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(71) Applicant: **Block System Stealth SRL**
70014 Conversano (BA) (IT)

(72) Inventor: **Selicato, Pietro**
I-70014 Conversano (BA) (IT)

(74) Representative: **Fezzardi, Antonio et al**
Studio Ferrario Srl
Via Collina, 36
00187 Roma (IT)

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(54) **AN AUXILIARY OPENING AND CLOSING DEVICE FOR "AUTOMOTIVE" FIELD**

(57) An auxiliary device for opening and closing the loading compartment of a motor vehicle, which can be installed on the back door of the vehicle, comprises: an anchoring plate (4) installed on the fixed side (PF) of the back door, and an anchoring plate (3) installed on the mobile side (PM) of the back door; a case (1) that protects and completes the entire device, said case (1) being hinged to the anchoring plate (3) of the mobile side (PM) of the back door; an engagement and release system constituted by a fixed plate (10) and a mobile plate (9), which is connected to a cylinder (6) rotatable with a key (2), and a thrust spring (7) set on the case (1) of the mobile side (PM) of the back door, and by a mobile shaped hook (5), provided with spring-operated return

means, which is mounted on the anchoring plate (4) of the fixed side (PF) of the back door; as well as a removable armoured hinge (8), with a system for protection against non-authorized removal, made up of an appropriately shaped and structured pin with breakable head (13) and a groove for an anti-removal safety Allen screw (14); a chip (11) fixed within the case (1) hinged on the anchoring plate (3) of the mobile side (PM) of the back door; and a feeler (12) appropriately shaped with elastic electric contacts fixed on the anchoring plate (4) of the fixed side (PF) of the back door and electrically connected to a processor (CPU) set on the fixed side (PF) of the back door or in the loading compartment.

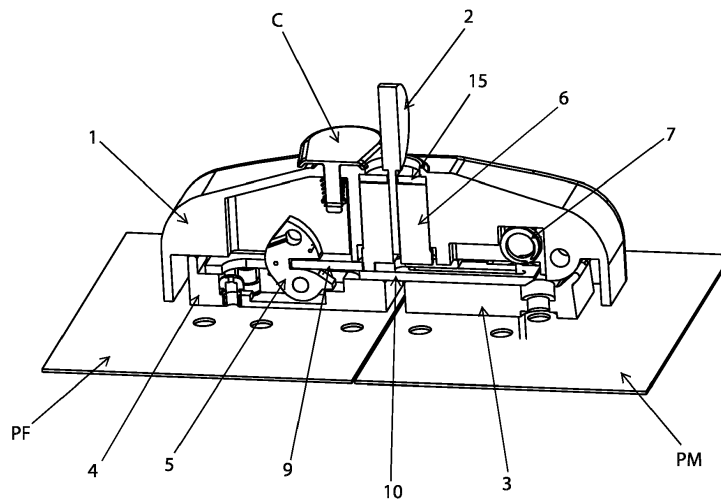


FIG.3

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Description

[0001] The present invention relates to the road-transport sector, and in particular - but not exclusively - to safety locks for goods compartments of vans and the like.

[0002] It is known that vans used by lorry drivers for making deliveries or for withdrawing goods have a loading compartment that is opened/closed many times a day, whenever it is necessary to take out goods or deposit them therein.

[0003] This involves a series of problems and disadvantages.

[0004] A first problem is the fact that the locks provided on the vehicle are not suited to withstanding such a high number of operations per day.

[0005] A second problem is represented by the fact that these standard locks do not present particular resistance to effraction.

[0006] A third problem is represented by the fact that the goods guarded in the loading compartment frequently have a high intrinsic value and consequently constitute an inviting target for ill-intentioned persons who wish to attempt to appropriate them unduly.

[0007] The main purpose of the invention is to overcome these problems by providing an auxiliary device for opening and closing the loading compartment of a motor vehicle that will be easy to install, resistant to effraction, and easy to use.

[0008] A better understanding of the invention will be obtained from the ensuing detailed description and with reference to the attached figures, which illustrate a preferred embodiment, purely by way of non-limiting example.

[0009] In the drawings:

Figure 1 is a front view of the invention, installed and in closed configuration;

Figure 2, which is similar to the previous one, illustrates the device with the opening key inserted;

Figure 3 illustrates the two plates for anchoring the device to the fixed side and the mobile side, respectively, of the back door of a vehicle;

Figures 3 and 3A illustrate a cutaway view and a median cross-sectional view, respectively, of the device of Figure 2 in the closed configuration;

Figures 3B and 3C, which are similar to the previous Figures 3 and 3A, illustrate the invention in an open configuration so that it can be unlocked and raised;

Figures 4 and 4A illustrate a cutaway view and a median cross-sectional view, respectively, of the device in the raised configuration to enable opening of the back door of the loading compartment of a vehicle with the normal standard lock (if present); the arrow in Figure 4A indicates the direction of closing of the device;

Figures 5 and 5A are a cutaway view and a median cross-sectional view, respectively, of the device during the initial re-closing step;

Figures 6 and 6A are a cutaway view and a median cross-sectional view, respectively, of the device during the final re-closing step;

Figures 7 and 7A are cutaway views that illustrate some details of construction regarding the electronics and sensor system of the device in the lowered and closed configuration;

Figure 8 is a rear view of the invention that illustrates the parts that are to be installed on the anchoring plates Figure 2;

Figure 9, which is similar to Figures 7-7A, illustrates some details of construction of the electronics and sensor system of the device in the raised configuration; and

Figure 10 illustrates some details of construction of the device regarding the system of hinged fixing on the mobile side of the back door of a vehicle.

[0010] As has already been mentioned previously, one of the main advantages of the invention is that it affords a greater safety as compared to locks mounted standard on vans and commercial vehicles where it is almost always necessary to protect "important" loads from external attacks and attempts at theft.

[0011] Its structure, which is sturdy being preferably constituted by components made of high-strength steel, renders it secure and hard to attack even with the use of any tool for forcing locks (such as pliers, levers, hammers, etc.).

[0012] The invention has been conceived precisely for simplifying use by the user who needs to open and close very frequently the loading compartment since, once the lock has been opened with its key, the latter can be pulled out, and the back door can be closed normally via said auxiliary device. Moreover, opening and closing of the loading compartment remain always and in any case independent of the driver's cab so as to guarantee, in the case of need, confidentiality and protection for the material transported.

[0013] In the example of embodiment that is described, a fixing with eleven anchoring points is envisaged. There is also envisaged the possibility of mounting an anchoring plate made of steel (counterplate) in the internal part of the loading compartment in order to enhance further the characteristics of sturdiness in fixing of the device.

[0014] There are also provided means for emergency opening in the internal part of the back door that enable, in the case where the user were to remain accidentally closed within the loading compartment, to open the lock via a release system constituted by an appropriately sized tie-rod positioned so that it cannot be in any way gripped from outside in the event of effraction.

[0015] A peculiar characteristic of the device forming the subject of the present invention consists in the fact of being provided with an electronic control system constituted by a chip with processor, which enables, through a precise communication protocol that cannot be tampered with, certain verification of whether the lock is open

or closed. This protocol is able to send the information on the state of the lock to an external auxiliary device, such as, for example, a GPRS satellite locator, which could use it potentially for a vast range of additional applications, such as, for example, for monitoring the dates and times of opening of the back door, the geographical position in which opening or closing has occurred, etc.

