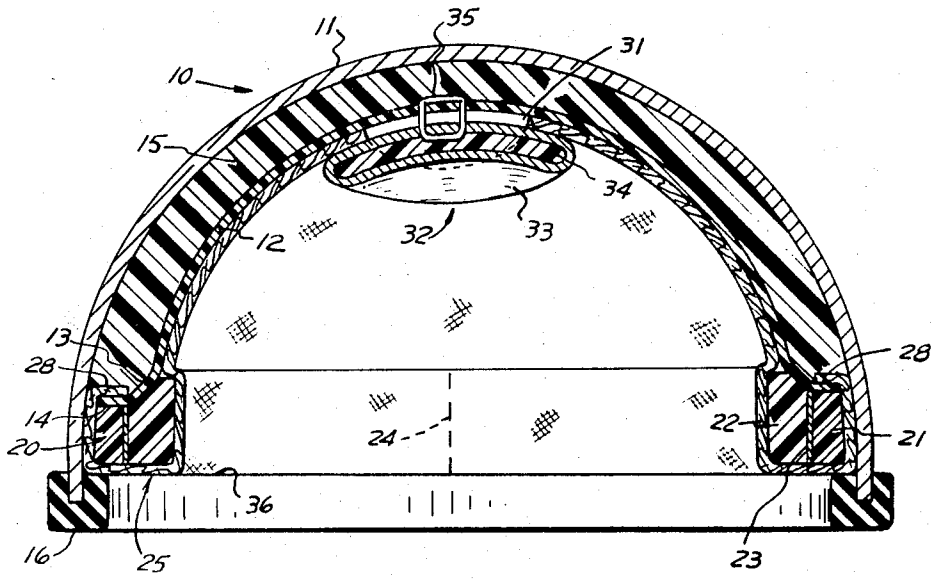
Sept. 9, 1969 D. F. RANEY 3,465,363

SAFETY HELMET SIZING BAND

Filed July 1, 1968

FIG. 1



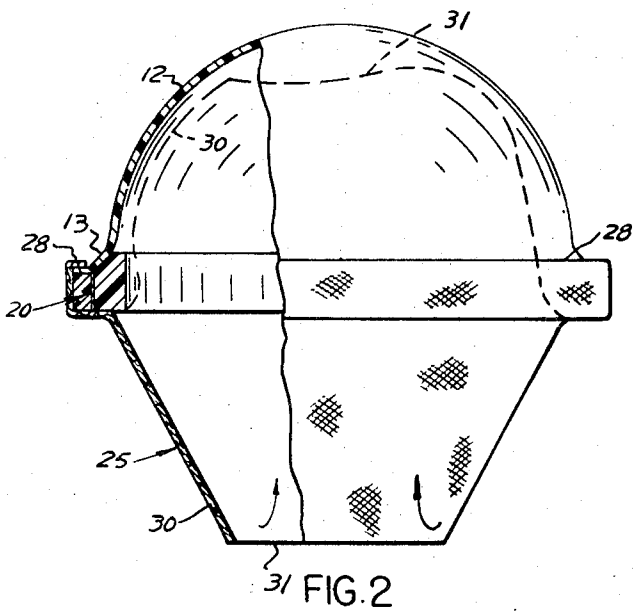




FIG. 2

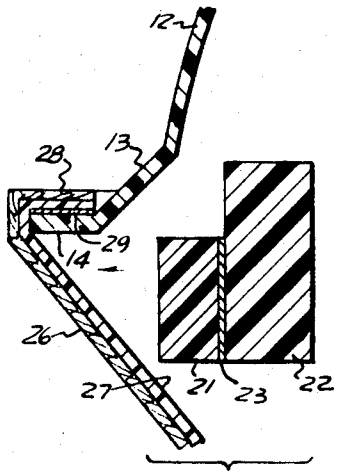



FIG. 3

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3,465,363

# SAFETY HELMET SIZING BAND

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Int. Cl. A42b 1/08, 1/22
U.S. Cl. 2—3 8 Claims

## ABSTRACT OF THE DISCLOSURE

A safety helmet formed of a shell having a lower edge and a resilient, relatively thick sizing band arranged beneath and in contact with the shell lower edge. The band is secured to the shell by means of a tube of elastically stretchable cloth-like material having one end stretched around the outer periphery of the band and fastened to the shell lower edge, with the tube bent around the band and into the shell to thereby elastically hold the band in position. Thus, the band may be removed for replacement by a different thickness band for sizing purposes. The band is formed of an elongated strip which tends to radially expand the band circumference. Hence, the band may frictionally secure the shell within a hard outer shell placed over the above mentioned shell.

## BACKGROUND OF INVENTION

This invention relates to an improvement in sizing bands used in safety helmets of the type illustrated in U.S. Patent 3,213,463 granted Oct. 26, 1965, to Marchello. For porperly sizing the helmet to the wearer's head a thick, resilient band is arranged within the helmet shell with the band being replaceable by bands of different thickness.

