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(54) **Device for mutually connecting two parts of road barrier and method of connecting these parts with each other**

Vorrichtung zur gegenseitigen Verbindung von zwei Teilen einer Straßenabgrenzung und Verfahren zum Verbinden der beiden Teile miteinander

Dispositif de connexion mutuelle de deux parties de barrière routière et procédé de connexion de ces parties

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(73) Proprietor: **CS-Beton s.r.o.**  
**412 01 Litomerice (CZ)**

(72) Inventor: **Matejka, Josef**  
**400 03 Ústí nad Labem (CZ)**

(74) Representative: **Danek, Vilém**  
**Danek & Partners**  
**Vinohradská 17**  
**120 00 Praha 2 (CZ)**

(56) References cited:  
**WO-A1-98/19015 KR-A- 20050 018 341**  
**US-A- 4 815 889 US-A1- 2005 152 744**

**EP 2 444 551 B1**

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## Description

### Technical Field

**[0001]** The present invention relates to a device for interconnection of two parts (panels) of road barrier made of solid materials, particularly concrete, wherein the device is disposed in an upper recess being performed on a front connecting end of each barrier part.

**[0002]** The invention also relates to a method of mutually connecting the parts of road barrier by means of the above device.

### Background Art

**[0003]** Currently, the requirements for intercepting road systems formed by road barriers are in the Czech Republic set by a valid standard CSN EN 1317, 1 to 5 "Silniční záchytné systémy" and TP RSD ČR No. 114 "Svodidla na PK" and No. 139 "Betonové svodidlo".

**[0004]** These regulations specify both qualitative technical requirements and requirements for safety barriers in terms of its retention, as well as terms of testing, including the classification of level of detention group.

**[0005]** Briefly, these requirements can be summarized in the following areas:

- requirements for the class of level of detention, setting out the parameters of detention action for passenger cars, buses, trucks,
- design of the shape of the individual components of crash barriers;
- requirements for joining the various parts of crash barriers;
- requirements for the resistance of the material of the elements of crash barriers to the effects of frost and deicing chemical agents;
- safety requirements related to the behavior of materials under impact;
- security requirements of road barriers detention and deformation effects, both locally and as a whole.

**[0006]** Beyond these regulations there are known observations of Road and Motorway Directorate of the Czech Republic as a decisive and dominant user of currently used crash barriers in the Czech Republic. They can be summarized into the following points:

- the issue of retention levels of the concrete that is used;
- splicing of components of crash barriers in the vertical and horizontal curvature of the route of crash barriers;
- problematic function of connections between parts of crash barriers in terms of structural behavior;
- labor-intensive assembly and disassembly in the exchange of one sheet of barriers;
- inability to dismantle the connection points of parts

of crash barriers, resulting in that the joints cannot be dismantled;

- the effect of corrosion and dirt, leaking over time into the joints of the individual components of the barriers and causing that the joints cannot be dismantled;
- irregular contact between the parts of the crash barriers in the crash barrier crossing angle castings, thereby losing their essential interception function;
- failure to comply with new requirements in terms of standards of behavior in its concrete crushing in the process of intercepting function of crash barriers and the threat to safety in adjacent lanes;
- occurrence of surface cracks in the concrete of road barriers between individual parts as the initiation of destruction by frost and chemical deicing agents.

**[0007]** At present, the concrete barriers of all classes of retention level are massively used on all types of roads, including adjacent areas (road shoulders) and parking.

**[0008]** Concrete barriers tend to have the same storage size, but differ in shape and particularly in the way of how they are interconnected. Mostly, the individual parts of concrete crash barriers are made of concrete with aeration, a measure addressing the durability of concrete against the effects of frost and chemicals.

**[0009]** As the disadvantages of the current state of the art concrete road barriers the following facts must be also considered:

The currently used dense concrete with sole use of aeration is very delicate to the production, especially on the processing technology, while disorder in the area of processing technology on the contrary always result in a reduction of concrete resistance to the effects of frost and deicing chemical means or reducing the strength of concrete - frequent crashes of parts of the road barriers are a good proof of that.

