United States Patent [19]

Davison et al.

[11] **3,898,700**

[45] **Aug. 12, 1975**

[54] **EAR PROTECTING DEVICE FOR SAFETY CAPS**

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[22] Filed: **June 26, 1974**

[21] Appl. No.: **483,409**

[52] **U.S. Cl.** ..... **2/209**; 179/156 R

[51] **Int. Cl.** **A42b 1/06**

[58] **Field of Search** ..... 2/209, 3 R, 8; 179/156 R; 403/348, 349

[56] **References Cited**

UNITED STATES PATENTS

13,112	6/1855	Waterhouse	403/348 X
306,874	10/1884	Thatcher	403/349 X
1,560,718	11/1925	Nowosielski	179/156 R
3,375,529	4/1968	Timm et al.	2/8
3,430,261	3/1969	Benner	2/209 X
3,562,816	2/1971	Hutchinson	2/209

FOREIGN PATENTS OR APPLICATIONS

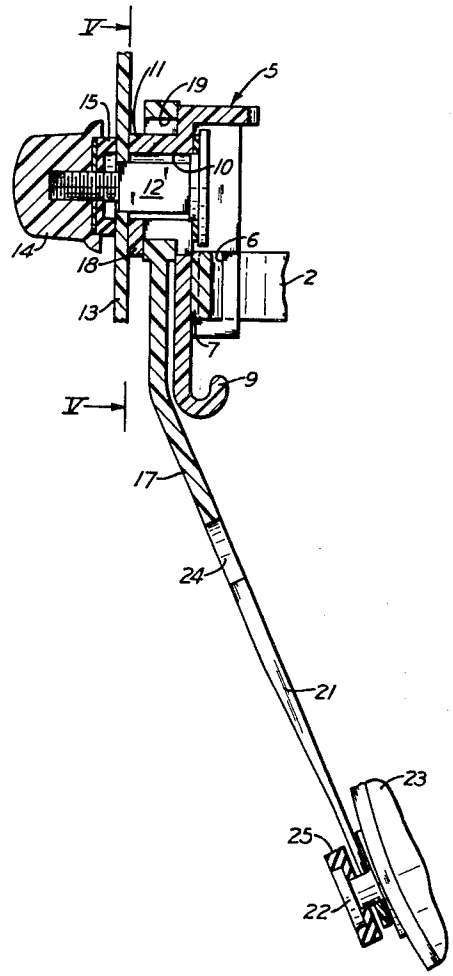
742,916	5/1943	Germany	403/349
1,037,901	5/1953	France	2/209

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Attorney, Agent, or Firm—Brown, Murray, Flick & Peckham

[57] **ABSTRACT**

A band that is adapted to surround the crown of a safety cap carries a pair of brackets at its opposite sides, which are provided with downwardly extending hooks to hook under the edge of the cap. Each of the brackets has an opening through it above the band, with the axis of the opening extending radially of the band. Projecting outwardly from the bracket around its opening is a cylindrical flange that extends through a hole in one end of a spring arm that carries an ear cover at its opposite end. A lug projects radially from the outer end of the flange and overlaps the arm to hold it on the flange, but the wall of the hole through the arm has a notch in it to enable the arm to be slipped off the flange after the arm has been rotated to align the notch with the lug. Bolts may be inserted in the bracket openings and provided with nuts on their outer ends for clamping a face shield against the outer ends of the bracket flanges.

