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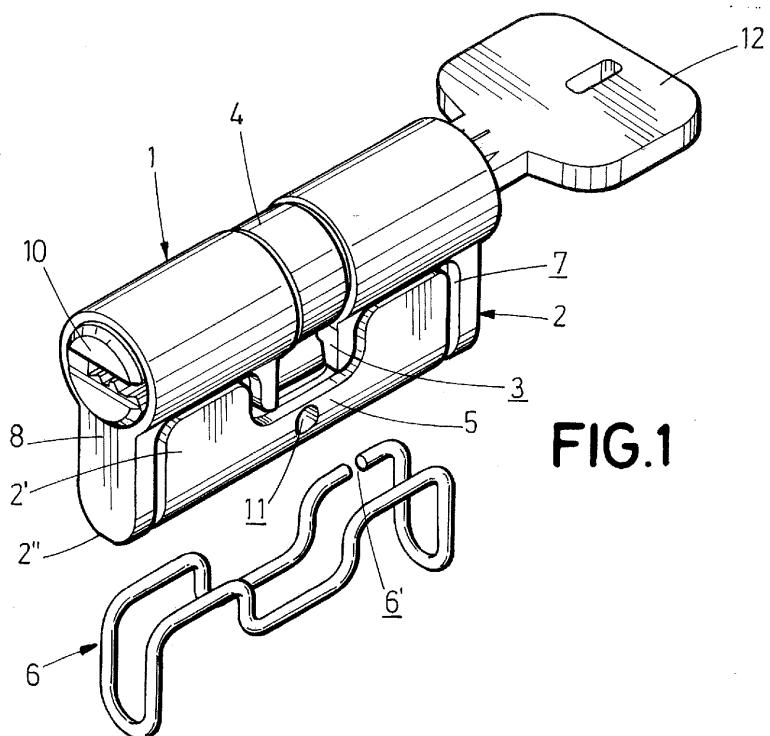
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### (54) Security device for lock cylinders

(57) The present invention relates to a security device for lock cylinders comprising a cylinder body which is formed by a cylindrical body (1) from which a radial prolongation (2) comprising two side faces (2') and a lower area (2'') extends along the entire length of its generatrix, where the cylindrical body (1) is split by an inner cavity (3) partially affecting the radial prolongation (2) without reaching the lower area (2'') thereof, there being in the radial prolongation (2), in correspondence with the

inner cavity (3), a weakened central area (5), comprising a continuous security element (6) that can be inserted by pressure and fitted in a groove (7) running continuously along both side faces (2') of the radial prolongation (2) and along the lower area (2'') thereof, as well as running along the weakened central area (5) of the radial prolongation (2), where the configuration of the security element (6) corresponds with the configuration of the groove (7).



**FIG.1**

## Description

### Technical Field of the Invention

**[0001]** The present invention relates to a security device for lock cylinders applicable in the locksmith industry, and more specifically in the field of locks for doors or accesses, which allows increasing the resistance of the lock given that the weakened central area of the cylinder body where the cam is located is protected to prevent the immediate removal of the cylinder even in the event that the lock is forced open by breaking the cylinder in said central area, whereby unauthorized accesses to a specific enclosure are prevented, all this by means of a simple, easy-to-assemble and low cost solution.

### Background of the Invention

**[0002]** Today cylinder bodies, also known as cylinders, for locks are known to consist of a cylindrical body from which a radial prolongation emerges in the lower portion thereof, such that both the cylindrical body and part of the radial prolongation are affected by an inner cavity in which a cam is housed, such that the cavity splits the cylinder into two portions, one portion corresponding with the outside of the door and another inner portion corresponding with the inside of the door. In the closed lock position, the cam projects from the transverse contour of the cylinder body, whereas in the open position, the cam remains within the contour of the cylinder body. The central area which is in the radial prolongation, located in correspondence with the inner cavity, in turn has a rather small width; it tends to have a threaded hole for fixing the cylinder body to the door or access in which it is to be installed, usually by means of a screw. Ultimately, as the result of the presence of the inner cavity and of the fixing hole, said central area is weakened in response to actions performed to force open the lock.

**[0003]** It is common that at least one of the ends of the cylindrical body of such locks has an opening, usually known as keyhole, for introducing a key to operate the lock, for going from the closed position to the open position and vice versa. A plurality of locking tumblers or any other locking means, each of which is operated by means of a spring is in turn housed in the radial prolongation, where said locking tumblers collaborate with the corrugated profile or ridges of the corresponding key.

