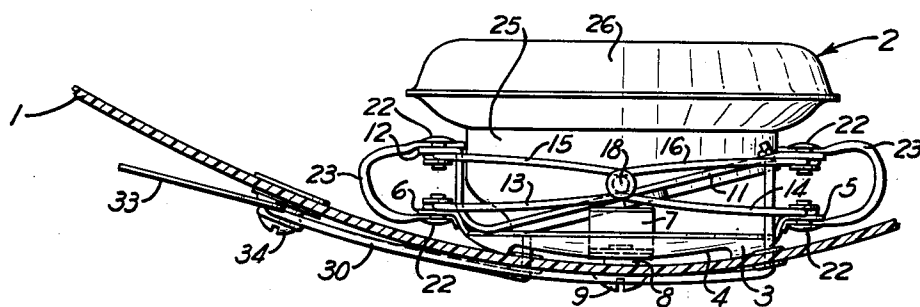


Fig. 2

INVENTOR.

GUY T. BIXBY

BY

Brown, Critchlow, Flick & Peckham

ATTORNEYS

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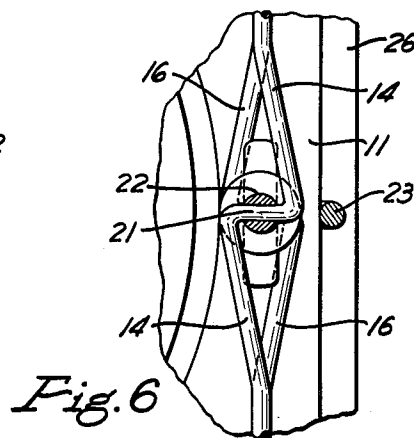
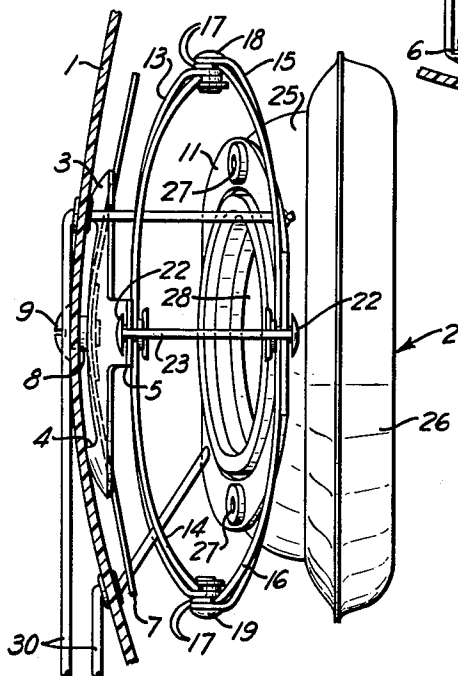
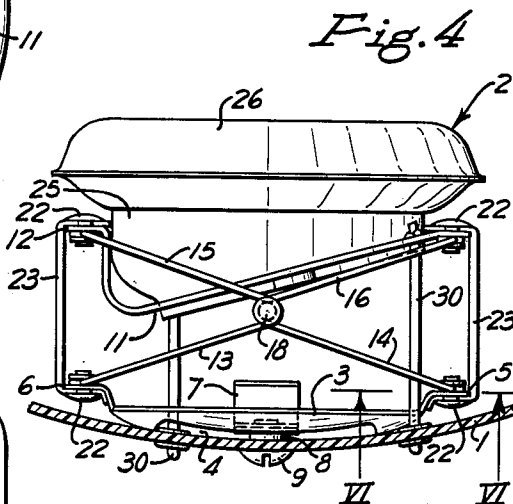
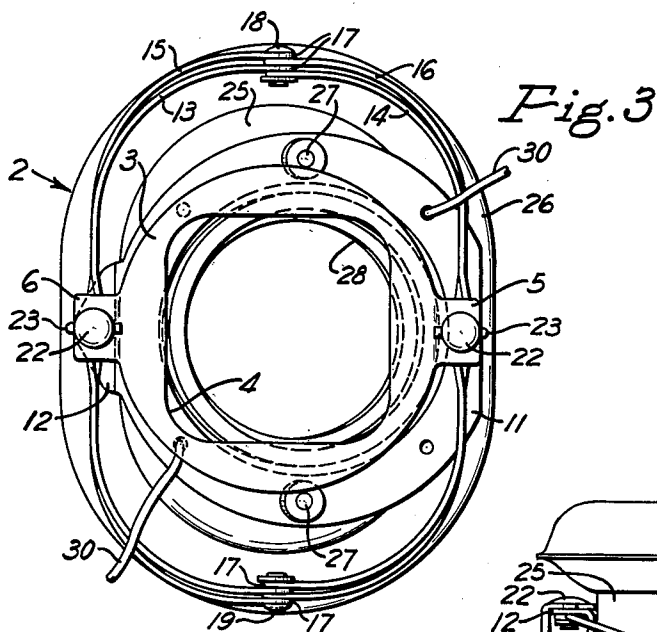
G. T. BIXBY