The Marchello type of sizing band described above, has a limited capacity to absorb impact shocks or energy, is relatively expensive to manufacture because of the need for cutting and trimming the head band to proper sizes and, if the helmet is not properly cared for or is abused, will tend to dislodge from its proper use position. Hence, the invention herein is concerned with forming an improved sizing band which will more positively stay in position, which can be more inexpensively formed and which may also function to lock the inner shell to the outer shell of a safety helmet.

## SUMMARY OF INVENTION

The invention herein contemplates forming a sizing or head band out of a lamination of two types of resilient plastic materials, the outer one being firm and the inner one being more highly resilient and deformable. The band is located beneath the lower edge of a helmet shell and is secured thereto by means of an elastically stretchable cloth tube. The tube has an end which is stretched to encircle the periphery of the head band and is secured to the shell above the head band, and then is bent or wrapped around the lower and inner edges of the band and placed within the helmet shell where it functions as a liner. The tendency of the tube material to elastically contract, holds the head band in proper position at the lower edge of the shell.

For proper sizing of a helmet, the tube may be pulled out of the helmet, the head band removed and replaced with a different thickness band or even trimmed and reused, where a larger size is required. Since the band tends to expand radially, it may function as a means for locking the inner shell within the outer shell of a helmet. By proper selection of the band material, it will function to absorb impact shocks to thereby better protect the wearer's head, as well as size the helmet to his head.



Thus, an object of this invention is to provide a removable and replaceable head band which is secured to the lower end of a helmet shell by means of a tube-like stretchable cloth material which can be manipulated so as to easily remove and replace the band, but which at the same time retains the band solidly in position, thereby simplifying and lowering the cost of such type head band.

These and further objects and advantages of this invention will become apparent upon reading the following description, of which the attached drawings form a part.

## DESCRIPTION OF DRAWINGS

FIG. 1 is a cross-sectional elevational view of a helmet illustrating the invention herein.

FIG. 2 is an elevational view, partially in cross-section, of the inner shell of the helmet with a cloth tube extending downwardly therefrom, before complete assembly.

FIG. 3 is an enlarged, fragmentary, cross-sectional view of a portion of the inner shell, cloth tube, and sizing band.

## DETAILED DESCRIPTION

FIG. 1 illustrates a safety helmet **10** formed with a hard outer shell **11** and a thinner and semi-flexible inner shell **12** whose lower edge is outwardly bent at **13** and extends radially outwardly into an edge flange **14**. The two shells are spaced apart for containing between them a liner of energy absorbing material **15**. The lower edge of the outer shell is provided with a rubber-like edge bead **16**.

The outer shell **11** may be formed of a glass fiber reinforced resin. The liner **15** may be formed of a foamed polystyrene which is characterized by being resiliently compressible under impact or pressure and having a relatively slow recovery rate to return to substantially its original shape for thereby absorbing the energy of impact. The inner shell may be made of any suitable plastic material which is relatively stiff but tends to flex under pressure of impact.

The foregoing description of a helmet forms no part of the invention hereof and hence no greater detail is given here. For example, the above mentioned Marchello patent shows such a type helmet construction.

The invention hereof relates to the sizing or head band **20**, which as shown in FIG. 3, is preferably formed of two elongated strips, namely an outer strip **21** and an inner strip **22**. Preferably, the outer strip is made of a resilient, but relatively firm plastic material which thereby is relatively stiff and suitable for energy absorption. The inner strip **22**, which is taller than the outer strip **21**, and is secured thereto by adhesive **23**, is preferably made of a more resilient, much softer, less dense material. For example, both strips may be made of foamed polyvinylchloride of different densities or of other suitable foamed plastics.

The composite band **20** is preferably made in a single long strip which is then bent around and positioned beneath the lower edge flange **14** of the inner shell **12**, with the opposite ends of the band simply abutting at **24**, but not being otherwise connected together.

A tube **25** formed of an elastically stretchable cloth is used to secure the band to the shell. As an example of such type cloth, FIG. 3 illustrates a cloth formed of an outer layer of a nylon woven jersey material **26** laminated to a lining **27** of polyurethene foam of approximately $\frac{1}{10}$ of an inch thickness. Other suitable elastic materials may also be used.

The tube **25** initially has a diameter considerably less than the cross-sectional size of the opening defined by the lower edge of the inner shell. Hence, as shown in FIG. 2, the upper end **28** of the tube is stretched around the outer periphery of the band and is then turned over and secured

to the top surface of the flange **14** by means of a suitable adhesive **29**. In this way, the band tends to elastically contract to thereby surround and hold the outer periphery and lower edge of the band **25**.

The lower or main body portion **30** of the tube is then bent or wrapped around the bottom of the band and the inner wall surface of the band is positioned against the inner surface of the inner shell, as indicated by the arrows and dotted lines in FIG. 2. The tube tends to elastically conform to the inner wall surface to thereby form an inner liner which, if formed of the laminate mentioned above, will provide for more comfort and better fit for the wearer.

When bent inside the shell, the opposite, open end **31** of the tube is located near the crown or upper portion of the shell. In this type of helmet, it is conventional to provide a crown pad **32**, which may be made of an envelope **33**, formed of plastic sheet, containing a resilient foam plastic filler **34**, with the envelope secured to the shell by means of a suitable tie cord **35**. An example of such a pad is illustrated in U.S. Patent No. 3,365,725, granted Jan. 30, 1968, to Webb.