9 Claims, 5 Drawing Figures



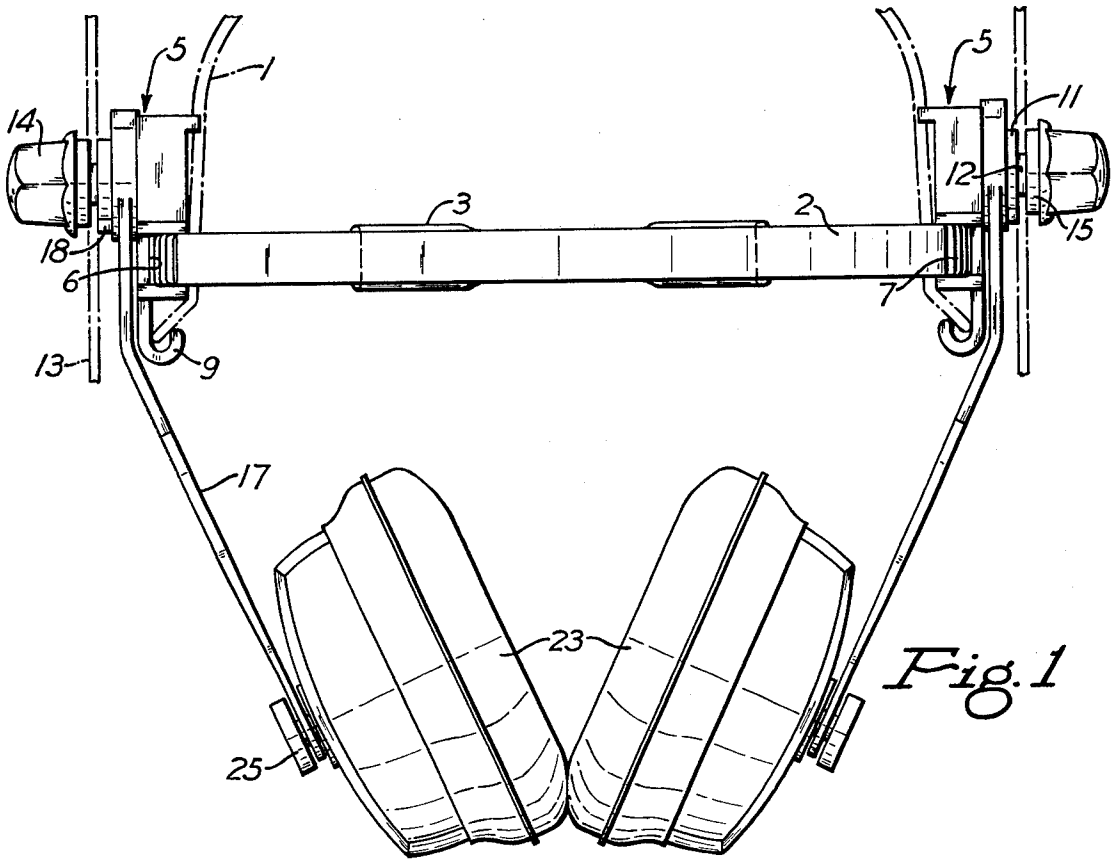


Fig. 1

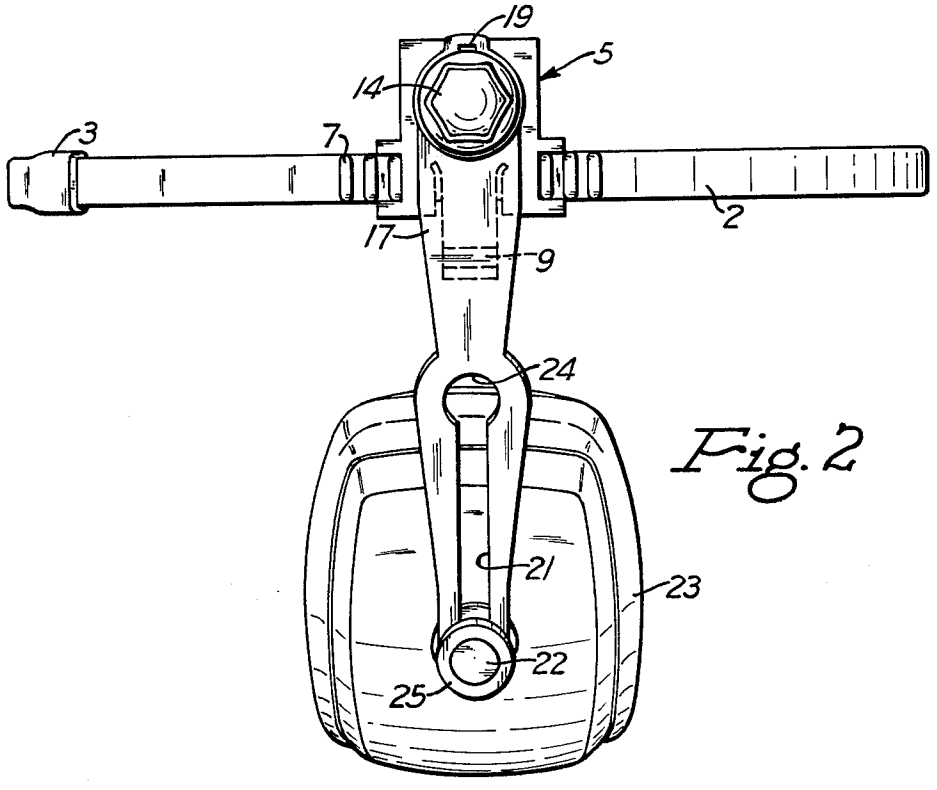


Fig. 2

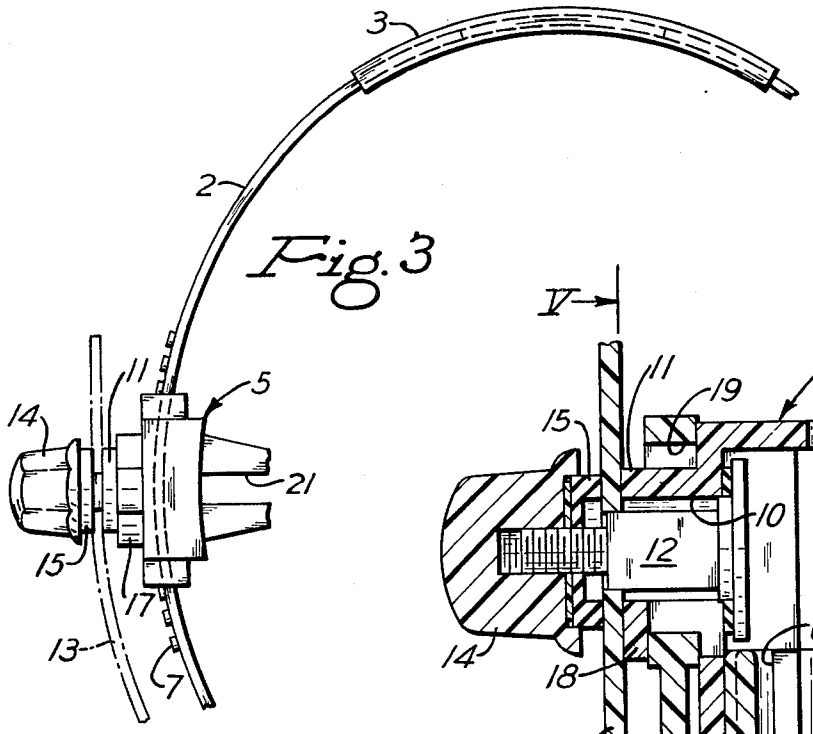


Fig. 3

Fig. 4

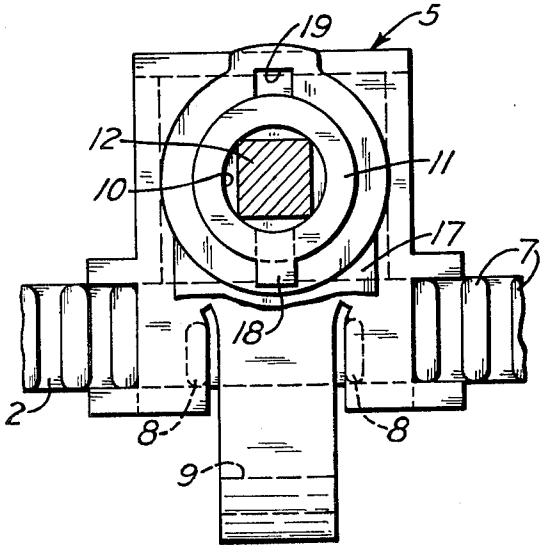
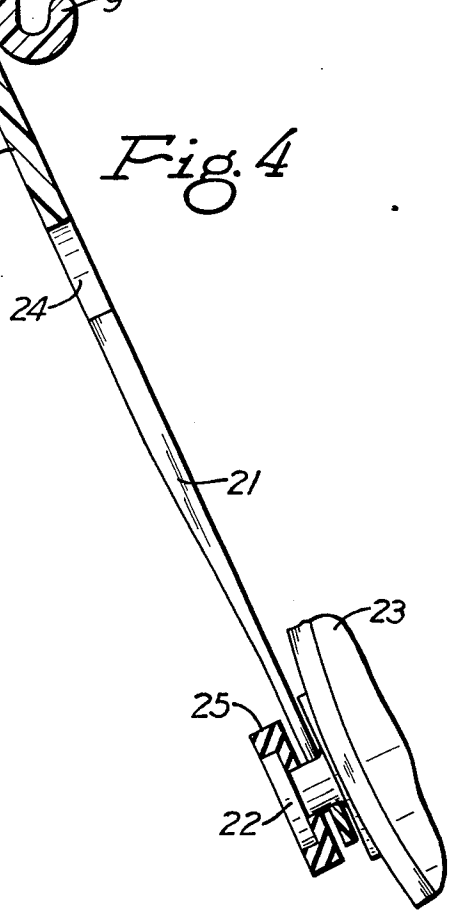


Fig. 5



EAR PROTECTING DEVICE FOR SAFETY CAPS

In Pat. No. **3,375,529,** an assembly is shown for mounting a face shield on headgear. This includes a band that extends around the crown of a safety cap and supports brackets at its opposite sides that hook onto the lower edge of the cap. The brackets support bolts on which the opposite sides of a face shield are mounted. This shield is held in its upper or lower position by nuts screwed on the outer ends of the bolts.

