Feb. 25, 1947. H. B. LEWIS 2,416,529

SAFETY HAT

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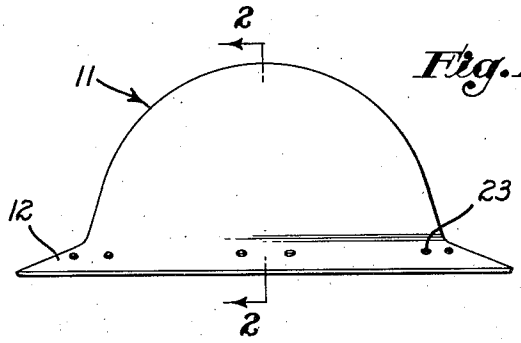
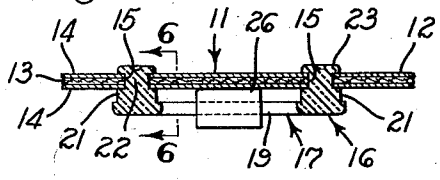



Fig. 1.

Fig. 5.



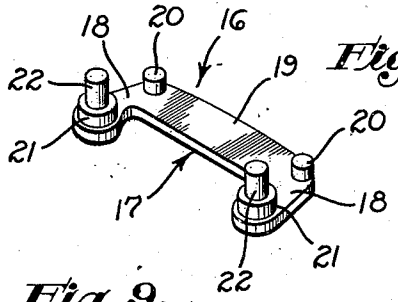




Fig. 4.

Fig. 6.

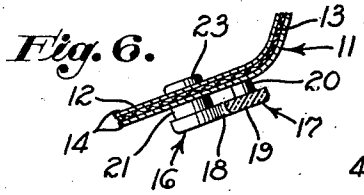
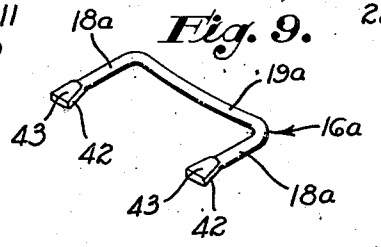



Fig. 9.



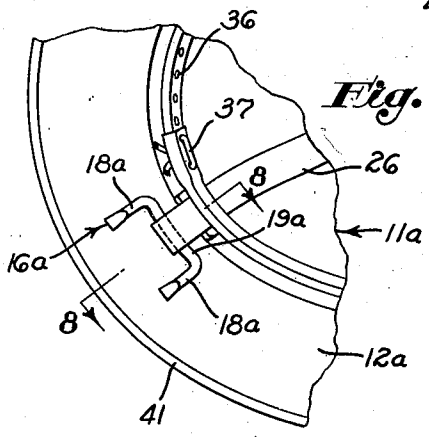




Fig. 7.

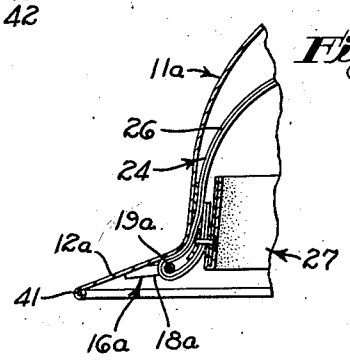



Fig. 8.

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Fig. 2.

