

Feb. 9, 1960

H. P. ROTH ET AL

2,923,941

PROTECTIVE HELMET

Filed Sept. 25, 1956

2 Sheets-Sheet 1

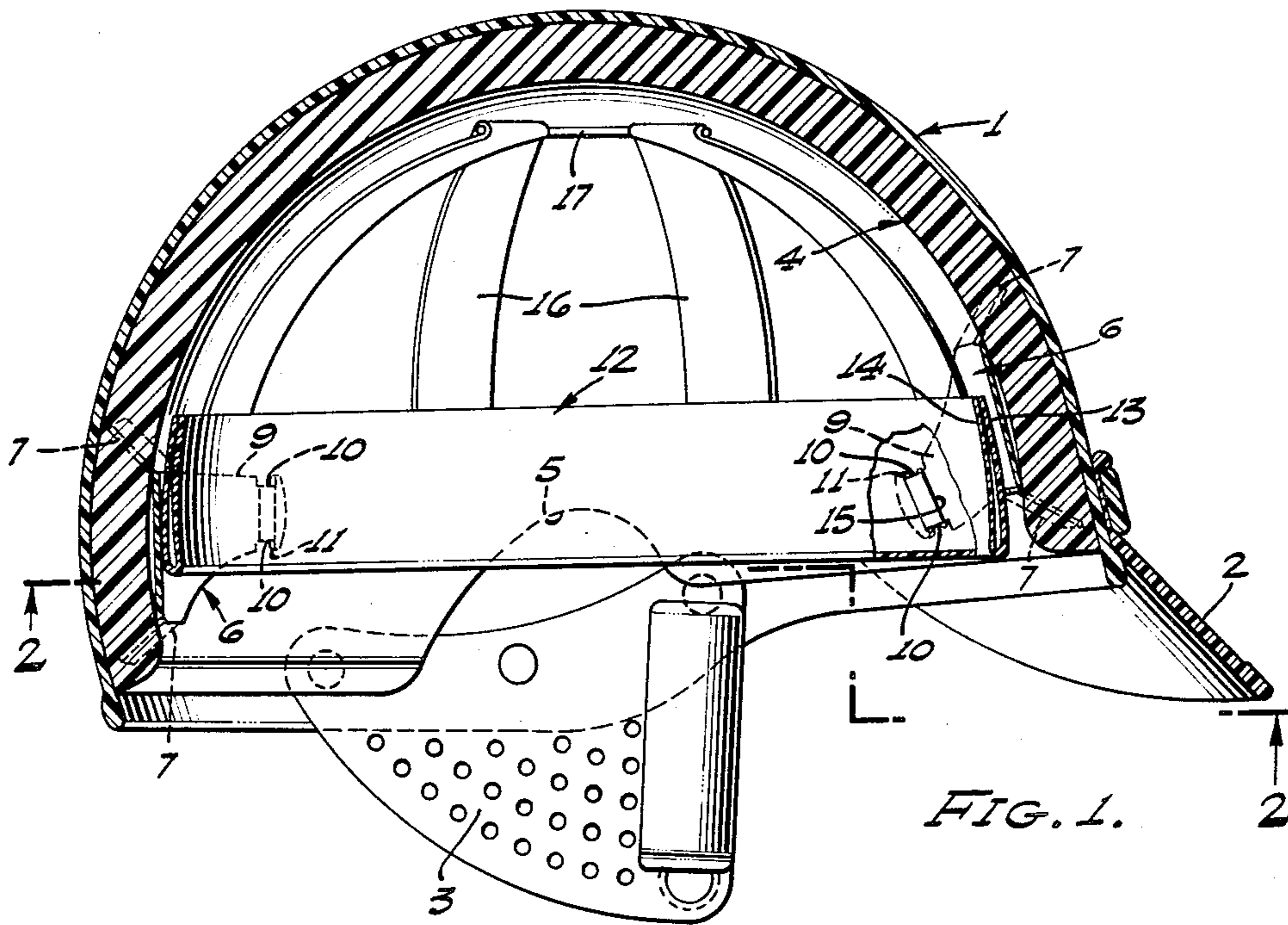


FIG. 1.