**[0010]** The currently used dense concrete with sole use of aeration is bursting spontaneously and instantaneously during its destruction, while differently sized pieces of concrete of the road barrier are spread all around, endangering other road users. Such concrete does not have the characteristics which are required by EU and Czech CSN standards and recommendations.

**[0011]** The connection of parts of road barriers is known from the utility model CZ 2970 U which is created by connecting plates, bolts and nuts and reinforcing rods with thread and nut anchored in concrete crash barrier elements, where the reinforcing bars are connected between different parts of the barrier line by connecting plates, bolts and nuts. This joint is very laborious and expensive, statically impure with possible dangerous additional forces caused by the deformation under load. The connection can be easily alienated. Anchorage reinforcement bars coupling, held in the concrete barrier cohesion components under load, causes destruction of the concrete around the joints and allows spreading of

large chunks of concrete road barriers, which is a big safety issue. Connections allow the construction only at small angular displacement of parts to each other.

**[0012]** Another connection of road barriers is described in the solution according to European patent EP 1528159, which is created by embedding "C" sections into concrete in the head of barriers parts, while their connection is achieved by inserting the "I" profiles into those C sections. This connection eliminates some of the deficiencies described above, but new problems arise. At a higher angle of rotation of parts to each other, this joint is hard to realize or even it is not feasible. After completion of the barrier function under load, the joint is irreversibly deformed and, virtually, it cannot be dismantled.

**[0013]** A similar problem arises by incorrect assembly or in cases where impurities or chemical de-icing agents are clogged into the joints. The behavior of concrete during its destruction is identical as in case of the one described above, including the issue of quality of concrete resistance to de-icing chemical agents, which is dependent on the age of the concrete.

**[0014]** The issues of presence of fine crack structures on the barrier panel have not yet been successfully solved in any of the contemporarily used road

#### Disclosure of the Invention

**[0015]** The objective of this invention is to create a solution that eliminates the above-mentioned shortcomings of prior art.

**[0016]** Another task of this invention is to create a new system of connecting the parts of road barriers in the line.

**[0017]** According to this invention as defined in claim 1, it was developed equipment for the connection between the two parts of road barrier of solid material, particularly concrete, which is located in the upper recesses, created by connecting the front end of each barrier panel. The device includes on each side in mirror-like manner against each other arranged:

- an anchor and cover casing, firmly anchored at its inner end to the barrier part by means of an anchoring element wherein the casings are provided at their outer ends with an opening with an internal thread;
- an anchor plate attached to the anchor and cover casing and bearing against inner wall of the recess in the barrier part;
- a connecting anchor pin attached by means of a threaded connection to the casing and being provided on one side with an internal thread and on the other side with a round head with a central opening for a tool;
- a thread end half of two-piece connecting head having its inner surface provided with a recess of half-round shape corresponding to the outer shape of the round head, wherein the connecting head half is passed over the corresponding round head for mutual connection by means of the thread.

**[0018]** One half of the connecting head is preferably provided with external threads, while the other half is provided with internal threads.

**[0019]** Preferably, there is created a space for the rectification of the length of connection in the length of the thread of the two halves of the connecting head.

**[0020]** In accordance with another aspect of this invention, a method of connecting the road barriers made of solid material, particularly concrete, by means of the above components according to claim 4 was also developed. The method includes the following steps:

- each part of the coupling barrier at its front connecting end provided with the upper connecting recess for the location of joints;
- the anchoring element is horizontally attached to barrier part;
- the anchor and cover casing provided at its outer end with opening with internal thread and anchor plate, where the anchor plate touches the inner side of the recess, is attached to the anchoring element;
- one half of the connecting head provided with thread is passed over the connecting anchor pin, which is provided with the outer thread on one side and with half rounded head with central opening for a tool on the other;
- the connecting anchor pin with dressed half connecting head is mounted in anchoring and cover casing equipped with internal thread to the thread opening;
- the fitting of the connection is adjusted by turning the connecting anchor pins;
- to obtain firm mutual connection of both halves of the connecting anchor pins, both halves of the two-piece connecting head are joined together by means of screw connection;

**[0021]** The solution of the new connection of individual parts of road barriers consists of a steel plate, which is firmly attached to an anchoring and a cover casing with internal thread which is screwed into the connecting anchor pin, the pin being provided with thread on one side and with half round head with a square opening, preferably hexagonal, on the other.