**[0004]** The cylinder body is usually longer than the door thickness, so once assembled the ends thereof project slightly from the two inner and outer faces of the door, having the drawback that any thief can act on the projecting end with a tool capable of producing a torque, impact or bending force on the cylinder, thus causing it to break at the weakened central area or cavity. Once broken, the cylinder body or half of the broken cylinder body is removed simply by pulling for the purpose of acting on the rotary cam for driving the mechanism to open the door and access the enclosure.

**[0005]** Sometimes a so-called protective shield, which also has decorative purposes, is provided for protecting the portion projecting from the cylinder.

**[0006]** Today there are different security devices and systems to prevent breaking the cylinder or at least make breaking it more difficult, as well as anti-removal devices, for the purpose of preventing removal if the cylinder ultimately breaks.

**[0007]** Some solutions are based exclusively on preventing removal, without offering reinforcement to the weakened central area, such as for example the slot envisaged for fitting on a flange located in the shield described in GB-2434403-A. The main drawback of this device is that in a situation to force open the lock, it is not effective once the shield is successfully removed; it is always easier to remove the shield of the lock than to remove the cylinder body. Once the shield is removed, the device does not prevent breaking the cylinder body.

**[0008]** On the other hand, there are solutions based on arranging outer reinforcement elements between both portions separated by the cavity, but said solutions are expensive and hard to implement as they require an additional element which must be provided during manufacture in many cases, with the subsequent cost increase. In most of these cases, they are complex parts envisaged to be used together with a cylinder body manufactured for that purpose, where the assembly is likewise complicated because it requires fixing inserts by means of specific fixing elements located in specific spaces for that purpose, such as the lock cylinders described in UK patent document nos. GB-2494737-A and GB-2375795-B, in European patent application nos. EP-2128359-A1 and EP-1707710-A1, or in German patent application no. DE-19744065-A1, for example.

**[0009]** Other solutions contemplate directly manufacturing the cylinder in two independent halves that are connected with one another by means of an attachment and reinforcement part internally linking both parts in addition to defining the attachment section, incorporating the fixing hole. As in the preceding case, these solutions are expensive, complex and rather unreliable, in addition to being ineffective in preventing the removal of the cylinder body once the link between the two portions forming the cylinder has been broken. An example of this solution is described in UK patent no. GB-2372535-B.

**[0010]** The solutions described in the preceding paragraph include the solution described in the Spanish invention patent no. ES-2197745-B1 which describes an anti-removal cylinder body for a lock comprising a plurality of linear filiform elements, where each filiform element fits in a specific groove provided for that purpose and the ends thereof are inserted in a pair of holes that must be made previously in the cylinder body, such that each filiform element acts as a reinforcement in a single direction. The drawbacks of this solution include the need to make a plurality of grooves and holes in specific positions in the cylinder body itself, with the cost that it entails, in addition to the assembly difficulty due to the need to

arrange a plurality of independent security elements in a plurality of holes and grooves that must be made in the radial prolongation, with the subsequent weakening of the cylinder body that it entails, as it has a plurality of drill holes and grooves in different positions, weakening the resistance thereof. On the other hand, the fact that a plurality of security elements must be arranged translates into the assembly having lower resistance, since for the assembly to achieve a specific resistance value it is necessary to provide all the elements, or at least as many elements as the number of directions to be reinforced, such that forgetting or failing to place only one of said elements according to a direction results in said direction not having reinforcement, whereby in response to an action in which a thief tries to move the cylinder in different directions, he/she will finally break it since it will not be reinforced in all directions.

**[0011]** Ultimately, in view of the foregoing, there is no optimal solution allowing the combined effect of preventing breakage and hindering removal by means of a simple, low cost, easy-to-install and easy-to-assemble element.

#### Description of the Invention

**[0012]** The present invention relates to a security device for lock cylinders which allows reinforcing the inner area of the cylinder body, i.e., area which is located in correspondence with the inner cavity, while at the same time a security element links both areas of the cylinder body separated by said cavity, whereby the removal of the cylinder body is prevented even in the event that said body has been intentionally broken from the outside in order to access the interior of the corresponding home or enclosure. Given its simplicity, the device is highly reliable.

