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(54) **Military protective helmet**

Militärischer Schutzhelm

Casque militaire de protection

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US-A- 2 532 442**

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## Description

**[0001]** The present invention relates to a military protective helmet as defined in the introductory portion of claim 1.

**[0002]** Current military protective helmets generally comprise a shell of plastics material or laminated plastic capable of withstanding strikes, ballistic impact or the like, the shell being composed of a defined number of fabric layers in a resin matrix such as polyester, phenolic resin etc.

**[0003]** Inside the shell there is provided a supporting basket including shock absorbing means and a suspension net and a head band, generally a leather band. This basket is firmly secured to the shell by means of holders. The helmet is also provided with a strap set including a chin and nape strap which are also fixed to the shell by means of buckles and fasteners. The free outer edge of the shell is trimmed with a padded band, especially a rubber band.

**[0004]** The basket with its shock absorbing means prevents the head of the soldier from coming in contact with the shell in case of impact. The military protective helmet is firmly held on the soldier's head via the strap set.

**[0005]** The holders serve to fasten the basket and the strap set to the shell and are each affixed to the shell by bolt-liner joints inserted into an associated bore in the shell.

**[0006]** US-PS 2,532,442 discloses a military helmet with an inlay and a supporting structure made of a plurality of interconnected straps and adapted to support said inlay on the wearer's head without permitting the inlay to contact the head of the wearer. The inlay is connected to the shell with the help of several rivets.

**[0007]** Typically, military helmets are provided with three holders for the basket and the strap set, two being fitted one on either lateral side of the helmet and the other to the rear. Such a military helmet is disclosed for instance in DE 94 09 465 U1.

**[0008]** Known helmet structures have the disadvantage of requiring relatively wide bores and bolt-liner joints to mount the holders in order to transmit applied forces and moments. This, however, impairs the ballistic and impact proof properties considerably as the laminated fabric will be damaged by the wide bore. In an area of approximately three centimeters around the bore the required ballistic proof property and the impact resistance or the like of the helmet are significantly reduced.

**[0009]** A further military helmet is disclosed in WO 97/37553, which has an outer shell free of apertures and an inner liner carrying the means for securing a chin strap array. The inner liner is secured to the outer shell by a mechanical interlock at the lower edge of the inner liner and the lower edge. The mechanical interlock is a resilient channel member clipped over the edge of the outer shell and affords a lip engaging the inner liner to

hold it within the outer shell when pushed therein. Furthermore, adhesive is located between the inner liner and the outer shell. Herewith the tough, thin inner liner contacts at least 95 % of the inner surface of the outer shell.

**[0010]** The problem with this known military helmet is that with this construction the inner liner is not changeable, for instance when the chin strap array has to be changed. Furthermore, the security of the connection between the inner liner and the outer shell is not sufficient and the weight becomes very high.

**[0011]** It is an object of the present invention to improve a military protective helmet as defined in the introductory portion of claim 1 so as to overcome the cited drawbacks and to propose a secure fastening of the holder to the shell.

**[0012]** This object is achieved by the characterizing features defined in claim 1 in conjunction with the elements in the introductory portion.

**[0013]** The understanding underlying the invention is that a holder that grips around the outer edge of the shell and engages the shell on either side ensures a first attachment of the holder to the shell without having to cut right through the laminated fabric, thus substantially retaining the properties of the shell in this area.

**[0014]** According to the invention the holder for the basket and/or the strap set is, therefore, U-shaped in section, folds over the outer edge of the shell and engages the associated portion on either side of the shell.

**[0015]** Advantageously, the holder is connected to the basket but also to the strap set, so that the holder performs the dual function of fastening the strap set and the basket.

**[0016]** According to one embodiment of the invention the holder comprises grip means engaging the plastics material, especially the plastic laminate of the shell, in the form of pointed teeth or the like. These teeth extend substantially horizontally from the holder into the shell, so as to ensure optimum transmission of tangential forces from the shell to the basket and the strap set and vice versa.

**[0017]** For the same reason the grip means according to a further embodiment of the invention are arranged in mutual alignment on opposite sides.

**[0018]** In order to ensure uniform transmission of the forces on the holder from the basket and/or the strap set to the shell, the holder preferably firmly bears on to the inner surface and the outer surface of the shell, at least in some areas.

