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(54) An electrical safety lock, particularly suitable for miniaturization

(57) This invention relates to a lock, which is operated by an electronic device controlling a mechanical part, whereby the lock operates according to the principle that the striker (11) on the door (3) of the box engages the rocking lever (8) integral with the body of the box; between the hook (11a) on the striker and the dog iron (8a) on the rocking lever there is a negative angle, preferably between approx. 1° and 10°, while between the door and the body of the box there is a certain clearance, closing which, for example by applying a slight pressure on the door and contemporaneously activating the electronic opening device, it is possible to disengage the striker and the rocking lever and, therefore, to open the door.

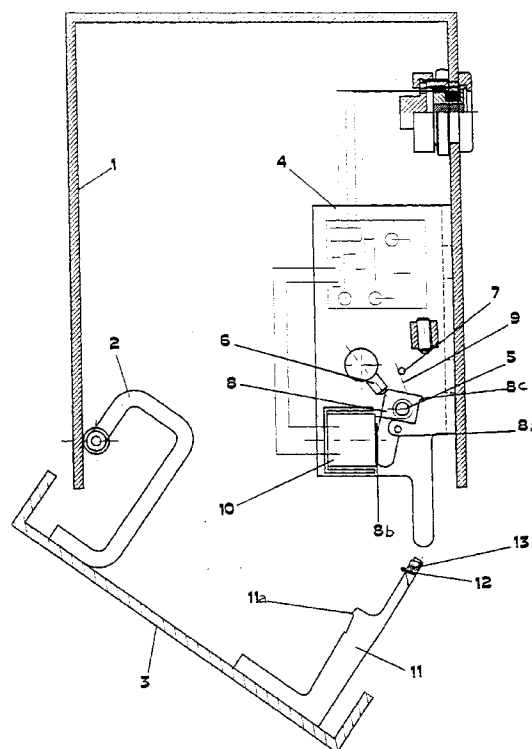


FIG 2

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## Description

### TECHNICAL FIELD

This invention relates to a safety lock which is particularly suitable for being miniaturized and adapted, for example, to payphones accepting and collecting coins in a box.

### BACKGROUND OF THE ART

These payphone boxes are currently provided with mechanical locks which may easily be picked, since they are opened by cap keys, and because they are exposed to atmospheric agents, they are often subject to discontinuous operation and may remain blocked, so that the authorized personnel cannot open them.

### DISCLOSURE OF INVENTION

This invention relates to a lock, which is operated by an electronic device controlling a mechanical part, whereby the lock operates according to the principle that the striker on the door of the box engages the rocking lever integral with the body of the box; between the hook on the striker and the dog iron on the rocking lever there is a negative angle, preferably between approx. 1° and 10°, while between the door and the body of the box there is a certain clearance, closing which, for example by applying a slight pressure on the door and contemporaneously activating the electronic opening device, it is possible to disengage the striker and the rocking lever and, therefore, to open the door. Furthermore, the lock has been designed to be opened by means of an electronic device, which controls the mechanical part, only after the recognition of a user code entered on the lock itself, by means of an electromagnet or the like, which attracts the rocking lever, making it rotate around a pivot and thus disengaging it, said electronic device being one of the subjects of the patent application RM 96 A/000829 filed by the same applicant.

The electronic safety lock contemplated and described hereunder is essentially composed of the following:

- a) a striker, consisting of a parallelepiped integral with the door and shaped for about 3/4 of its length in the form of a hook, continuing further down with a width of about half the upper part and terminating with a resetting tooth, provided with elastic means to bring it home.
- b) A rocking lever, which rotates around a pivot which is integral with the body, and is provided with an extension shaped like a hook and placed on the same side of, but not in axis with, the hook, and provided with a tooth whose length and position is such as to enable it to come into contact with the tooth on the striker; the rocking lever and its support are

provided with springs and a reaction pin for engaging the rocking lever and the striker, in the closed-lock position, the rocking lever being kept in the open position by means of suitable elastic means.

c) An electromagnet capable of attracting the rocking lever in the open-lock position, when a transmitter, activated by the user, sends the codes to a receiver, which, after having checked their correspondence with the safety codes, activates the electromagnet.