**[0013]** The device proposed by the invention comprises a cylinder body which is formed by a cylindrical body from which a radial prolongation comprising two side faces and a lower area extends along the entire length of its generatrix.

**[0014]** The cylindrical body is in turn split by an inner or central cavity splitting it into two portions, one portion corresponding with the outer face of the door and the other portion with the inner face. The cavity partially affects the radial prolongation without reaching the lower area thereof, there being in the radial prolongation, in correspondence with the inner cavity, a mechanically weakened central area, such that said central area is indeed weakened in response to any act of vandalism.

**[0015]** According to the invention, the security device comprises a substantially continuous security element that can be inserted by pressure and fitted in a surface groove running continuously along both side faces of the radial prolongation and along the lower area thereof, as well as running along the weakened central area of the radial prolongation, i.e., thus avoiding the area corresponding to the inner cavity, where the configuration of

the security element corresponds with the configuration of the groove. The security element thus performs the function of a spring acting like a highly elastic clamp which is coupled by pressure on the cylinder.

**[0016]** Even though a preferred embodiment of the invention contemplates the implementation thereof in cylinder bodies having a cylindrical configuration with radial prolongation, the application of the security device of the invention in cylinder bodies of any profile and configuration type is contemplated.

**[0017]** The solution proposed by the invention is a simple, reliable and easy-to-assemble solution which allows achieving the dual objective of providing a resistant lock cylinder, reinforcing the weakened central area, such that it is difficult to break said area even when subjecting the cylinder to a torque, impact or bending force, making removal difficult if the cylinder ultimately breaks.

**[0018]** The possibility that the security element does not project from the side faces and from the lower area of the radial prolongation when it is fitted in the groove is contemplated, whereby better integration and protection of the security element are achieved. The security element is coupled by pressure in the cylinder, i.e., it is pushed against the cylinder, it opens as it is being applied on the radial prolongation and closes when it coincides with the groove having the same geometry

**[0019]** Likewise, for greater ease in manufacture and to improve resistance, it is contemplated that the security element is symmetrical with respect to a longitudinal plane splitting the radial prolongation into two equal halves and passing through the axis of the cylindrical body, taking the position of the security element when it is fitted in the groove as reference. The security element may or may not be symmetrical with respect to a plane transverse to the axis of the cylindrical body passing through half of the inner cavity, taking the position of the security element when it is fitted in the groove as reference. Symmetry or asymmetry depends on the length of the outer and inner portions of the cylinder, which are not always of the same length.

**[0020]** Even though the security element is defined as a closed continuous element, said security element having a discontinuity, i.e., a small cut or interruption preferably located outside the inner area and the lower area, is contemplated to facilitate formation and subsequent assembly. The possibility of obtaining the security element by die cutting and forming from a sheet is contemplated. In this case the security element would be completely closed.

#### Description of the Drawings

**[0021]** To complement the description that is being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description in which the following has been depicted with an illustrative and non-

limiting character:

Figure 1 shows a schematic top perspective view of a preferred embodiment of the security element comprising the security device of the invention, where said security element has been removed from its service position in the groove incorporated in the radial prolongation of the lock.

Figure 2 shows a schematic bottom perspective view from a viewpoint opposite that of Figure 1, where the security element has been placed in its service position, i.e., housed in the groove of the radial prolongation.

Figure 3 shows a schematic profile view and a cross-section view of the device of the invention.

Figure 4 shows a schematic view such as that of Figure 3 from the opposite side and the cross-section centered on the inner void.

#### Preferred Embodiment of the Invention

**[0022]** In view of the described drawings it can be observed how in one of the possible embodiments of the invention the security device for lock cylinders proposed by the invention comprises a cylinder body which is formed by a cylindrical body (1) from which a hollow radial prolongation (2) comprising two side faces (2') and a lower curved area (2'') extends along the entire length of its generatrix.

**[0023]** The cylindrical body (1) is split by the inner or central cavity (3) partially affecting the radial prolongation (2) without reaching the lower area (2'') thereof, there being in the radial prolongation (2), in correspondence with the inner cavity (3), a mechanically weakened area (5). Said weakened central area (5) is formed as a solid central attachment section having a small width and a threaded hole (11) for fixing to the door by means of the corresponding screw, such that said central area (5) is to some extent weakened in response to any act of vandalism.

