

[54] **HEAD REST WITH ENERGY
ABSORBING HEAD PAD,
PARTICULARLY FOR VEHICLE SEATS**

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Germany.....

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[58] Field of Search.....297/391, 393, 397

[56] **References Cited**

UNITED STATES PATENTS

3,528,703	9/1970	Ohta.....	297/397
3,226,159	12/1965	Binding	297/397
3,205,005	9/1965	Brown.....	297/397

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[57] **ABSTRACT**

A head rest for a vehicle seat comprising a rigid frame structure supporting a deformable ribbed or finned structure of sheet material or molded from hard foam and having a thin covering padding of upholstery.

9 Claims, 4 Drawing Figures

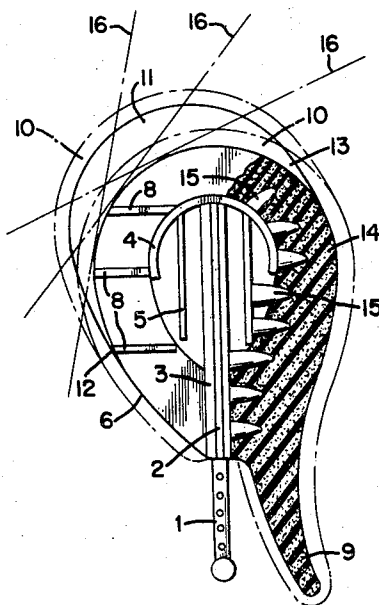


FIG.1

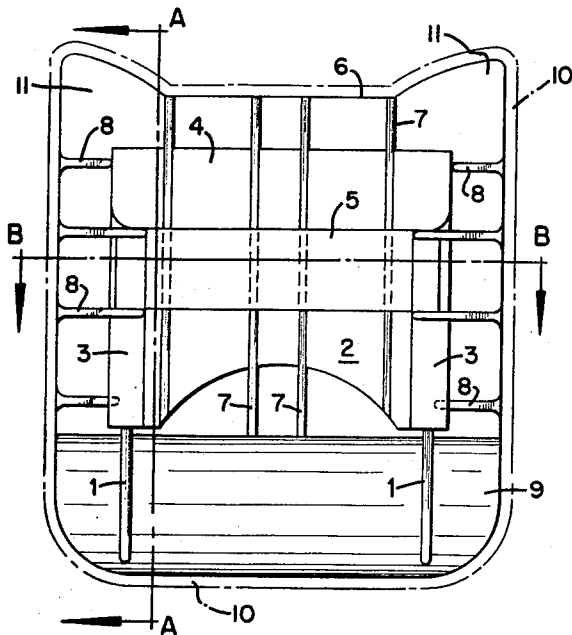


FIG.2

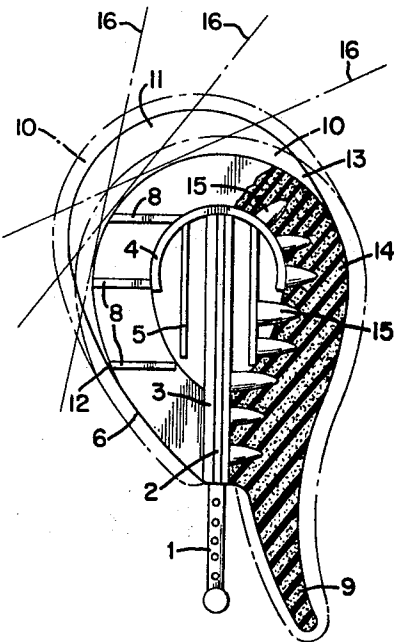


FIG.3

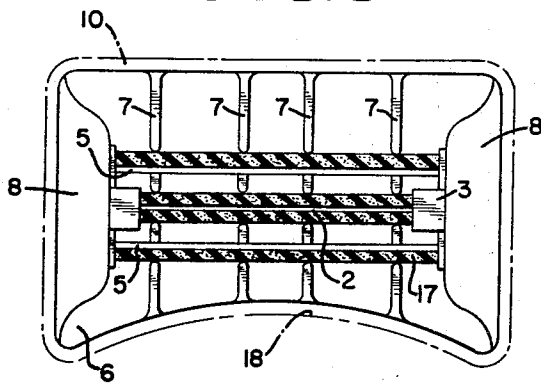
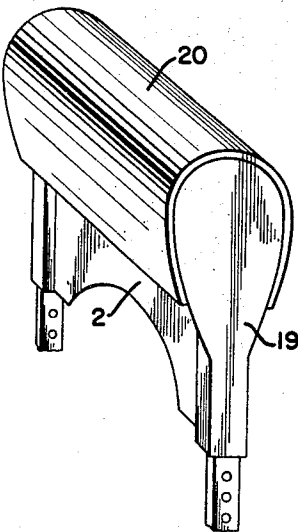


FIG.4



HEAD REST WITH ENERGY ABSORBING HEAD PAD, PARTICULARLY FOR VEHICLE SEATS

FIELD OF THE INVENTION

The invention relates to a head rest for a seat, particularly a vehicle seat.

