

April 2, 1963

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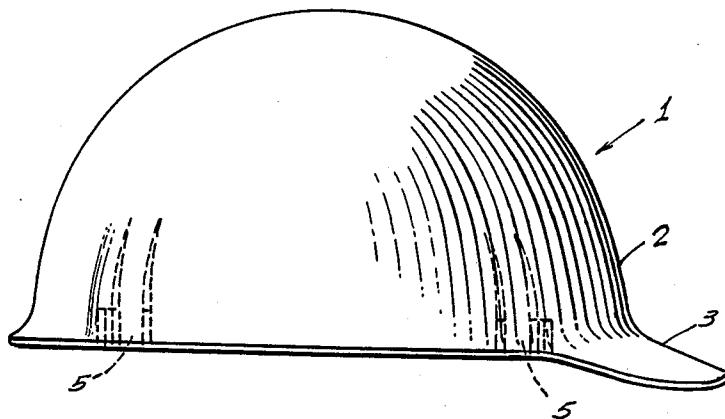
3,083,371

PROTECTIVE HEADGEAR

Original Filed April 27, 1954

4 Sheets-Sheet 1

Fig. 1.



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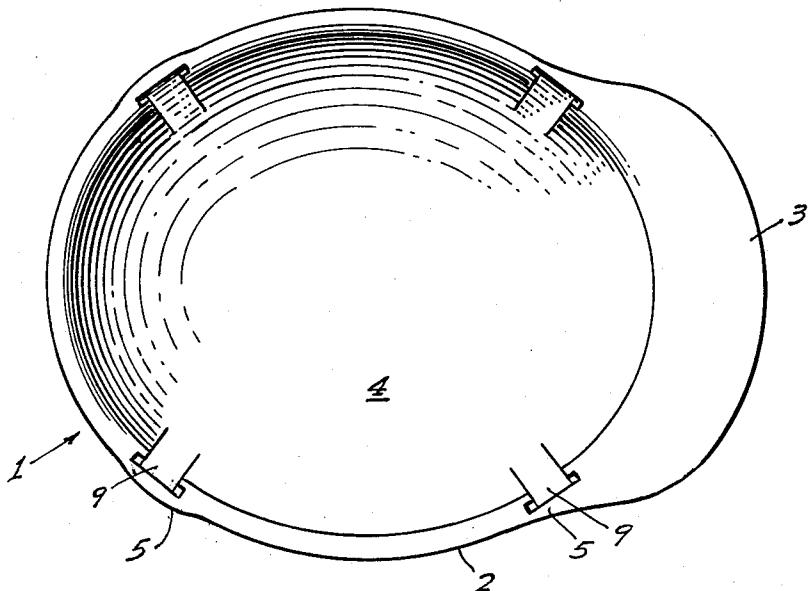


Fig. 2.

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4 Sheets-Sheet 2

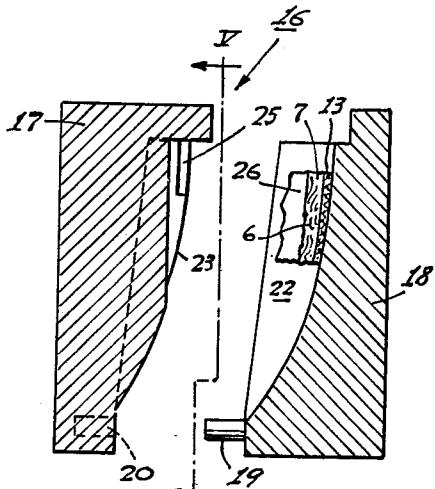
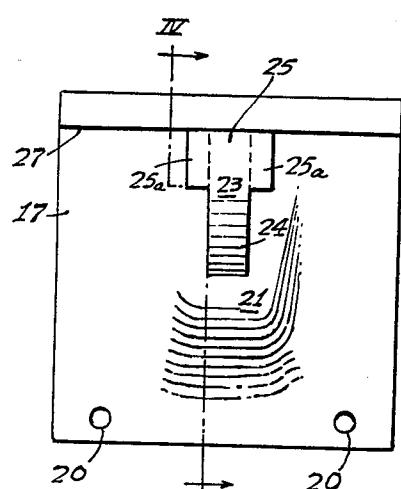


Fig. 5.

