



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.01.2013 Bulletin 2013/02

(51) Int Cl.:
E02D 29/14 (2006.01)

(21) Application number: **12002012.8**

(22) Date of filing: **22.03.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(71) Applicant: **FUCOLI-SOMEPAL FUNDIÇÃO DE FERRO, S.A.**
3001-906 Coimbra (PT)

(72) Inventor: **Da Fonseca Mendes Pereira, Luis Miguel**
3001-906 Columbra (PT)

(30) Priority: **23.03.2011 PT 10558011**

(74) Representative: **Ferreira, Maria Silvina Clarke, Modet & Co.**
Rua Castilho, 50-9°
1269-163 Lisboa (PT)

(54) **Anti-theft device for manhole covers and related securing method**

(57) This invention relates to an anti-theft device and method applied to hinge-based locking systems, in particular, those used in manholes. The device comprises a ring (1); a lid (2) to connect with the ring; a locking hook (3) of the lid (2) pivot that is placed onto cavities (1A and 1B) located in the ring (1); the lid (2) comprising a set of joining means with the ring. The ring (1) of the assembly can be located either secured to the ground with bitumi-

nous filler, cement or fixed with further binders and, to prevent the cover theft, the hook (3) external body is entirely covered with the pavement, so that solely with its removal/destruction will it be possible to take the lid out from the ring. The hook (3) may be placed in a stage when the ring (1) is already partially secured to the pavement. This invention is, therefore, chiefly useful to prevent the cover theft, while maintaining, on the other hand, all typical features and functionalities of the assembly.

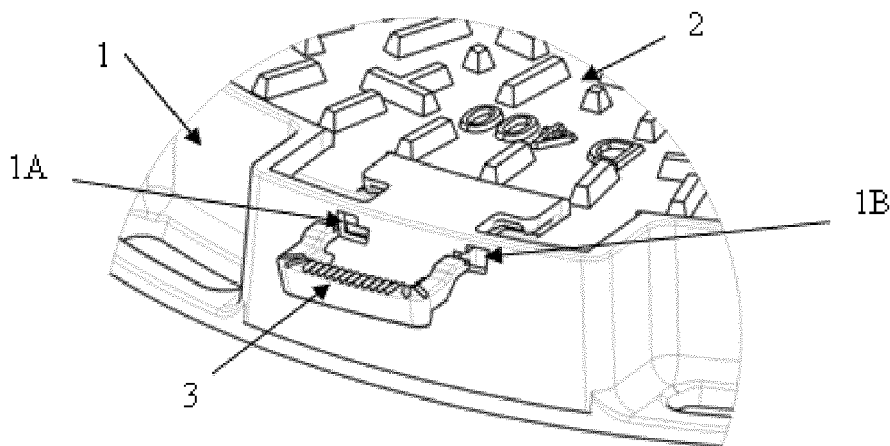


Figure 1

Description

BACKGROUND OF THE INVENTION

[0001] This invention relates to an anti-theft device and method applied to locking systems with hinge pins, in particular, those used in manholes of sewage systems or the like.

BACKGROUND OF THE INVENTION

[0002] Locking devices for manholes typically comprise a ring and the related lid made out of cast iron. Up to the mid-80s, locking devices for manholes were made out of flake graphite cast iron and would comprise two elements, the ring and the lid, whereby the interaction between them would solely be accomplished with the laying/overlying of the lid into the ring. Usually, they would not feature any fastening elements, a rotary joint or alike, that would allow the lid tilting as related to the ring. The said locking devices, namely those applied to heavy traffic lanes, distinguished for exhibiting high weights, in order to prevent its fracture and the lid lifting or displacement as related to the ring whenever vehicles would drive over it.

[0003] The advent of spheroidal graphite cast iron allowed maintaining the parts strength with a significantly smaller weight. As locking devices became increasingly lighter, however, means that would ensure that the lid would be fitted within the ring without any displacement became necessary, namely under more demanding traffic requirements. This situation has been provided for, and it has been particularly focused, in the standard EN 124 in 1989.