**[0019]** According to one embodiment of the invention the holder protrudes outwardly from the outer edge of the shell, so that the lower U-shaped area of the holder is adapted to receive the strap set. Preferably, the lower U-shaped area is formed to mate with the buckle of the strap set and the horizontal part of the U-shaped holder is V-shaped in section. A relatively simple construction can thus accommodate the strap set in the holder.

**[0020]** In order to affix the holder to the shell at yet

another point, apart from the grip means, the holder and the shell each are provided with relatively aligned bores to be engaged by a pin which connects the two vertical walls of the U-shaped holder. These bores may thus be of much smaller dimensions than those in known military helmets, where the holder is affixed to the shell by means of a single bolt-liner joint inserted in a bore. The provision of a wide bore tends to degrade the properties of the shell in this area.

**[0021]** It is known to have the outer edge trimmed with a padded band, for example with rubber. According to an embodiment of the invention this padded band covers the related vertical portion of the U-shaped holder and is provided with an aperture to allow the lower U-shaped portion of the holder to pass through. As a result the lateral padding is maintained intact even in the area of the holder attachment.

**[0022]** In order to ease the attachment of the holder the vertical inner portion of the U-shaped holder extends further upward than the vertical outer portion of the U-shaped holder. The upper region of the inner portion of the U-shaped holder is provided with a recess to secure the basket.

**[0023]** According to an embodiment of the invention the vertical inner portion of the U-shaped holder above the grip means is provided with a cutout, so that the grip means can be made from the material of the vertical wall by subsequent bending towards the shell.

**[0024]** Therefore, the holder can be manufactured as a one-piece thus reducing the cost of manufacture considerably.

**[0025]** Preferably the holder consists of metal, and is especially made of sheet metal.

**[0026]** Among others, the following advantages:

- Increases in the ballistic behaviour.
- Elimination of the parts that stick out of the helmet shell.
- Considerable decrease in weight due to elimination of elements.

**[0027]** Further advantages and features of the invention will be apparent from the following description of an embodiment of the invention with reference to the attached drawing in which

Fig. 1 is a schematic sectional elevation of a military protective helmet according to one embodiment of the invention;

Fig. 2 is a sectional view of the shell and the holder in Fig. 1;

Fig. 3 is a sectional view of the holder in Fig. 2, with the shell removed;

Fig. 4 is a side view of the holder in Fig. 3; and

Fig. 5 is a plan view of the holder in Fig. 4.

**[0028]** Referring to Fig. 1 there is shown in a schematic sectional view a military protective helmet 10. The military protective helmet 10 consists of a skull shaped shell 12 made up of a plastic laminate including a specific number of fabric layers embedded in a resin matrix such as polyester, phenolic and exhibiting defined ballistic and impact proof properties. Inside the shell 12 there is provided a suspended basket 14 which is provided with shock absorbing devices 16, a net 18 as well as a leather headband 20.

**[0029]** The shock absorbing devices 16, the net 14 and the headband 20 are interlaced by a strap spider 22 so as to form the basket 14.

**[0030]** The military protective helmet 10 is further provided with a strap set not shown in detail which is connected to either lateral side of the shell 12 respectively by a buckle 24 and a holder 26. The basket 14 is also connected to the holder 26, so that the holder 26 performs the dual function of fastening the strap set and the basket 14.

**[0031]** With reference to Figs. 2 to 5 the holder 26 will now be described in detail which, as mentioned above, is fixed on both lateral sides to the edge of the shell 12.

**[0032]** The holder 26 is substantially U-shaped in section and comprises two vertically extending walls 28 and 30. The wall 28 bears on to the outer surface of the shell 12 and the vertical wall 30 contacts essentially the inner surface of the shell 12.

**[0033]** Both vertical walls 28 and 30 are joined by a V-shaped horizontal part 32 of the U-shaped holder 26. The wall 30 is longer and extends further upwards other than the wall 28.

**[0034]** In the upper region of the wall 30 there is a bore 34. In addition the upper region of the wall 30 is rounded.

**[0035]** The two vertical walls 28 and 30 as well as the shell 12 are provided with a respectively aligned bore 36 to be engaged by a pin 37.

**[0036]** In the upper region of the wall 28 and the wall 30 there are several opposed pointed teeth arranged in the same horizontal plane which dig into the shell 12. These teeth 38 firmly secure the hold 26 to the shell 12. The walls 28 and 30 extend substantially downward from the teeth 38 and firmly bear on to the shell 12.

**[0037]** The V-shaped horizontal part 32 protrudes below the outer edge 39 of the shell 12 and is adapted to receive the buckle 24.