[0016] It is evident that this peculiar characteristic of the invention means that it is no longer just a "mechanical" device, but becomes, in effect, a more advanced "electromechanical" or mechatronic device.

[0017] From the constructional-structural standpoint, it should be noted that two peculiar characteristics are envisaged: the first consists in the fact that, contrary to all the systems already available on the market, the device forming the subject of the present invention has the mobile part hinged to a system of armoured hinge on the back door (thus enabling the case to turn) and not fixed thereon (thus forming a single piece therewith); the second consists in the fact that the spring-operated engagement/release system is mounted and is then fixed with respect to the fixed part of the back door, whereas in all the other systems it is located on the mobile side.

[0018] In other words, the devices currently available on the market are fixed with respect to the back door and close simultaneously with the original lock of the door, creating, in some cases, malfunctioning due to mechanical contrast, during closing, between the two blocking systems: the standard one and the auxiliary one. The device forming the subject of the present invention, instead, has a mobile (openable) part, with a armoured-hinge system, which engages in a fixed way with respect to its mobile hook, only after complete closing of the original lock of the back door, eliminating any kind of possible conflict between the two closing systems.

[0019] Both of these constructional innovations considerably facilitate the manoeuvres of opening (release) and closing (engagement) of the lock, rendering them more convenient for the operator.

[0020] The electromechanical or mechatronic safety device forming the subject of the present invention is basically constituted by an ensemble of components made of steel, built and shaped in such a way as to be resistant to any attempt at tampering, cutting, drilling holes, or heavy hammering.

[0021] With reference to Figures 1-1A and 2, the device comprises:

- two anchoring plates 3 and 4 made of steel: one (4) on the fixed side PF of the back door, preferably with six fixing holes, and one (3) on the mobile side PM of the back door, preferably with five fixing holes;
- an engagement and release system (Figures 3-3A) constituted by:
 - two plates, one 10 fixed and the other 9 mobile, which is connected to the cylinder 6 rotatable with a key 2 and a thrust spring 7 on the plate 3

of the mobile side PM;

- a mobile hook 5 made of steel, with spring-operated return means (not illustrated), mounted on the plate 4 of the fixed side PF;

- a case 1 made of steel, complete with a lid C for the cylinder 6, which protects the lock from bad weather conditions, and the defender 15 made of drill-resistant steel for protection of the lock that completes the entire device, said case 1 being hinged to the anchoring plate 3 on the mobile side (Figures 3-3A);
- a removable armoured hinge 8, provided with a system for protection against unauthorized removal that is made up of an appropriately shaped and structured pin with breakable head 13 and groove for an anti-removal safety Allen screw 14 (Figure 10);
- a chip 11, mounted on an appropriately shaped printed circuit, fixed inside the case 1 hinged on the mobile part 3 (Figures 7-7A);
- an appropriately shaped feeler 12 with elastic electrical contacts fixed on the anchoring plate 4 on the fixed side and electrically connected to a processor CPU set preferably on the fixed part PF of the back door.

OPERATION OF THE DEVICE

[0022] After the device has been mounted on the back door of the vehicle, it functions as a normal safety lock with key.

[0023] The key 2 (which preferably cannot be duplicated and is reversible) governs a rotatable cylinder 6 (preferably of the armoured, anti-effraction, type) connected to a mobile plate 9 that enables engagement (closing) to and release (opening) from the appropriately shaped mobile hook 5 provided with spring-operated return means.

[0024] In the closed configuration (Figures 3-3A), by turning the key 2, there is brought about sliding of the mobile plate 9, which, with said displacement, moves away from the hook 5 - disengaging therefrom - and enables the device to open automatically by turning about the hinge 8 as a result of the thrust spring 7.

[0025] Once open (Figures 4-4A), the key 2 can also be removed by turning it in the opposite direction, until the initial position of the cylinder 6 and hence of the mobile plate 9 is reached. As will be seen more clearly in what follows, this movement of return of the mobile plate 9 is important for subsequent closing of the device according to the invention, without the use of the key 2.

[0026] Advantageously, according to the present invention, for closing it will simply be necessary to bring the mobile side PM of the back door up to the fixed side PF and push it closed and then bring the case 1 of the device back down, getting it to turn about the hinge 8 to bring about engagement of the mobile plate 9 with the shaped hook 5, overcoming the force of contrast of the spring 7.

[0027] In this situation, in fact, the plate 9 acts on the

shaped hook 5 causing it to turn (Figures 5-5A and Figures 6-6A) until it clicks again into the position of engagement/closing (Figures 4-4A) thanks to the return spring (not illustrated) with which it is provided.

[0028] According to a peculiar characteristic of the invention, in the closing position, the electrical contact between the chip 11 and the processor CPU is closed via the feeler 12; hence, the signal sent will be that of "device closed" (Figures 7-7A).

[0029] When, instead, the safety device is released, and can thus turn about the hinge 8, the electrical contact between the chip 11 and the processor CPU is open, and the signal sent will be that of "device open" (Figure 9).

[0030] By means of this electronic control system, it is possible, through a precise communication protocol that cannot be tampered with, to send the information on the state of the lock to an external auxiliary device, which could use it potentially for a vast range of additional applications, such as, for example, monitoring dates and times of opening of the back door, geographical position in which opening or closing has occurred, etc.

[0031] In this way, it is also possible to supervise remotely the means of transport and use the device also as a true "black box" that records all the events of opening/closing of the loading compartment, sending the data to a GPRS satellite transceiver system already existing on the vehicle or one suitable for these purposes that has been installed thereon.

[0032] Also envisaged is the possibility of connection of the supply of the CPU to a backup battery via the electrical wiring system of the vehicle.

[0033] In addition to its structural strength, other advantages of the device are:

its reliability over time, due to the sturdiness of the components and to the quality of the materials used (high-strength steels and thermal treatments of surface hardening); also the cylinder used for the lock is always shielded, of the anti-effraction type with unduplicatable and reversible safety key; and its versatility due to the fact that it can be mounted on the back door and/or on the side door of the vehicle, using, however, always the same key; it is also possible to envisage, with the same functions and advantages, a "maxi" version for installation on lorries and articulated vehicles.

[0034] It should be noted that, if the loading compartment is provided with a back door with single leaf, the fixed part described so far is constituted by the part of the bodywork on which the back door closes.