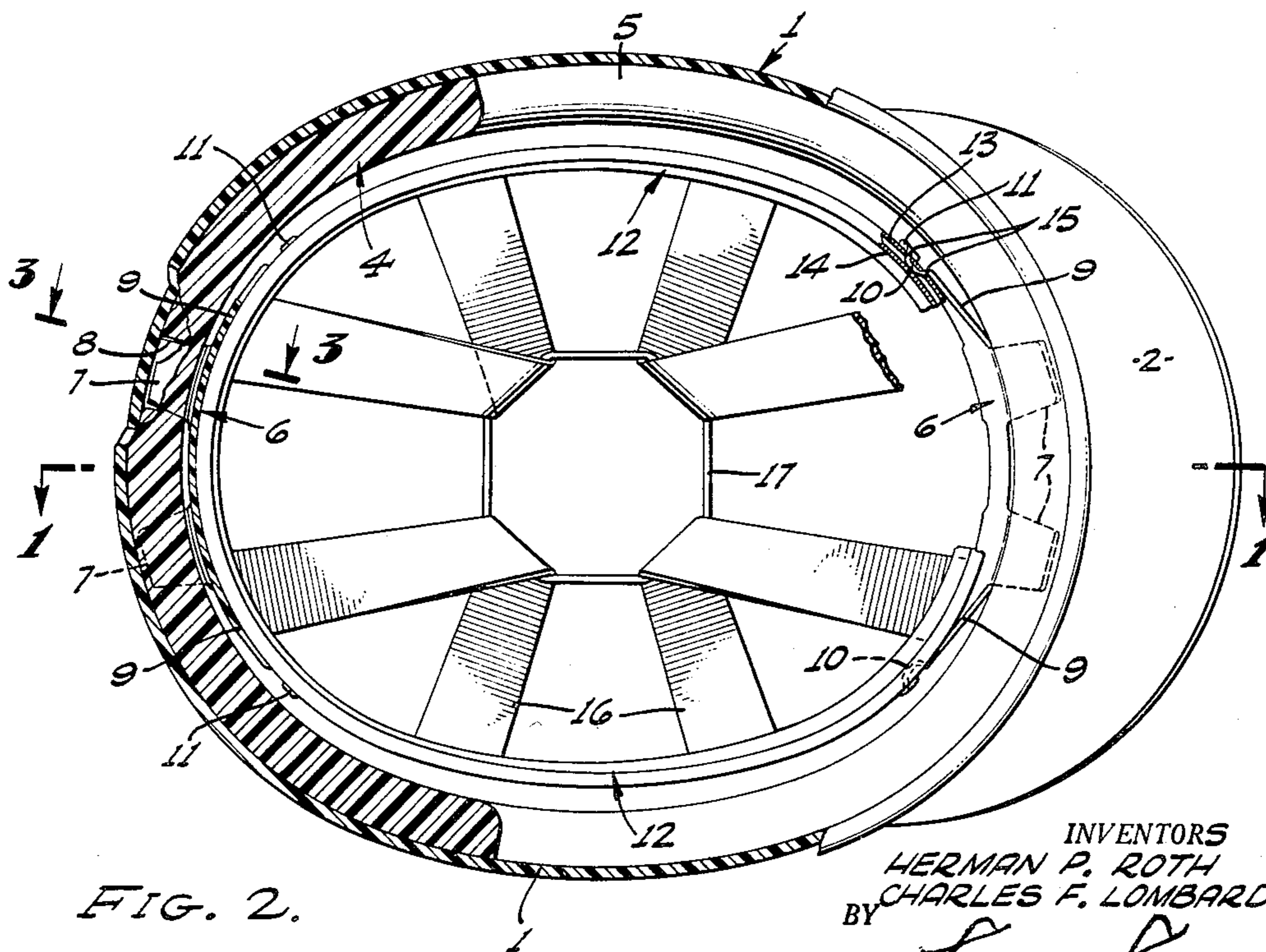


FIG. 2.