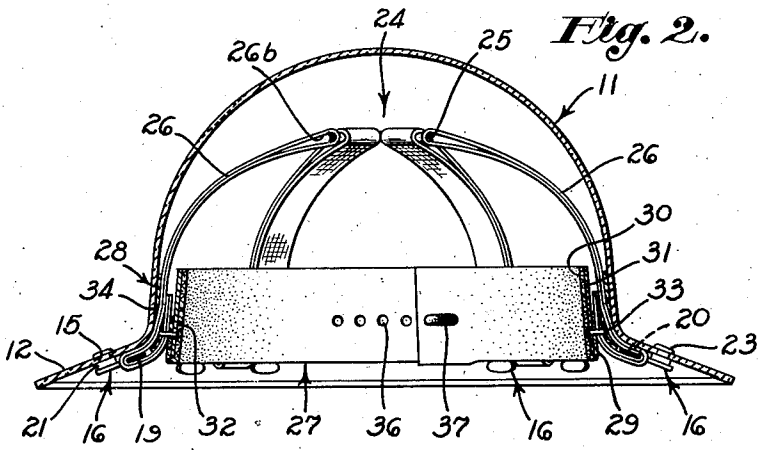
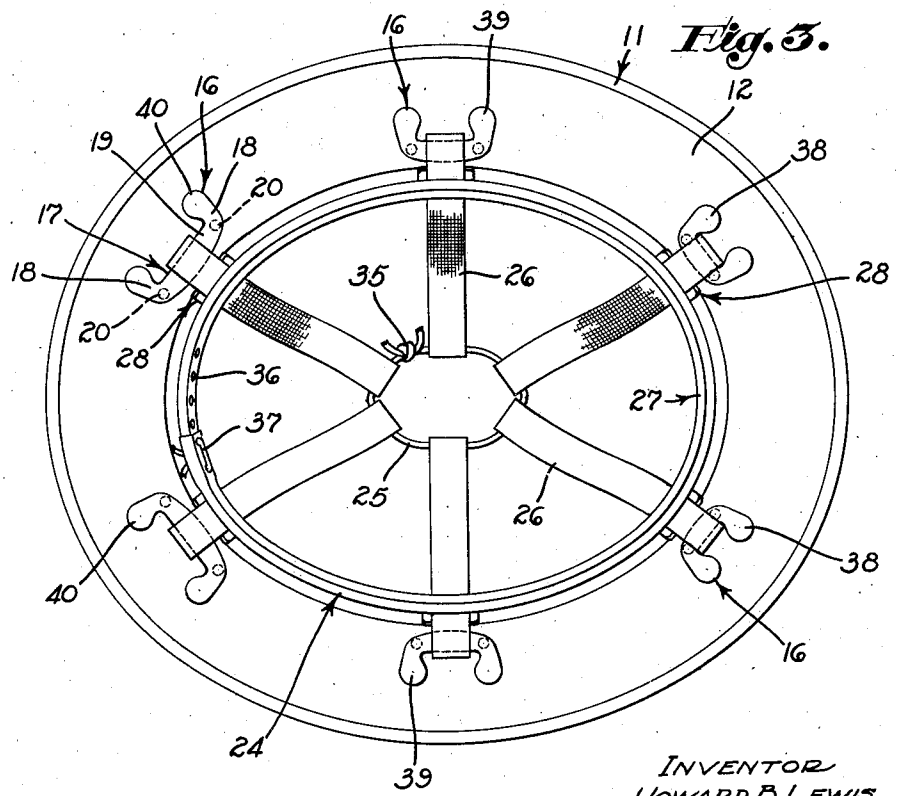



Fig. 3.




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Patented Feb. 25, 1947

2,416,529

# UNITED STATES PATENT OFFICE

2,416,529

## SAFETY HAT

Howard B. Lewis, Venice, Calif.

Application March 22, 1943, Serial No. 479,978

9 Claims. (Cl. 2—3)

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My invention relates to a safety hat of the type that may be worn by workers in various fields of work, such as the construction of tunnels, buildings, oil well derricks, mines, etc., to protect the head of the wearer from falling objects.

Among the objects of my invention are the provision of such a safety hat which will absorb a part of the force of impact of objects striking the hat and dissipate the remainder of such force by applying it over broad areas of the head of the wearer, to provide such a hat which will maintain the impact-resisting shell or outer hat-like member in spaced relationship with the head of the wearer, permitting the free circulation of air between the shell and the headgear at all times, to provide such a hat which shall include an outer deformation-resisting hat-like member having within it head-engaging means which are connected thereto and conformable to the outline of the head of the wearer independently of the form of the shell, to provide in such a hat a head-engaging means including adjusting means, whereby the extent to which the head engaging such means projects into the crown of the hat may be readily varied, to provide in a hat of the class described head-engaging means including adjusting means, whereby the circumferential size of the head-engaging means may be easily varied to fit heads of different sizes, and to provide connecting means between the head-engaging means and the impact-resisting shell, preventing rotation of the shell relative to the head-engaging means and permitting variation in the circumference of the head-engaging means to fit two heads of different size.

