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(54) A protective helmet with a head-width adjusting device adjustable from the exterior

(57) A protective helmet is provided with a head-width adjusting device adjustable from the exterior, wherein an adjusting wheel (5) disposed rotatably at the head side of the helmet shell (6) is connected to a toothed wheel (2) via a mechanically connected flexible element (4) for the transmission of the turning moment, wherein the toothed wheel (2) is disposed in a guide seat (1) in active connection with the head support ring (3), in such a way that the open ends of the head support ring (3) of the protective helmet, which are provided with complementary teeth, can be moved towards or away from one another for the head-width adjustment depending on the direction of rotation.

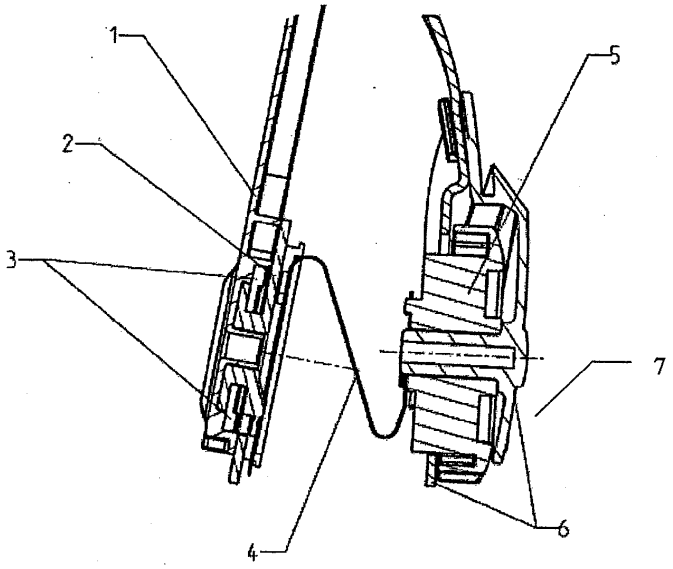

Fig. 1

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Description

[0001] The invention relates to a protective helmet with a head-width adjusting device adjustable from the exterior.

[0002] Since the human head is very variable with regard to the given head shape, i.e. with regard to head circumference, width and height, it is known to provide protective helmets with devices for adaptation to various head shapes, in order to ensure comfortable wearing of the helmet with at the same time a secure and firm fit, so that the protective function is safeguarded in work, fire, disaster or rescue deployment.

[0003] There are helmets with adjustment devices for different head sizes, which are adjusted beforehand, i.e. when the helmet has not been put on, or can alternatively be adjusted while they are being worn, i.e. when the helmet has been put on. It is precisely the adjustability from the exterior that is finding increasing popularity in the market, since the helmet can be adapted individually and also in the ongoing situation, without the helmet having to be taken off. The head-width or head-circumference adjustment is the adjustment which has the greatest effect on a good fit of the helmet. Known systems are adjusting wheel systems, wherein a wheel on the head support ring is rotated, the effect of which is that two toothed racks, i.e. the open ends of the head support ring, move towards one another by means of a toothed wheel and so either increase or reduce the circumference of the support ring.

[0004] Full-shell helmets are pulled down relatively far in the area of the back of the wearer's neck, so that the adjustment mechanism or the head-width adjusting device on the head support ring is fitted under the helmet shell, with the result that the operation is difficult to access. Some protective helmet suppliers use adjustment mechanisms for the head-width adjustment which are fitted on the head support ring, wherein an adjusting wheel including the guide for the toothed racks, a catch mechanism for the adjusted head width and an uncoupling mechanism for releasing the adjusted head-width adjustment are disposed in a housing on the head support ring. On the one hand, a certain encapsulation and compactness of the system is thus achieved, but on the other hand this also gives rise to a stiffening of the head support ring in the rear region which is uncomfortable for the wearer of the helmet.

[0005] With other protective helmet suppliers, the head-width adjusting devices are fitted directly on or to the helmet shell, but they are connected by means of a telescopic rod to the actual mechanism and are located inside the housing on the head support ring, so that the head support ring is thus also stiffened by the housing in the rear region of the helmet, with the result that wearer comfort is not at the optimum.

[0006] The following may be mentioned as examples of the aforementioned known head-width adjusting devices: DE 4022422 A1, DE 19882440 B4 as well as US 5,373,588 and US 7,174,575 B1. A holding arrangement with a spring clip for ear protection to be worn in combination with helmets emerges from German utility model DE 1870098 U.

[0007] The problem of the invention consists in making available a protective helmet with a head-width adjusting device improved compared to the prior art, so that on the one hand a firm fit of the helmet for safeguarding the protective function is provided, with at the same time comfortable, secure wearer comfort for various head sizes and with easy adjustability of the adjusting device from outside the helmet.

