

[54] **SUSPENSION FOR HARD PROTECTIVE HAT OR THE LIKE**

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[58] Field of Search..... 2/3 R, 3 A, 3 B, 3 C, 5, 2/6, 7, 8

[56] **References Cited**

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[57] **ABSTRACT**

A suspension for a hard protective hat has a crown piece adapted to overlie the wearer's head and a plurality of band arms extending outwardly from the crown piece and provided at their outer ends with respective attachment feet adapted to be secured to the hat. Two of the arms extending from the crown piece in opposite directions terminate short of the respective feet and are connected to these feet via respective connecting members each having one end attached to the outer end of the arm and another end attached to the respective foot and each including a ligature extending transverse to the respective arm. These ligatures are of smaller cross section than the arms so that even in very cold weather they are capable of deforming in the longitudinal direction of the arms and imparting resilience to the suspension. Curved stabilizing elements extend from each of the feet to the crown piece and are of smaller cross section than the arms so that these stabilizing arms are first pulled tight and straight before the arms are longitudinally loaded.

7 Claims, 2 Drawing Figures

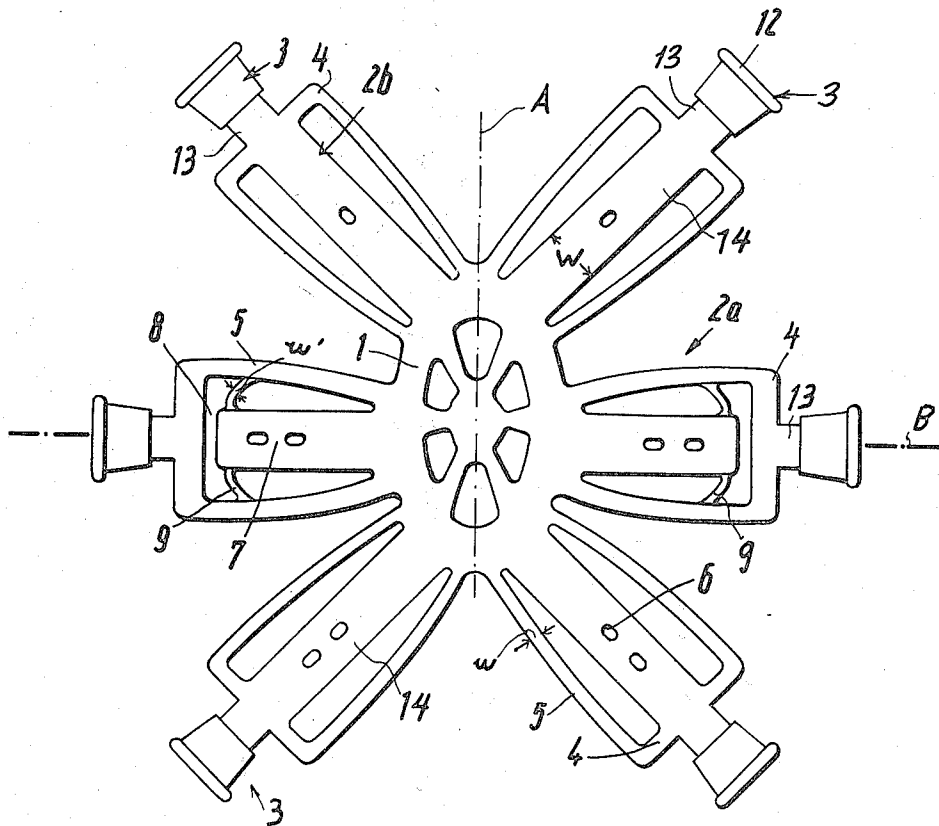


Fig. 1

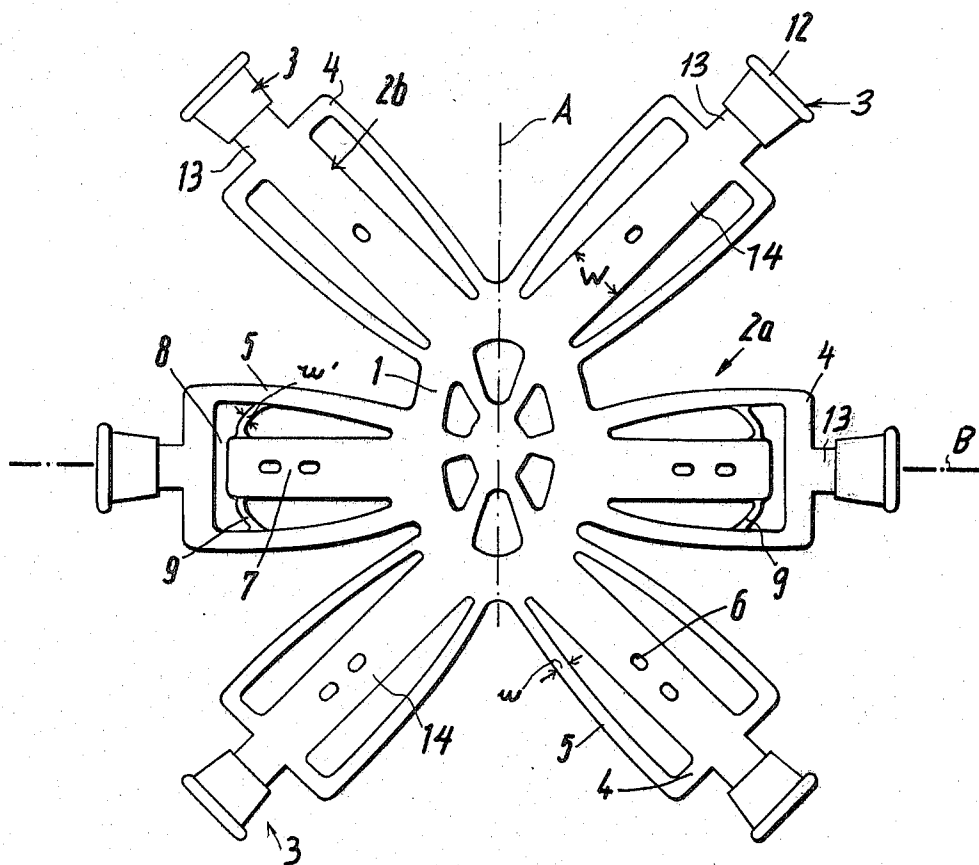
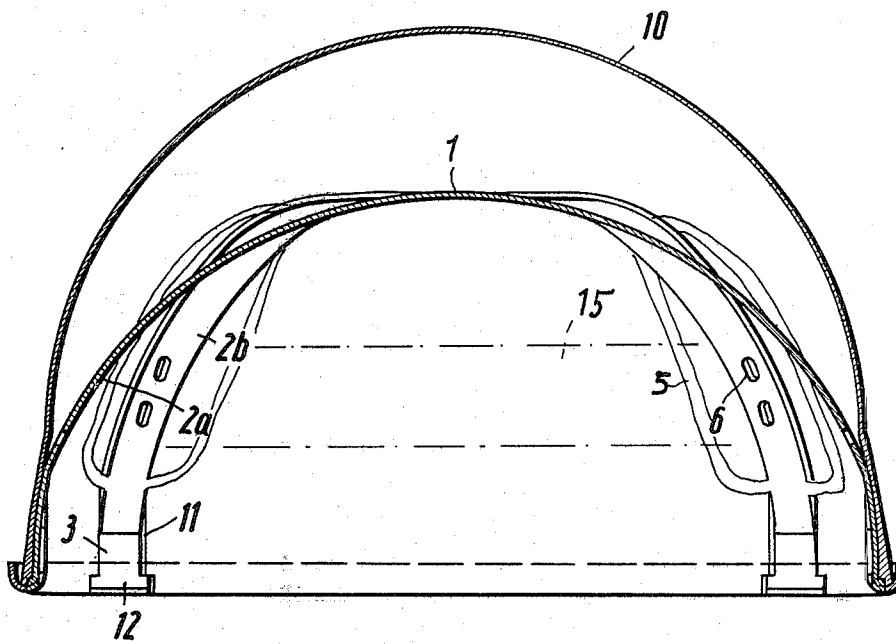


Fig. 2



SUSPENSION FOR HARD PROTECTIVE HAT OR THE LIKE

FIELD OF THE INVENTION

The present invention relates to a hard protective hat or helmet. More particularly this invention concerns a suspension for supporting such a protective hat on the wearer's head.

BACKGROUND OF THE INVENTION