**[0024]** In turn there is housed in the inner cavity (3) a rotary cam (4) through which a plurality of teeth (9) which are housed inside the radial prolongation (2) is operated in closing and opening by means of the corresponding key (12), when it is introduced in the openings made for such purpose located at the ends (8) of the cylinder body, specifically in a rotor (10) which can rotate with respect to said cylinder body when operated by the key (12).

**[0025]** Likewise, the security device comprises a substantially continuous security element (6) of spring steel wire that can be inserted by pressure and fitted in a surface groove (7) running continuously along both side faces (2') of the radial prolongation (2) and along the lower area (2'') thereof, as well as running along the weakened central area (5) of the radial prolongation (2), i.e., thus avoiding the area corresponding to the inner cavity (3), where the configuration of the security element (6) corresponds with the configuration of the groove (7).

**[0026]** According to a preferred embodiment, the security element (6) does not project from the side faces (2') and from the lower area (2'') of the radial prolongation (2) when it is fitted in the groove (7), whereby better integration and protection of the security element (6) are achieved. The security element (6) is therefore perfectly integrated in the structure of the cylinder body which makes the removal of the cylinder from its positioning in the corresponding lock difficult even if the cylinder is intentionally broken, with respect to its central area (5), acting as highly reliable security elements. In such situation, the security element (6) keeps both portions of the cylinder body linked and attached to one another through the central area (5), acting as an attachment element to prevent removal if it breaks. Additionally, though unnecessary, fixing the security element (6) by any means, such as clipping, welding or adhering on the radial prolongation (2) of the cylinder body, for example, is contemplated, although it is preferably assembled by pressure.

**[0027]** As seen in the drawings, the security element (6) is symmetrical with respect to a longitudinal plane splitting the radial prolongation (2) into two equal halves and passing through the axis of the cylindrical body (1), taking the position of the security element (6) when it is fitted in the groove (7) as reference. Likewise, it is seen in the drawings that the security element (6) is symmetrical (it may not be) with respect to a plane transverse to the axis of the cylindrical body (1) passing through half of the inner cavity (3), likewise taking the position of the security element (6) when it is fitted in the groove (7) as reference, i.e., the security element (6) passes through the lower area (2'') of the radial prolongation (2) twice.

**[0028]** According to a preferred embodiment, the security element (6) consists of a steel wire.

**[0029]** As seen in Figures 1 and 3, the security element (6) has a discontinuity (6'), located outside the central area (5) and the lower area (2''), to allow for certain flexible deformation so that it is easily inserted in its fitted position in the groove (7).

**[0030]** In view of this description and set of drawings, the person skilled in the art will understand that the embodiments of the invention which have been described can be combined in many ways within the object of the invention. The invention has been described according to several preferred embodiments thereof, but for the person skilled in the art it will be evident that multiple variations can be introduced in said preferred embodiments without exceeding the object of the claimed invention.