**[0038]** A padded band 40 folds over the outer edge 39 of the shell 12 and is provided adjacent to the holder 26 with an aperture 42 to allow the lower portion 32 of the holder 26, i. e. the V-shaped horizontal part, to pass through.

**[0039]** The basket 14 is connected to the upper bore 34 in the wall 28, preferably via a snap fastener.

**[0040]** The holder 26 is a one-piece part and fabricated in one operation. To achieve this a cutout 44 is made in the wall 30 during the manufacturing process so that the

cutout material can be used to form the teeth 38 by subsequent bending in the direction towards the wall 28. As a result the weight of the holder 26 can be reduced. The end of the wall 28 is defined by the teeth 38. The teeth 38, the bores 34 and 36 as well as the cutout 44 can easily be made by a machining process. In a subsequent step the holder 26 is formed correspondingly.

**[0041]** To do this the holder 26 consists of metal and is fabricated from a sheet metal.

**[0042]** The invention is primarily characterized by the fact that the teeth 38 on the one hand dig into the shell 12 from the inside and from the outside which avoids severing the laminated fabric and on the other hand allow the holder 26 to be firmly secured. The additional bore 36 can thus be kept much smaller than in current helmets.

**[0043]** In addition, the holder 26 is easy, to manufacture and to mount and remains invisible from the outside in the area of its attachment to the shell 12 as it is completely covered by the padded band 40. The ballistic proof properties of the military protective helmet 10 remain thus substantially unaffected by the manner of attaching the holder 26, and the number of parts required can be reduced and accordingly the weight as well.

#### List of reference signs

#### [0044]

10	helmet
12	skull-shaped shell
14	suspended basket
16	shock absorbing devices
18	net
20	leather headband
22	strap spider
24	buckle
26	holder
28	inner vertically extending wall
30	outer vertically extending wall
32	V-shaped horizontal part
34	bore
36	bore
37	pin
38	teeth
39	outer edge
40	padded band
42	aperture
44	cutout

#### Claims

1. A military protective helmet (10) comprising a skull shaped shell (12) of plastics material capable of withstanding strikes, ballistic impact or the like, with a basket (14) connected to the shell (12) by means of a holder (26), and with a strap set also connected

to the shell (12) by means of a holder (26) to keep the helmet (10) stable on the soldier's head, **characterized in that** the holder (26) for the basket (14) and/or the strap set is U-shaped in section and grips around the outer edge (39) of the shell (12) and engages the shell (12) on either side.

2. A military protective helmet according to claim 1, **characterized in that** the holder (26) is connected to both the basket (14) and to the strap set.

3. A military protective helmet according to claims 1 or 2, **characterized in that** the holder (26) comprises grip means such as teeth (38) or the like, which dig into the plastics material, especially into the plastic laminate.

4. A military protective helmet according to claim 3, **characterized in that** the grip means extend substantially horizontally from the holder (26) towards the shell (12).

5. A military protective helmet according to any one of the preceding claims, **characterized in that** the grip means are arranged mutually opposed and level with one another.

6. A military protective helmet according to any one of the preceding claims, **characterized in that** the holder (26) firmly bears on to the inner surface and the outer surface of the shell (12), at least over defined areas.

7. A military protective helmet according to claims 2 to 6, **characterized in that** the holder (26) extends downwardly past the outer edge (39) of the shell (12) so that the lower U-shaped portion of the holder (26) is adapted to accommodate the strap set.

8. A military protective helmet according to claim 7, **characterized in that** the U-shaped portion mates with a buckle (24) of the strap set, and the horizontal part (32) of the U-shaped holder (26) is preferably V-shaped in section.

9. A military protective helmet according to any one of the preceding claims, **characterized in that** the holder (26) and the shell (12) each have mutually aligned bores (34, 36) to be engaged by a pin (27) which connects both vertically extending walls (28, 30) of the U-shaped holder (26).

10. A military protective helmet according to any one of the preceding claims, **characterized in that** a padded band (40) which folds over the outer edge (39) is provided and which covers part of the vertically extending wall (28, 30) of the U-shaped holder (26) and has an aperture (42) to allow the lower portion

of the holder (26) to pass through.