**[0022]** Anchoring and cover casing is firmly anchored to the part of the barrier by means of anchoring element, which is located at the opposite end than the internal thread.

**[0023]** The two-piece connecting head provided with thread is passed over the half round head of the connecting anchor pin.

**[0024]** One half of the two-piece connecting head is always passed over the connecting anchor pin before the pin is screwed to the anchoring and cover casing.

**[0025]** With this half of two-piece connecting head it is possible to move it along the shaft of the connecting anchor pin so that it does not impede to assemble the parts of the barrier together.

**[0026]** The parts of the two-piece connecting head as-

sembled by screw connection interconnect both connecting anchor pins of adjacent parts of the barriers and the parts are firmly mounted.

**[0027]** The connection can be rectified and adjusted by revolving the connection in its axis by means of connecting anchor pin.

**[0028]** With clearance in the length of the thread of both halves of the connecting head, the length of the connection can be rectified and adjusted.

**[0029]** The internal recesses of both halves of the two-piece connecting head has the half-round shape identical in inverse formation and also is identical to the shape of the half-round end of the anchor pin.

**[0030]** The half round ends of the connecting anchor pins are interconnected by combining both halves of the two-piece connecting head. This means that the barrier parts connection is of a ball joint.

**[0031]** In the upper side of the part of the barrier there is an upper recess in which the anchoring of the above described connection of the barrier parts is disposed.

**[0032]** When mounting components to the barrier line, the two opposing halves of the head of two adjacent anchor elements are screwed into each other so that they are firmly interconnected.

**[0033]** Such a line of interconnected parts of road safety barriers to the desired integral length has the following features:

- the connection is created by ball joint, which is fully able to carry the burden that is placed on him during functional load of the barrier,
- such ball joint allows angular rotation of one the part of the road barrier to another one by  $\pm 10^\circ$ , which is a reserve sufficient for the needs of mounting barrier parts in different road directional curvatures and elevation,
- both the connecting anchor pin and the connecting head allow the longitudinal rectification, adjustment and setting of the connection,
- both the connecting anchor pin and the connecting head are easy to assemble with low labor inputs during the assembling, rectification or even after the disruption of the part of the barrier or when the replacement is required so that the joint has to be dismantled,
- the connection of the set of the barrier parts is statically pure and does not introduce additional side forces into the construction,
- the connection is not sensitive to pollution including the effects of frost and chemical de-icing agents, its functionality and ability to be dismantled is maintained even after the destruction of the part of the road barrier,
- the construction of the connection allows easy and on other parts of the barrier independent change of any part of the barrier anywhere in the line of the road barrier,
- the method of anchoring the connection to the part

of the barrier eliminates the destruction of the concrete in the surroundings of the anchor point caused by cohesion failure with anchoring element.

**[0034]** For the production of parts of the road barrier the concrete of special formula has been developed. Such special formula contains both the classic components of concrete, i.e. water, cement, gravel, aggregates, plasticizers and aerating agents, which also contains a combination of two unusual ingredients, which is the amorphous silica and reinforcing fibers, which are mostly plastic.

**[0035]** Using a novel combination of special additives in concrete, the parallel creation of bubbles in the concrete gel and a multiple augmentation of formation of the crystals of hardening cement and blending of concrete with plastic fibers is achieved.

