March 27, 1956 L. P. FRIEDER ET AL 2,739,310

HEADGEAR STRUCTURE

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Fig. 1

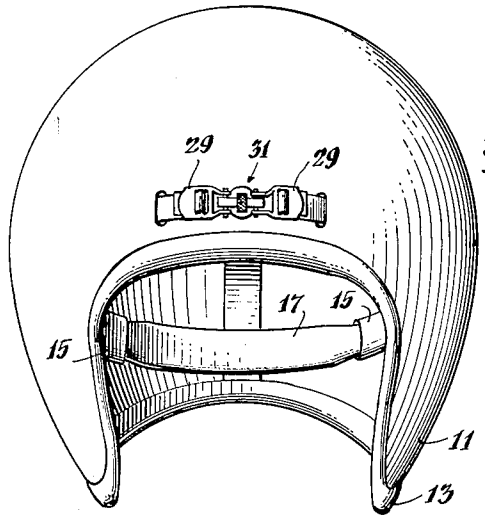

Fig. 2

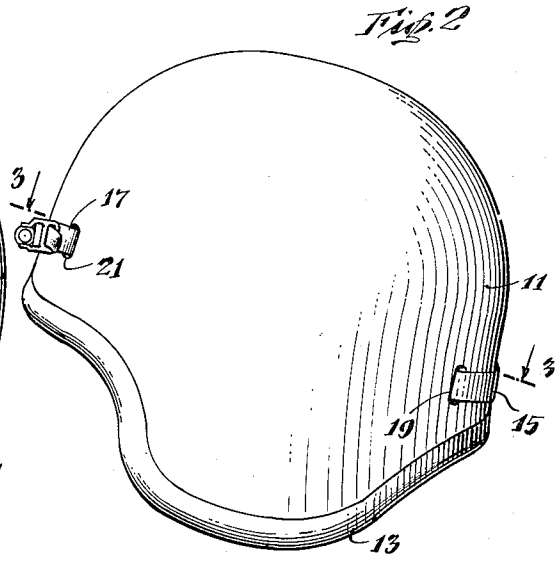

Fig. 3

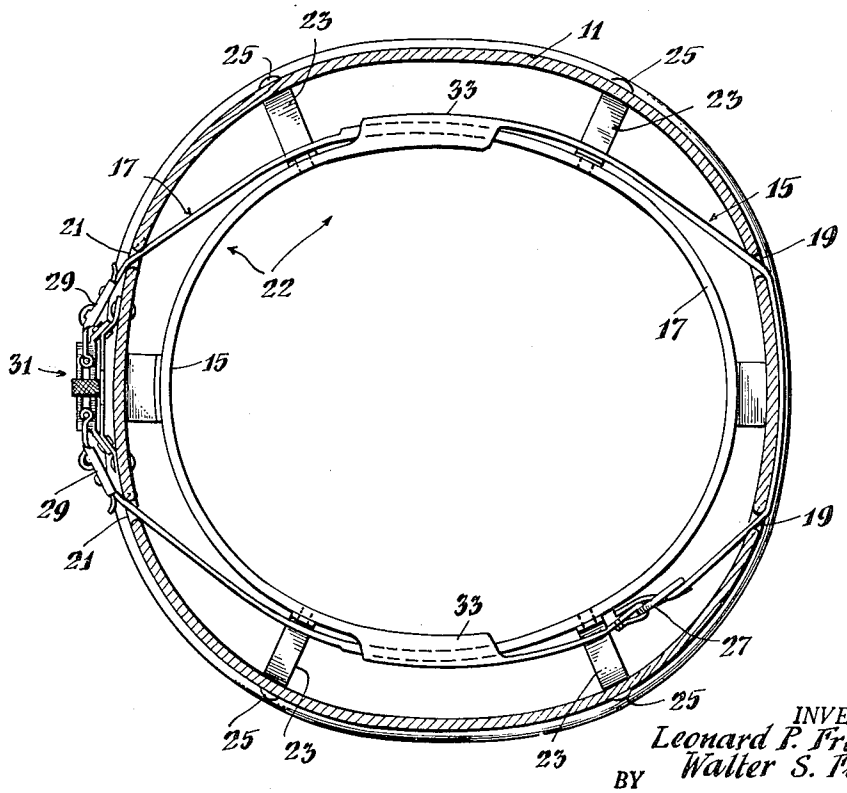

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Fig. 4

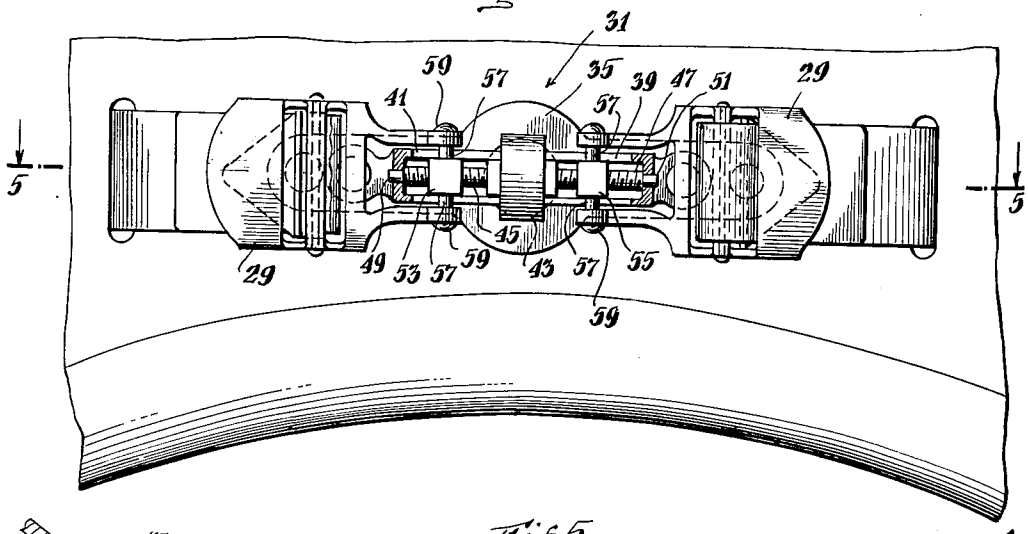


Fig. 5

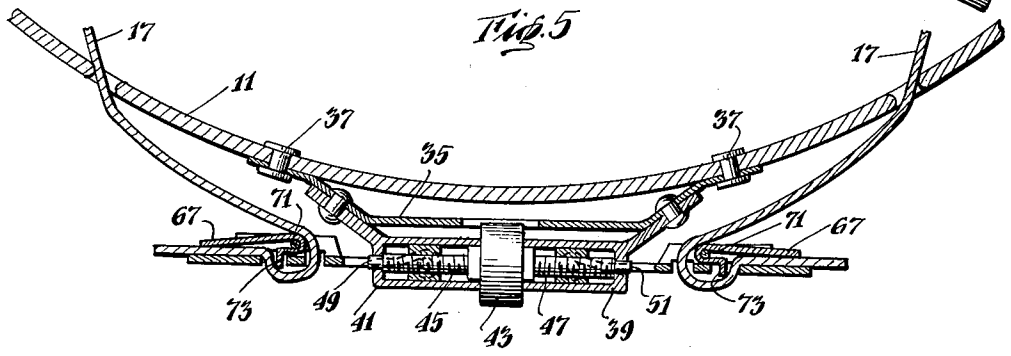


Fig. 7

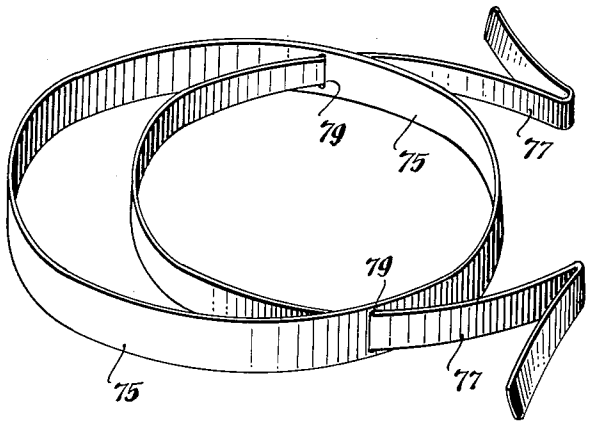
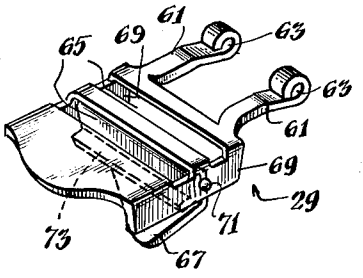


Fig. 6



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HEADGEAR STRUCTURE

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4 Claims. (Cl. 2—3)

This invention relates to protective helmets and other headgear, and particularly to helmets having a conforming and preferably adjustable headband arrangement, advantageously spaced within the shell of the headgear. One particularly effective type of headgear to which the present invention is applicable is that described and claimed in our copending patent application Serial No. 201,904, filed December 21, 1950, for Headgear Structure, the present invention thus representing, in a specific sense, still further improvements in head-supporting bands of the sort contemplated by said application, being especially useful in protective helmets, i. e. rigid-shell helmets intended to protect the head of the wearer against heavy blows or sharp impact.