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2 Sheets-Sheet 2

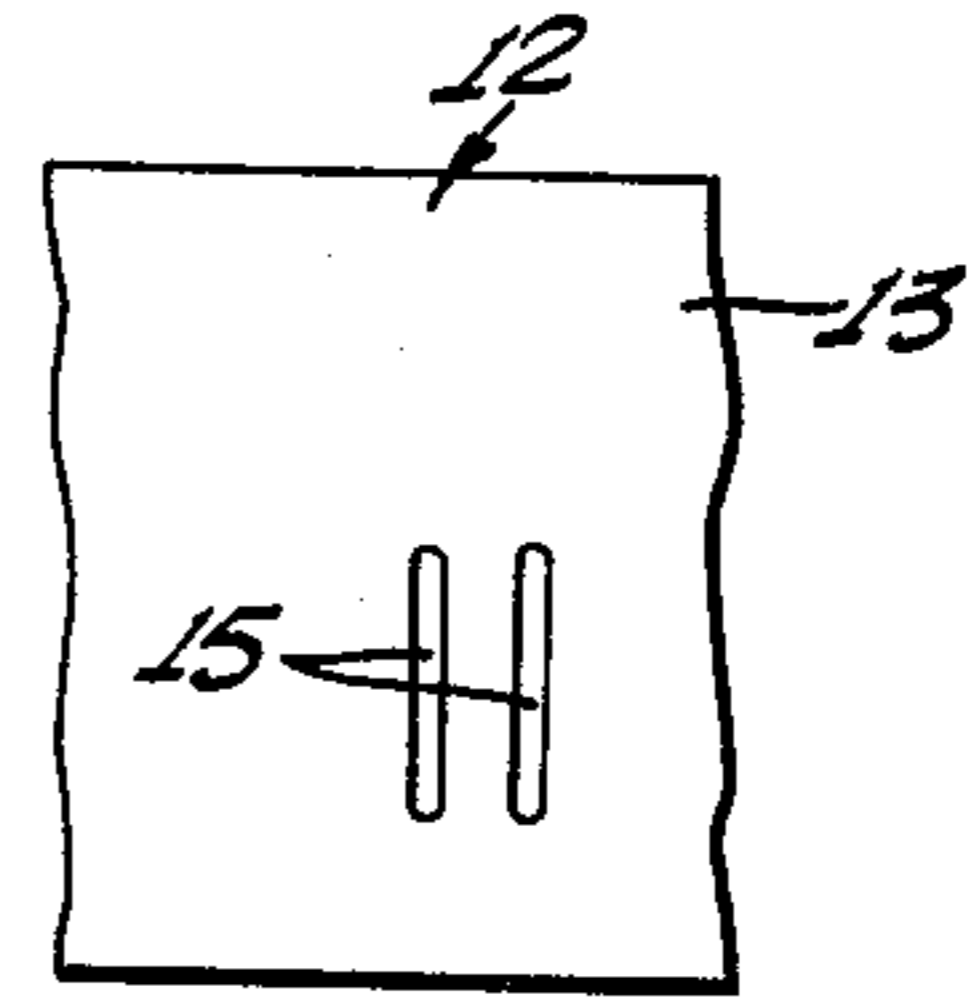
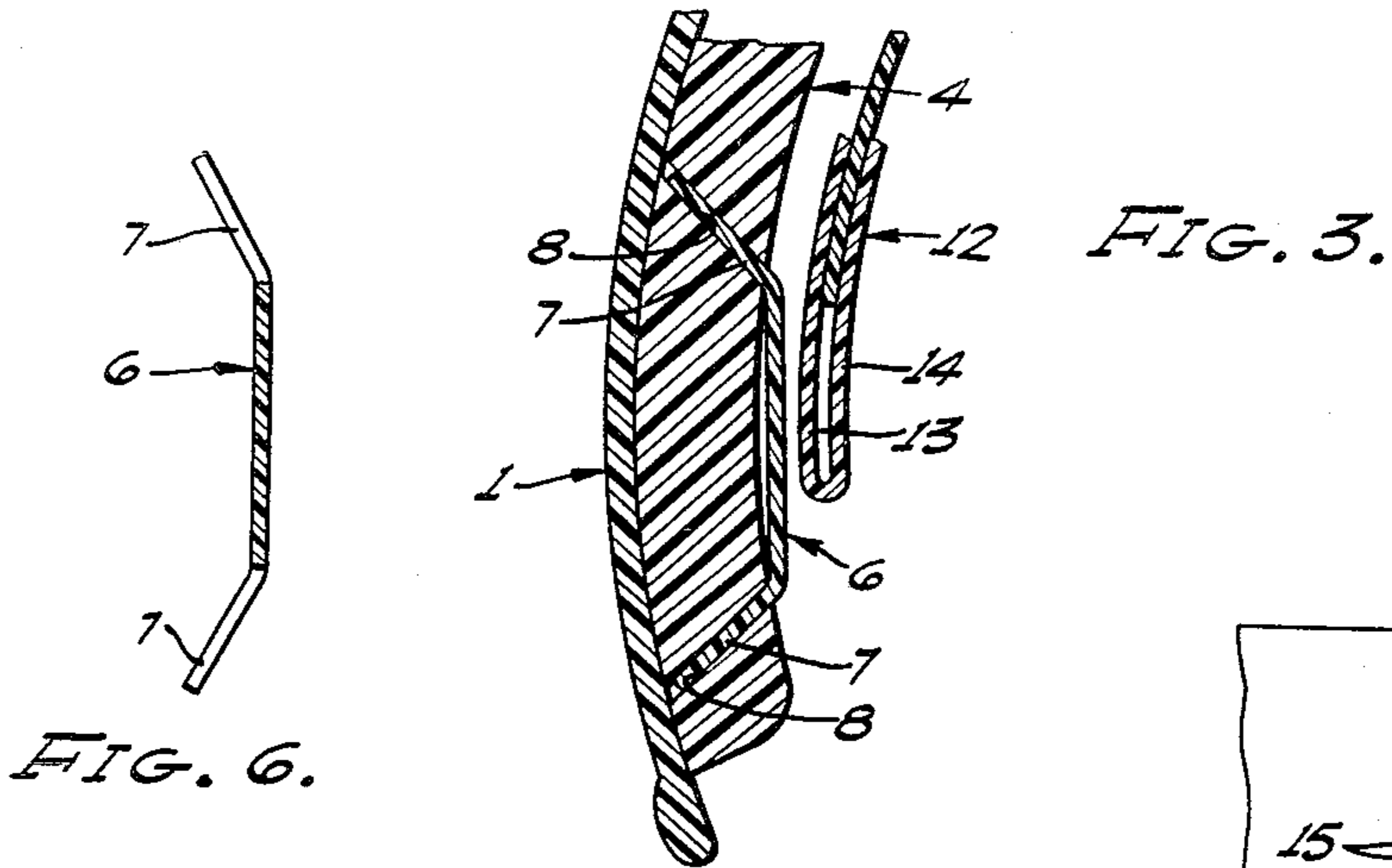