**[0036]** By adding these two special ingredients in the process of concrete formation, concrete processing and maturing of the concrete, the aerated concrete with significant crystallization of cement gel, thereby increasing its density and strength, reducing absorption of reinforcing fibers, is obtained.

**[0037]** Due to aeration and by enhanced crystallization of amorphous silica cement, the resistance of concrete to freezing and defrosting chemical agents is few times higher.

**[0038]** In fact, the resistance is doubled, which practically eliminates the accidents of the parts of the barrier commonly seen today.

**[0039]** Using fiber reinforcement, the durability of the concrete is further protected against massive development of cracks and surface layers of concrete barriers with a significant reduction of concrete fragmentation, causing that a large parts of the barrier fall off when carrying out its safety function.

**[0040]** Parts of crash barriers made of new concrete mixtures, exhibit new properties, thereby removing some of the above described shortcomings of existing barriers.

**[0041]** Before casting the barrier parts, an anchor plate with securely attached anchor and cover casing are inserted in the casting mould, while those elements are firmly attached to the anchor element.

**[0042]** These parts of the new connections are firmly fixed to mould of the part of the barrier, and this is in the area of the recess in future upper side of barrier part. Then the pouring of mould by concrete follows.

**[0043]** After hardening of the concrete and removing the part of the barrier, the connecting anchor pin is screwed into the required depth of the anchor and cover casing. Before screwing the connecting anchor pin, the one half of the connecting head is passed over the anchor pin so that the half round recesses of the head including the thread is orientated towards the half round head of the connecting anchor pin.

### Brief Description of Drawings

[0044] The invention will be further illustrated by example of its practical implementation and the description will be given with regard to the drawings attached thereto, where:

Figure 1 shows a plan view of connection of two parts of the barrier;

Figure 2 shows a sectional view of this connection.

### Example of Embodiment of the Invention

[0045] The embodiment of the connection of the parts of road barrier, displayed on Fig. 1 and 2, comprises of the steel anchor plate 2 and anchor and cover casing 3 with internal thread, the casing 3 is firmly attached to the anchor plate 2, further it comprises connecting anchor pin 5 which is screwed into the above internal thread and the pin 5 is provided with thread on one side and with half round head 9 with tool opening 7 on the other, where the opening 7 is preferably of hexagonal shape.

[0046] The anchor and cover casing 3 is firmly attached into the part 8 of the road barrier by anchoring element 4.

[0047] The two-piece connecting head 6, equipped with thread, is passed over the half round head 9 of the connecting anchor pin 5.

[0048] One half of the two-piece connecting head 6 is always attached to the anchor pin 5 before the pin 5 is screwed to the anchor and cover casing 3.

[0049] With this half of two-piece connecting head 6 it is possible to move it along the shaft of the connecting anchor pin 5 so that it does not impede to assemble the parts 8 of the barrier together.

[0050] The parts of the two-piece connecting head 6 assembled by screw connection interconnect both connecting anchor pins 5 of parts 8 of the barriers and the parts of the head 6 are firmly mounted.

[0051] The connection can be rectified and adjusted by revolving the connection in its axis by means of connecting anchor pin 5.

[0052] The length of the connection can be rectified and adjusted with use of clearance in the length of the thread of both halves of the connecting head 6.

[0053] The internal recesses of both halves of the two-piece connecting head 6 has the half-round shape identical in inverse formation with the shape of the half round ends, that is with the half round head 9 of the connecting anchor pin 5.

[0054] The connection of half round ending of half round head 9 of the connecting anchor pins 5 and a creation of ball joint is performed by connecting both halves of the two-piece connecting head 6.

[0055] The anchor and cover casing 3 with internal thread is firmly anchored with its opposite end to the part 8 of the road barrier by anchoring element 4.

[0056] In the upper side of the part 8 of the road barrier there is a recess 1 in which the anchoring of the above

described connection of the parts 8 is performed.

### Industrial Utilization

[0057] Road barriers, formed preferably of concrete parts that are connected according to the present invention, meet the required standards and are suitable for use in areas where it is necessary to build a solid retention system of the above described qualities.