As mentioned above, a characteristic of the mechanical part of the lock is that, when it is closed, the angle formed by the rocking lever hook and the striker hook is negative by about 1° to about 10°, thus engaging the two hooks in a virtually inviolable position.

The lock may be opened only after the electromagnet has received the necessary energy to attract the rocking lever and only if the user, by pressing the door, closes the minimum clearance of several millimetres (between approx. 0.2 and 0.8) between the body and the door, thus allowing the rocking lever hook to disengage itself from the striker hook and to rotate, until stopped in the open-lock position by the specific elastic means.

A further characteristic of the lock is the miniaturized power feeder, which is very effective, especially thanks to the external ring featuring a slot of several millimetres and which is very small so as to reduce the dispersion of energy and improve the performance of the device.

### A BRIEF DESCRIPTION OF THE DRAWINGS

A specific embodiment of the invention will now be described by way of example, with reference to the accompanying drawing, in which:

Fig. 1 shows a view from above of the plan of the lock.

Fig. 2 shows a view from above of the lock featured in fig. 1, in the open position.

Figs. 3 to 7 show a plan of the engagement details and of the resetting tooth in the various positions, from closed to open.

### DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Having regard to the above figures, the electronic safety lock is shown mounted on a box, or the like, but it may also be installed on any kind of door.

The striker 11, fastened by means of screws or the like, on the door 3 hinged to the body 1, by means of the hinge 2, consists of an elongated element, substantially shaped like a parallelepiped, on whose internal face, for about 3/4 of its length, there is a hook 11a, after which the striker continues with a reduced width to the end, where there is a resetting tooth 12, which may clearly

be seen in the detail shown in Fig. 3, hinged in 13 and provided with a spring 14, which always positions it at 45° to the horizontal axis of the striker.

To the body 1 is fastened, by means of a base 4, with screws or the like, the set comprising the rocking lever 8, an electromagnet 10, and electronic opening components.

The rocking lever 8 rotates around a pivot 5 and presents a spike 8a, which departs from a substantially rectangular body pivoted in 5 and provided with a spring coaxial with the pivot 5, kept in a loaded position by the reaction pin 7.

An electromagnet 10 attracts the rocking lever, which features a metal plate 8b on the face toward the electromagnet, thus making it rotate. This movement occurs when the user, by means of an electronic device which is the subject of a previous patent by the same inventor, by means of an infrared transmitter sends energy and certain predetermined codes to an infrared receiver, which checks the correspondence between the received code and the set code and powers the electromagnet 10, which thus attracts the rocking lever 8.

The negative angle between the spike 8a of the rocking lever 8 and the hook 11a of the striker allows the opening of the lock, after the activation of the electromagnet, only if the clearance of a few millimetres between the door and the body has been suitably closed, so that the hook 11a of the striker 11 moves inward, thus disengaging the spike 8a of the rocking lever 8. This negative angle absolutely prevents the lock from being forced or picked since, when the electromagnet is not activated, the more the door is pulled outward, by means of a crowbar or other such instrument, the stronger becomes the engagement between the spike 8a of the rocking lever 8 and the hook 11a of the striker.

When the rocking lever 8 is attracted by the electromagnet 10, and after the door has been opened and kept in an open position, by rotating it by a few degrees compared to the longitudinal axis of the striker, by means of suitable elastic means, such as, for example, a presser 6, which exercises a certain force on the face of the rocking lever keeping it in the open-lock position (figs. 3 and 5). When the door 3 is closed, the resetting tooth 12, located at the end of the resetting device 13 engages the tooth 8c, located on the end of the face parallel to the striker 11 of the rocking lever 8, determining the rotation of the rocking lever 8, which moves from the angled open-lock position, toward the opposite side of the striker 11, to the closed-lock position, parallel to the longitudinal axis of the striker 11, while at the same time engaging the spike 8a of the rocking lever with the hook 11a of the striker and locking the door with absolute safety.