While certain structures disclosed in our copending application involve means for adjusting the size of the headband assembly, a chief object of the present invention is to afford new and advantageous structure, in a helmet or the like, whereby accurate and ready adjustment of the headband size can be achieved. A more specific object is to provide headgear of the described character, including easily controlled or operated means for adjustment of headband size, especially for fine adjustment at desired times and in a rapid manner, to achieve full but comfortable fit of the equipment on the head of the wearer.

A still further object is to afford, in headgear of the stated character, headband means having instrumentalities for ready and rapid manual change of the exact size of the head-encircling band, i. e. not only to afford an initial adjustment of head size but also to permit at least minor change in such size while the headgear is being worn. Thus, for example, in situations where a helmet or the like must be worn continuously for a long period of time, optimum comfort is served by maintaining exactly the proper fit of the band to the head at all times, such proper fit often requiring some change now and then. For instance, after the headgear has been worn for some time, it may be necessary to loosen the band a little, to avoid undue pressure on the head; or alternatively, if the user finds himself in a situation where the likelihood of the helmet falling off is increased, some tightening of the band may be necessary. The present invention accordingly provides means for the stated purposes, especially means which are accessible and operable, e. g. by the wearer himself, without even removing the headgear and without making any adjustment at an inner location of the shell.

Still further objects are to provide improved head-engaging or like suspension structure, e. g. of flexible bands, in helmets and other headgear, as well as to provide a simplified and yet fully effective arrangement of the headband means, permitting adjustment of head size by moving such headband means, e. g. forward and rear portions thereof, toward or away from each other.

To these and other ends, the novel features and principles of the invention may be readily understood from the following description and accompanying drawings of

certain advantageous embodiments, set forth by way of example.

In the drawings:

Fig. 1 is a front elevational view of a helmet including adjusting means for the headband assembly;

Fig. 2 is a side elevational view of the helmet of Fig. 1;

Fig. 3 is a horizontal section on line 3—3 of Fig. 2;

Fig. 4 is an enlarged elevational view of the headband adjusting means shown in Figs. 1 to 3 inclusive;

Fig. 5 is a similarly enlarged horizontal section on line 5—5 of Fig. 4;

Fig. 6 is a perspective view of one of the buckle devices included in Fig. 4; and

Fig. 7 is a somewhat schematic view of a novel and simplified form of headband assembly.

The headgear illustrated in Figs. 1 through 3 is in this instance a helmet of the style used by high-speed aircraft pilots, although the invention may be adapted to numerous other styles of hats. The helmet illustrated is composed of a shell 11 which has a seal 13 around the edges thereof, which may be composed of rubber or a similar elastic material. There is a pair of head bands 15 and 17 (Fig. 3) which cooperate to encircle the head in a spaced relationship to shell 11 of the helmet. Each of these head bands is fastened to the shell by passing through a pair of slots 19 and 21 respectively. A head-encircling loop 22 is formed by the pair of head bands 15 and 17 and is maintained evenly spaced inside the shell 11 by means of its described mounting arrangement and by the further aid of elasticized material bands 23 which may be fastened to the shell by means of any convenient fastening device such as rivets 25. These elasticized bands 23 may be stitched to the head bands 15 and 17 at the part of the head band lying radially in line with each rivet. The head bands 15 and 17 may also be associated with loops (not shown) which can be attached to the head bands and which go across the top of the wearer's head in order to keep the head spaced from the top of shell 11 in cooperation with the head bands 15 and 17 which keep it spaced from the sides.