### Claims

1. A device for mutually connecting two parts (8) of road barrier of mass material, especially mass concrete, wherein the device is to be disposed in an upper recess (1) being performed on a front connecting end of each barrier part (8), **characterized in that** the device comprises:

- anchor and cover casings (3) that are to be arranged in mirror like manner on each side and to be fixedly anchored at their inner end to each barrier part (8) by means of an anchoring element (4) attached to the barrier part, wherein the anchor and cover casings are provided at their outer end with an opening with an internal thread;
- an anchor plate (2) being attached to each anchor and cover casing (3) to bear against the inner wall of the recess (1) in the barrier part (8);
- a connecting anchor pin (5) being attached by means of a threaded connection to each casing (3) and being provided on one side with a thread and on the other side with a half round head (9) with a central opening for a tool;
- a two-part connecting head (6) with thread end halves having its inner surface provided with a recess of half-round shape corresponding to the outer shape of the half round head (9), wherein the connecting head (6) half is passed over the corresponding half round head (9) for mutual connection of the head halves by means of the thread, creating a ball joint.

2. A device according to claim 1, **characterized in that** one half of the connecting head (6) is provided with external thread, while the other half is provided with internal thread.

3. A device according to claim 1 and 2, **characterized in that** in the length of the thread of both halves of the two-piece connecting head (6) the device is provided with a clearance for rectification and adjustment of the length of the connection.

4. A method of connecting the two parts (8) of road barrier of mass material, especially mass concrete,

by means of the device according to any of claims 1 to 3, **characterized in that:**

- each part (8) of the barrier at its front connecting end provided with the upper recess (1) for the location of connection; 5
- the anchoring element (4) is horizontally attached to each barrier part (8) ;
- the anchor and cover casing (3) provided at its outer end with opening with internal thread and anchor plate (2) thereto is attached to each anchoring element, so that the anchor plate touches the inner side of the recess 10
- each half of the connecting head (6) provided with thread is passed over the connecting anchor pin (5), which is provided with the outer thread on one side and with half rounded head (9) with central opening (7) for a tool on the other; 15
- each connecting anchor pin (5) with dressed half of connecting head (6) is mounted to the thread opening in a respective anchor and cover casing (3) equipped with internal thread; 20
- the fitting of the connection is adjusted by turning the connecting anchor pins (5);
- both halves of the two-piece connecting head (6) are joined together by means of screw connection to obtain firm mutual connection of both halves of the connecting anchor pins (5). 25

#### Patentansprüche

1. Vorrichtung zur gegenseitigen Verbindung von zwei Teilen (8) von Straßenleitplanken aus massivem Material, insbesondere aus Beton, die sich in der oberen Vertiefung (1) befindet, die am vorderen Ende jedes Teiles (8) der Leitplanke entsteht, **dies sich dadurch kennzeichnet, dass** die Vorrichtung folgende Elemente umfasst:

- Verankerungs- und Abdeckgehäuse (3) spiegelverkehrt gegenüber auf jeder Seite angeordnet und am inneren Ende an jedem Teil (8) der Leitplanke mit Hilfe eines Verankerungselementes (4) verankert, dass am Teil der Leitplanke befestigt ist, an dem die Verankerungs- und Abdeckgehäuse an ihrem äußeren Ende mit einer Öffnung mit einem innenliegenden Gewinde versehen sind; 45
- Verankerungsplatte (2), die am jedem Verankerungs- und Abdeckgehäuse (3) so befestigt ist, dass diese an der inneren Wand der Vertiefung (1) im Teil (8) der Leitplanke aufsitzen; 50
- Verbindungs- und Verankerungsbolzen (5), der mit Hilfe einer Gewindeverbindung an jedem Gehäuse (3) befestigt ist und auf einer Seite mit einem Gewinde und auf der anderen Seite mit einem halbrunden Kopf (9) mit einer mittigen 55

Werkzeugöffnung versehen ist;

- zweiteiliger Verbindungskopf (6) mit Hälften mit einem Gewindeende, deren Innenfläche mit einer halbrunden Vertiefung versehen ist, die der äußeren Form des halbrunden Kopfes (9) entspricht, wobei die Hälfte des Verbindungskopfes (6) über den entsprechenden halbrunden Kopf (9) übergezogen ist, damit die beiden Hälften mit Hilfe des Gewindes ein Kugelgelenk bilden.