11. A military protective helmet according to any one of the preceding claims, **characterized in that** the inner vertically extending wall (30) of the U-shaped holder (26) is longer than the outer vertically extending wall (28) to extend further upwards.
12. A military protective helmet according to claim 11, **characterized in that** the upper region of the inner vertically extending wall of the U-shaped holder (26) is provided with a cutout (44) for fastening the basket (14).
13. A military protective helmet according to any one of the preceding claims, **characterized in that** the holder (26) is a onepiece part.
14. A military protective helmet according to claim 13, **characterized in that** the upper region of the inner vertically extending wall of the U-shaped holder (26) has a cutout (44) above the grip means, so that the grip means can be made from the vertical wall material by subsequent bending towards the shell (12).
15. A military protective helmet according to claim 14, **characterized in that** the holder (26) consists of metal and is manufactured from sheet metal.

#### Patentansprüche

1. Militärischer Schutzhelm (10), umfassend eine der Schädelform entsprechende Schale (12) aus Kunststoffmaterial, welche Schlägen, Geschosseinschlag oder dergleichen standhalten kann, mit einem durch einen Halter (26) mit der Schale (12) verbundenen Korbeinsatz (14) und mit einem ebenfalls über einen Halter (26) mit der Schale (12) verbundenen Riemenatz zur stabilen Halterung des Helms (10) auf dem Kopf des Soldaten, **dadurch gekennzeichnet, dass** der Halter (26) für den Korbeinsatz (14) und/oder den Riemenatz U-förmigen Querschnitt hat und um den Außenrand (39) der Schale (12) herum greift und auf jeder der beiden Seiten mit der Schale (12) in Eingriff geht.
2. Militärischer Schutzhelm nach Anspruch 1, **dadurch gekennzeichnet, dass** der Halter (26) sowohl mit dem Korbeinsatz (14) als auch mit dem Riemenatz verbunden ist.
3. Militärischer Schutzhelm nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Halter (26) Greifmittel wie Zähne (38) oder dergleichen umfasst, die sich in das Kunststoffmaterial, insbesondere in das Kunststofflaminat, eingraben.

4. Militärischer Schutzhelm nach Anspruch 3, **dadurch gekennzeichnet, dass** die Greifmittel im wesentlichen horizontal vom Halter (26) zur Schale (12) hin verlaufen.
5. Militärischer Schutzhelm nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Greifmittel einander gegenüberliegend und auf gleicher Höhe miteinander angeordnet sind.
6. Militärischer Schutzhelm nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Halter (26), zumindest über definierte Flächen hinweg, fest auf der inneren und äußeren Oberfläche der Schale (12) aufliegt.
7. Militärischer Schutzhelm nach den Ansprüchen 2 bis 6, **dadurch gekennzeichnet, dass** der Halter (26) nach unten am unteren Rand (39) der Schale (12) vorbei verläuft, so dass der untere U-förmige Abschnitt des Halters (26) den Riemenatz aufnehmen kann.
8. Militärischer Schutzhelm nach Anspruch 7, **dadurch gekennzeichnet, dass** der U-förmige Abschnitt mit einer Schnalle oder Spange (24) des Riemenatzes zusammenpasst, und der horizontale Teil (32) des U-förmigen Halters (26) vorzugsweise V-förmig im Querschnitt ist.
9. Militärischer Schutzhelm nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Halter (26) und die Schale (12) gegenseitig ausgerichtete Bohrungen (34, 36) haben, die für den Eingriff eines Stifts (27) vorgesehen sind, der beide vertikal verlaufende Wände (28, 30) des U-förmigen Halters (26) verbindet.
10. Militärischer Schutzhelm nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** ein gepolstertes Band (40), das über den äußeren Rand (39) herumgebogen ist, vorgesehen ist, und das einen Teil der vertikal verlaufenden Wand (28, 30) des U-förmigen Halters (26) abdeckt und eine Öffnung (42) hat, um ein Hindurchverlaufen des unteren Abschnitts des Halters (26) zu ermöglichen.
11. Militärischer Schutzhelm nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** die vertikal verlaufende Innenwand (30) des U-förmigen Halters (26) länger als die vertikal verlaufende Außenwand (28) ist, damit sie weiter nach oben verläuft.
12. Militärischer Schutzhelm nach Anspruch 11, **dadurch gekennzeichnet, dass** der obere Bereich

der vertikal verlaufenden Innenwand des U-förmigen Halters (26) mit einem Ausschnitt (44) zur Befestigung des Korbeinsatzes (14) versehen ist.