[0004] The fact that locking devices became lighter and easier to be handled made them more vulnerable to unlawful operations, including the covers burglary. The assemblies available in the market allow the lid to be easily removed from the ring by a sole individual and without using any specific kind of tool whatsoever.

[0005] The invention disclosed herein, upon being applied to the assembly (ring and lid) averts the cover from being disconnected from the ring, thus preventing it from being stolen.

SUMMARY OF THE INVENTION

[0006] The purpose of the invention disclosed herein is to describe an anti-theft device to be applied to ring-lid assemblies of manhole locking systems, in particular, to underground manholes or the like, wherein prevention against the cover theft is a major issue. The said device comprises a ring (1), a lid (2) to engage the ring, a locking hook (3) to secure the lid (2) to the ring (1), the hook (3) being placed onto cavities (1A and 1B) located in the ring (1), and the lid (2) comprising an assembly of claws (2A and 2B) that are held locked with the ring (1), wherein the ring (1) pertaining to the assembly is secured to the

ground with bituminous filler, cement or other binders and/or via anchoring means, and the claw (2A,2B) locking of the lid (2) pivot with the ring (1), is accomplished via closing means and the hook (3) engagement, and the external body (3J) of the hook (3) protrudes from the ring (1) and features an knurled edge (31) to secure the hook onto the pavement.

[0007] In a preferred embodiment of the invention, the anti-theft device for manhole covers includes a hook (3) which, upon the mounting position, includes a "U" shape viewed from an upper view, comprising locking tabs (3C, 3D) and anti-removal collars (3E,3F) in the device's arms that prevent the removal of the hook (3) as related to the ring (1) when the lid (2) is closed, and the arms (3A, 3B) of the hook (3) including closing means and engagement means comprising two vertical locking tabs (3C and 3D), that are aided/complemented with the vertical engagement and locking tabs (3G and 3H), whereby the said tabs prevent the hook (3A and 3B) arms, as they have been applied to the assembly comprising the ring (1) and the lid (2), from rotating, being displaced from its position and, therefore, prevent the removal of the lid claws (2A and 2B) as related to the ring (1).

[0008] In a preferred embodiment of the invention, the anti-theft device for manhole covers exhibits the cover material made out of cast iron, preferentially, made out of spheroidal graphite cast iron.

[0009] Another purpose of the invention disclosed herein describes an anti-theft method to be applied to ring-lid assemblies of manholes locking systems, wherein the assembly locking includes the following steps, as follows:

- a) Composition of a flat, solid support surface wherein the ring will lay, by applying a binder, e.g., cement, layered to approximately 3 cm at least below the pavement level;
- b) Setting up the lid (2) into the ring (1);
- c) Fitting of the hook (3) onto the cavities (1A and 1B) of the ring (1), provided for that purpose;
- d) Engagement of the hook arms (3A,3B) using the claws (2A, 2B) of the lid to enable the connection and the locking between the ring and lid, while preventing the withdrawal of the lid (2) as related to the ring (1);
- e) Application of the bitumen, or another binder, layered to the ground level, being levelled with the remaining bitumen of the pavement, thus covering the external body (3J) of the hook (3) and, therefore, wrapping the locking knurled edge (31), whereupon the lid (2) will be locked against the ring (1) nevertheless, on a pivoting way.

[0010] In a preferred embodiment, the anti-theft method of manhole covers includes a hook (3) that, as it is placed at a side position of the ring (1) does not interfere whatsoever with the proper laying of the entire ring (1) surface, thus allowing the correct ring (1) application up-

on the manhole support structure.

[0011] In a preferred embodiment, the anti-theft method of manhole covers includes two arms (3A and 3B) that engage the cavities (1A and 1B) located in the ring, whereby the said cavities (1A and 1B) have been designed to enable the hook to connect with in one sole position, by means of the engagement tabs (3G and 3H) located in the arms (3A and 3B) of the hook (3).