Fig. 4.

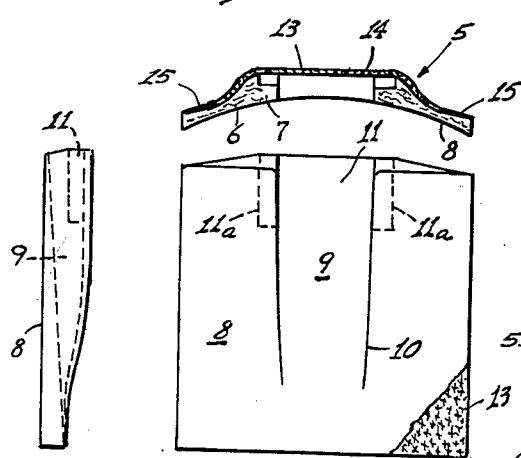


Fig. 3.

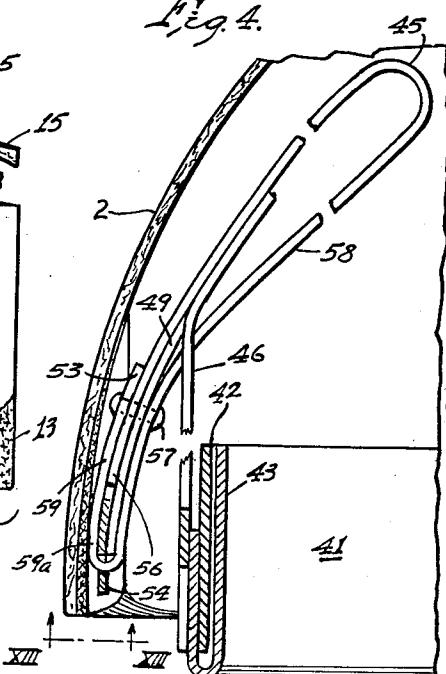


Fig. 12.

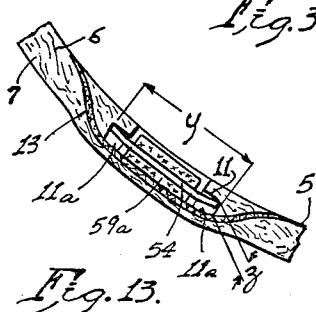


Fig. 13.

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PROTECTIVE HEADGEAR

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4 Sheets-Sheet 3

Fig. 6.