2. Die Vorrichtung gemäß dem Anspruch 1, **die sich dadurch auszeichnet, dass** eine Hälfte des Verbindungskopfes (6) mit einem Außengewinde versehen ist, einsteilen die zweite Hälfte mit einem Innengewinde versehen ist.
3. Die Vorrichtung gemäß dem Anspruch 1 und 2, **die sich dadurch auszeichnet, dass** auf der Länge des Gewindes beider Hälften des Verbindungskopfes (6) ein Spiel zur Rektifikation der Länge der Verbindung gebildet wird.
4. Die Art der gegenseitigen Verbindung der Teile (8) der Straßenleitplanke aus massivem Material, insbesondere aus Beton, mit Hilfe der Vorrichtung gemäß Anspruch 1 bis 3, **zeichnet sich dadurch aus, dass**

- jeder Teil (8) der Verbindungsleitplanke an der Stirnseite der Verbindung mit einer oberen Vertiefung (1) zur Platzierung der Verbindung versehen wird;

- in jedem Teil (8) der Leitplanke waagrecht ein Verankerungselement (4) verankert wird; 35

- am Verankerungselement (4) ein Verankerungs- und Abdeckgehäuse (3) befestigt wird, das am äußeren Ende mit einer Öffnung mit einem Innengewinde und einer Verankerungsplatte (2) so versehen ist, dass die Verankerungsplatte auf der Innenseite der Vertiefung (1) aufsitzt; 40

- jede Hälfte des Verbindungskopfes (6), die mit einem Gewinde versehen ist, wird über den verbindenden Verankerungsbolzen (5) gezogen, der auf einer Seite mit einem Außengewinde und auf der anderen Seite mit einem halbrunden Kopf (9) mit einer mittigen Werkzeugöffnung (7) versehen ist; 45

- jeder Verbindungs- und Verankerungsbolzen (5) mit der übergezogenen Hälfte des Verbindungskopfes (6) wird in der Gewindeöffnung an der zugehörigen Verankerung und am Abdeckgehäuse (3) mit dem Innengewinde befestigt; 50

- die anliegenden Verbindungen werden durch das Drehen der Verbindungs- und Verankerungsbolzen (5) eingestellt;