FIG. 4.

FIG. 5.

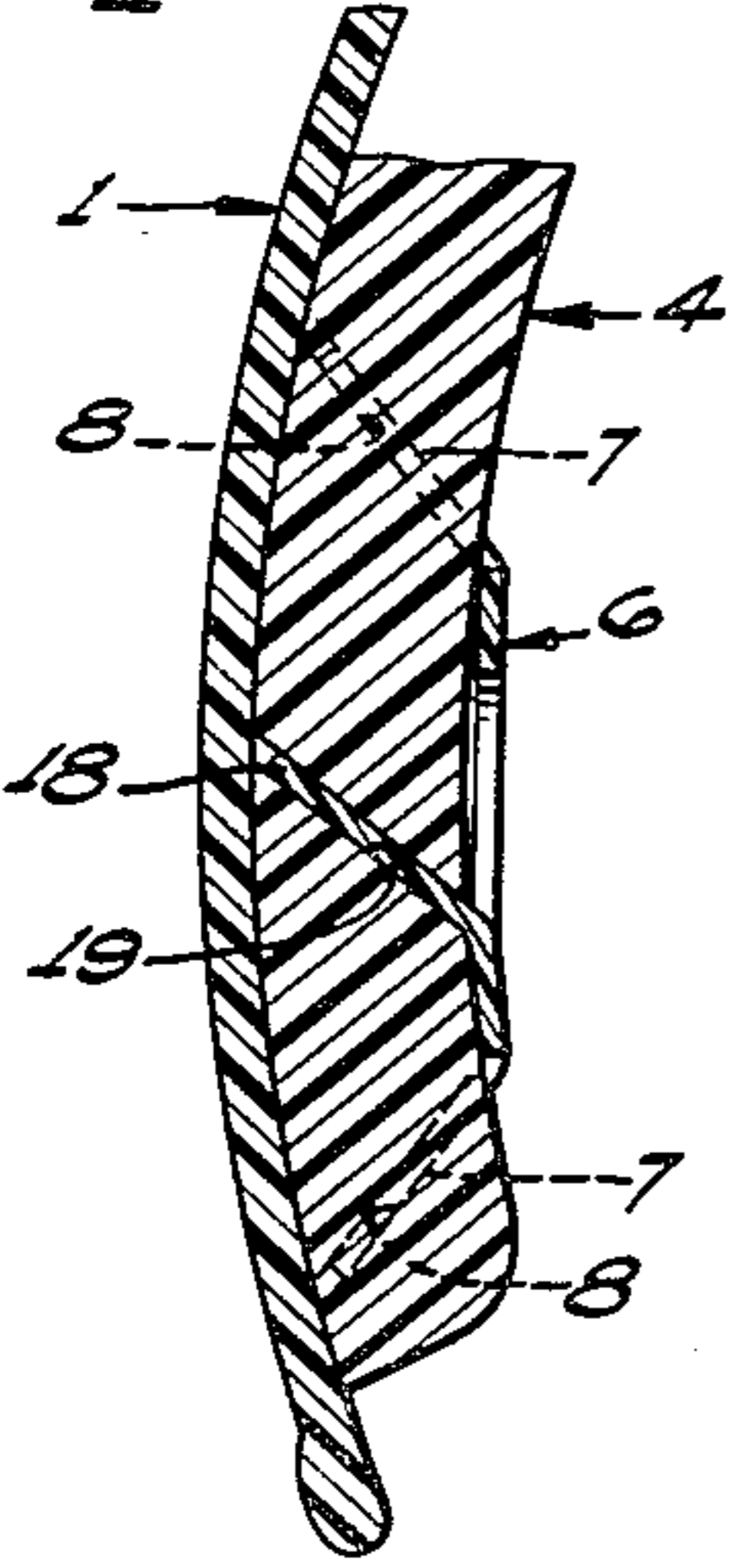