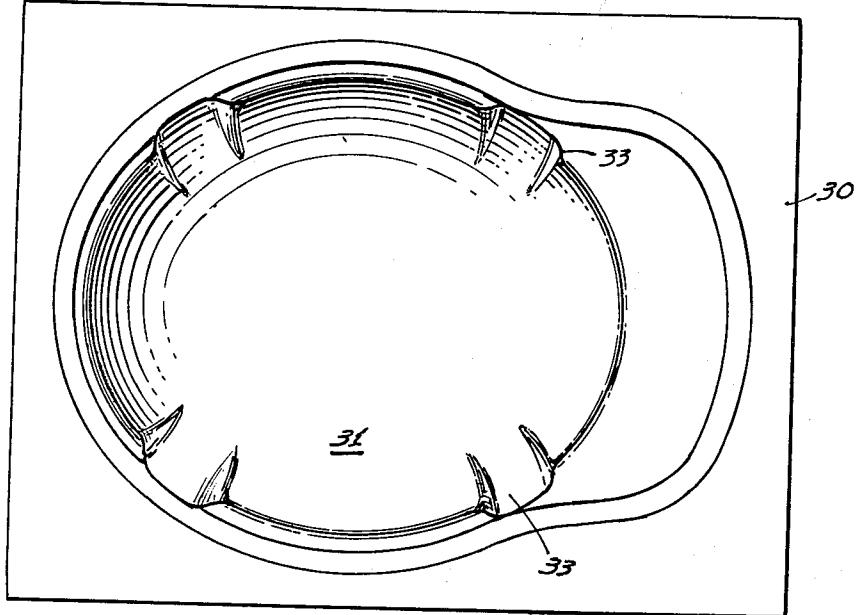
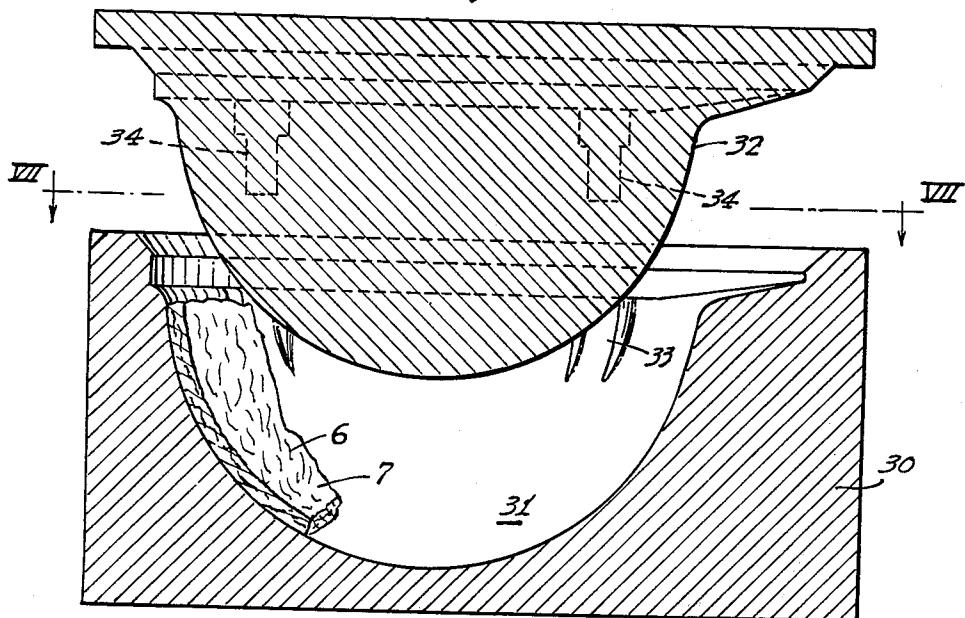


Fig. 7.

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4 Sheets-Sheet 4

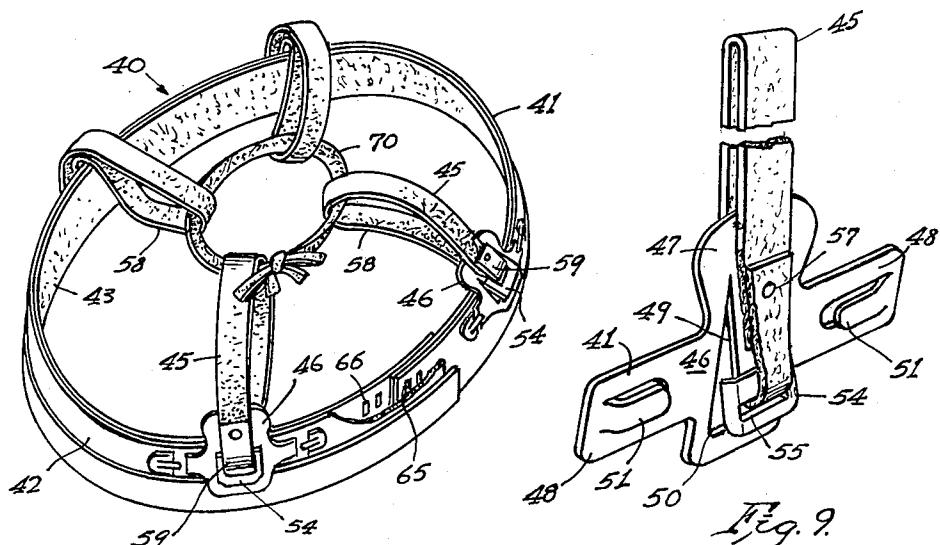


Fig. 9.