It is obvious from the above description that, in order for the lock to work in the best possible manner, the settings of the position of the striker 11 and of the base 4 supporting the rocking lever 8 must be as accurate as possible and a certain clearance must be provided for

between the door 3 and the body 1.

The above describes the preferred embodiment of this invention, which may obviously be modified, as long as the following claims are complied with.

### Claims

1. An electronic safety lock, particularly suitable to be miniaturized, comprising: a striker 11 integral with the door; a rocking lever 8 pivoted to a support integral with the body; springs and reaction pins capable of returning the rocking lever to the hooked position; an electromagnet 10 capable of attracting the rocking lever; a code transmitter and receiver for activating the electromagnet; wherein the lock is operated by means of an electronic device controlling a mechanical part, the lock being closed because the striker 11 on the door 3 engages with the rocking lever 8 integral with the body 1; there being a negative angle of between approx. 1° and 10°, between the hook 11a on the striker and the spike 8a on the rocking lever 8, and there also being a certain clearance between the door and the box, closing which, for example, by applying a slight pressure to the door, it is possible to activate the electronic opening device, which causes the disengagement of the striker 11 and the rocking lever 8 and the consequent opening of the door.
2. An electronic lock as claimed in claim 1, wherein the striker 11, fastened by means of screws or the like, on the door 3 hinged to the body 1, by means of the hinge 2, consists of an elongated element, substantially shaped like a parallelepiped, on whose internal face, for about 3/4 of its length, there is a hook 11a, after which the striker continues with a reduced width to the end, where there is a resetting tooth 12, hinged in 13 and provided with a spring 14, which always positions it at 45° to the horizontal axis of the striker.
3. A safety lock as claimed in the preceding claims, wherein the body 1 is fastened, by means of a base 4, with screws or the like, the set comprising the rocking lever 8, an electromagnet 10, and electronic opening components.
4. A safety lock as claimed in the preceding claims, wherein the rocking lever 8 freely rotates around a pivot 5 and featuring a spike 8a, departing from a substantially rectangular body pivoted in 5, provided with a spring 9, coaxial with the pivot 5, and held in a loaded position by the reaction pin 7.
5. A safety lock as claimed in the preceding claims, wherein the electromagnet 10 attracts the rocking lever 8, provided on the face toward the electromag-

net with a metal plate 8b, causing it to rotate around the pivot.

6. A safety lock as claimed in the preceding claims, wherein the rotation of the rocking lever 8, to enable the opening of the door, takes place when the user, by means of an electronic device where an infrared transmitter sends energy and certain predetermined codes to an infrared receiver which, after having checked the correspondence between the codes, powers the electromagnet 10. 5 10
7. A safety lock as claimed in the preceding claims, wherein the negative angle between the spike 8a of the rocking lever 8 and the hook 11a of the striker opens the lock, after the activation of the electromagnet, only if the clearance of several millimetres between the body and the door is closed, so that the hook 11a of the striker 11 is pushed inwards and may disengage the spike 8a of the rocking lever 8. 15 20
8. A safety lock as claimed in the preceding claims, wherein the rocking lever 8, when attracted by the electromagnet 10, and after the door has been opened, is kept in an open-lock position, rotated by several degrees compared to the longitudinal axis of the striker, by elastic means, preferably a presser 7 on the edge of the rocking lever which, when this reaches the open-lock position, keeps it in that position pressing on the side of the rocking lever. 25 30
9. A safety lock as claimed in the preceding claims, wherein during the closing of the door 3, the resetting tooth 12 on the end of the resetting device 13 engages the tooth 8c on the rocking lever 8 on the terminal part of the face parallel to the striker 11, causing the rotation of the rocking lever 8, which goes from the position of angled opening toward the opposite side of the striker 11 to the closed position parallel to the longitudinal axis of the striker 11, while engaging the spike 8a of the rocking lever 8 with the hook 11a of the striker and closing the door. 35 40