Claims

1. An auxiliary device for opening and closing the loading compartment of a motor vehicle, which can be installed on the back door of the vehicle, **character-**

ized in that it comprises, in combination:

- an anchoring plate (4) installed on the fixed side (PF) of the back door, and an anchoring plate (3) installed on the mobile side (PM) of the back door;
- a case (1) that protects and completes the entire device, said case (1) being hinged to the anchoring plate (3) of the mobile side (PM) of the back door;
- an engagement and release system, constituted by:
 - a fixed plate (10) and a mobile plate (9), which is connected to a cylinder (6) that can be turned with a key (2), and a thrust spring (7) set on the case (1) on the mobile side (PM) of the back door; and
 - a shaped mobile hook (5), provided with spring-operated return means, which is mounted on the anchoring plate (4) on the fixed side (PF) of the back door;

- a removable armoured hinge (8), with system for protection against non-authorized removal, made up of a pin appropriately shaped and structured with breakable head (13) and groove for anti-removal safety Allen screw (14);
- a chip (11), which is fixed within the case (1) that is hinged on the anchoring plate (3) on the mobile side (PM) of the back door; and
- a feeler (12), which is appropriately shaped with elastic electrical contacts that are fixed on the anchoring plate (4) on the fixed side (PF) of the back door and is electrically connected to a processor (CPU) set on the fixed side (PF) of the back door or in the loading compartment;

wherein said device has the mobile part hinged on the back door and not fixed thereon, enabling the case (1) to turn; and wherein the spring-operated engagement/release system is mounted on the fixed part of the back door, and is hence fixed with respect thereto.

2. The device according to Claim 1, **characterized in that** the key (2) governs rotation of the rotatable cylinder (6) that moves the mobile plate (9) that enables engagement/closing and release/opening of the mobile hook (5), which is shaped and is provided with spring-operated return means.
3. The device according to the preceding claim, **characterized in that**, in the closed configuration, by turning the key (2), there is brought about sliding of the mobile plate (9) which, with said displacement, moves away from the hook (5), disengaging therefrom, and enables the device to open automatically

by turning about a hinge (8) as a result of the thrust spring (7).

4. The device according to the preceding claim, **characterized in that**, once the device has been opened, the key (2) can be removed by turning it in the opposite direction until the initial position of the cylinder (6), and hence of the mobile plate (9), is reached; said movement of return of the mobile plate (9) being important for subsequent closing of the device without the use of the key (2). 5
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5. The device according to the preceding claim, **characterized in that**, for closing, it is sufficient to bring the mobile side (PM) of the back door up to the fixed side (PF) and bring the device back down, getting it to turn about the hinge (8) to bring about engagement of the mobile plate (9) with the shaped hook (5), overcoming the force of contrast of the spring (7); thus obtaining that, during closing, the plate (9) acts on the shaped hook (5) causing it to turn until it clicks again into the position of engagement/closing thanks to the return spring with which it is provided. 15
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6. The device according to the preceding claim, **characterized in that**, when the device is in the closing position, an electrical contact between the chip (11) and the processor (CPU) is closed, thus signalling the state of "device closed". 25
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7. The device according to Claim 5 or Claim 6, **characterized in that**, when the device is released and can thus turn about the hinge (8), an electrical contact between the chip (11) and the processor (CPU) is open, thus signalling the state of "device open". 35

8. The device according to Claims 6 and 7, **characterized in that**, by means of the aforesaid "device open"/"device closed" signals it is possible, through a precise communication protocol that cannot be tampered with, to check at every moment whether the device is open or closed, as well as to send the information on the state of the lock to an external auxiliary device, such as, for example, a GPRS satellite locator, which could use said information, for example, for monitoring the dates and times of opening of the back door, and the geographical position in which opening or closing has occurred. 40
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9. The device according to the preceding claim, **characterized in that** it envisages data-transmission means for remote surveillance of the vehicle and for recording all the events of opening/closing of the loading compartment. 50
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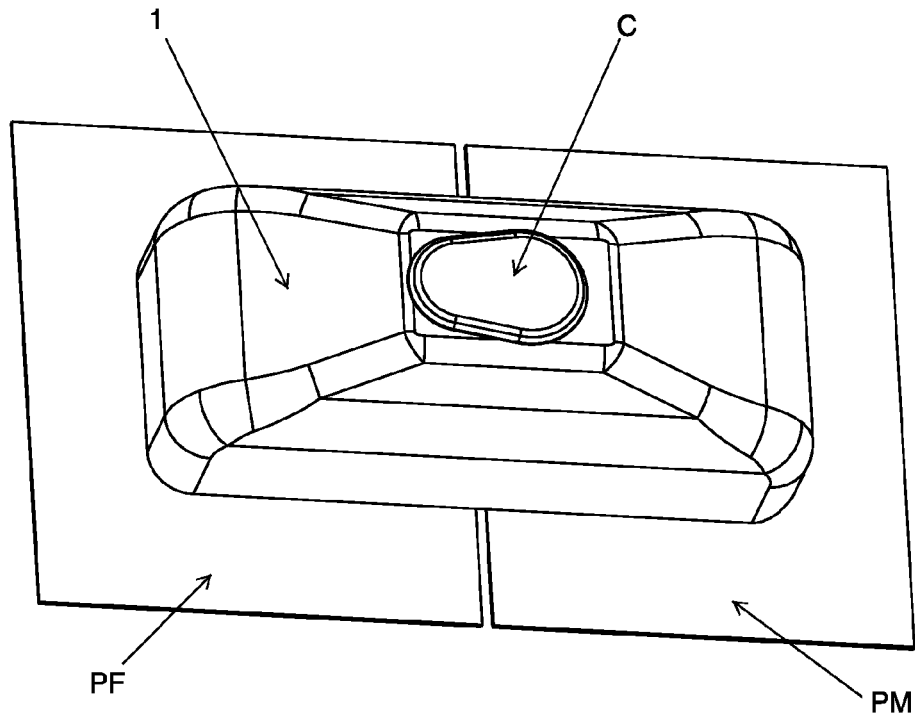