BACKGROUND OF THE INVENTION

Head pads for head rests are known in varying forms and usually comprise as the supporting structure of frame of wire or tubular material or of sheet metal, either in plane form or with an upturned edge for providing better rigidity. The frame is upholstered with a padding of thick foam material defining the outward shape thereof and provided with a cover.

The supporting frames hitherto proposed do not exhibit optimal characteristics with regard to deformation. Either they were too weak, as in the case of the wire structures, so as to yield to the impact from a person's head upon a collision with resulting danger of fracture of the spinal column at the neck, or, if they were rigid enough to withstand the maximum forces that could occur, the corresponding deformations were too small and the excessive decelerating forces they exerted on the head tended to cause concussion.

The high strength of the upholstery or padding material required in view of the shaping thereof contributed to prolonging the path of the impact of the head on the inner frame structure and therefore led to prohibitively high impact speeds, since the soft padding materials could not offer any appreciable resistance to the impact.

In U.S. Pat. No. 3,205,005 the requirement for a high energy-absorbing capacity is recognized, but in the proposed solution thereof, a much too small path of deformation is obtainable.

British Pat. No. 1,702,692 discloses the use of an apertured metal sheet which tends to absorb energy. It is recognized that the range of forces that can be absorbed and the path of deformation of the sheet are limited and that the elasticity thereof is relatively high, and the supporting bars carrying the head pad are therefore adapted to deflect rearwardly in response to a prolonged loading effect. However, this facilitates upward projection of the body in the seat and also fracture of the neck.

OBJECT AND SUMMARY OF THE INVENTION

It is an object of the invention to contribute to more widespread use of safety belts, which are now being used on a very small scale, even if they are provided in the vehicle. It is unlikely that even a law requiring the use of belts would basically change this situation. Therefore, it must be taken into account that any effective protection of a passenger against shock or damage to the cervical spinal column or to the head or the brain must be effective even if the body is projected upwards in the seat in an accident. However, under these conditions, it is extremely dangerous to provide elastic or resilient supports for attaching the head rest to the seat, for when yielding occurs and causes the support to bend, this facilitates still more upward projection of the body of a passenger and very soon the head is bent backwards to a dangerous degree.

It is therefore desirable to provide a head rest, in which the interior frame structure is as rigid as possible and which can be tilted as close to the head as possible. The head pad should be constructed to absorb high amounts of energy through deformation thereof. The point of highest force resistance should be at a high level so as to normally support the skull and receive its impact above the center of gravity of the skull. Even under the most unfavorable conditions the impact should be received not too far below the center of gravity. The head pad must be supported by a large area of the force-absorbing structure and be of such construction that by deformation thereof it absorbs the energy of deceleration of the head of the passenger and also the impact of co-passengers which may occur from any arbitrary direction depending on the direction of the collision.

This is achieved according to the invention by means of a deformable member having a high capacity of energy absorption which may be composed of two or more parts, and which is supported by means of ribs, fins, corrugations or the like on the frame structure. The deformable member may be a shell-like structure of sheet material. It is also possible to use formed or molded members of a hard-foam material and which is adapted to the energy-absorbing requirements by a corresponding arrangement of ribs thereon.

The shaping and the ribbing of the energy-absorbing structure is preferably selected so as to cause a progressive increase in the energy absorption with increasing penetration of the skull, so that beginning with a mere point contact, the contact area becomes gradually larger with increasing penetration, whereby the forces exerted on the skull are held in tolerable limits. In order to provide a stand-by damping means when the path of deformation is fully exhausted, a damping layer of hard foam material may be provided on the inner structure for supporting the rib structure of the deformable member.

An enlargement of the path of deformation and an increased progressivity can be achieved with the aid of a correspondingly shaped and proportioned pretreated band or strap of synthetic fiber of the kind used for safety belts and which is tensioned on the structure to serve as a supporting surface for the energy-absorbing members. To reduce the impact, the head portion should have only a thin padding of upholstery, which must be particularly soft to provide comfort owing to the lack of depth thereof. If the energy-absorbing structure is completely closed with the exception of apertures for the entry of adjusting bars thereof, a suitable process is to provide embedding in a correspondingly soft foam of the "integral foam" type.