Embodiments of the invention capable of accomplishing the foregoing objects and providing these advantages and others are described in the following specification, which may be better understood with reference to the accompanying drawings, in which

Fig. 1 is a side elevational view of one embodiment of my invention;

Fig. 2 is a vertical sectional view taken as indicated by the line 2—2 of Fig. 1;

Fig. 3 is a bottom plan view of the same embodiment;

Fig. 4 is a perspective view of the eye member or connecting means of the same embodiment;

Fig. 5 is a longitudinal sectional view of the eye member or connecting means of Fig. 4 attached to the hat;

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Fig. 6 is a transverse sectional view taken as indicated by the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary bottom plan view of an alternative embodiment of my invention;

Fig. 8 is a sectional view taken as indicated by the line 8—8 of Fig. 7; and

Fig. 9 is a perspective view of the eye member or connecting means of the embodiment illustrated in Figs. 7 and 8.

Referring to the drawings, which are for illustrative purposes only, the numeral 11 indicates an outer shell or impact-resisting member or hat-like member, which may be substantially semi-spherical in shape but is preferably semi-ellipsoidal and which is preferably, though not necessarily, provided with an outwardly flared brim 12 at its lower periphery.

The hat-like member 11 is made of any material having the desired characteristics of resistance to impact and weight. In the form illustrated in Figs. 1 to 6, inclusive, the material comprising the hat-like member 11, as is best illustrated in Fig. 5, includes a layer of fabric or woven material 13 impregnated with and covered on both of its sides with a plastic 14, the fabric and plastic being molded or pressed into the desired shape in any of the manners well known for the forming of such plastic articles.

Formed in the lower portion of the hat-like member 11 or in the brim 12 is a plurality, illustrated as six in number, of pairs of openings 15. The numeral 16 indicates a connecting member or eye member, which is best illustrated in Fig. 4. The eye member 16 includes a U-shaped body 17 comprising leg portions 18 and a connecting portion 19 between them. Formed upon one side of the body portion 17 adjacent each of the intersections of the leg portions 18 and the connecting portion 19 is a supporting button 20, illustrated as cylindrical in form and made integral with the eye member 16. Adjacent the free end of each of the leg portions 18, the eye member 16 is provided with supporting portions 21, projecting from the same side of the body portion 17 and illustrated as cylindrical in form and integral with the eye member 16.

Projecting from each of the supporting portions 21 is a pin 22, illustrated as cylindrical in form coaxial with the adjacent supporting portion 21 and integral therewith. The eye member 16 may be formed of any suitable material having the desired characteristics of tensile strength and light weight. In the embodiment illustrated in Figs. 1 to 6, inclusive, the eye member 16 is formed of

a suitable plastic, either by molding or casting in any of the manners well known for such processing of plastics.

The pins 22 are made of such dimensions as to project through the openings 15 in the hat-like member 11 sufficiently that they may be riveted or peened over to provide a head 23 engaging the outer surface of the hat-like member 11. The supporting buttons 20 and the supporting portions 21 are made of a thickness sufficient to keep the body 17 spaced from the hat-like member 11 to permit the passage of a strap or connecting member of a head-engaging means, to be later described, to pass therebetween.

The numeral 24 indicates the head-engaging means of the hat of my invention and is best illustrated in Figs. 2 and 3. The head-engaging means 24 includes a securing member 25, a plurality of straps or connecting members 26, a head-band 27, and engaging members 28. The strap members 26, illustrated as six in number, are formed of any desirable flexible material of sufficient tensile strength, and preferably one having a slight elongation when subjected to tension. I have found that soft cotton fabric is well suited for this purpose, and, when such material is employed, I prefer to double it, passing the two free ends between the hat-like member 11 and the connecting portion 19 of one of the eye members 16, so that the folded upper end of each of the strap members 26 provides an opening or loop 26b.