[0012] In another preferred embodiment, the anti-theft method of manhole covers includes arms (3A, 3B) of the hook (3) that are provided with two vertical locking tabs (3C and 3D), which are aided/complemented with the vertical engagement and locking tabs (3G and 3H), whereby these tabs prevent the ring arms (3A and 3B), as they have been applied to the assembly comprising the ring (1) and the lid (2), from rotating, thus being displaced from its position and, therefore, they prevent the removal of the lid claws (2A and 2B) as related to the ring (1).

[0013] In a further preferred embodiment, the anti-theft method of manhole covers includes tabs (3C, 3D, 3G, 3H) that have been designed so that, as the hook (3) is installed within the assembly comprising the ring (1) and the lid (2), there isn't any available space whatsoever to slot in any type of tool, thus rendering impossible the hook (3) rupture with the application of a force that might otherwise be exerted upon the bottom part of the hook arms (3A and 3B).

[0014] In another preferred embodiment, the anti-theft method of manhole covers includes vertical locking tabs (3A and 3B) and vertical engagement and locking tabs (3G and 3H) which, as they have been placed within the ring (1) into cavities (1A and 1B), engage the internal part of the box located in the ring (1) to hook up the claws (2A and 2B) of the lid (2), thus enabling its pivoting without, however, making its removal possible, unless otherwise accomplished with the removal/destruction of the pavement to take the hook (3) and the lid (2) out.

GENERAL DESCRIPTION OF THE INVENTION

[0015] This invention relates to an anti-theft device and method for manhole covers applied to hinge pin-based locking systems, in particular, those used in underground manholes or the like, wherein prevention against the cover theft is a major issue. The device disclosed herein is **characterized in that** it preferably comprises the following elements, as follows: A ring (1); a lid (2) to connect with the ring; a locking hook (3) of the lid (2) pivot placed onto cavities (1A and 1B) located in the ring (1); wherein the lid (2) comprises a set of joining means (2A and 2B) with the ring; the ring (1) of the said assembly being secured to the ground by means of a bituminous filler, cement or other binders; wherein the rear part of the hook (3), being formed with the knurled edge for securing (31) and the external body of the hook (3J), is entirely covered with the pavement in order to, solely with the removal/destruction hereof, would become possible to remove

the hook (3) and the lid (2).

DESCRIPTION OF FIGURES

[0016]

Figure 1: Schematic view of the assembly comprising the ring, lid and the hook, where the following numerals correspond to the elements, as follows:

- 1 - Ring
- 2 - Lid
- 1A - Cavity
- 1B - Cavity
- 3 - Hook

Figure 2: Cross-section view of the ring cavity wherein the lid claw and the hook are fitted into and where the following numerals correspond to the elements, as follows:

- 1 - Ring
- 2A - Lid claw
- 3 - Hook

Figure 3: Upper view of the assembly and where the following numerals correspond to elements, as follows:

- 1 - Ring
- 2 - Lid
- 2A - Lid claw
- 2B - Lid claw
- 3 - Hook
- 3A - Hook arm
- 3B - Hook arm

Figure 4: Upper view of the anti-theft hook, and where the following numerals correspond to elements, as follows:

- 3 - Hook
- 3A - Hook arm
- 3B - Hook arm
- 3C and 3D - Vertical locking tabs
- 3E and 3F - Anti-removal collars
- 3G and 3H - Vertical engagement and locking tabs

Figure 5: Side view of the anti-theft hook, and where the following numerals correspond to elements, as follows:

- 3A and 3B - Hook arms
- 3C and 3D - Vertical locking tabs
- 3E and 3F - Anti-removal collars
- 3J - External body of the hook

Figure 6: Rear view of the anti-theft hook, and where the following numerals correspond to elements, as follows:

- 3E and 3F - Anti-removal collars
- 31 - Knurled edge for securing
- 3J - External body of the hook

Figure 7: View of the opening/closure of a general assembly with the hinge pin system:

- 1 - Ring
- 2 - Lid
- 3 - Hook

DETAILED DESCRIPTION OF THE INVENTION

[0017] As can be seen in Figures 1 and 2, the lid (2) is pivoted in the ring (1), and the hook (3) fits, through its arms, within cavities (1A, 1B) of the ring (1).