- beide Teile des zweiteiligen Verbindungskop-

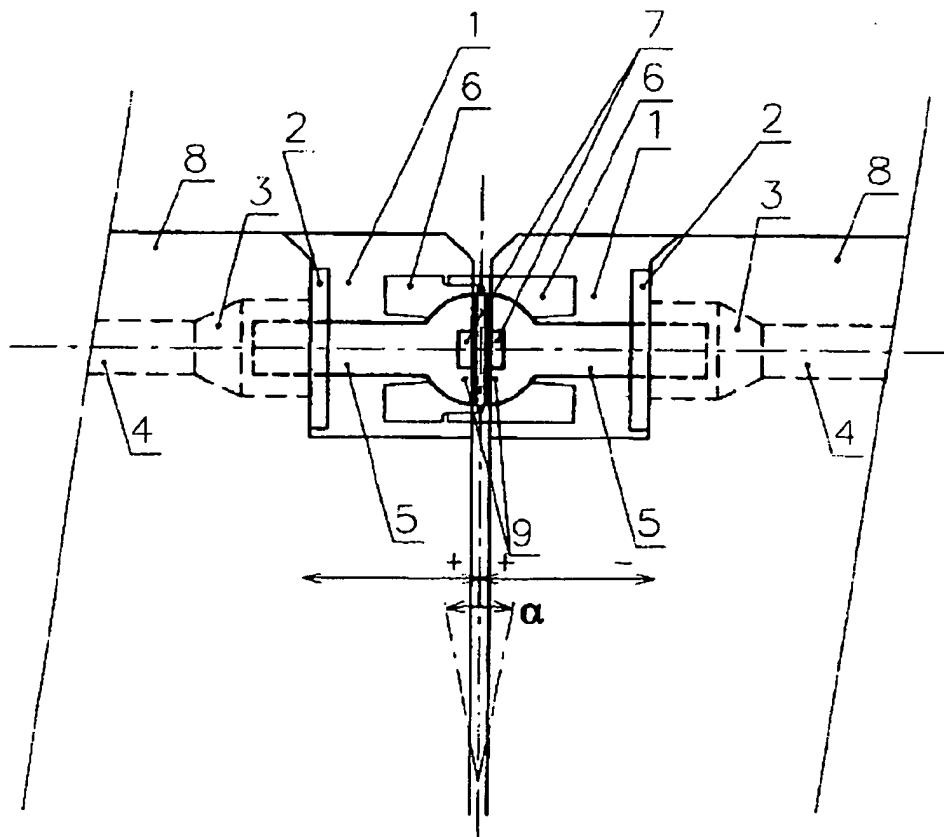
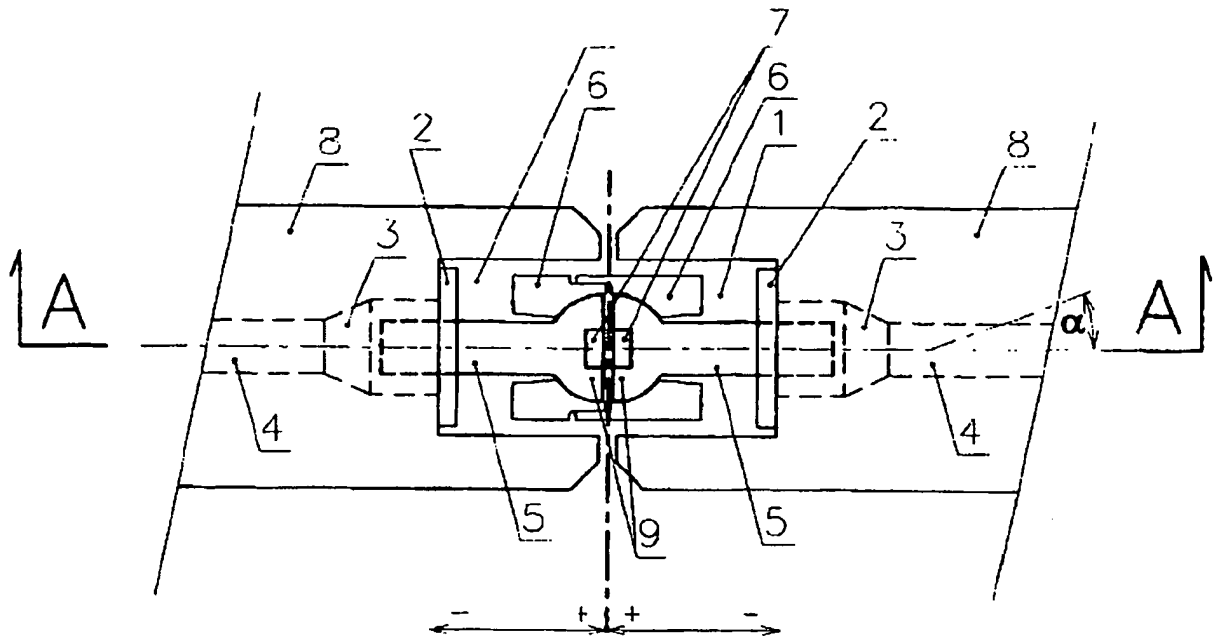
fes (6) werden mit Hilfe einer Schraubverbindung miteinander verbunden, damit diese die beiden Hälften der Verbindungs- und Verankerungsbolzen (5) fest verbinden.