One of the head bands, e. g. the head band 15 which fastens at the rear of the shell 11 passing one or both of its ends through the slots 19, may be preadjusted to a given size depending upon the size of shell 11, and may have its ends fastened together in any convenient manner for instance by means of a buckle 27. The other band 17, which is mounted to the helmet by being passed through slots 21, is made adjustable in size by means of a pair of buckles 29 and a motion-reducing fine adjustment device 31, the separate ends of the band 17 being respectively fastened to the buckles 29. The two bands 15 and 17 cross one another at the sides and are maintained in juxtaposition with telescoping arrangements constituted by a sleeve portion 33 on each side of the rear head band 15 through which the front head band 17 is passed. Another arrangement for maintaining the juxtaposition of the head bands is illustrated in Fig. 7 and will be described later. Head bands 15 and 17 are made of a material which has only very slight (or no appreciable) elasticity in order to keep the head from touching the sides of shell 11 when any shock is felt by the shell. Shell 11 is composed of a light but strong material which may be fibrous plastic material having sufficient hardness to withstand heavy blows, but, at the same time, enough resilience to absorb shocks without cracking.

The motion-reducing adjustment device 31 is illustrated in greater detail in Figs. 4 and 5, and Fig. 6 shows a perspective view of one of the buckles 29. The slow motion adjustment device 31 is composed of a flat backing plate 35 which is fastened to shell 11 by any convenient means such as rivets 37. To this backing plate 35 is fastened a pair of rectangular shaped hollow mem-

bers 39 and 41. These members carry a knurled thumb wheel 43 rotatably fitted between them. Thumb wheel 43 has right and left-hand threaded shafts 45 and 47 integral therewith. Each of these shafts ends in a reduced smooth portion 49 and 51 respectively. These reduced bearing portions 49 and 51 rotate in holes at the ends of the rectangular hollow members 41 and 39 respectively. There are two internally threaded lugs 53 and 55 which are respectively disposed on the shafts 45 and 47 and which have left and right-hand threads to match the threads on the threaded portions of the shafts. The lugs are kept from turning by the enclosing structure of the members 39, 41. Thus, as the rotatable assembly (journaled at its ends in the members 39, 41) is turned one way or the other by the thumb wheel, the lugs are moved toward or away from each other. These lugs 53 and 55 carry lateral pins or shafts 57 integral therewith which extend far enough to allow the buckles 29 to be fastened thereto. The buckles 29 may be maintained on shafts 57 by any convenient means such as rivet heads 59.

It will now be clear that a fine and smooth adjustment of the size of head band 17 may be had, by simply rotating thumb wheel 43 in one direction or the other to cause the buckles 29, and thus the ends of the head band 17, to be drawn closer together or farther apart. This adjustment of the size of head band 17 will adjust the size of the head-encircling loop 22 (Fig. 3) since the other head band 15 remains fixed in size once it is installed in the shell 11. An approximate adjustment of the size of the head-encircling loop 22 may be made for different sized heads, by adjusting the ends of the head band 17 in the buckles 29. Then once the head size is adjusted for the individual wearer, he may make quick, easy and on-the-head adjustments as desired.

The buckles 29 may be any appropriate style which will hold the ends of head band 17 securely, but we prefer to use the style shown, as illustrated by one buckle 29 shown in perspective in Fig. 6. Each buckle consists of a pair of arms 61 spaced apart in order to straddle one of the rectangular hollow members 39 or 41. The ends of arms 61 are curved around to leave holes 63 for receiving the corresponding shafts or pins 57 of lugs 53 and 55. The body of each buckle 29 has a pair of slots or openings 65 through which an end of head band 17 may be threaded in the manner illustrated most clearly in Fig. 5. There is also a locking lever means 67 which is pivoted between the sides 69 of each buckle by means of a pin 71 which may be conveniently peened over or burred to the sides 69 of the buckle. The locking lever means 67 has a straight edged upstanding portion 73 which cooperates with one of the slots 65 to give a locking action on the end of head band 17 which passes through the adjustment slots 65 in the manner clearly illustrated. In Fig. 5, the locking lever means 67 is shown in its locked position although each buckle 29 is shown as swung partially outward (with the band 17 slack) in such a position that the locking lever means is accessible to be lifted to pivot the same into its unlocked position for releasing the ends of head bands 17. Fig. 6 illustrates the locking lever means 67 in its unlocked position such that the ends of head band 17 may be readily slipped through the slots and adjusted for various sizes of the loop of head band 17.