As a rule a hard hat or the like comprises a ridged outer shell made of light metal or synthetic resin, a so-called spider or suspension in the helmet, and a head band carried by the suspension which snugly surrounds the wearer's head. The suspension comprises a central crown piece adapted to overlie the wearer's head and a plurality of outwardly and downwardly extending arms whose outer ends are secured in the hard shell of the hat adjacent the lower rim thereof. The head band is secured to the suspension at intermediate locations on the arms. Customarily the suspension is a simple flat piece of synthetic-resin formed generally in the shape of a star.

Such suspension holds the outer shell above the wearer's head so that a blow to the shell will be partly absorbed by this suspension and otherwise transmitted evenly to the wearer's head, so as to avoid the considerable injury that would often take place with a sharp concentrated blow. The principal disadvantage of such a system is that in cold climates, where the temperature drops to -19°C , the suspension becomes extremely rigid so that it not only loses its ability to cushion a blow delivered to the shell, but is also quite uncomfortable for the wearer. In such situations recourse has been had to relatively expensive suspensions made of textile.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention to provide an improved suspension for a protective hat or the like.

Another object is the provision of such a suspension which remains elastic at extremely low temperatures and which is inexpensive to manufacture.

SUMMARY OF THE INVENTION

These objects are attained according to the present invention in a suspension for a hard protective hat which comprises a crown piece adapted to overlie the wearer's head, a plurality of band-like arms extending outwardly from the crown piece, an attachment foot connected to each of the arms and adapted to be secured to the hat, and at least two connecting members each having one end attached to the outer end of a respective one of the two arms and the other end attached to the respective foot. The two arms provided with such connecting members terminate short of and form a gap with the respective feet. Each connecting member includes a strip portion or ligature which extends transverse to the respective arm and which is of smaller cross section than the respective arm.