[0018] Figure 3 shows the lid (2) assembled inside the ring (1). As illustrated, the lid claw (2A, 2B) remains locked, because when the locking hook (3) is introduced within cavities (1A, 1B), the arms (3A and 3B) of the hook remain on top of the lid (2A, 2B) pivot.

[0019] Figures 4 and 5 show in particular the building detail of the anti-theft hook. The upper view illustrates the arms (3A and 3B) of the hook, the anti-removal collars (3E and 3F), that work as backstops, and the engagement tabs (3C, 3D, 3G and 3H) and, finally, the knurled edge (31) to secure the hook (3) employing bituminous material or alike.

[0020] Figure 6 is particularly interesting, as it details the anti-removal collars (3E, 3F) and the knurled edge (31) to secure the hook (3) with bituminous material or alike.

[0021] And finally, Figure 7 depicts the opening/closure mode of a cover featuring the hinge pin system provided with the related locking hook (3). The lid (2) can be pivoted with the ring (1), yet the claw remains locked by the hook (3).

[0022] The securing method of the ring (1) to the ground is preferentially carried out in two steps. In the first step, a binder, e.g. cement, is placed and layered to at least 3 cm below the pavement level.

[0023] Upon the completion of this first step, the lid (2) is to be slotted in the ring (1) and connected thereto with the claws (2A and 2B), where subsequently the hook (3) is to be placed onto cavities (1A and 1B) of the ring (1) that are provided for that purpose and through the engagement among the arms (3A, 3B) and the claws (2A, 2B) to enable the connection and locking between the ring and the lid, while preventing the lid (2) from being removed as related to the ring (1), but on a pivoting mode, as shown in Figure 3.

[0024] After the hook (3) has been placed, the lid (2) may be completely closed, thus moving forward to the second step of the device installation with the application

of the bitumen, or another binder, layered to the ground level, covering the hook (3), in its external body (3J) and the knurled edge (31).

[0025] As the bitumen is completely dried, the lid (2) may be opened and closed, but cannot though be removed from the ring (1).

It should be noted that the system claimed herein allows the ring (1), upon its application, to be perfectly levelled and supported along the entire extension of its laying surface, as the hook (3), as it is placed at side position of the ring (1), does not interfere whatsoever with the proper laying of the ring (1) within the manhole support structure.

[0026] The hook comprises two arms (3A and 3B) that fit within cavities (1A and 1B) located in the ring. Cavities (1A and 1B) have been designed to allow the hook engagement in a sole position, by means of the engagement tabs (3G and 3H) located in the arms (3A and 3B) of the hook (3), in order to clear out any doubt whatsoever to the assembler upon the engagement of the hook (3) in the ring (1).

[0027] The arms (3A and 3B) of the hook (3) are provided with two vertical locking tabs (3C and 3D), which are aided/complemented with the vertical engagement and locking tabs (3G and 3H). These tabs prevent the hook arms (3A and 3B), upon being applied to the assembly comprising the ring (1) and the lid (2), from rotating, being displaced of its position, while enabling the removal of the lid claws (2A and 2B) as related to the ring (1). The said tabs are further designed so that, when the hook (3) is installed in the assembly comprising the ring (1) and the lid (2), there isn't any available space whatsoever to slot in any type of tool, thus rendering impossible the hook (3) rupture with the application of a force that might otherwise be exerted upon the bottom part of the hook (3A and 3B) arms.

[0028] The vertical locking tabs (3A and 3B) and vertical engagement and locking tabs (3G and 3H), after they have been placed within the ring (1) into cavities 1A and 1B, engage the internal part of the box located in the ring (1) to hook up the claws (2A & 2B) of the lid (2).