The portion of the tube near the opening **31** may be tucked between the crown pad **32** and the inner shell to thereby neatly keep it in place and to improve appearance.

Preferably, the upper edge of the outer shell edge band **16** forms an inwardly directed shoulder **36** so that the band is slightly compressed between the shoulder **36** and the inner shell flange **14**. As illustrated in FIG. 1, the outer strip **21** is located beneath the flange **14** whereby the inner strip **22** is deformed and pressed against the bent portion **13** of the inner shell to widen the band for better and more comfortable fit.

Because the outer strip **21** of the band **20** is firmer and stiffer it tends to straighten out the entire band back to its original straight shape. This plus the slight compression of the band between the flange **14** and the shoulder **36** provides an outwardly directed pressure by the outer strip **21** against the interior of the outer shell **11** to frictionally secure the inner shell within the outer shell.

## OPERATION

In operation, once the helmet is assembled as illustrated in the drawings, its size may be adjusted by pulling the tube **25** downwardly into the FIG. 2 position, pulling the band out, and replacing it with another band of an increased or decreased thickness, as needed. Thereafter, the tube may be bent back within the shell. Hence, an easily removable, inexpensive sizing band is provided which functions to comfortably conform to the size and contours of the head, absorb impact energy, and help to secure the parts of the helmet together.

This invention may be further developed within the scope of the following claims. Accordingly, it is desired that the foregoing description be read as being merely illustrative of an operative embodiment of this invention and not in a strictly limited sense.

Having fully described an operative embodiment of this invention, I now claim:

**1.** In a safety helmet formed of a shell having a lower edge, a replaceable sizing band comprising:

an elongated, resilient, relatively thick band extending around the circumference of, beneath and in contact with the lower edge of the shell;

a tube formed of elastically stretchable cloth-like material, and initially of a diameter considerably less than the cross-sectional distances of the opening defined by the lower edge of the shell;

one end of the tube being stretched around, to encircle the outer periphery of the band and being fastened to the shell lower edge;

the tube being bent around the lower edge of the band and extending into the inside of the shell to at least partially line the interior of the shell while also surrounding the band and securing the band to the shell by the elastic contraction of the tube material;



the tube and the band being otherwise substantially free of positive securement to the shell, so that the band may be removed by pulling the tube out of the shell for freeing the band, wherein the band may be replaced by a band of different thickness for properly sizing the shell to the head of the wearer.

**2.** A construction as defined in claim **1**, and said shell having its lower edge formed by an outwardly extended integral flange, and the tube encircling the flange and being fastened to the upper exposed surface thereof.

**3.** A construction as defined in claim **2**, and including a substantially rigid, hard outer shell arranged over, completely containing, and spaced from said above mentioned shell, which thereby forms an inner shell, with the lower edge of the inner shell terminating above the lower edge of the outer shell;

the portion of the said tube encircling the outer periphery of the band being in face to face contact with the inner surface of the outer shell;

said band being characterized by tending to expand radially outwardly to thereby provide a constant radially outwardly directed force against the outer shell for frictually securing the inner shell to the outer shell.

**4.** A construction as defined in claim **3**, and a radially inwardly extending shoulder formed on the lower edge of the outer shell, the band being compressed slightly between the shoulder and said flange for additionally holding the band and inner shell within the outer shell.

**5.** A construction as defined in claim **1**, and said band being formed of two strips, secured together in face to face contact, with the outer of the two strips being formed of a relatively firm material and the inner of the two strips being considerably more resilient and soft than the outer strip for adjusting to size and contours of the wearer's head, and the outer strip having a tendency to radially expand in diameter to thereby constantly apply a radially outwardly directed force upon the tube portion encircling it for holding the band against movement relative to the tube.

**6.** A construction as defined in claim **5**, and said shell having its lower edge formed by an outwardly extending integral flange, with the tube encircling the flange and fastened to the outer surface of the shell; and the inner of the two strips being taller than the outer strip; the upper face of the outer strip being in face to face contact with the under surface of the flange and the portion of the inner strip which is above the outer strip being pressed against the interior surface of the shell above the flange.

**7.** A construction as defined in claim **5**, and the opposite free ends of the band being normally arranged adjacent to and in contact with, but free of positive securement to each other, so that the outer strip resiliently tends to straighten out to thereby provide said radially outwardly directed force.

**8.** A construction as defined in claim **1**, and said tube portion within the shell extending upwardly to near the crown of the shell and tending to closely conform to the inner surface of the shell; and a crown pad secured within the shell at the crown thereof and overlying the free edge of the open end of the tube portion within the shell, to sandwich such free edge between the crown pad and the shell.


**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,994,090 | 8/1961 | Ostwald | 2—183 XR |
| 3,015,103 | 1/1962 | Zbikowski | 2—3 |
| 3,146,462 | 9/1964 | Militello | 2—3 |
| 3,396,408 | 8/1968 | Enger | 2—183 |



JAMES R. BOLER, Primary Examiner

U.S. Cl. X.R.

2—183