[0008] The solution to the problem is obtained with the features of claim 1. The dependent claims recite features of preferred embodiments and developments of the protective helmet according to the present invention.

[0009] The protective helmet with a head-width adjusting device according to the present invention is advantageously characterised in that adaptation of the head width takes place from the exterior, without there being an adverse effect on the wearer comfort of the protective helmet due to stiffening of the rear part of the head support ring, since the adjusting device, comprising an adjusting wheel, a catch and decoupling system, is fitted directly to the helmet shell, so that a housing for the mechanism on the head support ring that would adversely affect wearer comfort and usability is not required.

[0010] In embodiments of the present invention, there may be disposed on the head support ring solely a guide seat, which makes it possible for the open ends of the head support ring, which are constituted as toothed racks, to be moved or displaced towards one another by means of a toothed wheel. The driven toothed wheel of the guide seat is connected to an adjusting wheel on the helmet shell - operable by the user or helmet wearer - by means of a flexible element which is flexible in the axial direction, i.e. between the helmet shell and the head support ring, and is rigid in the radial direction. It is precisely the flexibility in the defined axial direction that is of great importance, because the head support ring can thus be adapted in a flexible manner to the head of the helmet wearer without pressure points being caused by mechanical stiffening.

[0011] A further advantage of the invention consists in the fact that, as a result of the geometry and the design of the flexible element, two functions are fulfilled by one component, i.e. on the one hand to transmit the turning moment, which is generated by the operation of the external adjusting wheel, in the radial direction independent of angle, without thereby jamming or locking. On the other hand, the geometry and design of the flexible element enable a length compensation in the axial direction as in the case of a telescopic rod. It is precisely the independence of angle that makes it possible for the guide seat to lie relatively skewed in space on account of the different geometries of the back of the human head, so that

wearer comfort with a secure and firm fit is at all times provided without pressure points arising.

[0012] An example of embodiment of the invention will now be described with reference to the accompanying figures of which:

Fig. 1 is a cross-sectional view through a head-width adjusting device in a first adjustment in a helmet,

Fig. 2 is a cross-sectional view through a head-width adjusting device in a second adjustment in a helmet,

Fig. 3 is a cross-sectional view of the adjustment mechanism for the displacement of the open ends of the head support ring with the complementary toothed wheel, and

Fig. 4 is an isometric view of the flexible element constituted as a spring.

[0013] Fig. 1 shows a flexible head-width adjusting device for a helmet, in particular for a protective helmet and especially for a full-shell protective helmet, wherein a rear section of helmet shell 6 is shown. Adjusting wheel 5, which can be rotated from the exterior for the adjustment or displacement of head support ring 3, is connected in a supported manner via a rigid bolt to a section of helmet shell 6, wherein only a part of adjusting wheel 5 is accessible to the user from the exterior on account of a recess in helmet shell 6.

[0014] By operating and therefore rotating adjusting wheel 5, head support ring 3 is widened or reduced in terms of the periphery depending on the direction of rotation of adjusting wheel 5. The rotation of adjusting wheel 5 in direction of rotation 7 is transmitted by flexible element 4, produced as an, in particular, Z-shaped metal spring, especially made of stainless steel, to a toothed wheel 2 connected mechanically thereto.

[0015] Toothed wheel 2 displaces the open ends of head support ring 3, which are constituted in the form of toothed racks, towards one another (fig. 3) in guide seat 1, so that a width adaptation of head support ring 3 to the given head width or shape of the helmet wearer thus takes place.

[0016] It can be seen in fig. 2 how flexible element 4 is deformed elastically when adapted to a larger head, a residual flexibility continuing to remain in the system.

[0017] In the comparison of fig. 1 and 2, it is clear that a change in the width adjustment of head support ring 3 is accompanied by independence of the angle of rotation of the turning moment transmission.

[0018] Fig. 4 shows an S- like, and in particular Z-shaped, flexible element 4 made from a stainless spring sheet steel with a width of 10 to 40 mm and a height of 20 to 90 m and a thickness of 0.10 to 0.40 mm.

Claims

1. A protective helmet with a head-width adjusting device adjustable from the exterior, wherein an adjusting wheel (5) disposed rotatably on the helmet shell (6) is connected to a toothed wheel (2) via a mechanically connected flexible element (4) for the transmission of the turning moment, wherein the toothed wheel (2) is disposed in a guide seat (1) in active connection with the head support ring (3), in such a way that the open ends of the head support ring (3) of the protective helmet, which are provided with complementary teeth, can be moved towards or away from one another for the head-width adjustment depending on the direction of rotation.

2. The protective helmet according to claim 1, wherein the flexible element (4) is constituted in the form of a Z-shaped spring made from a sheet steel.