[0029] The arms (3A and 3B) of the hook (3) have two collars (3E and 3F) that avert the hook (3) removal as related to the ring (1) when the lid (2) is closed.

[0030] The hook (3) features a knurled edge (31) that enables an enhanced securing of the hook upon the application of the bitumen, or another binder, layered to ground level.

[0031] The hook (3) includes an external body (3J), which has been designed, so to allow an improved connection with the ring (1) and the binding material. This external body (3J) prevents or hinders the hook (3) removal as related to the assembly comprising the ring (1) and the lid (2), including in some events wherein, either deliberately or due to wear and tear of the binding material, it is partially removed.

Claims

1. Anti-theft device for manhole covers, comprising the following elements, as follows:

- a ring (1) of the assembly that is secured to the ground by means of bituminous filler, cement, other binders and/or anchoring means;
- a lid (2) to slot in the ring (1) comprising an set of claws (2A, 2B) that are locked against the ring (1);
- a hook (3) that locks the lid (2) against the ring (1) wherein the hook (3) is placed onto cavities (1A and 1B) located in the ring (1), and also the locking of the claws (2A, 2B) of the lid pivot with the ring, is carried out by locking and engagement means of the hook (3), whereby the external body (3J) of the hook (3) protrudes from the ring (1) and features a knurled edge (3I).

2. Anti-theft device for manhole covers according with Claim 1, wherein the hook includes in its arms locking tabs (3C, 3D) and anti-removal collars (3E and 3F).

3. Anti-theft device for manhole covers according with the previous Claims 1 and 2, wherein the arms (3A, 3B) of the hook (3) include locking and engagement means comprising two vertical locking tabs (3C and 3D), which are aided/complemented with the vertical engagement and locking tabs (3G and 3H).

4. Anti-theft device for manhole covers according with Claim 1, wherein the lid material is made out of cast iron.

5. Securing method for manhole covers that include the anti-theft device for manhole covers claimed in previous Claims 1 to 4, wherein the assembly and securing of the assembly comprises the elements, as follows:

- a) composition of a flat, solid support surface wherein the ring will lay, by applying a binder, layered to at least 3 cm below the pavement level;
- b) Setting up the lid (2) into the ring (1);
- c) Fitting the hook (3) onto cavities (1A and 1B) of the ring (1);
- d) Engagement of the arms (3A, 3B) of the hook with the lid claws (2A, 2B);
- e) Application for the binder layered to the ground level, thus covering the external body (3J) of the hook (3) and wrapping the locking knurled edge (3I), whereupon the lid (2) will be locked against the ring (1) on a pivoting way.

6. Securing method for manhole covers according with Claim 4, wherein the two arms (3A and 3B) are en-

gaged with cavities (1A and 1B) located in the ring, by means of the engagement tabs (3G and 3H) located in the arms (3A and 3B) of the hook (3).

7. Securing method for manhole covers according with Claim 4, wherein the arms (3A, 3B) of the hook (3) are provided with two vertical locking tabs (3C and 3D), which are aided/complemented with the vertical engagement and locking tabs (3G and 3H).

8. Securing method for manhole covers according with Claim 6, wherein the vertical locking tabs (3A and 3B) and the vertical engagement and locking tabs (3G and 3H), after they have been placed within the ring (1) onto cavities (1A and 1B), engage the internal part of the box located in the ring (1) to hook up the claws (2A and 2B) of the lid (2).