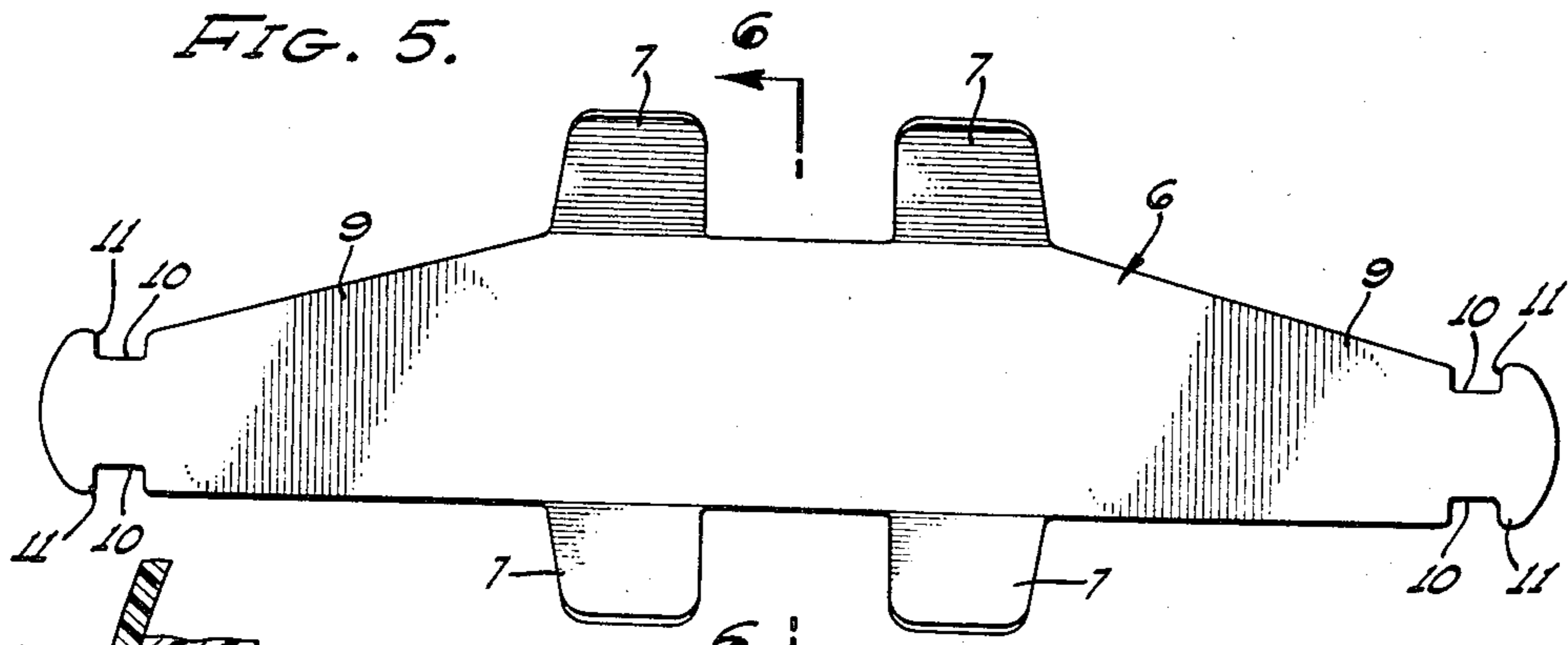


FIG. 8.