Fig. 8.

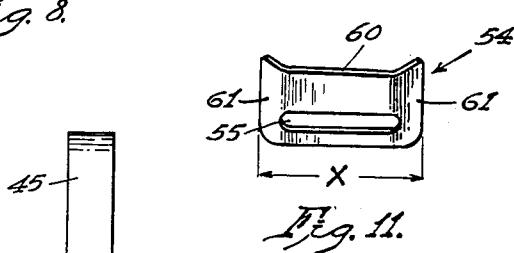


Fig. 11.

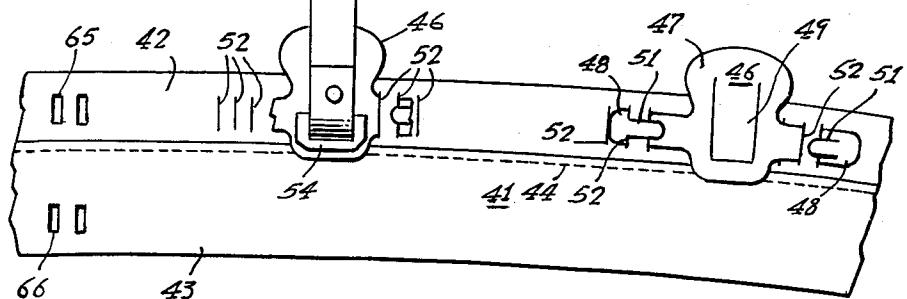


Fig. 10.

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## 1

3,083,371

## PROTECTIVE HEADGEAR

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Mine Safety Appliances CompanyOriginal application Apr. 27, 1954, Ser. No. 425,925, now  
Patent No. 2,931,042, dated Apr. 5, 1960. Divided  
and this application June 30, 1959, Ser. No. 824,050  
7 Claims. (Cl. 2-3)

This invention relates to headgear and more particularly to protective or safety headgear and improved headgear lining used therewith.

This application is a division of application Serial No. 425,925, filed April 27, 1954 for Protective Headgear, now Patent No. 2,931,042, granted April 5, 1960.

Past experience has indicated that the headgear linings now employed are not completely adequate for properly supporting the headgear on the head of the wearer and to provide a safe and comfortable fit for all head sizes. Further, the present day linings are normally of such construction as not to permit the replacement of parts which are quickly worn out, thus, necessitating costly replacement of a major portion of or a complete lining.

Accordingly, it is the general object of this invention to provide an improved headgear lining which will positively support the headgear on the head of the wearer and will provide a safe and comfortable fit for all head sizes and constructed in a manner whereby parts thereof may be easily adjusted, replaced and inexpensively manufactured.

Other objects and advantages will become apparent from the following description and annexed drawings in which:

FIG. 1 shows a side elevation of a protective headgear;

FIG. 2 is a plan view of the headgear showing the inside construction thereof;

FIG. 3 shows the front, top and end views of one pre-formed suspension;

FIG. 4 is a sectional elevation of the molds, with the male mold taken on line IV-IV of FIG. 5, for forming the headgear suspensions but of smaller scale than the suspension shown in FIG. 3;

FIG. 5 is a plan view of the male mold taken on line V-V of FIG. 4;

FIG. 6 is a sectional elevation of the headgear mold with parts in vertical elevation;

FIG. 7 is a plan view of the female mold taken on line VII-VII of FIG. 6;

FIG. 8 is a perspective view with parts broken away of the novel headgear lining;

FIG. 9 is a perspective view with parts broken away of a portion of the lining;

FIG. 10 represents a plan view with parts broken away of an unfolded portion of the lining shown in FIG. 8;

FIG. 11 is a perspective view of a lining clip;

FIG. 12 is a sectional elevation of part of the lining as attached to the headgear; and

FIG. 13 is an enlarged fragmentary view of one of the headgear suspensions and a portion of the lining as viewed on line XIII-XIII of FIG. 12.