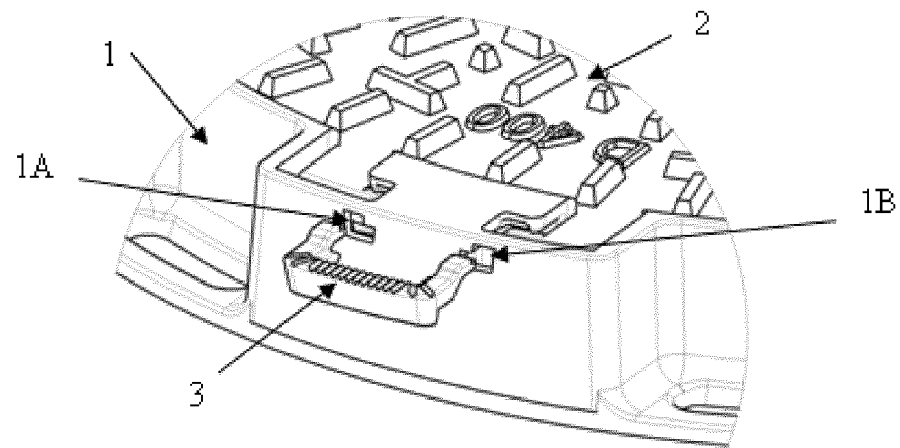


Figure 1

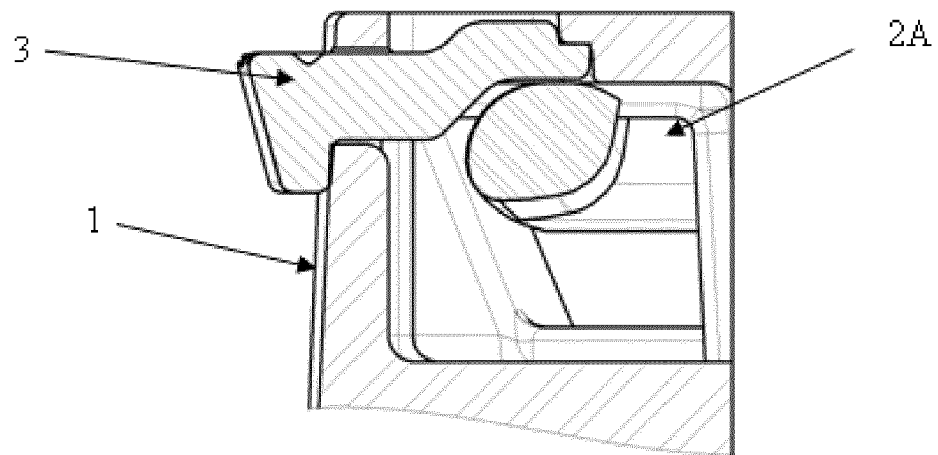


Figure 2

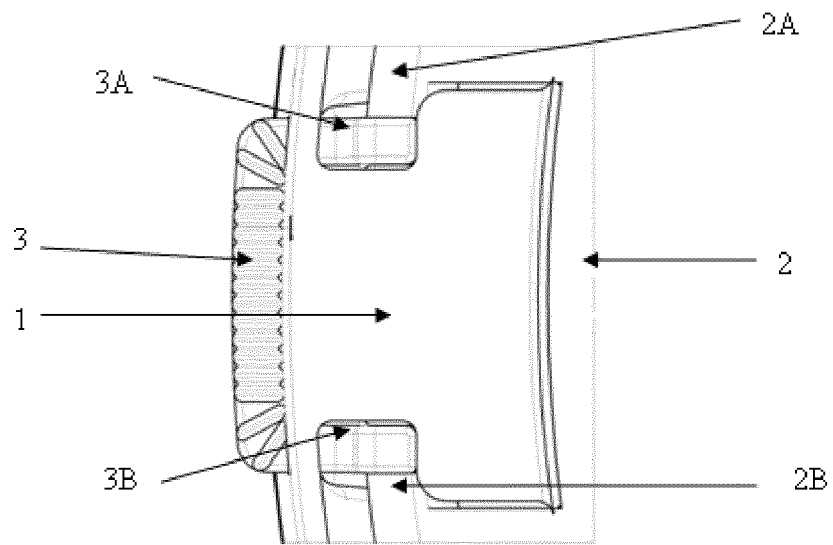


Figure 3

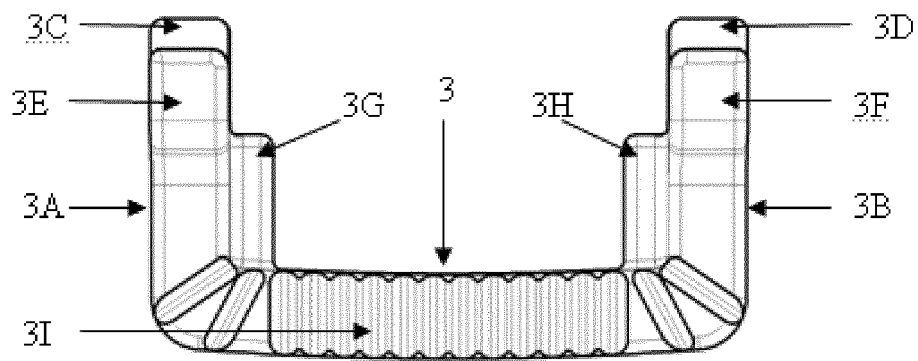