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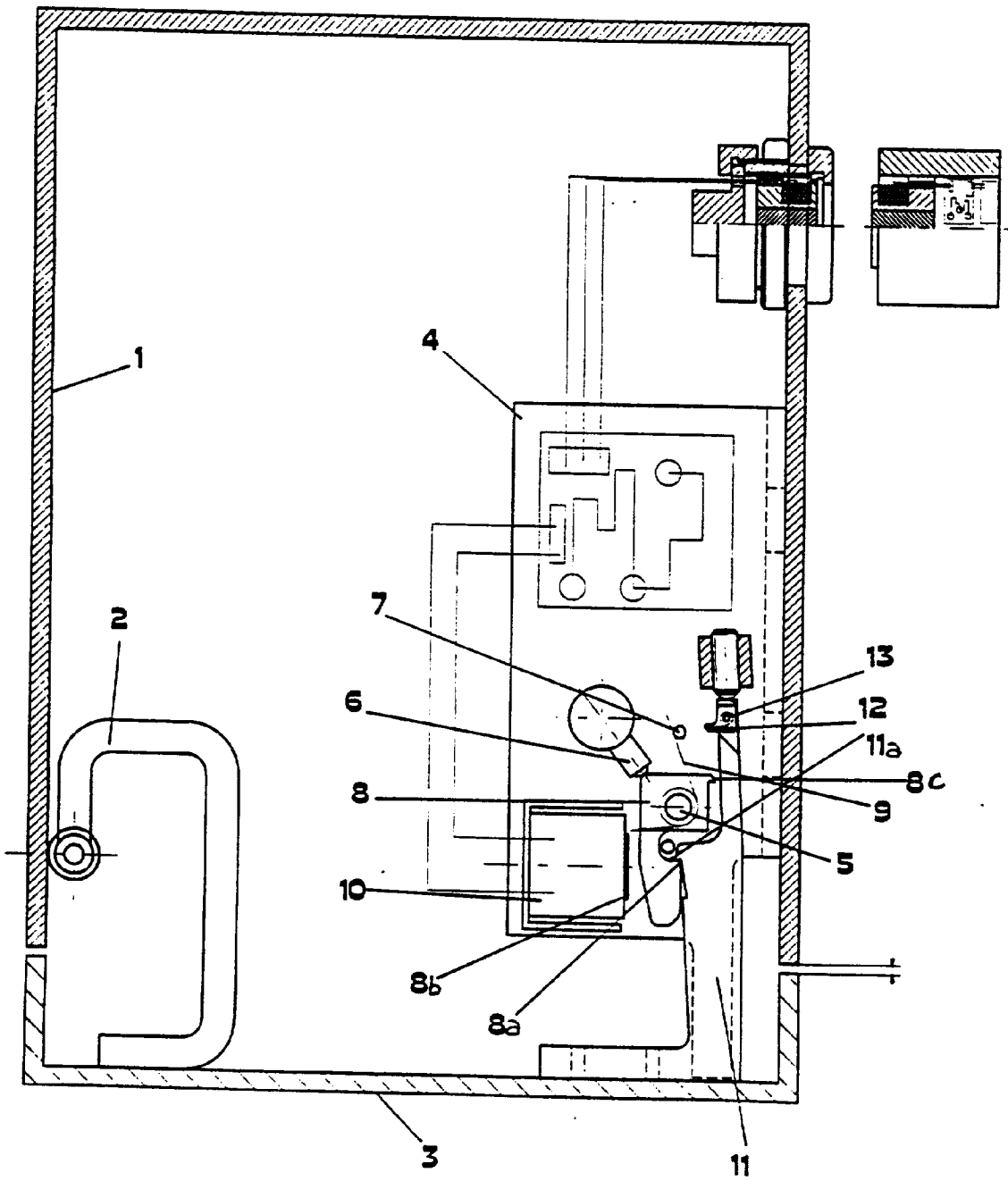