13. Militärischer Schutzhelm nach einem der voranstehenden Ansprüche, **dadurch gekennzeichnet, dass** der Halter (26) ein einstückiges Teil ist. 5
14. Militärischer Schutzhelm nach Anspruch 13, **dadurch gekennzeichnet, dass** der obere Bereich der vertikal verlaufenden Innenwand des U-förmigen Halters (26) einen Ausschnitt (44) oberhalb der Greifmittel aufweist, damit die Greifmittel durch anschließendes Biegen zur Schale (12) hin aus dem Material der vertikalen Wand hergestellt werden können. 10
15. Militärischer Schutzhelm nach Anspruch 14, **dadurch gekennzeichnet, dass** der Halter (26) aus Metall besteht und aus Blech hergestellt ist. 15

## Revendications

1. Casque de protection militaire (10) comprenant une coque en forme de crâne (12) en matière plastique capable de supporter des coups, un impact balistique ou équivalent, avec une coiffe (14) rattachée à la coque (12) au moyen d'un support (26), et avec un jeu de sangles également rattaché à la coque (12) au moyen d'un support (26) pour maintenir le casque (10) stable sur la tête d'un soldat, **caractérisé en ce que** le support (26) pour la coiffe (14) et/ou le jeu de sangles présente une section en forme de U et est resserré autour de l'arête extérieure (39) de la coque (12) et en prise avec la coque (12) de chaque côté. 25
2. Casque de protection militaire selon la revendication 1, **caractérisé en ce que** le support (26) est rattaché à la fois à la coiffe (14) et au jeu de sangles. 30
3. Casque de protection militaire selon la revendication 1 ou 2, **caractérisé en ce que** le support (26) comprend des moyens d'accrochage tels que des dents (38) ou équivalents, qui pénètrent dans la matière plastique, en particulier dans le stratifié plastique. 35
4. Casque de protection militaire selon la revendication 3, **caractérisé en ce que** les moyens d'accrochage s'étendent sensiblement horizontalement du support (26) vers la coque (12). 40
5. Casque de protection militaire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les moyens d'accrochage sont agencés mutuellement opposés et à hauteur l'un de l'autre. 45
6. Casque de protection militaire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le support (26) appuie fermement sur la surface intérieure et la surface extérieure de la coque (12), au moins sur des zones définies. 50
7. Casque de protection militaire selon l'une quelconque des revendications 2 à 6, **caractérisé en ce que** le support (26) s'étend vers le bas au-delà de l'arête extérieure (39) de la coque (12) de sorte que la partie inférieure en U du support (26) est apte à recevoir le jeu de sangles. 55
8. Casque de protection militaire selon la revendication 7, **caractérisé en ce que** la partie en U est apparée à une boucle (24) du jeu de sangles, et la partie horizontale (32) du support en U (26) est de préférence à section en V.
9. Casque de protection militaire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le support (26) et la coque (12) comportent chacune des alésages (34, 36) mutuellement alignés destinés à recevoir une goupille (27) qui relie les deux parois s'étendant verticalement (28, 30) du support en U (26). 20
10. Casque de protection militaire selon l'une quelconque des revendications précédentes, **caractérisé en ce qu'il** est prévu une bande rembourrée (40) qui est repliée sur l'arête. extérieure (39) et qui couvre une partie de la paroi s'étendant verticalement (28, 30) du support en U (26) et comporte une ouverture (42) permettant à la partie inférieure du support (26) de passer à travers. 25
11. Casque de protection militaire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la paroi intérieure s'étendant verticalement (30) du support en U (26) est plus longue que la paroi extérieure s'étendant verticalement (28) afin de s'étendre plus loin vers le haut. 30
12. Casque de protection militaire selon la revendication 1, **caractérisé en ce que** la partie supérieure de la paroi intérieure s'étendant verticalement du support en U (26) est pourvue d'une découpe (44) pour la fixation de la coiffe (14). 35
13. Casque de protection militaire selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le support (26) est une pièce d'un seul tenant. 40
14. Casque de protection militaire selon la revendication 13, **caractérisé en ce que** la partie supérieure de la paroi intérieure s'étendant verticalement du support en U (26) comporte une découpe (44) au- 45

dessus des moyens d'accrochage, de sorte que les moyens d'accrochage peuvent être fabriqués à partir de la matière de la paroi verticale par pliage subséquent vers la coque (12).

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15. Casque de protection militaire selon la revendication 14, **caractérisé en ce que** le support (26) est en métal et est fabriqué à partir de tôle métallique.

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