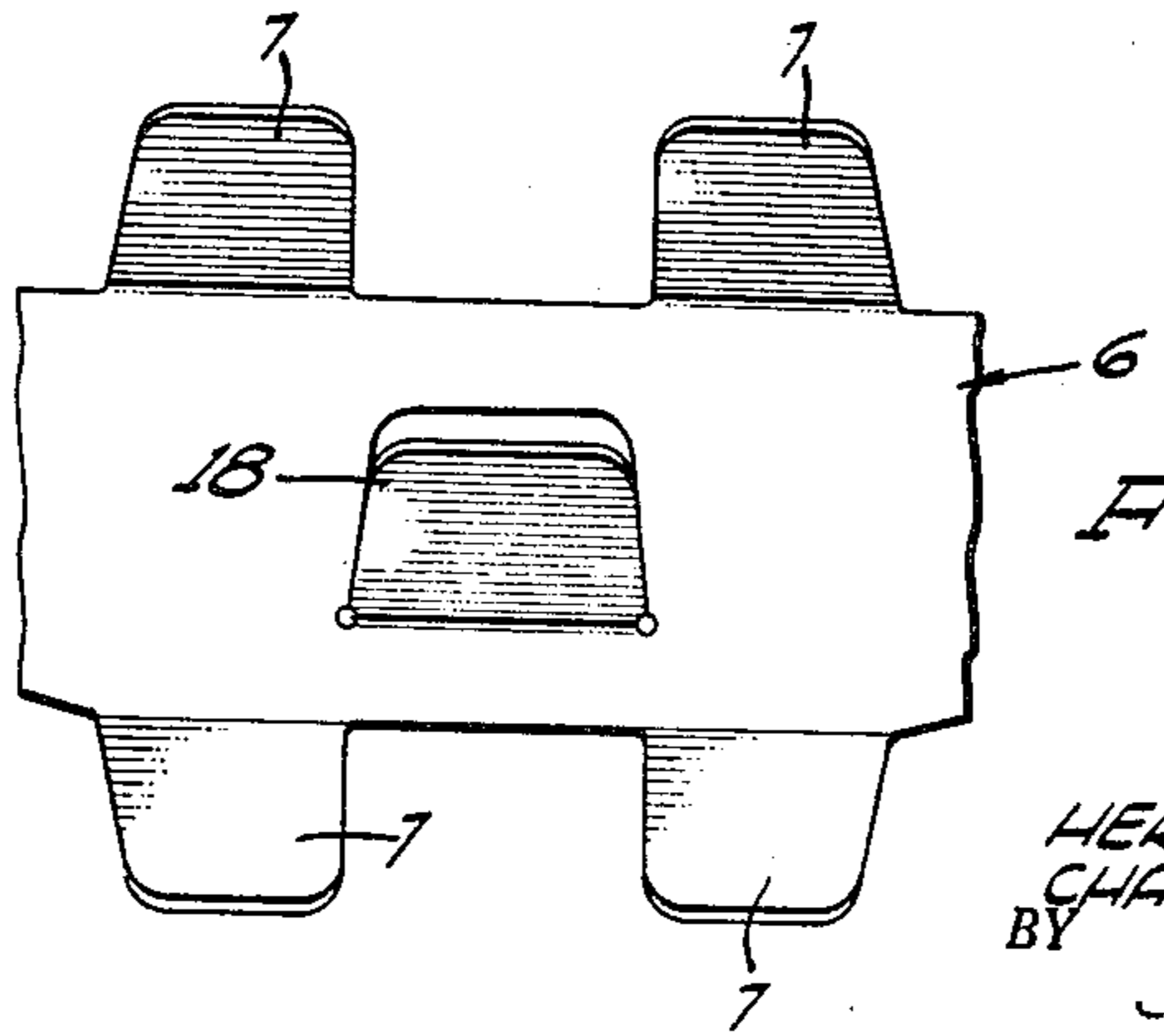


FIG. 7.

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PROTECTIVE HELMET

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6 Claims. (Cl. 2—3)

This invention relates to protective helmets designed for protection of the human head against impact injury, more particularly to protective hats or helmets such as may be worn by industrial workers, motorcycle riders, automobile race drivers, and others engaged in activities where injury to the head is a serious possibility.

Included in the objects of this invention are:

First, to provide a protective helmet which utilizes an energy-absorbing substantially nonresilient material, such as disclosed in U.S. Patent No. 2,625,683, which deforms under impact to dissipate impact energy; the helmet also incorporating a novel suspension means whereby the helmet is comfortably supported on the wearer's head.

Second, to provide a protective helmet wherein the suspension means does not interfere with the function of the impact energy-absorbing material.