## Revendications

1. Dispositif permettant de raccorder deux éléments (8) d'un rail de sécurité en matériau massif, principalement en béton, situé dans un encastrement supérieur (1) créé sur l'extrémité de raccordement avant de chacun des éléments (8) du rail, **caractérisé en ce que** ce dispositif comprend :
  - un fourreau d'ancrage et de recouvrement (3) agencé symétriquement de chaque côté et fixé par son extrémité intérieure à chacun des éléments (8) du rail à l'aide d'un composant d'ancrage (4) fixé à l'élément du rail, en sachant que les extrémités extérieures des fourreaux d'ancrage et de recouvrement sont équipées d'un orifice muni d'un filet femelle ;
  - une platine d'ancrage (2) fixée à chacun des fourreaux d'ancrage et de recouvrement (3) de manière à ce qu'ils soient en butée sur la cloison intérieure de l'encastrement (1) de l'élément (8) du rail ;
  - un mandrin de raccordement et d'ancrage (5) qui est fixé à chaque fourreau (3) par le biais d'un raccord fileté et qui comporte un filet d'un côté et une tête hémisphérique (9) intégrant un orifice central pour outil de l'autre ;
  - une tête de raccordement en deux parties (6) dont chaque moitié a une extrémité filetée et dont la surface intérieure comporte un évidement de forme hémisphérique correspondant à la forme extérieure de la tête hémisphérique (9), en sachant qu'une moitié de la tête de raccordement (6) est emmanchée sur la tête hémisphérique correspondante (9) afin que les moitiés de la tête se raccordent par filetage de manière à former une articulation sphérique.
2. Dispositif selon la revendication 1 **caractérisé en ce que** chaque moitié de la tête de raccordement (6) est munie d'un filetage mâle alors que la seconde moitié est, elle, munie d'un filetage femelle.
3. Dispositif selon les revendications 1 et 2 **caractérisé en ce que**, sur la longueur du filetage des deux moitiés de la tête de raccordement en deux parties (6), un jeu a été créé pour qu'il soit possible de rectifier la longueur du raccord.
4. Mode de raccordement des éléments (8) d'un rail de sécurité en matériau massif, principalement en béton, en ayant recours au dispositif selon les reven-

dications 1 à 3 **caractérisé en ce que**

- la face de raccordement avant de chaque élément (8) du rail de sécurité comporte un encastrement supérieur (1) dans lequel vient de placer le raccord ;
- un élément d'ancrage (4) s'ancre de manière horizontale dans chacun des éléments (8) du rail ;
- un fourreau d'ancrage et de recouvrement (3) dont l'extrémité extérieure est munie d'un filet femelle et d'une platine d'ancrage (2) se fixe à l'élément d'ancrage (4) de manière à ce que la platine d'ancrage soit en butée sur la face intérieure de l'encastrement (1) ;
- chaque moitié de la tête de raccordement (6), munie d'un filet, est tirée par-dessus le mandrin d'ancrage et de raccordement (5) qui comporte un filet d'un côté et une tête hémisphérique (9) intégrant un orifice central pour outil (7) de l'autre ;
- chaque mandrin de raccordement et d'ancrage (5) sur lequel est emmanchée la moitié de la tête de raccordement (6) se fixe dans l'orifice fileté pour s'assembler au fourreau d'ancrage et de recouvrement (3) correspondant, muni d'un filet mâle ;
- l'ajustage du raccord se réalise en faisant pivoter les mandrins de raccordement et d'ancrage (5) ;
- les deux éléments de la tête de raccordement en deux parties (6) se fixent l'un à l'autre grâce à un raccord vissé, de manière à ce que les deux moitiés des mandrins de raccordement et d'ancrage (5) soient parfaitement assemblées.





**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- CZ 2970 U [0011]
- EP 1528159 A [0012]