Figure 4

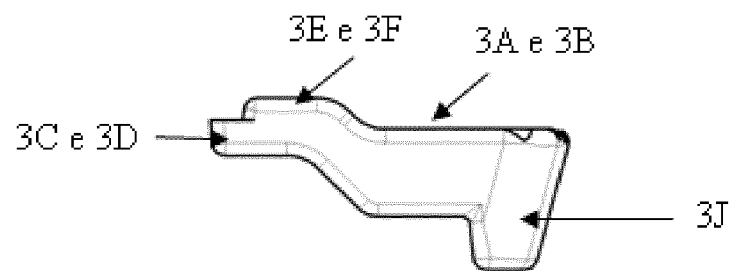


Figure 5

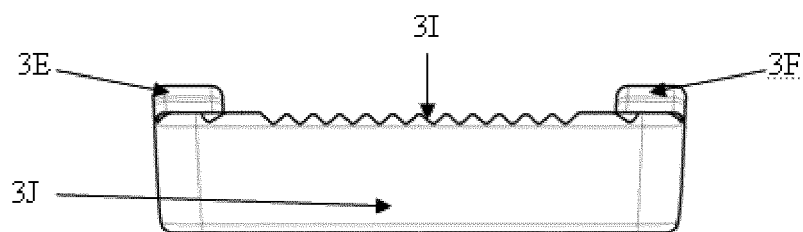


Figure 6

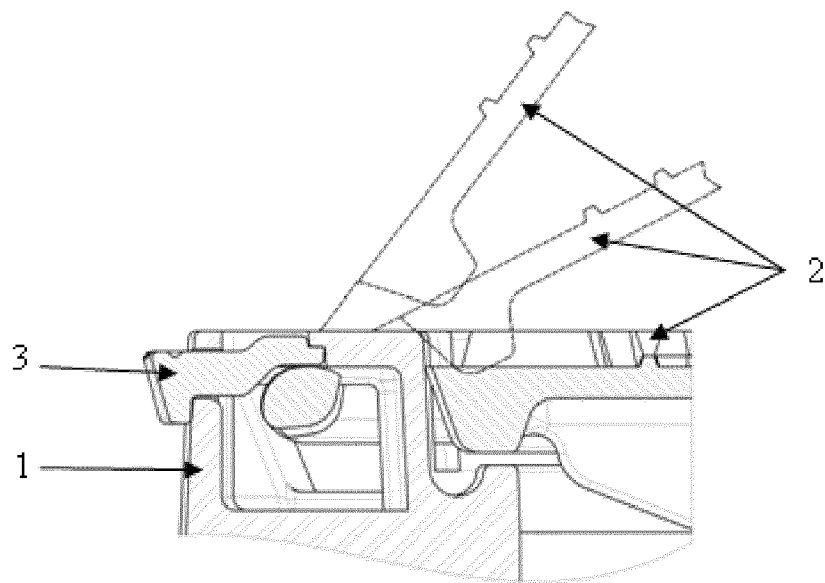


Figure 7