FIG.1

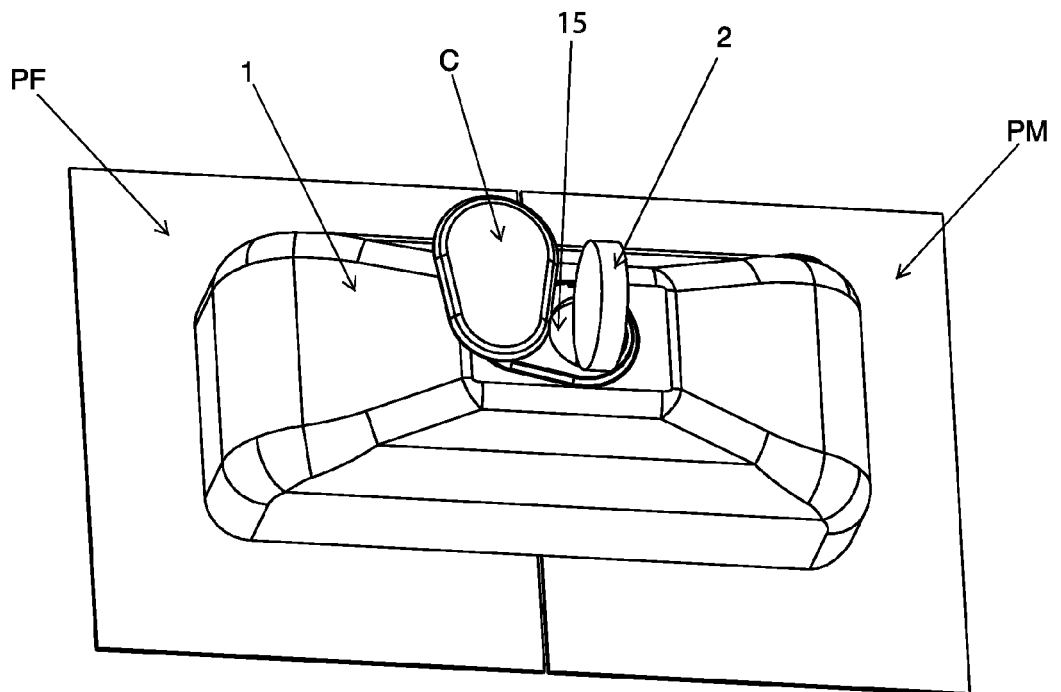


FIG.1A

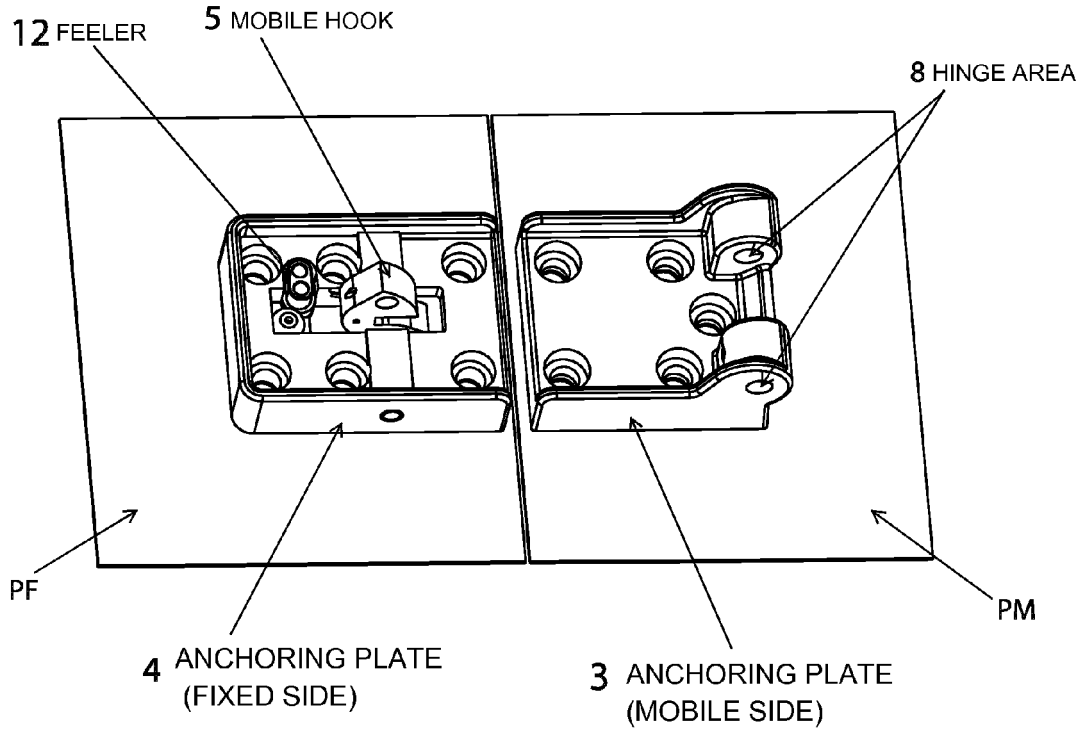


FIG. 2

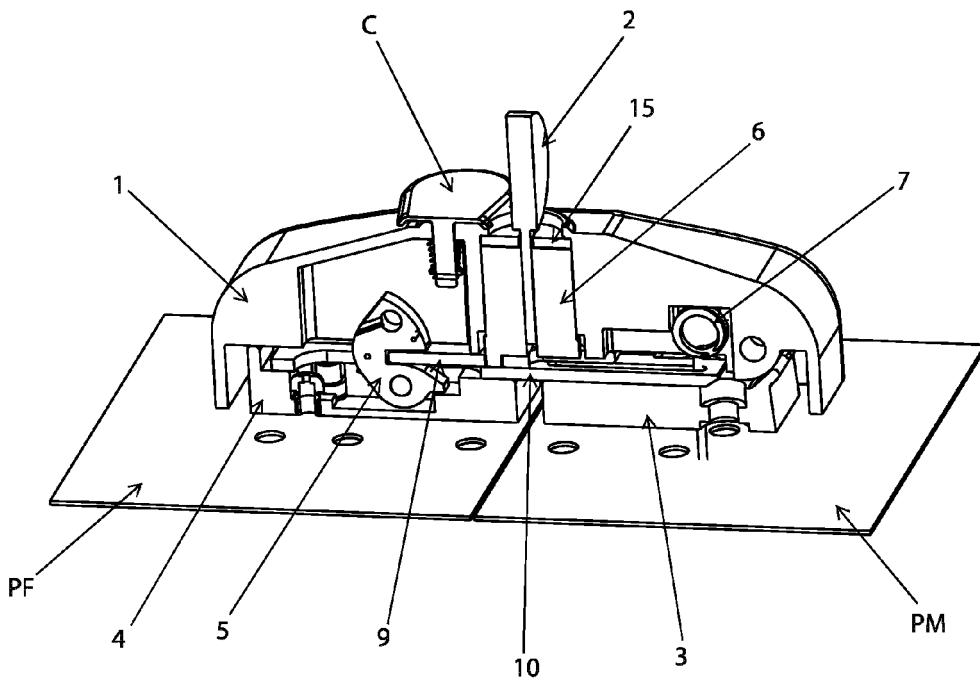


FIG. 3

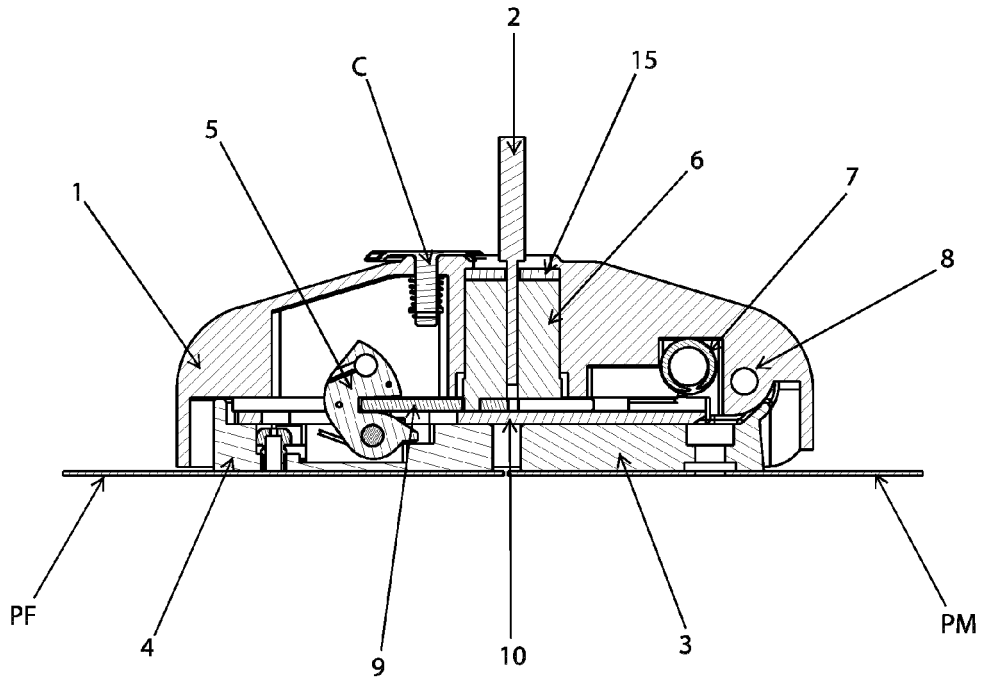


FIG.3A

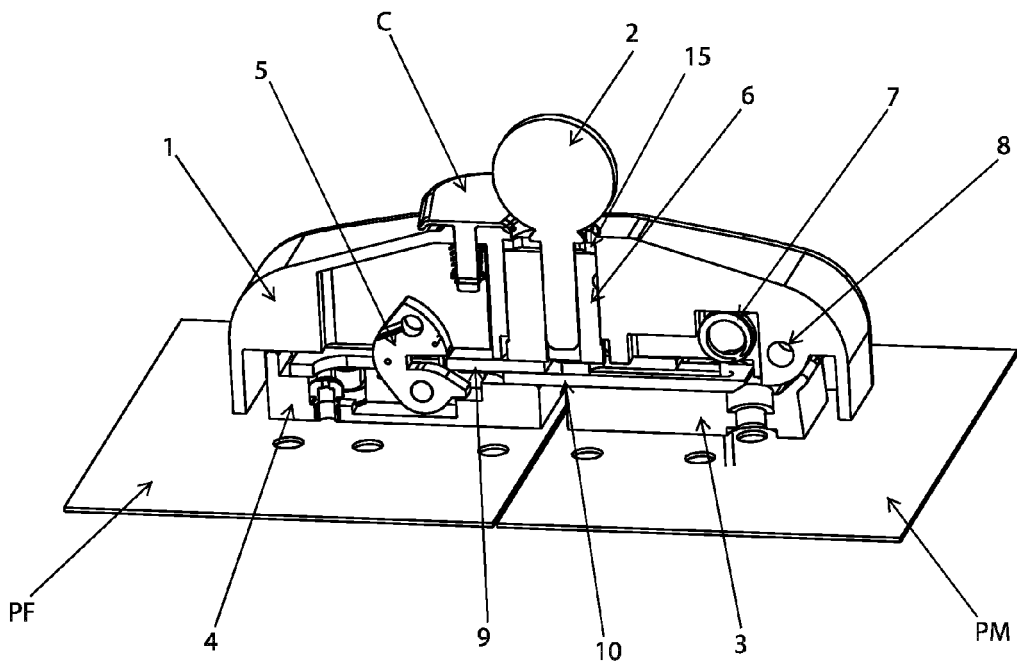


FIG.3B

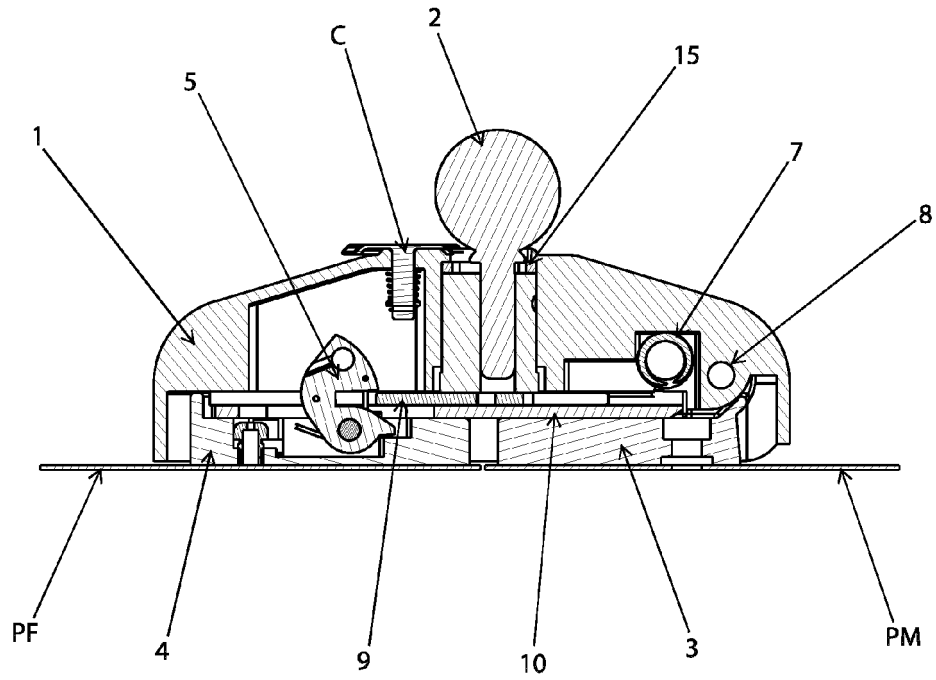


FIG.3C