It is among the objects of this invention to provide an assembly similar to the one shown in the above-mentioned patent, but which can also support covers for the ears to protect them from undesirable noise, which permits either the shield or the ear covers to be removed when desired, and which exerts substantially the same pressure against the ear covers regardless of head sizes.

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

FIG. **1** is a front view;

FIG. **2** is a side view;

FIG. **3** is a fragmentary plan view;

FIG. **4** is an enlarged fragmentary vertical section; and

FIG. **5** is a vertical section taken on the line V—V of FIG. **4.**

Referring to the drawings, a relatively stiff but somewhat flexible band extends around the lower portion of the crown of a safety cap **1.** This band may be composed of a strip **2** of plastic, the ends of which are connected by resilient tube **3** cemented to them. The tube can be stretched lengthwise as the band is pressed down over the cap crown so that the band will snugly engage the cap for most of its circumference.

At opposite sides of the cap, brackets **5** are slidably mounted on the band. The opposite sides of the central portion of each bracket are provided with slots **6,** through which the band extends. To prevent the bracket from accidentally sliding along the band, the outer surface of the band at its opposite sides is provided with a number of laterally spaced vertical ribs **7,** between which a pair of similar ribs **8** on the inner surface of the bracket normally project as shown in dotted lines in FIG. **5.** By temporarily straightening the normally curved section of the band that extends through the bracket, the ribs on the band will be withdrawn from the bracket ribs so that the bracket can be adjusted lengthwise along the band.