In this arrangement the strip portions or ligatures even at a very low temperature is capable of flexing since it extends transverse to the longitudinal axis of the respective arm.

The entire suspension according to the present invention is integrally formed of a flexible synthetic-resin. The feet are thickened portions at the ends of the arms

and are adapted to be received in corresponding recesses on the inside of the rim of the helmet shell.

According to yet another feature of this invention each of the arms is provided with at least one stabilizing strip of substantially smaller cross section than the respective arm and having one end secured to the crown piece and another end secured to the respective foot. Between these two ends the stabilizing strips each extend generally parallel to the respective arms but are not straight so that on longitudinal stressing and stretching of the respective arms the stabilizing strip is pulled into a straight condition before it also begins to accept longitudinal loading.

In accordance with another feature of this invention each of the feet includes a crosspiece extending perpendicularly to the respective arm and serving as one of the insertions of the respective stabilizing strip. This crosspiece is of smaller cross section than the respective arm so that it also has a spring function.

According to a further feature of the present invention a pair of such strip portions extends from the free ends of the two opposite arms to which they are connected at an angle to the respective arms. They are each connected to a respective stabilizing strip which in this case forms part of the connecting member.

BRIEF DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1 is a plan view of a suspension according to the present invention, and

FIG. 2 is a cross section through a protective hat provided with the suspension shown in FIG. 1.

SPECIFIC DESCRIPTION

As shown in FIG. 1 a suspension according to the present invention has a crown piece 1 adapted to overlie the wearer's head and provided with six outwardly extending arms including two side arms 2a and four end arms 2b. The arms 2a extend in opposite directions from the centerline A and the arms 2b extend from the centerline A at angles of 60° .

Each of the arms 2a and 2b terminates at an attachment foot 3 comprising a thickened end piece 12 carried on a neck 13 from which extends a pair of transverse pieces 4.

Each of the arms 2b comprises a band-like element 14 of regular width W. Holes 6 formed in this band 14 allow a head band shown schematically at 15 in FIG. 2 to be secured to the suspension. Stabilizing strips 5 extend from the outer ends of crosspieces 4 to the center piece 1 and have thickness w equal to approximately $W/3$.

The arms 2a each have a central band-like element 7 of width W and terminating just short of the crosspieces 4 of the feet 3 so as to form a gap 8. Short spring elements or ligatures 9 are connected between the end of the band 7 and the stabilizing elements 5 of these arms 2a. These strips 9 are arcuate and of width w' equal to approximately $W/5$. Moreover these ligatures 9 extend transversely to a cross line B perpendicular to the line A and acting as symmetry line for the elements 2a. The strips 9 furthermore extend back from the tip of the band 7 toward the centerline A and are concave toward this line A.

The suspension shown in FIG. 1 is secured as shown in FIG. 2 in a hard shell 10 formed with recesses 11 adapted to receive the ends 12 of feet 3. It can be seen here that the arms 2a are slightly shorter than the arms 2b so that they bend the suspension along the line B over a larger radius of curvature than the legs 2b. Thus as a general rule the legs must be deformed before the legs 2b are pulled tight. In addition the stabilizing strips 5 are curved so that these elements also must be pulled straight before they can be stretched tight.

I claim:

1. A suspension for mounting a head band in a shell of a hard protective hat, said suspension comprising:
 a crown piece adapted to overlie the wearer's head;
 a plurality of arms formed integrally with and extending outwardly from said crown piece;
 respective attachment feet each provided at the outer end of a respective arm and adapted to be secured to said shell, at least two of said arms extending from said piece in opposite directions;
 respective bands reaching outwardly from said crown piece along each arm of said two arms and having a free outer end spaced from the respective foot, said suspension being adapted to be attached to said head band; and
 respective connecting members each having one end attached to the outer end of a respective one of said bands and another end attached to the respective foot, each of said members being formed at

least partially as a flexible ligature extending transverse to and being of smaller cross section than the respective arm and band.

2. The suspension defined in claim 1, wherein said crown piece, said arms, said attachment feet, and said connecting members are all integrally formed of a flexible synthetic resin.

3. The suspension defined in claim 2 wherein each of said feet includes a thickened foot piece and a cross-piece extending transversely to the respective arm.

4. The suspension defined in claim 3, further comprising respective pairs of stabilizing strips flanking said arms and each of substantially smaller cross section than the respective arms, said stabilizing strips each having one end secured to the respective crosspiece and another end secured to said crown piece.

5. The suspension defined in claim 4 wherein said stabilizing strips are of arcuate shape.

6. The suspension defined in claim 5 wherein said one ends of said stabilizing strips constitute part of said connecting members, said ligatures each extending between the respective said one end and the respective free end of the respective arm.

7. The suspension defined in claim 1 wherein another two of said arms have their free ends connected directly to the respective feet, said other two arms being of greater length between said crown piece and the respective feet than the first-mentioned two arms.

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