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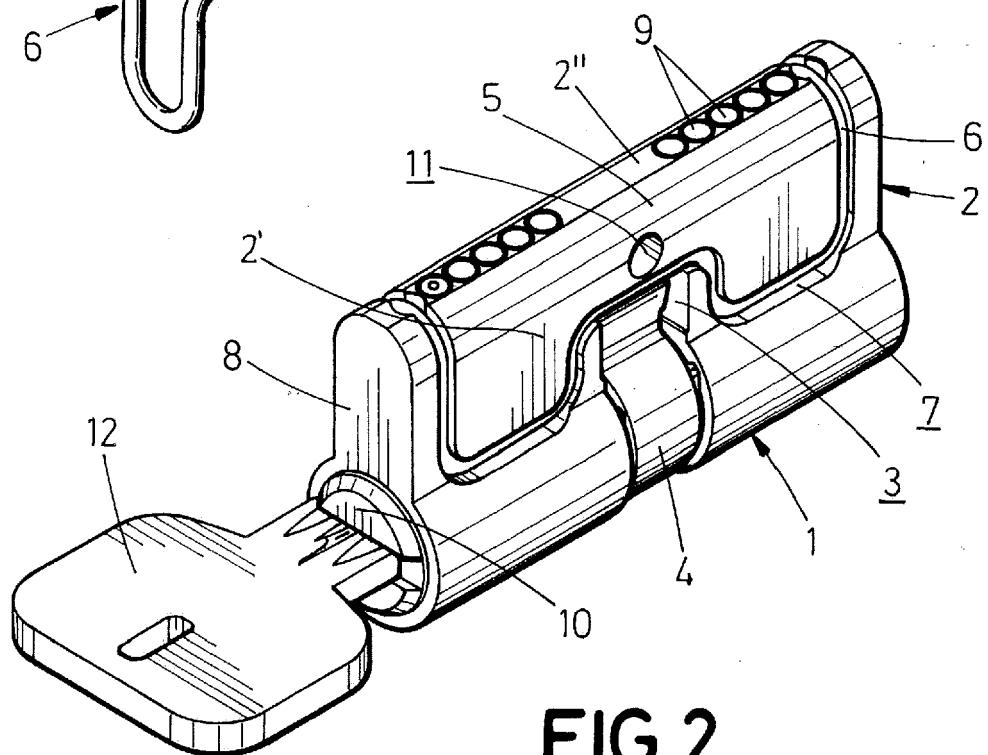
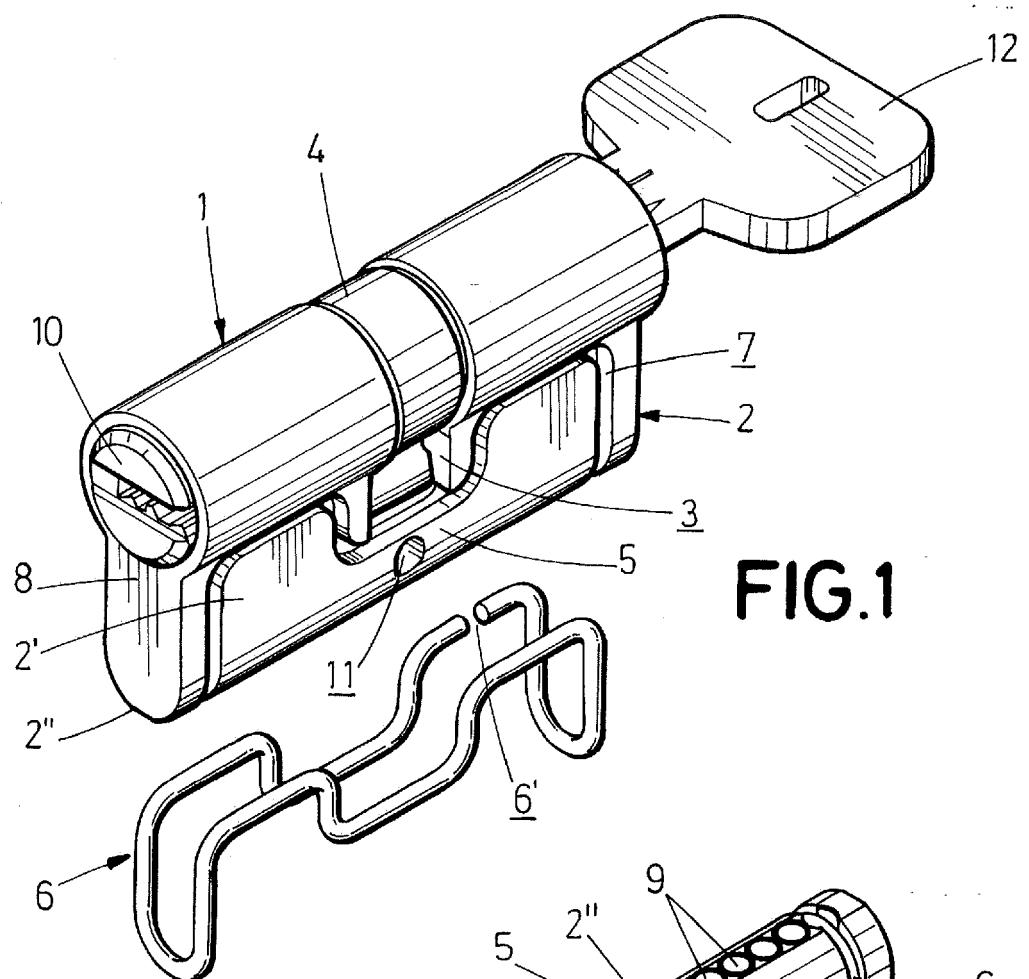
#### Claims