Fig. 7 shows another arrangement for providing a pair of head bands 75 and 77 with an interlocking relationship, in order to provide a head encircling loop such as is used in the headgear of this invention. This arrangement comprises a pair of transverse openings or slots 79 in the head band 75 through which the ends of head band 77 are directly passed (at these single localities, only) so that the necessary juxtaposition of the head bands at their crossing areas will be maintained. It will be understood that the bands 75, 77 are to be secured to the helmet shell and other parts (including the buckles 29) in exactly the same way as the bands 15, 17 in Figs. 1 to 5.

Referring back to the structure of Fig. 5, it will be noted that although the ends of the band 15 can be permanently fastened as by stitching instead of the buckle 27, the provision of adjustable means such as the buckle shown, is particularly desirable. This further adjustability not only enhances the ease of fitting the helmet to the head in general respects, but is of specific advantage in positioning the head, regardless of size, so that the forehead is spaced a predetermined distance from the front visor opening of the helmet shell. In other words, by providing adjustability of the length of both headband elements 15 and 17, a definite, desired, upward visual angle can be achieved for any size of head to which the helmet is affixed.

While we have shown and described what we now consider to be a preferred embodiment of our invention in accordance with the applicable statutes, numerous other embodiments will be suggested to one skilled in the art and our disclosure is to be considered as illustrative only and not as limiting our invention in any way.

We claim:

1. A headgear comprising a shell, a head-encircling band configuration including a pair of headband elements, said headband elements having complementary head-engaging portions adapted to engage conformably corresponding complementary portions of a head, means connecting said head-engaging portions to the shell and maintaining the entire length of said portions spaced inwardly from the shell and on opposite sides of a central vertical plane through the shell, each headband element having a pair of end portions extending from its head-engaging portion to the shell on the opposite side of said central plane from said head-engaging portion, a pair of securing devices adjustably attachable to each of one pair of end portions, said devices cooperating when adjusted in the same sense to change the size of said configuration, and cooperating when adjusted in opposite senses to shift the center of the configuration with respect to the shell, fine adjustment means supporting said devices, said fine adjustment means comprising a frame, a manually rotatable rigid lead screw member journaled in said frame, oppositely threaded end portions on said lead screw member, a pair of nuts, one on each of said screw end portions, means connecting each of said devices to one of said nuts, and means preventing rotation of said nuts, said fine adjustment means being effective upon rotation of said rotatable member to simultaneously vary in the same sense the length of both of said one pair of end portions, so as to maintain substantially equal spacing between the shell and both ends of the head-engaging portion of the associated headband element.

2. A headgear as defined in claim 1, in which said lead screw extends horizontally and said means connecting the devices and the respective nuts includes connecting members pivoted on said nuts for rotation about vertical axes.

3. A headgear comprising a shell having internal dimensions large enough to receive the head of a wearer with substantial clearance about the entire periphery of the head and shell and headband means for supporting the shell substantially centered on the wearer's head, said headband means including a band portion having a generally arcuate central part adapted to engage a portion of a wearer's head and a pair of end parts extending tangentially from said central part to the shell, means including said end parts connecting said head-engaging band portion and the shell and maintaining the entire length of said head-engaging band part spaced inwardly from the shell and effective to hold said head-engaging part in head-fitting relation, and fastening means to hold said pair of end parts in engagement with the shell, the fastening means comprising a pair of separate and independently adjustable fastening devices respectively engaging the end parts, for separately drawing up and releasing said end parts, said devices cooperating when adjusted in the same sense to provide adjustment of the size of the head-engaging band part, and cooperating when adjusted in op-

posite senses to shift the center of the head-engaging band part with respect to the center of the shell.

4. A headgear comprising a shell and a headband means therein including two sets of band portions each having a head-engaging central part and a pair of end parts, said head-engaging parts providing a head-encircling band configuration, said pairs of end parts respectively extending to the forward and rear portions of the shell, means including said end parts connecting said band configuration and the shell and maintaining the entire length of said band configuration spaced inwardly from the shell and effective to hold said head-engaging parts in complementary head fitting relation, means for adjusting the length of one of said band portions to adjust the size of said headband means, and fastening means to hold said pairs of end parts in engagement with the shell, the fastening means for the pair of end parts on the other band portion comprising a pair of separate and independently adjustable fastening devices respectively engaging the end parts of said one pair, for separately drawing up and releasing said end parts, said devices cooperating when adjusted in the same sense to provide adjustment of the size of the head-encircling band configuration, and

cooperating when adjusted in opposite senses to shift the center of the band configuration with respect to the center of the shell, whereby said devices may be operated to correct any misalignment of said centers occasioned by adjustment of the head size.

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