One of the engaging members 28 is positioned adjacent the lower end of each of the strap members 26, and positioned adjacent the inner side of the lower ends of the strap members 26 is an outer fold 29 of the head-band 27. The head-band 27 is formed of leather or similar material and, as illustrated in the drawings, is folded upon itself to provide an upwardly extending inner fold 30 with a reinforcing band 31 positioned between the outer and inner folds 29 and 30. The reinforcing band 31 is formed of any material having the desired characteristics of resistance to heat, moisture, tensile and binding stresses and may with advantage be formed of composition, fibre-board, imitation leather, or the like.

The reinforcing band 31 may be secured to the outer fold 29, if desired, as by a rotary stitching 32 adjacent the upper edge of the outer fold 29. The reinforcing band 31 extends throughout the length of the head-band 27, and the ends of the head-band 27 and reinforcing band 31 overlap in telescoping relationship.

Extending through the reinforcing band 31, the outer fold 29 of the head-band 27, the lower ends of one of the strap members 26, and the lower end of one of the engaging members 28 is a fastening member 33, which may be a brad or a rivet. The inner ends of the brads or rivets 33 are prevented from causing any discomfort to the wearer by the cushioning effect of the inner fold 30.

Each of the engaging members 28 is provided with a slot 34 therein above its connection to the fastening member 33, each member 28 thus being in the form of a loop or plate having a strap-receiving slot 34 and the associated strap member 26 is extended through the opening 34 after and above its passage between the connecting portion 19 of one of the eye members 16 and the hat-like member 11, as illustrated in Fig. 2.

Extending through the loops 26b in the upper ends of the strap members 26 is a securing member 25, preferably in the form of a woven lace. The strap members 26 are made of such lengths that their upper ends are at some distance from each other, with the result that the securing member 25, extending through their loops 26b will roughly approximate a circle when the device is positioned upon the head of a wearer, the member 25 also constituting head-engaging means and the size of this circle being readily varied by adjusting and tying the ends of the securing member 25 in a knot 35.

Extending through both the outer and inner folds 29 and 30 of the head-band 27 and the reinforcing band 31 adjacent both of their ends are a plurality of openings 36, illustrated as equally spaced.

A connecting means in the form of a lace 37 is provided for extension through pairs of coinciding openings 36 in the two ends of the head-band 27 and reinforcing band 31, so that, when the ends of the lace 37 are tied together on the outer side of the head-band 27, the head-band 27 is maintained at the desired circumferential length. With the head-engaging means 24 assembled and secured to the hat-like member 11, as described and illustrated, it will be apparent that the head-band 27 is permitted to conform to the outline of the head of the wearer, even though this outline be different from the outline of the hat-like member 11. It will be apparent that with a hat-like member 11 of semi-elliptical shape, as illustrated, the space between the head-band 27 and the hat-like member 11 may be substantially uniform around the head of a dolichocephalic wearer, whereas for a brachycephalic wearer the head-band 27 will be separated from the hat-like member 11 a lesser distance at the sides of the head than at the front and rear of the head.

It is desirable that the hat-like member 11 be prevented from rotating relative to the head-engaging means 24 and also that the connection of some of the strap members 26 to the hat-like member 11 be movable circumferentially in order to vary the circumference of the head-band 27. In accordance with my invention these desirable attributes are provided by making the connecting portions 19 of the eye members 16 of various lengths. Thus, the two eye members 16 positioned at the front of the hat-like member 11 and indicated by the numeral 38 are provided with connecting portions 19 of a length substantially equal to the width of the strap members 26 with which they are to be associated. The eye members 16 positioned at the sides of the hat-like member 11 and indicated by the numeral 39 are provided with connecting portions 19 of a length substantially greater than, and in this illustrated embodiment approximately one and a half times, the width of the strap members 26 with which they are to be associated. The eye members 16 connected at the back of the hat-like member 11 and indicated by the numeral 40 are provided with connecting portions 19 substantially wider than, and in this illustrated embodiment approximately twice, the width of the strap members 26 with which they are to be associated. The distances between the openings 15 of the pairs of such openings receiving the eye members 38, 39, and 40 are correspondingly spaced.