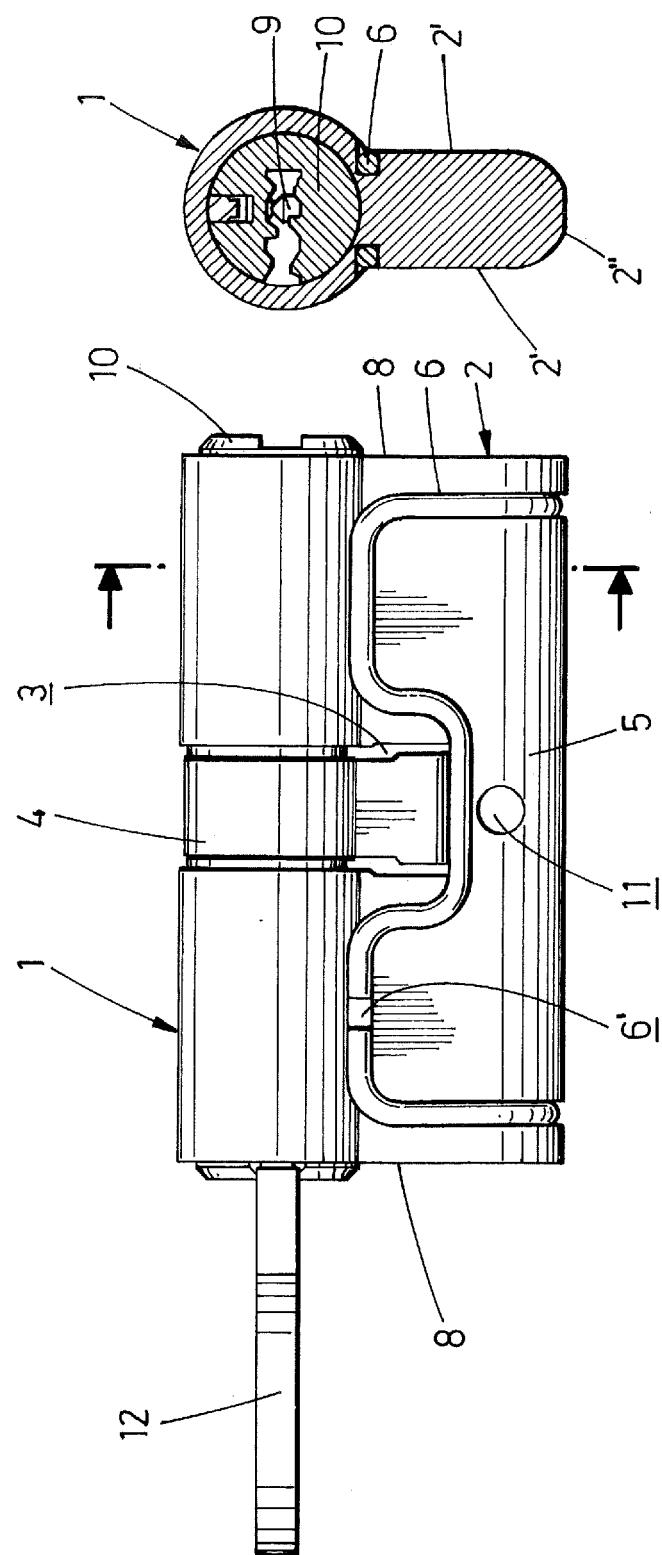
1. Security device for lock cylinders comprising a cylinder body which is formed by a cylindrical body (1) from which a radial prolongation (2) comprising two side faces (2') and a lower area (2'') extends along the entire length of its generatrix, where said cylinder

drical body (1) is split by an inner cavity (3) partially affecting the radial prolongation (2) without reaching the lower area (2") thereof, there being in the radial prolongation (2), in correspondence with the inner cavity (3), a mechanically weakened central area (5), 5  
**characterized in that** the security device comprises a continuous security element (6) that can be inserted by pressure and fitted in a groove (7) running continuously along both side faces (2') of the radial prolongation (2) and along the lower area (2") thereof, as well as running along the weakened central area (5) of the radial prolongation (2), where the configuration of the security element (6) corresponds with the configuration of the groove (7). 10