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INVENTOR.
GUY T. BIXBY

BY
Brown, Crichtlow, Flick & Peckham
ATTORNEYS

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EAR CUP ASSEMBLY FOR HELMETS

Guy T. Bixby, Littleton, Colo., assignor to Mine Safety Appliances Company

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4 Claims. (Cl. 2—3)

This invention relates to aviators' helmets, and more particularly to cushioned cups therein that fit around the ears.

Aviators' helmets are equipped with earphones which must be held close to the ears. To hold the phones in place and also to reduce interference from outside noises, it is customary to mount the phones in cups that enclose the ears and are pressed against the head by resilient means, such as springs. At least the head-engaging portions of the cups are made of a soft material so that they will conform to the head around the ears and not become uncomfortable. However, since heads vary considerably in width, ear cups that are comfortable for a narrow head may be pressed too tightly against a wide head, because the greater the compression of the springs that press against the cup, the greater the pressure the cups will exert against the head.

It is among the objects of this invention to provide an ear cup assembly, which is simple and compact, which is comfortable to wear, which will engage heads of different widths and configurations with substantially the same pressure, which is adjustable up and down in a helmet, which can be tilted in all directions, and which can be held away from the head when not in use.

In accordance with this invention the inner side of an upright frame supports an ear cup that is adapted to engage the head around an ear. Spaced from the outer side of the frame is an upright supporting member. In the general area between this member and the frame there are four U-shape wire springs, each of which has one end above and the other end below the frame. Means is provided for pivotally connecting the upper ends of the springs together, and additional means in axial alignment with the first means pivotally connects the lower ends of the springs together. Two of the springs diverge inward from the pivotal means toward the frame and the other two springs diverge outward toward the supporting member. The central portions of the two inner springs are secured to the frame at its front and back marginal portions. The central portions of the two outer springs are similarly secured to the supporting member at its front and back. The springs urge the frame away from the support, but the distance they can spread those two elements apart is limited by suitable flexible means.

The preferred embodiment of the invention is illustrated in the accompanying drawings, in which

FIG. 1 is a side view of a helmet equipped with my ear cup assemblies;

FIG. 2 is a horizontal section of the helmet taken on the line II—II of FIG. 1, showing a top view of the right-hand ear cup held in an outer position;

FIG. 3 is a view of the outer side of the ear cup assembly;

FIG. 4 is a view similar to FIG. 2, but with the ear cup released and disposed in its normal inner position;

FIG. 5 is a fragmentary vertical section of the helmet, showing the right-hand ear cup from the front; and

FIG. 6 is an enlarged section taken on the line VI—VI of FIG. 4.