Third, to provide a protective helmet of this type wherein the suspension means may vary or be adjusted as to size, so that a single size of helmet shell with its impact energy-absorbing layer may be accommodated to a range of head sizes.

Fourth, to provide a protective helmet of this type wherein the suspension means is attached in a novel manner to the impact energy-absorbing material of the helmet.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawings in which:

Figure 1 is a transverse sectional view through a protective helmet incorporating the invention, the section being taken through 1—1 of Fig. 2;

Fig. 2 is a partial sectional, partial bottom view thereof, taken through 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view, taken through 3—3 of Fig. 2;

Fig. 4 is a fragmentary side view of the headband, showing one set of the attachment slits therein;

Fig. 5 is a developed view of one of the suspension members;

Fig. 6 is a transverse sectional view thereof through 6—6 of Fig. 5;

Fig. 7 is a fragmentary developed view similar to Fig. 5, showing a modified form of suspension member; and

Fig. 8 is a fragmentary sectional view similar to Fig. 3, showing the manner of attachment of the suspension member.

The protective helmet includes a shell 1 formed of relatively rigid material, such as reinforced plastic or metal, and shaped to conform approximately to the human head but dimensioned so as to fit in spaced relation thereover.

The shell 1 may be provided with a visor 2 at its forward end, or the lower margin may be molded or otherwise formed to provide a rim in the manner of conventional protective helmets. The provision of a visor or rim is dictated by the intended use of the protective helmet, that is, whether or not it is intended for industrial use or to be worn by vehicle drivers.

In the construction shown, the sides of the shell 1 are

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provided with ear-covering members 3 having suitable means for the attachment of a chin strap or the like.

Fitted within the shell 1 is an impact energy-absorbing lining 4. The lining is relatively thick and is formed of material such as is more fully described in Patent No. 2,625,683.

The lining 4 may be molded or otherwise formed so as to conform to the contour of the shell 1. The lining may be made in one or several sections, as desired, and is cemented or otherwise secured to the shell so that the lining and shell function as a unit. In the construction shown, the lower margins of the lining are provided with ear-clearance recesses 5.

Mounted within the forward and rear ends of the lining are suspension members 6. These members are formed of flat, pliable plastic material, such as polyethylene. The central or midportion of each suspension member is provided with oppositely directed tabs 7. Formed in the lining 4 are angularly related slots 8. These slots are located so as to receive the tabs 7 and are dimensioned to conform to the tabs so that the tabs may be forced therein. This is made possible by the fact that the suspension members 6 are formed of pliable material.

Each suspension member 6 includes circumferentially extending tongues 9 having side notches 10 near their extremities which form interlocking shoulder portions 11.

The extremities of the suspension members 6 are adapted to be joined to a headband 12 dimensioned to fit snugly on a human head. The headband may be formed of pliable plastic material, leather, or the like. The headband preferably comprises a radially outer ply 13 and a radially inner ply 14. The outer ply is provided with pairs of slits 15 so located as to receive the ends of tongues 9 and cooperate with side notches 10 and shoulder portions 11 to interlock with the suspension members 6 so that the headband 12 may be centered within the lining 4.

Attached to the headband 12 are upwardly extending crown straps 16. In the construction shown, four such crown straps are provided, each of which is attached at its extremities to the headband and folded intermediate its ends. A connecting loop 17 is passed through the folded portions of the crown straps 16 so as to form a cage adapted to fit over a human head and support the headband 12 thereon. In the construction shown, the rear portion of the shell 1 and lining 4 are arranged so as to project downwardly from the headband 12 in order to provide protection for the neck of the wearer.

The extremities of the tongues 9 of the suspension members 6 are offset laterally from the longitudinal axes of the suspension members so that the suspension members may be positioned with either longitudinal margin uppermost. Thus the suspension member which joins the headband 12 to the rear side of the lining 4 is offset downwardly from the headband, whereas the suspension member joining the headband to the forward portion of the lining 4 is offset upwardly therefrom.

The slits 15 may differ in their angular position in the headband 12 so as to be in proper position to receive the side notches 10.

It should be observed, however, that, depending upon the location of the lower margin of the shell 1 and lining 4 relative to the headband 12, both of the suspension members 6 may be arranged as shown at the forward portion of the helmet. Thus for industrial purposes or wherever a neck-protecting portion is not needed, the rear portion of the headband 12 may be supported in the same manner as shown in conjunction with the forward portion thereof.