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2. Security device according to claim 1, wherein the security element (6) does not project from the side faces (2') and from the lower area (2") of the radial prolongation (2) when it is fitted in the groove (7). 20
3. Security device according to any of the preceding claims, wherein the security element (6) is symmetrical with respect to a longitudinal plane splitting the radial prolongation (2) into two equal halves and passing through the axis of the cylindrical body (1), 25 taking the position of the security element (6) when it is fitted in the groove (7) as reference.
4. Security device according to any of the preceding claims, wherein the security element (6) is symmetrical with respect to a plane transverse to the axis of the cylindrical body (1) passing through half of the inner cavity (3), taking the position of the security element (6) when it is fitted in the groove (7) as reference. 30
5. Security device according to claim 1 or 2, wherein the security element (6) is not symmetrical with respect to a plane transverse to the axis of the cylindrical body (1), taking the position of the security element (6) when it is fitted in the groove (7) as reference. 40
6. Security device according to any of the preceding claims, wherein the security element (6) consists of a spring steel wire. 45
7. Security device according to any of the preceding claims, wherein the security element (6) has a discontinuity (6'). 50
8. Security device according to any of the preceding claims, wherein the security element (6) has been obtained by die cutting and forming. 55





**FIG. 3**

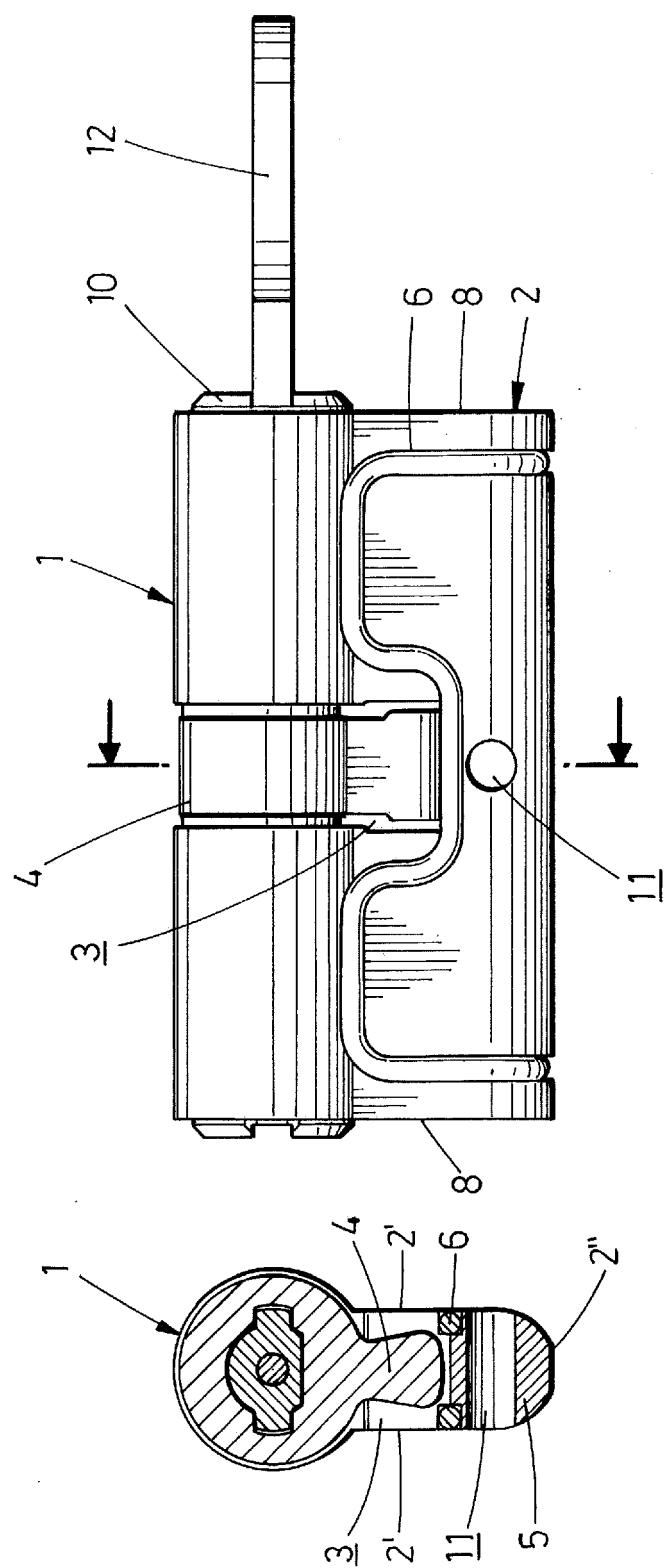


FIG. 4



## EUROPEAN SEARCH REPORT

Application Number

EP 13 38 2464

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1	Place of search The Hague	Date of completion of the search 15 May 2014	Examiner Pérez Méndez, José F
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