3. The protective helmet according to claim 2, wherein the spring has a width of 10 to 40 mm, a height of 20 to 90 mm, a material thickness of 0.10 to 0.40 mm and is made from a stainless steel.

4. The protective helmet according to any one of the preceding claims, wherein the adjusting wheel (5) is fixed with a rigid bolt to the helmet shell (6) and is connected to the flexible element (4).

5. The protective helmet according to any one of the preceding claims, wherein the flexible element (4) is constituted with the toothed wheel (2) in a modular unit.

6. The protective helmet according to any one of the preceding claims, wherein the guide seat (1) is connected to the toothed wheel (2) in such a way that, by means of the open ends of the head support ring (3), a detachable connection arises without further fixing means between the guide seat (1) and the toothed wheel (2).

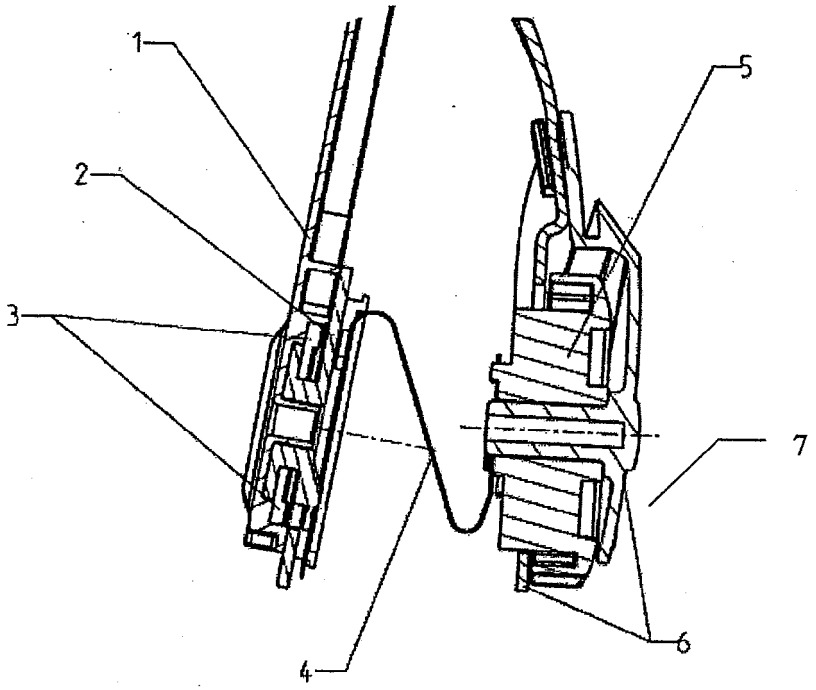

Fig. 1

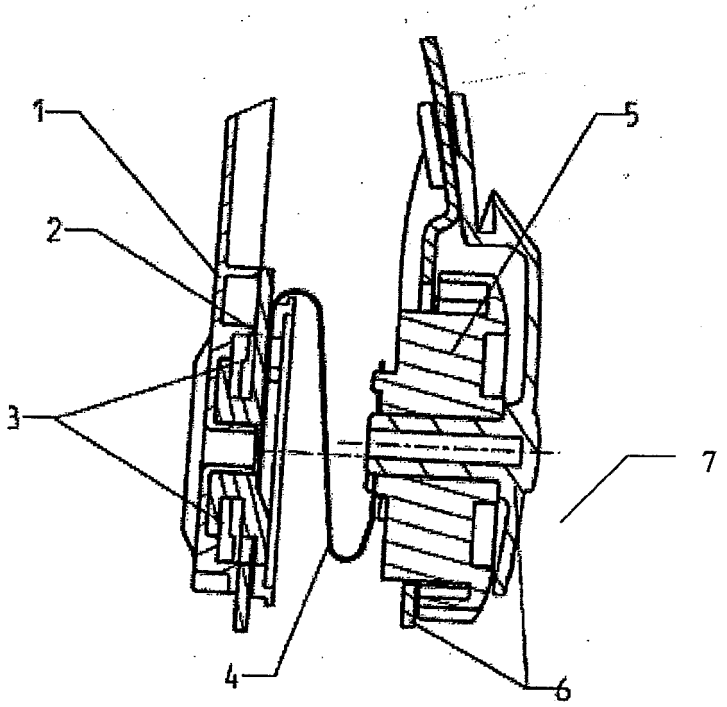

Fig. 2

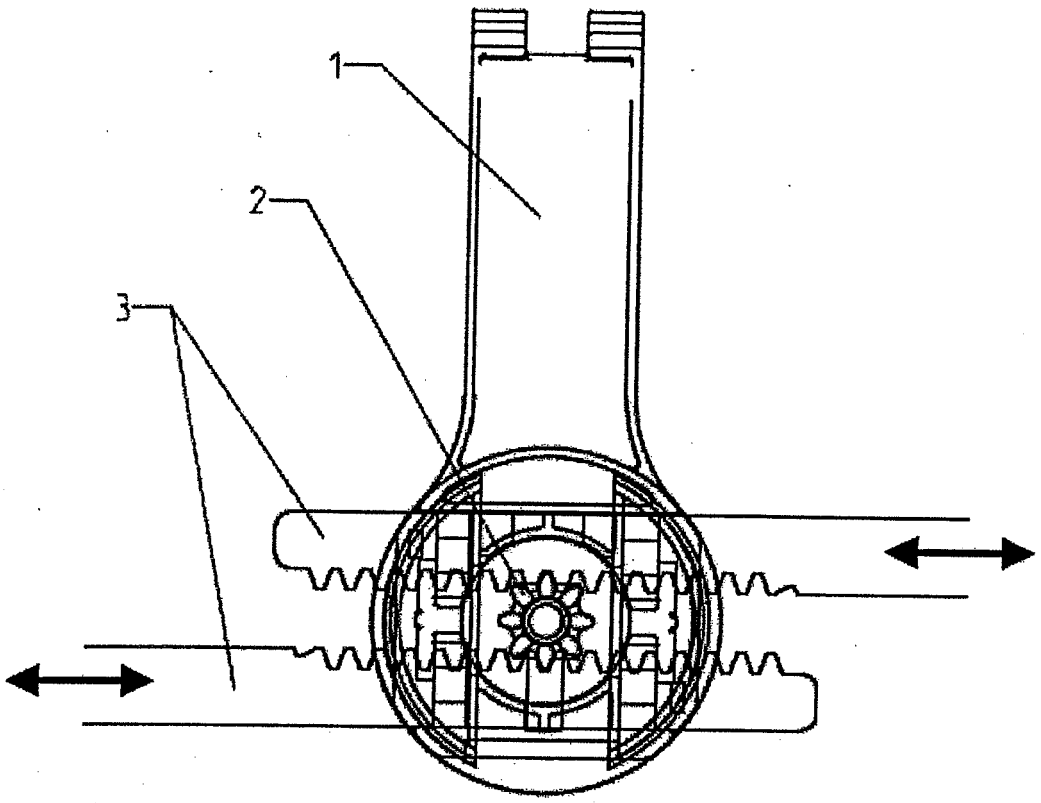

Fig. 3

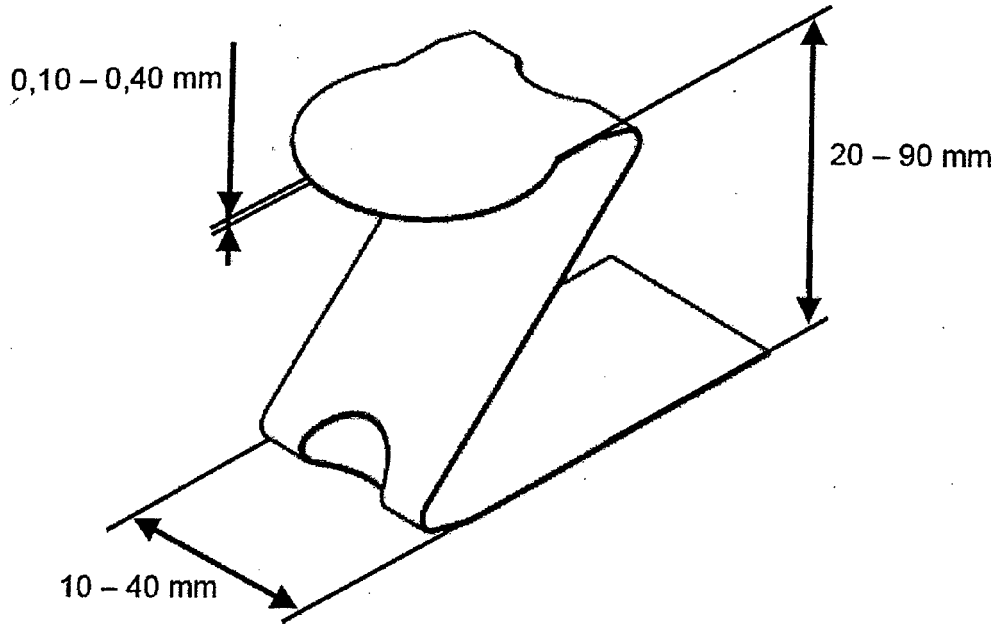

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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- DE 4022422 A1 **[0006]**
- DE 19882440 B4 **[0006]**
- US 5373588 A **[0006]**
- US 7174575 B1 **[0006]**
- DE 1870098 U **[0006]**