Although the instant invention is not concerned with a protective headgear which is fabricated in a particular manner, a reinforced plastic headgear is illustrated and described to serve only as an example of the type which may be used. Other formulations of plastic headgear, and metallic headgear may be employed with the novel headgear lining.

Noting FIGS. 1 and 2, the headgear 1 comprises a crown 2 and a visor 3. The headgear, of course, is not limited to this shape and may take the form of a headgear having only a crown or one having a continuous brim around the crown. The inner surface 4 of the crown includes identical suspensions 5 in the form of slotted in-

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verted T-shaped members described more fully herein-after. Inner surface 4 of the headgear is free of any projections extending from the surface inwardly toward the head of the wearer. As best seen in FIG. 13, the headgear is composed of unorientated glass fibers 6 bonded together by a plastic material 7. Fibers 6 extend throughout the plastic to provide a reinforced headgear capable of withstanding considerable punishment inflicted by sharp or blunt objects.

Headgear suspensions 5 each comprise a curved surface 8 conforming in shape to a curved section of the inner surface 4 of the crown when bonded thereto and is interrupted by a T-shaped slot 9 formed by a vertical leg 10 and a horizontal crossbar 11 having end portions 11a. The slot 9 provides a mounting and anchoring means for a headgear lining. Suspension 5 has a backing 13 of fabric bonded as an integral part thereof when molded. The central portion 14 and integral wings 15 of backing 13 are shaped by compound curves as is readily seen in FIG. 13 and in the top and end views of FIG. 3, thus providing a smoothly curved and pleasing appearance to the outer surface of the headgear in its completed form. Suspension 5 is inverted when affixed in the crown of the headgear to provide an inverted T-shaped suspension. As illustrated, the headgear 1 contains four suspensions, but it is readily understood that a lesser or greater number of suspensions may be incorporated in the headgear depending upon the number of points at which it is desired to mount the headgear lining.

The headgear suspensions are formed by molds such as shown in FIGS. 4 and 5. Molds 16 comprise a male mold 17 and a complementary female mold 18 and include dowels 19 (only one shown) fitting into holes 20 for properly positioning the molds together. The male mold 17 has a convex surface 21 complementary to the concave surface 22 of the female mold and contains a T-shaped protrusion 23 extending outwardly therefrom. The T-shaped protrusion 23 is formed by a vertical leg 24 and a horizontal crossbar 25 having end portions 25a. These end portions 25a are spaced from the convex surface 21 as seen in FIG. 4. Each suspension is molded by first placing a sheet of fabric 13 across the concave surface or cavity 22 of the female mold 18 and by secondly placing a mass 26 of fibers 6 impregnated with plastic material 7 on top of the fabric. This mass of fibers may take the form of a mat or sheet of fibers dipped into or otherwise impregnated with plastic, or the mass, for example, may be untreated with the plastic being placed on the mass in solid or liquid form before the molds are closed. The male mold 17 is then placed in mating relationship with female mold 18 by positioning pins 19 into holes 20 and thereby compressing the materials between the molds. When pressure is applied to the molds under the conditions of heat, if necessary, the plastic and fibers are thoroughly intermingled and bonded to the fabric, the fabric being preferably of a coarse texture to provide better bonding between the plastic and the fabric. As pressure and/or heat is applied, the fibrous plastic readily flows around the T-shaped protrusion 23 and easily fills up the space under end portions 25a.

Upon disengagement of the molds, the rigid suspension 5 of FIG. 3 is formed containing the T-shaped slot 9 conforming to the shape of the T-shaped protrusion 23 on the male mold 17. The fabric backing 13 of the suspension conforms to the concave shape of the female mold 18 and provides a surface for bonding the suspension to the headgear. The fabric 13 is preferably of a width equal to the distance between shoulder 27 and holes 20 of the male mold, and its length may be such as to extend beyond the sides of the mold for trimming to any desired final length. The suspension 5 is removed

from male mold 17 by merely sliding it away from shoulder 27.