Integral with each bracket is a hook **9** that extends downwardly and hooks under the edge of the narrow side brim of the safety cap to prevent the band from riding up on the cap.

Each bracket **5** also extends up above the band and is provided above it with an opening **10** (FIGS. **4** and **5**), the axis of which extends substantially radially of the band. Encircling the outer end of this opening and integral with the bracket is a cylindrical flange **11.** A bolt **12** extends through the passage formed by opening **10** and the flange. The head of the bolt engages the inner surface of the bracket and the bolt projects from the outer end of the flange as shown in FIG. **4.** The two bolts extend through holes in the opposite sides of a face shield **13** that is held on the bolts by nuts **14** screwed onto the outer ends of the bolts. The nuts press elastic washers **15** against the outer surface of the shield to clamp the shield between these washers and

the outer ends of flanges **11.** The pressure of the washers against the shield can be adjusted by the nuts so that the shield will remain in any position to which it may be tilted.

It is a feature of this invention that protective ear covers also can be supported by brackets **5.** Accordingly, the upper ends of a pair of elongated supporting members or spring arms **17** are provided with holes through which the bracket flanges **11** extend. The arms can be rotated on the flanges between downwardly extending positions and positions above the brim of the cap. The thickness of the upper portion of each arm is less than the length of the flange on which it is mounted, and the outer end portion of the flange is provided with a radial lug **18** that overlies and engages the outer surface of the arm so that the latter is normally located between the lug and the body of the bracket and thereby locked in place by the lug. In order to be able to apply the arm to the flange and also remove it therefrom when desired, the wall of the hole through the spring arm is provided with a radial notch **19.** This notch is located at the top of the hole while the arm is extending downwardly below the cap. By rotating the arm about **180°** around the flange **11** in order to align the notch. with lug **18,** the arm can be slipped outwardly past the lug and removed from flange **11,** provided the nut **14** has first been removed from bolt **12.**

The upper portion of each arm **17** is parallel to the adjoining bracket, but directly beneath the bracket the arm is bent so that it slopes downwardly and inwardly towards the opposite arm as shown in FIG. **1.** This inclined portion is provided with a longitudinal slot **21,** in which a head pin **22** that projects from the back of an ear cover **23** is slidably and rotatably mounted. The head of the pin overlies the outer surface of the arm at opposite sides of the slot, but the head can be removed from the upper end of the slot by pulling it through a circular opening **24** that is just large enough to allow the head to pass through. To prevent accidental separation of the ear cover and its supporting arm after the pin has been inserted in slot **21,** the effective diameter of the pin head is increased by mounting an elastic ring **25** on it. This ring encircles the head of the pin tightly and extends inwardly along its inner surface. The ring has to be stretched in order to pull it off or to put it on the head.

Although the slots in spring arms **17** permit the ear covers to be adjusted up and down to fit over ears that are at different levels on different heads, the device must also accommodate heads of different widths between the ears. The spring arms accomplish this because they can move in or out to decrease or increase the distance between the ear covers as required. Since the upper ends of the arms are mounted on brackets **5** above the cap brim, the arms extend straight down from flange **11** to the bottom of the brim. Then they slope inwardly and downwardly beneath the cap.

In order to keep the pressure of the ear covers against the head as low as possible for the purpose of comfort, regardless of the location of a persons ears or the width of his head, provision is made for automatically maintaining substantially uniform pressure under such conditions. This is accomplished by reducing the cross sectional area of the spring arms as their lower ends are approached so that if the ear covers are near the lower ends of the arms, which will have to be sprung outward farther than if the ear covers were near the upper ends

of slots 21, the arms still will exert substantially the same pressure against the ear covers and the head. The preferred way of weakening the spring arms as their lower ends are approached is to taper the width of the arms downwardly, and also their thickness. The degree of taper can be determined by experiment, depending principally on the material of which the arms are made.