To facilitate adjustment of the size of the head-band 27 the openings 36 therein may be spaced apart uniformly distances corresponding to a change in hat size of one-eighth.

As is best illustrated in Fig. 2, the connecting portions 19 of the eye members 16, by which the force of the impact of an object striking the hat-

like member 11 is transferred to the head-engaging means 24, are supported at their inner edges by the buttons 20 in engagement with the hat-like member 11 and adjacent their outer edges by the supporting portions 21 likewise contacting the hat-like member 11, so that the stress to which these connecting portions 19 are subjected is primarily tension, as contrasted with a bending moment, so that various plastic materials may be employed for the manufacture of the eye members.

By varying the effective length of the securing member 25, the distance between the upper ends of the strap members 26 may be readily varied, so that the vertical distance between the top of the hat-like member 11 and the securing member 25 may be readily adjusted, and thus the extent to which the head of the wearer projects into the hat-like member 11 may be easily varied.

The embodiment of my invention illustrated in Figs. 7 to 9, inclusive, differs from the embodiment previously described in that the hat-like member 11 is formed of metal instead of fabric and plastic, being provided with a rolled edge 41 to prevent damage to objects or injuries to persons which it may contact, and in that the construction of the eye members indicated by the numeral 16*a* is substantially U-shaped, including leg portions 18*a* and a connecting portion 19*a* extending between them; each of the leg portions 18*a* is inclined upwardly at its free end, as indicated by the numeral 42 of Fig. 9, and this upwardly inclined portion is flattened on its upper and lower surfaces, as indicated by the numeral 43 of the same figure.

When the upper flattened surface is spot welded to the brim 12*a* of the hat-like member 11*a*, the connecting portions 19*a* of the eye members 16*a* are spaced from the brim 12*a* sufficiently to permit the passage of the strap members 26 therebetween. The connecting portions 19*a* of the eye members 16*a* at the front and on the sides and at the back of the hat-like member 11*a* vary in length in the same way and for the same purposes as the connecting portions 19 of the eye members 16 as previously described.

In both embodiments of my invention the securing member 25 and the upper ends of the strap members 26 are supported by the wearer's head, and the lower end of each strap member being connected to the head-band is also supported by the wearer's head. The hat-like member is hung on and supported by the loops in the strap members formed intermediate their ends and thus supported by the wearer's head while spaced from it at all points. Any impact upon the outer hat-like member is distributed over broad areas of the wearer's head through the securing member 25, the strap members 26, and the head-band 27.

Likewise in both embodiments of my invention hereinbefore described it will be seen that the size of the head-band may be readily varied between wide limits to accommodate different sizes of heads, and the rotation of the hat-like member relative to the head-engaging means and head-band is prevented. Likewise the head-engaging means may be easily and quickly adjusted to vary the distance to which the head of the wearer projects into the hat-like member.

While the embodiments of my invention which I have illustrated and described accomplish the objects and provide the advantages primarily stated, there are various other embodiments of my invention which may likewise accomplish



these objects and provide such advantages, and I therefore wish my invention to be considered as not restricted to the specific embodiments herein described but as including all variations thereof coming within the scope of the claims which follow.

I claim as my invention:

1. In a head-protecting device, the combination of: a shell member; head-engaging means within and spaced from said member; a plurality of eye members associated with said shell member; and a plurality of flexible straps connecting said means and said eye members, corresponding strap and eye members being so relatively dimensioned that said means is so connected to said shell member at at least one of said eye members as to prevent its circumferential movement relative to said shell member, the connection between the other straps and eye members providing for adjustment of said head-engaging means relative to said shell member whereby the circumferential size of said head-engaging means may be varied.