The head pad may be provided with lateral ear members with corresponding ear-like portions of the energy absorbing structure which laterally support the head without extending to the sensitive portions of the shoulder and the neck, where they could exert uncomfortable pressure. Therefore they extend not lower than about the middle of the pad and upwardly over the possible points of contact with the head substantially to the rear end of the upper surface thereof.

The energy-absorbing member together with the padding may extend downwardly at the back of the head pad and cover a supporting bar for adjustably

mounting the head rest even in the uppermost adjustable position thereof. This prevents a passenger in the back seat from being projected against and injured by such bars. To this purpose, a smaller energy absorption is sufficient, for it has been shown that with high accelerations of impact, the whole body is projected upwardly about the lower legs, so that the main part of the energy absorption has to be provided by the correspondingly shaped upper edge of the head pad, whereas for smaller amounts of acceleration, such as in emergency braking, often the upper part of the body folds over and the head is thrown against the upper edge of the back rest or the supporting bars of the head pad.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 shows a head rest according to the invention.

FIG. 2 is a section taken on line A—A of FIG. 1.

FIG. 3 is a cross section on line B—B of FIG. 1.

FIG. 4 shows an interior frame structure for the head rest.

DESCRIPTION OF EMBODIMENT

FIG. 1 shows a head rest according to the invention in front view. For clarity, the deformable shell member is represented as being transparent. The head rest comprises adjusting bars 1 which provide vertical adjustability and support the interior frame structure 2 with adjusting means 3, the structure 2 having a high resistance against bending. The frame 2 has on the upper side a supporting surface 4 extending in arcuate form and further supporting surfaces provided by a rigid skirt 5.

A hollow shell member 6 is supported on frame structure 2 by means of peripheral supporting ribs surrounding the member as shown at 7 and lateral supporting ribs 8. A skirt 9 extending far downwards protects against impact from the rear to adjusting bars 1. The thin and soft padding 10 is only schematically illustrated.

FIG. 2 shows the front portion of the hollow member 6 with supporting ribs 8 and the rear portion in the form of a hard foam member 14 with ribs 15, which also extends downwardly to form a skirt 9 behind adjusting bars 1.

Also clearly apparent in the cross section are the surrounding supporting surface 4 and the stiffening surface 5. Also visible are ears or lateral members 11 which begin at the middle of the front side of head pad 12 and extend to the rear portion 13 of the upper side into the area of the illustrated tangents 16 to the surface corresponding to the contact with the head of a passenger. In this case also, the padding 10 is only schematically shown.

In FIG. 3, the outer shell 6 with the concavity 18 thereof for receiving the passenger's head is shown as well as sections through the surrounding ribs 7, which

are supported on surfaces 2 and 5. These surfaces are covered by hard foam 17 to provide better protection against penetrating impact.

In FIG. 4, there is shown an inner frame structure 2 with enlarged lateral members 19, the structure being provided with a supporting surface for the energy-absorbing shell formed by a plastic band 20 of predetermined elasticity, which is tightly stretched and supported between lateral members 19.

What is claimed is:

1. A head rest having an energy-absorbing padding, particularly for vehicle seats, comprising

a supporting frame structure disposed interiorly thereof having a rounded upper edge to provide a supporting surface, the interior frame structure being substantially non-deformable in response to impact forces,

a deformable hollow shell member surrounding said frame structure and having a high capacity of energy absorption by deformation,

a deformable rib structure disposed interiorly of said hollow shell and arranged to support said member in substantially spaced relation to said frame structure, and

a thin, soft padding of upholstery material covering said head rest.

2. A head rest according to claim 1, in which said frame structure has a pair of lateral supporting members and a band at the upper edge thereof, said band having a large area and being tensioned between said lateral members and supporting said deformable hollow shell member with the rib structure thereof.

3. A head rest according to claim 1, in which the surface of said interior structure supporting said rib structure is covered with damping hard-foam material.

4. A head rest according to claim 1, in which said deformable hollow shell member and said padding are provided with lateral ear members for supporting the head and extending forwardly within the area of possible contact with the head.

5. A head rest according to claim 4, in which said ear members extend from below the middle of the head portion to the rear part of the upper side.

6. A head rest according to claim 1, in which said deformable member, said rib structure and said padding extend on the rear side substantially below said supporting frame structure.

7. A head rest according to claim 1, in which said rib structure is formed as an integral part of said deformable hollow shell member.

8. A head rest according to claim 7, in which said deformable hollow shell member comprises sheet material having stiffening elements provided therein to form said rib structure.

9. A head rest according to claim 7, in which said deformable member comprises hard foam material forming a rib structure.

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