The method of molding the protective headgear 1, including the suspensions 5, will now be described, and reference is made to FIGS. 6 and 7 which show a female mold 30 having a cavity or depression 31 similar to the outer surface shape of the headgear 1 and a male mold 32 conforming in shape to the inner surface 4. The female mold comprises four concave depressions 33 and male mold contains four complementary circumferentially spaced T-shaped protrusions 34 (only two shown) similar to the one shown at 23 in FIGS. 4 and 5.

When the molds are in the open position and a headgear is to be molded, preformed suspensions 5 are slid snugly and upwardly over each of the T-shaped protrusions 34. A mass of fibers 6 is placed in the depression 31 and the plastic 7 is applied to the fibers. Upon compressing the molds together, with or without the influence of heat, the heat, if any, required being dependent upon the type of fibers and plastic used, the plastic and fibers will commingle and pervade the space between the molds, and between the backing 13 of each suspension 5 and its complementary depression 33. When the molds are disengaged and after the formed headgear 1 is allowed to somewhat cool, the headgear is taken from the mold and is in the form shown in FIGS. 1 and 2. The headgear may be molded under various pressures and temperatures, which, of course, are dependent upon the type of plastic used and the type of molding desired.

In order to support the headgear upon the head of a wearer, reference is now made to a novel lining which is positive in its support, extremely flexible in adjustment and facilitates replacement of component parts. Referring to FIGS. 8 to 13, the headgear lining 40 comprises a sweatband 41 including a cradle tab mounting portion 42 and a head engaging portion 43. The portions 42 and 43 may be formed, as shown in FIG. 10, in two pieces attached together as by stitching 44 or by cementing and the like, or these portions may be parts of a one-piece material. The lining 40 may be made of any of the materials well known in the art. Cradle straps 45 are releasably attached to portion 42 by cradle strap supports or tabs 46 and are adjustably and releasably connected together by a cord 70 at the upper ends thereof. The lower ends of the straps 45 each support a mounting clip 54 having an aperture 55 and the clip being further constructed for attachment into a slot 9 as hereinafter more fully described. Each tab 46 is preferably made of a material which is flexible but contains some rigidity to provide stability to the lining and comprises a main body portion 47 and arms 48. Each body portion 47 includes a tongue 49 stamped therefrom to form an aperture 50, the tongue and aperture providing cradle strap attachment means. Each of the arms 48 also has a tongue 51 stamped therefrom to provide a locking means for the tab when the arms 48 are inserted into slits 52 of sweatband portion 42. Once the arms 48, including their tongues 51, are inserted completely through slits 52, the tongues are then placed in overlying relation to said slits to releasably lock the tabs 46 on said sweatband portion 42. Although the tabs are locked in position, limited movement to each side is provided to permit self-seeking adjustment when other parts of the lining are varied. As shown in FIG. 10, a plurality of slits 52 are provided so that the tabs may be circumferentially varied on the sweatband portion 42. Each cradle strap 45 is attached to its respective tab 46 (FIG. 12) by inserting one free end 53 of the strap down through aperture 50 of tab 46 and then looping this end around tongue 49. End 53 is then inserted into aperture 55 of clip 54 for attachment to the other free end 56 of the cradle strap by a fastener 57. The fastener 57 may be of the permanent or detachable type and pierces tongue 49 to provide anchoring means for both

ends of the cradle strap. The portion of each cradle strap above the fastener 57 constitutes a head engaging loop 58, and the cradle strap portion below the fastener constitutes a clip carrying loop 59, including portion 59a. Each of the clips 54 (FIG. 11) comprises a medial portion 60 having the aperture 55 formed therein and angularly disposed end portions 61. The clips 54 may be made from various substantially inelastic and spring-like deformable materials, such as metal and plastic, and each clip is of such normal length when not attached to the cradle strap as to loosely fit the length of each crossbar 11 of slots 9. That is, length x of the clip (FIG. 11) is less than length y of the crossbar (FIG. 13). The width z of a crossbar 11 is of such dimension as to freely accommodate only a clip 54 but will not also freely accommodate the thickness portion 59a of its cradle strap 45 unless the clip is deformed or expanded to provide the necessary clearance for the thickness of portion 59a. As each clip 54 and its strap portion are inserted into a crossbar 11, the end portions 61 of the clip will deform or be bent toward coplanar relationship with the medial portion 60, pressing the end portions 61 into tight engagement with the crossbar end portions 11a. Noting FIGS. 8 and 10, the sweatband 25 includes mating holes 65 and 66 for the purpose of threadedly receiving an adjusting cord (not shown) or the like for varying the size of the sweatband to accommodate various head sizes.