2. In a head-protecting device, the combination of: an outer hat-like member; head-engaging means within and spaced from said hat-like member; a head-band within and spaced from said member; a plurality of flexible members, each of said flexible members being connected at one end to said head-engaging means and at the other end to said head-band; and a plurality of eye members attached to said hat-like member, certain of said eye members being relatively elongated and slidably connected to certain of said flexible members for movement of said certain flexible members circumferentially of said hat-like member, whereby the circumferential size of said head-band may be varied, and others of said eye members being non-slidably connected to other flexible members to prevent movement circumferentially of said hat-like member.

3. In a head-protecting device, the combination of: a hat-like member; eye members associated with said hat-like member adjacent its lower edge; a plurality of strap members, the upper end of each of which is provided with an opening and the lower end of each of which is passed through one of said eye members; an engaging member secured to the lower end of each of said strap members and engaging a portion of the same strap member above the associated eye member, whereby each strap member is secured to one eye member, the circumferential dimensions of less than all of said associated strap and eye members being such that relative circumferential movement may occur; a securing member extending through the openings in the upper ends of said strap members; and connecting means secured to said engaging members, said band, and said strap members, whereby said hat-like member is maintained in spaced relation with the head.

4. In combination in a head gear: head-engaging means including a head-band; a plurality of connecting members connected with said head-band and adapted to connect said head-band with a hat-like member; attaching means movably connected with certain of said connecting members and adapted for adjustably attaching said certain connecting members with said hat-like member whereby said certain members may move circumferentially of said hat-like member; and other attaching means connected with other of said connecting members in non-adjustable relationship preventing movement of said other

of said connecting members circumferentially of said hat-like member.

5. A combination according to claim 4 wherein the head-band is adjustable for head size, and certain of said attaching means provide more adjustment of their respective connecting means than certain others thereof.

6. In combination in a head gear: adjustable head-engaging means; a plurality of connecting members attached to said head-engaging means and adapted for connection also with a hat-like shell; and attaching means for attaching said connecting members to said hat-like shell, said attaching means comprising eye members, there being an eye member for each connecting member, certain of said eye members being relatively elongated for slidably connecting said connecting members with said shell for corresponding movement of corresponding connecting members circumferentially of said shell, and other eye members being dimensioned to prevent slidable movement of corresponding connecting members circumferentially of said shell.

7. In a head-protecting device, the combination of: a shell member; circumferentially adjustable head-engaging means within and spaced from said member; means connecting said head-engaging means to said shell member and against relative rotation with respect to said shell member; a plurality of eye members associated with said shell member; and a plurality of eye-engaging members connecting said head-engaging means and said eye members, said eye-engaging members and eye members being so relatively dimensioned that said head-engaging means may move circumferentially with respect to said shell member, whereby the circumferential size of said head-engaging means may be varied.

8. In combination with head gear having a plurality of eye means associated therewith: head-engaging means including a head-band; and a plurality of connecting members connected with said head-band and adapted for connection to



such eye means, at least one of said connecting members being so dimensioned relative to its connected eye means as to prevent relative circumferential movement of the head gear and said head-band, and others of said connecting members being so dimensioned relative to their connected eye means as to permit relative circumferential movement of the head gear and portions of said head-band whereby the circumferential size of said head-engaging means may be varied while rotation of such head gear relative to said head-band is prevented.

9. In combination with head-engaging means including a head-band adjustable as to size and a plurality of connecting members: a shell-like hat member; and a plurality of eye members associated with said hat member, and adapted for connection with such connecting members, at least one of said eye members being so dimensioned relative to its associated connecting member as to prevent relative circumferential movement of such head-band and said hat member, and others of said eye members being so dimensioned relative to their associated connecting members as to permit relative circumferential movement of portions of such head-band and said hat member whereby the circumferential size of such head-band may be varied while rotation of said hat member relative to such head-band is prevented.

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