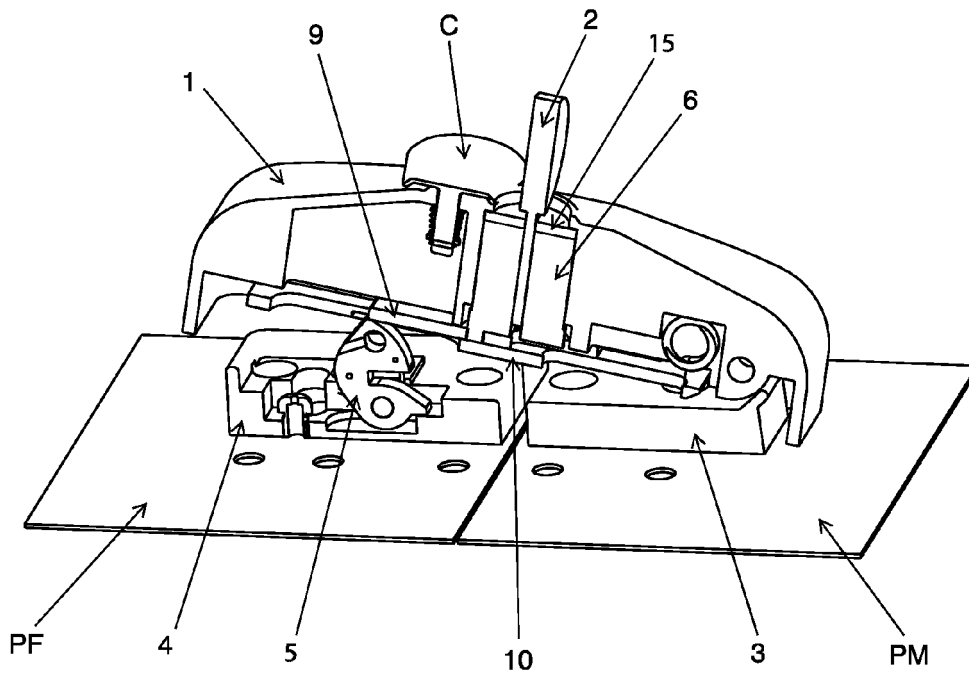


FIG.4



FIG.4A

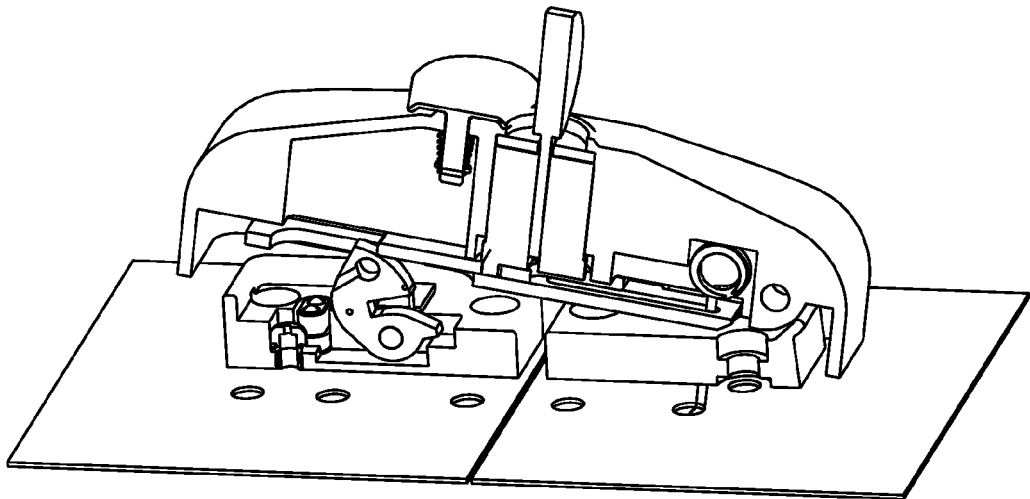


FIG.5

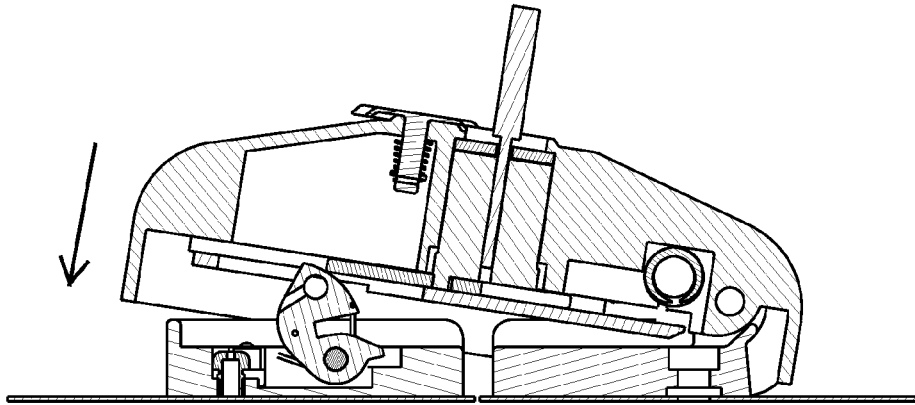


FIG.5A

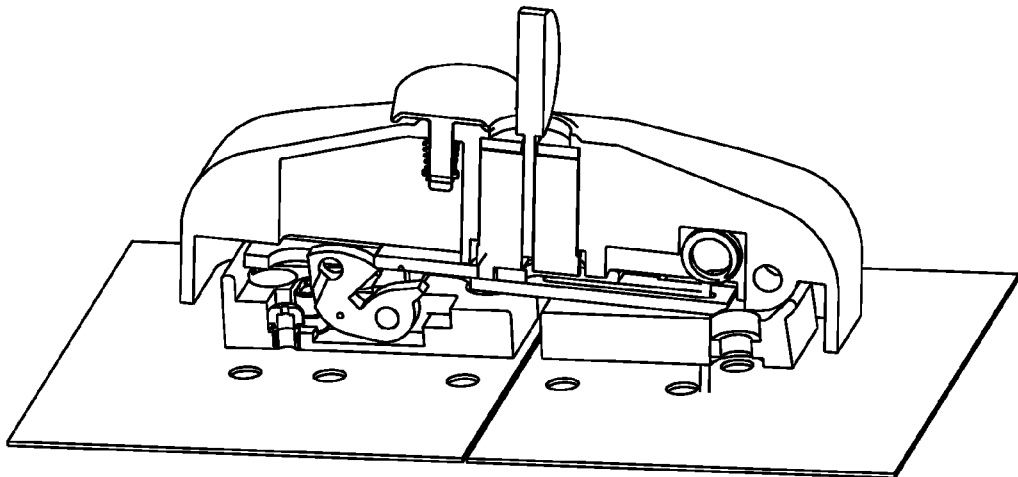


FIG.6

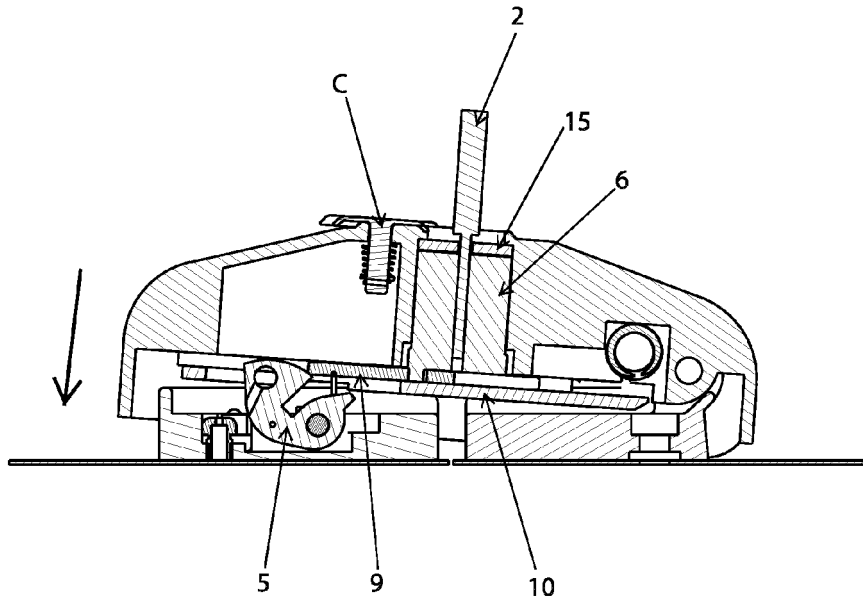


FIG.6A

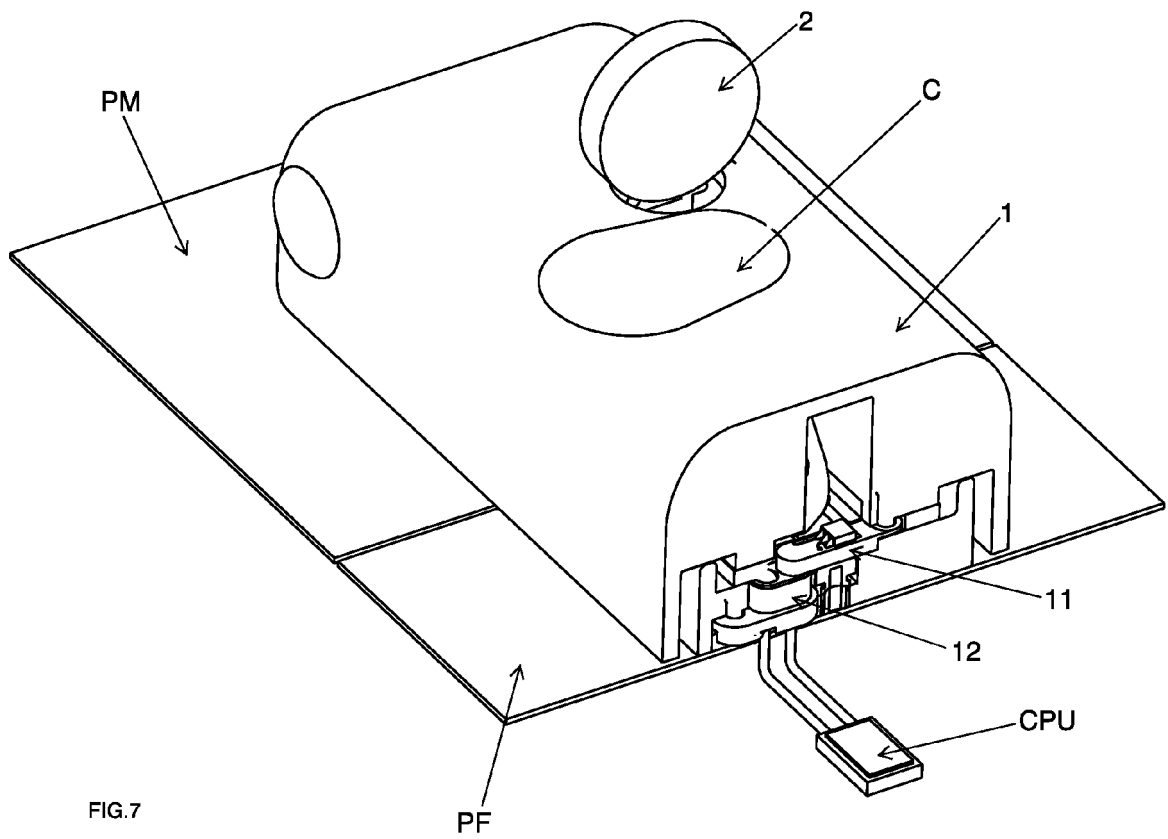


FIG.7