Referring to the drawings, an aviator's helmet 1 of any suitable construction has sides that completely cover the opposite sides of the head and extend down below the ears. Mounted inside of the helmet at each side is an ear cup 2 for receiving and fitting around the adjacent

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ear. The support for each cup includes a rigid supporting member 3, preferably concave, provided with a central opening 4 and forwardly and rearwardly projecting lugs 5 and 6. A longitudinally curved upright bar 7 engages the inner surface of the supporting member and has a circular nut 8 secured to its central portion and extending out through a hole in the side of the helmet beside the ear. The bar is normally clamped tightly against the supporting member by a screw threaded in the nut and having a head 9 engaging the outer surface of the helmet. By loosening the screw, the supporting member can be raised or lowered or rotated a few degrees and then clamped in place again.

Spaced inwardly from supporting member 3 is a rigid upright frame, the main body of which is formed like a ring 11. The plane of this ring preferably is inclined forward and away from the supporting member, in which case the back part of the ring has a central tongue 12 that extends inward away from lug 6 and then rearward a short distance to form a back marginal portion. The frame is supported from the supporting member by four U-shaped wire springs 14, 13, 15 and 16, located more or less between them and having ends above and below the frame. The ends of the springs are bent to form eyes 17, and the eyes at the upper end of the springs are aligned with one another and pivotally connected by a substantially vertical pivot pin 18. The eyes at the lower ends of the springs are likewise pivotally connected by a pivot pin 19 in axial alignment with the upper pin. Consequently, each of the springs can be pivoted on a substantially vertical axis relative to the other three.

The central portion of each spring is provided with a kink as shown in FIG. 3, preferably one that has a short straight portion 21 originally disposed substantially perpendicular to the common axis of pivot pins 18 and 19. The kinks in the two outer springs 13 and 14 are fastened tightly to the lugs 5 and 6 on the supporting member, while the kinks in the inner springs 15 and 16 are secured to the front and back marginal portions of the frame. This can be done conveniently by slotted rivets 22 extending through the supporting member and frame, with the straight portions 21 of the springs extending through the slots in the rivets.

The springs are so shaped originally that in order to fasten them to the supporting member and frame the central portions must be sprung inward toward the axis of the pivot pins, since the distance between the rivets in the supporting member and likewise between the rivets in the frame is less than would be the distance between the central portions of the outer pair of springs 13 and 14 if those springs were disposed in a common plane. The same thing is true of the inner pair of springs. The result is that the two outer springs tend to move supporting member 3 outward and away from the pivot pins and thereby diverge outward, while the two inner springs in attempting to move the frame inward and away from the pivot pins diverge inward toward it. Therefore, any movement of the frame and support toward each other must cause the springs to flex and resist such movement. On the other hand, the distance that the frame and support can be pushed apart by the springs is limited as shown in FIGS. 4 and 5 by suitable flexible means, such as cords 23 having their ends clamped beneath the rivet heads.

The ear cup 2 itself is mounted on the inner face of the frame. The cup includes a substantially rigid base 25 that has a greater depth at its back than at its front in order to receive the ear. A cushion ring 26 is mounted on the edge of the cup for engagement with the side of the head. The cup base is secured to the frame by screws 27, and the outer side of the base projects into

frame ring 11 and is provided with a circular opening 28 for receiving an earphone (not shown).

Secured to substantially diametrically opposite points on the frame ring are the opposite ends of a flexible cord 30 that extends out through holes 31 and 32 in the side of the helmet to form a loop outside of it. A pull tab 33 is fastened to the central part of the loop. By pulling on the tab and looping the cord over a projecting boss 34 on the outside of the helmet, the adjoining ear cup will be pulled outward toward the side of the helmet and held there as shown in FIGS. 1 and 2. This allows the cup to be held away from the head when desired, and it also spreads the two cups in a helmet farther apart so that the helmet can be applied more easily to a head that is considerably wider than the normal space between the cups, which is only slightly less than the width of the narrowest head with which it is intended the helmet should be used.

The angle between the springs and the frame and support will be reduced as the ear cup is pressed outward toward the side of the helmet. Therefore, even though the springs are being compressed, the change in angle will prevent them from exerting appreciably more pressure against the frame in a direction parallel to the axis of the cup. In this way the spring pressure normal to the frame and cushion can be maintained substantially uniform while the helmet is in use, regardless of the spacing between the cushions of the two ear cups.