It is obvious that in order to store the ear covers above the cap brim the lower ends of the spring arms must be sprung outwardly a considerable distance to permit the ear covers to be swung up past the brim. The load on the arms should not be permitted to build up materially at that time because it might reach an intolerable level or cause displacement of the cap on the head during the process. To avoid such a condition, the lower end portion of each arm below the level at which pins 22 normally would be located is the narrowest length and least thickness of the arm. This increases the flexibility of that part of the arm.

This device can be used with both the face shield and the ear protectors, or it can be used with the ear protectors without the face shield, or with the face shield without the ear protectors. In place of a face shield, a welding helmet of the type that is swung up and down can be used. Generally, if there are times when it is not desired to use the ear protectors, they will not be removed but will merely be swung up above the cap brim and against the rear portion of the crown of the cap.

According to the provisions of the patent statutes, we have explained the principal of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claim, the invention may be practiced otherwise than as specifically illustrated and described.

We claim:

1. An ear protecting device for mounting on a safety cap having a brim, said device comprising a band adapted to surround the crown of such a cap, a pair of brackets mounted on the band at opposite sides thereof and provided with downwardly extending hooks for hooking under the edge of the brim, each of said brackets having an opening therethrough above said band, the axis of the opening extending substantially radially of the band, a cylindrical flange projecting outwardly from the bracket around said opening, a pair of spring arms for supporting ear covers, each arm having a hole through one end receiving one of said flanges, an ear cover carried by the other end of the arm, and a retaining lug projecting radially from the outer end portion of each cylindrical flange and overlapping the arm supported by the flange to hold it thereon, the wall of said arm hole being provided with a radial notch to enable the arm to be slipped off said flange after the arm has been rotated on the flange to align the notch with said lug.

2. An ear protecting device according to claim 1, in which said lugs are at the bottom of said cylindrical flanges, and said notches are at the top of said arm holes, whereby the lower ends of the arms must be swung up above the brackets to align the notches with said lugs.

3. An ear protecting device according to claim 1, in which each of said arms is a flat resilient strip having an upper portion substantially perpendicular to the axis of the cylindrical flange supporting it, and a lower portion normally sloping downwardly and inwardly from the lower end of said upper portion and tapered downwardly in cross section, each of said ear covers having a headed retaining pin projecting from its back, and said sloping lower portion of each arm being provided with a central longitudinal slot for slidably and rotatably receiving the retaining pin on the adjoining ear cover.

4. An ear protecting device according to claim 3, in which said downwardly sloping portion of each arm tapers both in thickness and width toward its lower end.

5. An ear protecting device according to claim 4, in which the lower end portion of each arm has a uniform thickness and width that is substantially the same as the thickness and width of the lower end of its tapered portion.

6. An ear protecting device according to claim 1, including bolts extending through said bracket openings and having heads at the inner ends of the openings, the bolts being adapted to extend through holes in the opposite sides of a face shield, and nuts on the outer ends of the bolts for clamping the shield against the outer ends of the said flanges.

7. An ear protecting device according to claim 6, including resilient washers on said bolts for compression between the outer surface of a face shield and the inner ends of the adjoining nuts to press the shield against said flanges.

8. An ear protecting device for mounting on a safety cap, comprising a pair of spring arms having upper ends formed for connection to the opposite sides of a safety cap, said arms being flat resilient strips having substantially parallel upper portions and lower portions normally sloping downwardly toward each other from the lower ends of said upper portions, said downwardly sloping portion of each arm tapering in thickness and width toward its lower end, and an ear cover carried by the lower end of each arm and having a headed retaining pin projecting from its back, the sloping lower portion of each arm being provided with a central longitudinal slot slidably and rotatably receiving the retaining pin on the adjoining ear cover.

9. An ear-protecting device according to claim 8, in which the lower end portion of each arm has a uniform thickness and width that is substantially the same as the thickness and width of the lower end of its tapered portion.

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