Accordingly, the operation of attaching the lining to the headgear and proper adjustment thereof is very simple. It is merely necessary to insert each of the clips 54 into the respective suspensions 5 by applying a small amount of pressure to deform the clips. The cord 70 may be loosened or tightened to conform the head engaging loops 58 to the head of the wearer and space the top of crown 1 away from the cradle straps. Sweatband 41 may then be adjusted according to the desired head size and the tabs 46 may be moved, if necessary, by selecting the desirable slits 52. Adjustment of the tabs is not usually necessary since limited circumferential movement is provided between the arms 51 of a tab and any pair of sweatband slits 52.

The construction of the lining with its various adjustments and headgear attachment features facilitates selection of a comfortable fit for all working conditions and assures proper spacing from the headgear for maximum head protection.

Having explained the principle of the present invention and having illustrated and described what is considered to be the best embodiment, it is to be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

55. 1. A protective headgear including a rigid crown having suspension means, lining mounting means releasably connected to said suspension means, said suspension means forming slots for the reception of said mounting means, said mounting means comprising cradle straps and a flexible clip connected to each strap, and each of said slots is constructed and arranged so that the clip will be deformed against the wall of the slot when the clip and a portion of the strap are inserted therein with the portion of the strap between the wall of the slot and the clip.

65. 2. A protective headgear including a rigid crown having suspension means, lining mounting means releasably connected to said suspension means, said suspension means forming slots for the reception of said mounting means, said mounting means comprising cradle straps with a clip connected at the lower end of each strap, each said clip normally shaped with a straight medial portion and angularly disposed end portions, each of said slots is constructed and arranged so that the end portions of the clip will be deformed against the wall of the slot toward co-

planar relationship with the medial portion of the clip when the clip and a portion of the strap are inserted into the slot with the portion of the strap between the wall of the slot and the clip.

3. A headgear lining comprising a sweatband and cradle straps and supports, said straps connected to said sweatband by said supports, each of said supports having a body portion and a pair of arms extending from the body portion, said sweatband having slits for circumferentially slideably engaging said arms, and said arms including locking means for releasably fastening said arms to said sweatband.

4. A headgear lining comprising a sweatband and cradle straps and supports, said straps connected to said sweatband by said supports, each of said supports having a body portion and a pair of arms extending from the body portion, said sweatband having means for engaging said arms, and said arms having tabs releasably locking said arms to said sweatband.

5. A headgear lining comprising a sweatband and cradle straps and supports, said straps connected to said sweatband by said supports, each of said supports having a body portion including a tongue and a pair of arms extending from the body portion, said sweatband having means engaging said arms, each of said straps comprising a strip of material folded around a tongue to form a mounting loop at the end of said tongue, and said folded strip being secured to the support above said loop.

6. A headgear lining comprising a sweatband having a head encircling side and a mounting side, said lining

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comprising supports, cradle straps connected to said sweatband by said supports, each of said supports having a body portion and a pair of arms extending from the body portion, said sweatband having means engaging said arms, each body portion positioned adjacent said mounting side and having an elongated tongue cut therefrom forming an aperture in the body portion, each of said straps comprising a strip of material folded around the said tongue and connected at its ends to said body portion away from the end of the tongue to form a pair of closed loops.

7. The combination of claim 6, wherein said pair of loops comprises an upper loop and a lower loop, means connecting each upper loop, headgear mounting clips, and each lower loop carrying a mounting clip.

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