In some cases, the ear cups may be tilted while pressed against the head. That will not change the pressure of the cup against the head appreciably because, as pointed out above, the thrust exerted by the springs stays about the same regardless of the angles of the springs while the helmet is in use. Of course, the ear cup can rock on the pivot pins 18 and 19 to any extent necessary for accommodating itself to various face angles.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practised otherwise than as specifically illustrated and described.

I claim:

1. An ear cup assembly for the inside of a helmet, comprising an upright frame having inner and outer sides and front and back marginal portions, an ear cup supported by the inner side of the frame, an upright supporting member spaced from the outer side of the frame, four U-shape wire springs, each spring having one end above and the other end below said frame, means pivotally connecting the upper ends of the springs together on an upright axis, means in axial alignment with said first-mentioned means pivotally connecting the lower ends of the springs together, two of said springs diverging inward from said pivotal means toward said frame and the other two springs diverging outward toward said supporting member, means securing the central portions of the two inner springs to the frame at its front and back marginal portions, means securing the central portions of the two outer springs to the supporting member at its front and back, the springs urging the frame away from the supporting member, and flexible means limiting the distance the springs can spread the supporting member and frame apart.

2. An ear cup assembly for the inside of a helmet, comprising an upright frame having inner and outer sides and front and back marginal portions, an ear cup supported by the inner side of the frame, an upright supporting member spaced from the outer side of the frame and provided with a central opening, an upright bar between the frame and supporting member and extending

above and below the latter, a fastener attached to the central portion of the bar for fastening it to the side of a helmet to hold the bar tightly against said supporting member, four U-shape wire springs, each spring having one end above and the other end below said frame, means pivotally connecting the upper ends of the springs together on an upright axis, means in axial alignment with said first-mentioned means pivotally connecting the lower ends of the springs together, two of said springs diverging inward from said pivotal means toward said frame and the other two springs diverging outward toward said supporting member, means securing the central portions of the two inner springs to the frame at its front and back marginal portions, means securing the central portions of the two outer springs to the supporting member at its front and back, the springs urging the frame away from the supporting member, and flexible means limiting the distance the springs can spread the supporting member and frame apart.

3. An ear cup assembly for the inside of a helmet, comprising an upright frame having inner and outer sides and front and back marginal portions, an ear cup supported by the inner side of the frame, an upright supporting member spaced from the outer side of the frame, four U-shape wire springs, each spring having one end above and the other end below said frame, means pivotally connecting the upper ends of the springs together on an upright axis, means in axial alignment with said first-mentioned means pivotally connecting the lower ends of the springs together, two of said springs diverging inward from said pivotal means toward said frame and the other two springs diverging outward toward said supporting member, the central portion of each spring being provided with a kink, means tightly fastening the kinks in the two inner springs flat against the frame at its front and back, means tightly fastening the kinks in the two outer springs to the supporting member at its front and back, the springs urging the frame away from the supporting member, and flexible means limiting the distance the springs can spread the frame and supporting member apart.

4. An ear cup assembly for the inside of a helmet, comprising an upright frame having inner and outer sides and front and back marginal portions, an ear cup supported by the inner side of the frame, an upright supporting member spaced from the outer side of the frame, four U-shape wire springs, each spring having one end above and the other end below said frame, means pivotally connecting the upper ends of the springs together on an upright axis, means in axial alignment with said first-mentioned means pivotally connecting the lower ends of the springs together, two of said springs diverging inward from said pivotal means toward said frame and the other two springs diverging outward toward said supporting member, the central part of each spring being bent to form a short straight portion extending forward and backward, rivets mounted in the front and back marginal portions of the frame and supporting member about midway between their top and bottom, each rivet being provided with a longitudinal slot receiving one of said straight portions of a spring, the rivets holding said straight portions tightly against said supporting member and frame, the springs urging the frame away from the supporting member, and flexible means limiting the distance the springs can spread the frame and supporting member apart.

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