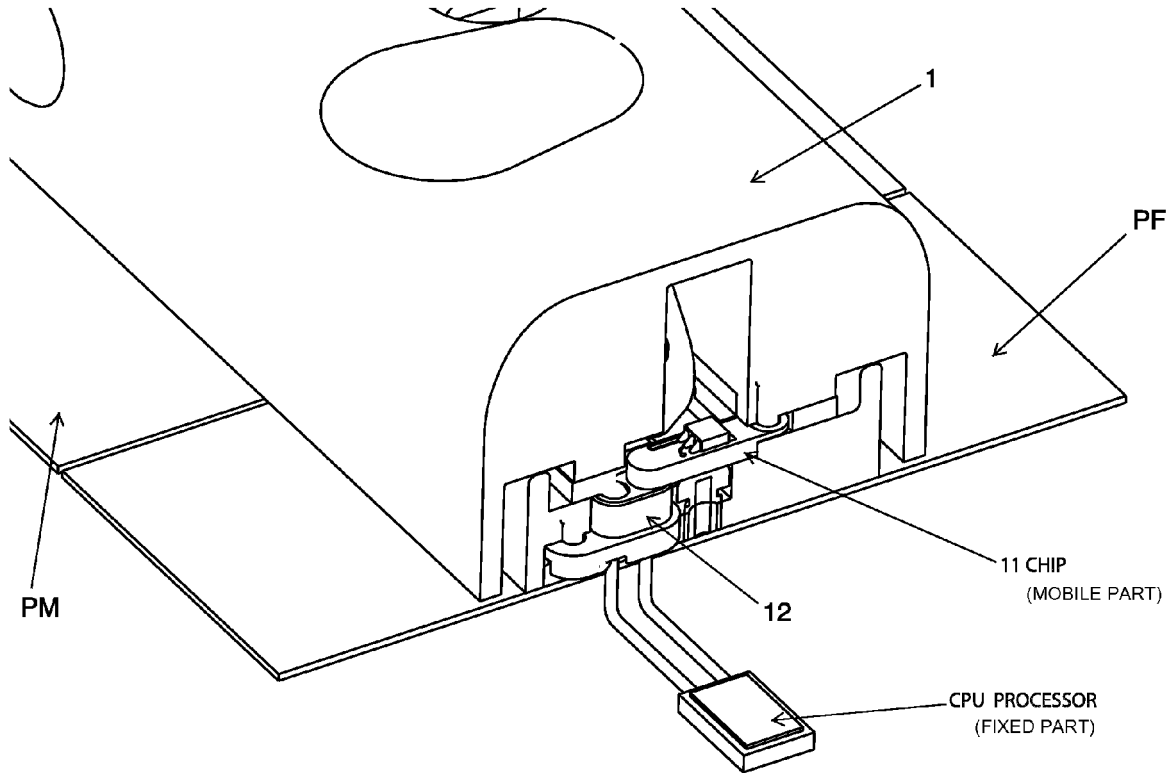


FIG.7A

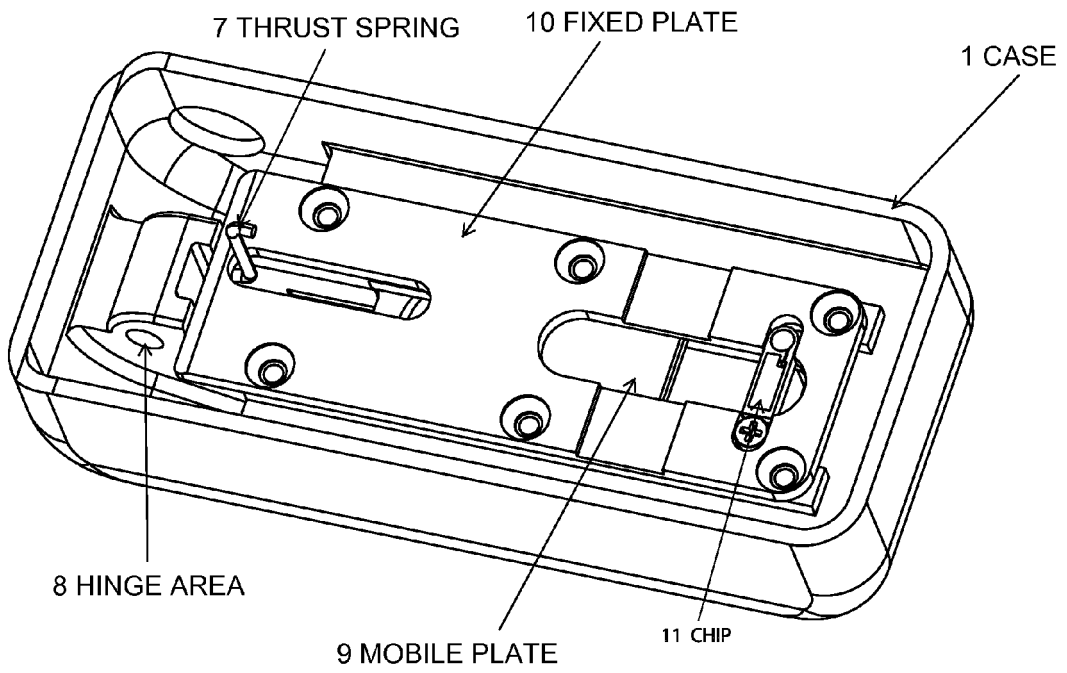


FIG.8

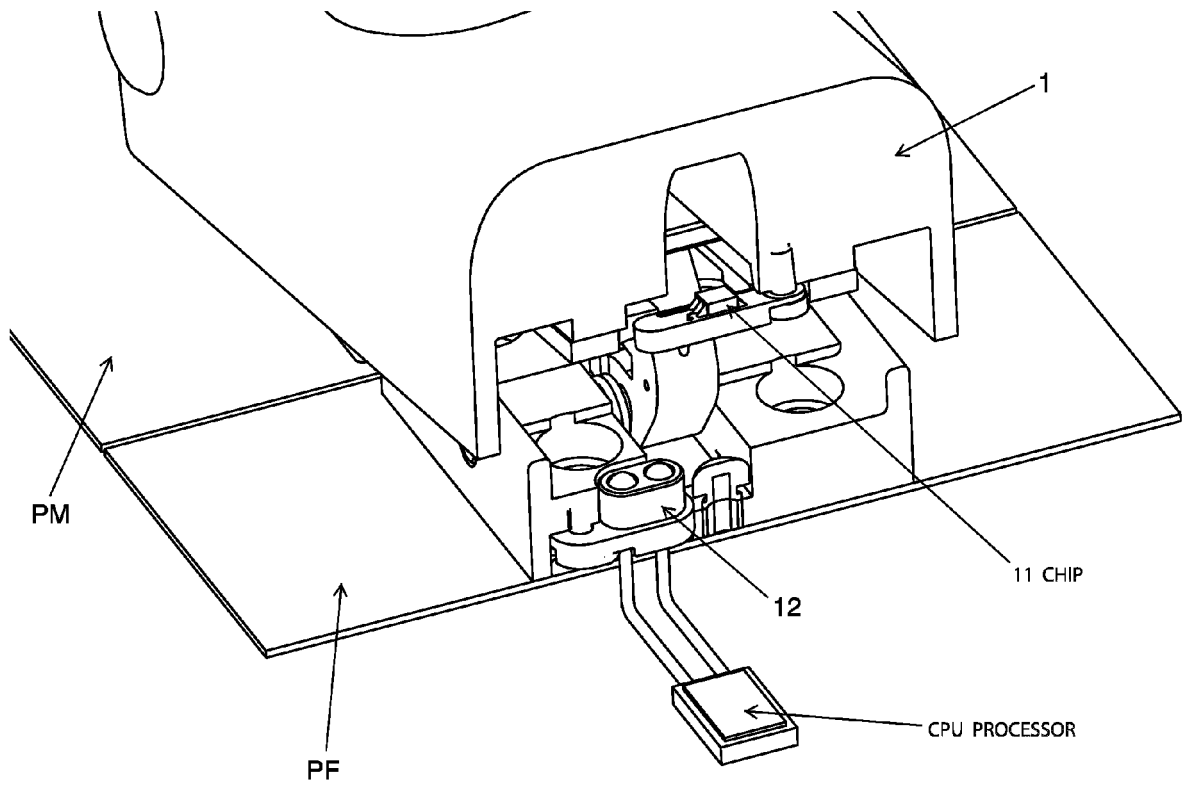


FIG. 9

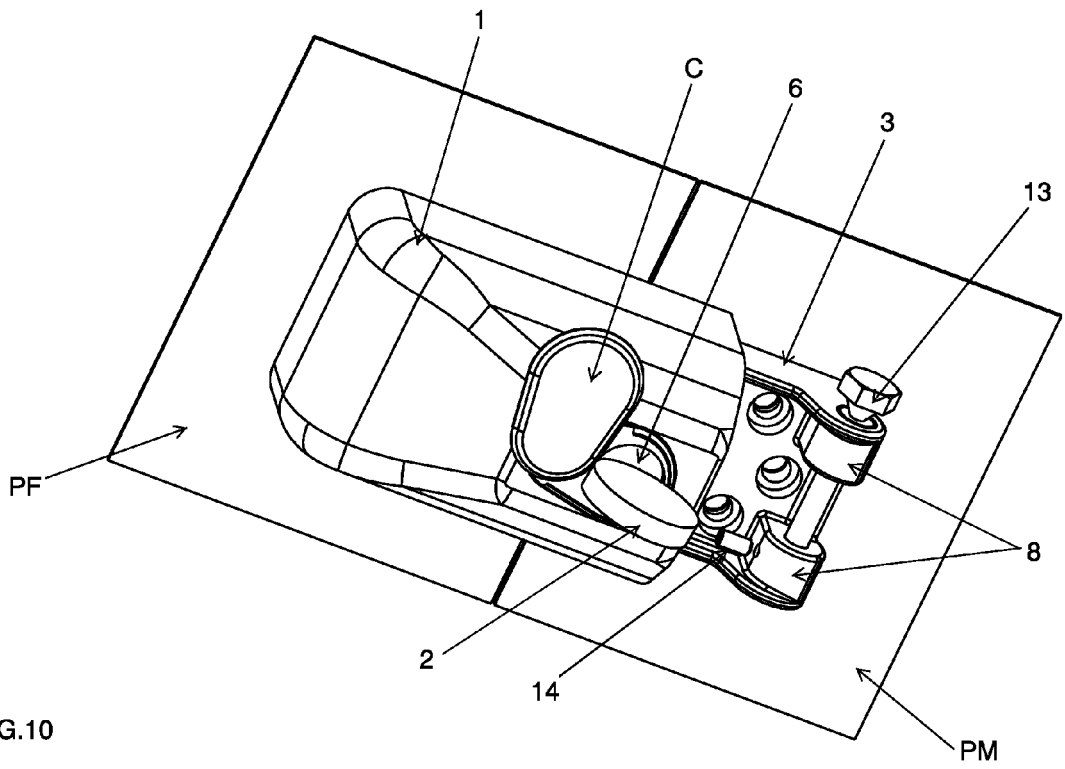


FIG. 10



EUROPEAN SEARCH REPORT

Application Number
EP 15 18 4808

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* page 4, line 17 - page 5, line 9 * * page 6, line 18 - line 32 * * figures 1-4 *	2-9	
X	----- US 2004/069023 A1 (MASSETH JAMES E [US] ET AL MASSETH JR JAMES E [US] ET AL) 15 April 2004 (2004-04-15)	1	
A	* paragraph [0016] - paragraph [0021] * * figures 1-4 *	2-9	TECHNICAL FIELDS SEARCHED (IPC) E05B E05C
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	* column 2 - column 3 * * figures 1-7 * -----		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 8 December 2015	Examiner Antonov, Ventseslav
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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