It will be observed that no extraneous fastening means is employed to join the suspension members 6 to the lining 4 or to the headband 12. Thus by reason of the fact

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that the suspension members 6 are formed of flat pliable material they cannot contribute to any localizing of pressure in the event of a crushing blow delivered to the shell 1. This is highly important, for ordinary fastening devices, such as metal snap fasteners, would create regions of localized pressure.

The suspension members 6 enable the lining of the helmet to occupy a spaced relation to the head so as to provide air circulation under normal conditions of use. However, in the event of impact against the shell 1 the lining 4 is readily moved into contact with the head so that the energy-absorbing characteristics of the lining may be utilized to the best advantage.

Reference is directed to Figs. 7 and 8. In this construction an additional upwardly directed tab 18 is provided in the central portion of the suspension member 6. As shown in Fig. 8, this tab is forced into a slit 19. The tab 18 joins the suspension member 6 close to its lower margin and resists any tendency of the lower pair of tabs 7 to work out of the lining 4.

Either or both the rearward and forward suspension members 6 may be provided with the added tab 18. Due to the fact that the forward suspension member is inverted with respect to the rearward member, the tab 18 of the forward suspension member is also inverted.

While particular embodiments of this invention have been shown and described, it is not intended to limit the same to the exact details of the constructions set forth, and it embraces such changes, modifications, and equivalents of the parts and their formation and arrangement as come within the purview of the appended claims.

What is claimed is:

1. A protective helmet, comprising: a shell; a relatively thick lining of impact energy-absorbing material within said shell and extending substantially to the lower edge thereof, said lining and shell arranged to fit loosely over a human head; a headband dimensioned to fit a human head; a plurality of flexible suspension members, each member including angularly related tabs at its upper and lower margins, said lining having angularly related slits receiving said tabs, each suspension member also including circumferentially extending tongues secured at their extremities to said headband; and crown straps extending upwardly from said headband and arranged to fit a human head.

2. A protective helmet, comprising: a shell; a relatively thick lining of impact energy-absorbing material within said shell and extending substantially to the lower edge thereof, said lining and shell arranged to fit loosely over a human head; a headband dimensioned to fit a human head; a plurality of flexible suspension members, each member including angularly related tabs at its upper and lower margins, said lining having angularly related slits receiving said tabs, each suspension member also including circumferentially extending tongues terminating in attachment elements, said headband having slits adapted to receive and secure said attachment elements; and crown straps extending upwardly from said headband and arranged to fit a human head.

3. A protective helmet, comprising: a headband; a series of crown straps forming a head-receiving cage to support the headband on a human head; suspension members formed of flat pliable material extending circumferentially and secured at their extremities to said

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headband, said suspension members having tab elements at the midportions of their upper and lower margins; a shell; and a relatively thick crushable lining within said shell and extending substantially to the lower edge thereof, said shell and lining proportioned to fit over a human head in spaced relation thereto, said lining having angularly related slits receiving said tabs to thereby support said crushable lining and shell from said headband.

4. A protective helmet, comprising: a headband; a series of crown straps forming a head-receiving cage to support the headband on a human head; suspension members formed of flat pliable material extending circumferentially and secured at their extremities to said headband, said suspension members having tab elements at the midportions of their upper and lower margins, and an upwardly directed tab intermediate their upper and lower margins; a shell; and a relatively thick crushable lining within said shell and extending substantially to the lower edge thereof, said shell and lining proportioned to fit over a human head in spaced relation thereto, said lining having angularly related slits receiving said tabs to thereby support said crushable lining and shell from said headband.

5. A protective helmet, comprising: a shell; a relatively thick lining of low strength crushable impact energy-absorbing material within said shell and extending substantially to the lower edge thereof, said lining and shell arranged to fit loosely over a human head; a headband dimensioned to fit a human head; a plurality of suspension members formed of pliable material of substantially uniform thickness, each interengaging said lining over substantial areas and including circumferentially extending ends secured at their extremities to said headband, thereby to yieldably suspend said lining and shell from said headband, said suspension members unimpeding crushing of said lining and offering substantially no localizing of force in the event said lining is crushed in the region of said suspension members.

6. A protective helmet, comprising: a shell; a relatively thick lining of impact energy-absorbing material within said shell and extending substantially to the lower edge thereof, said lining and shell arranged to fit loosely over a human head; a headband dimensioned to fit a human head; and a plurality of flexible suspension members, each member including angularly related tabs at its upper and lower margins, said lining having angularly related slits receiving said tabs, each suspension member also including circumferentially extending tongues secured at their extremities to said headband.

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