FIG 1

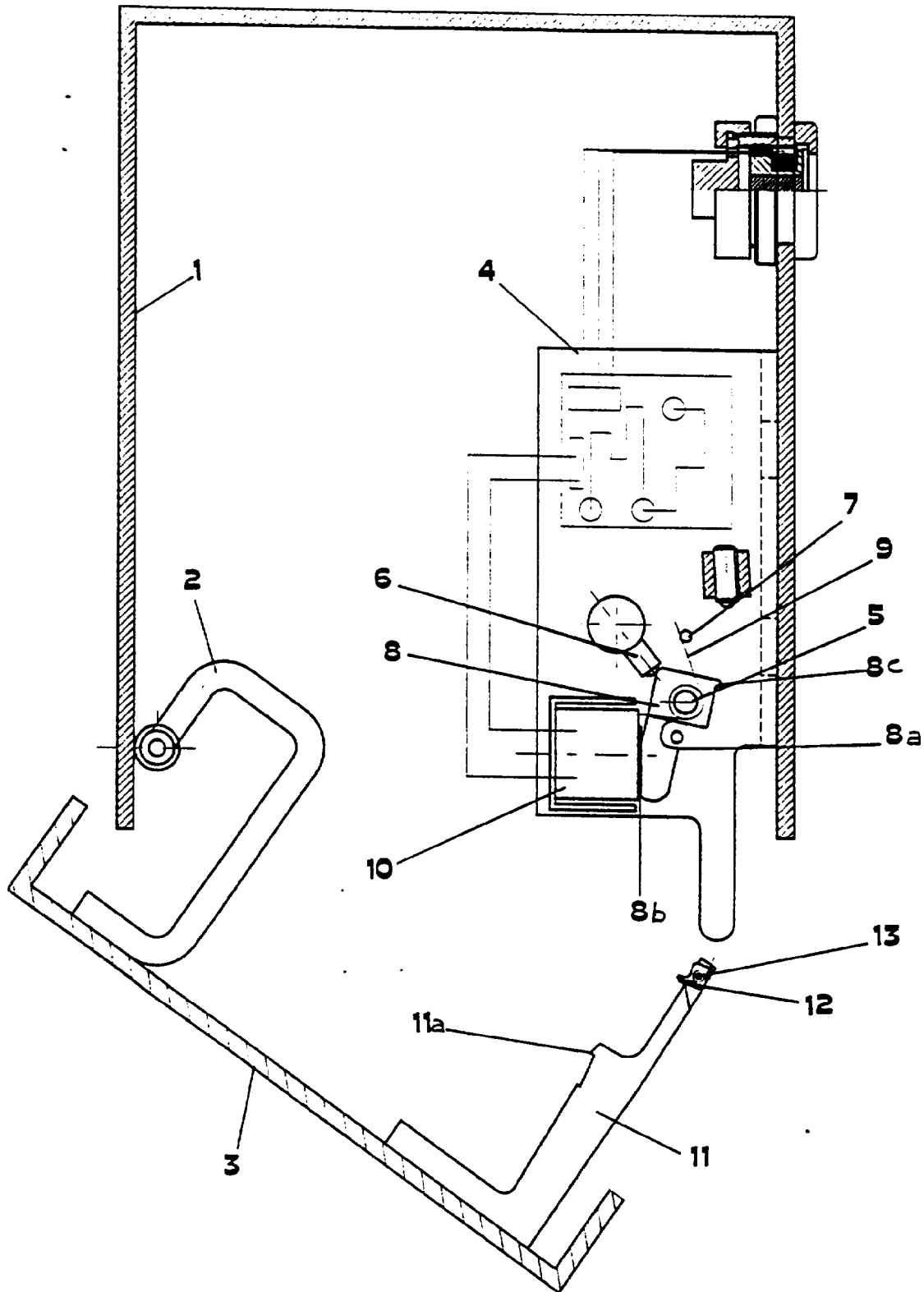
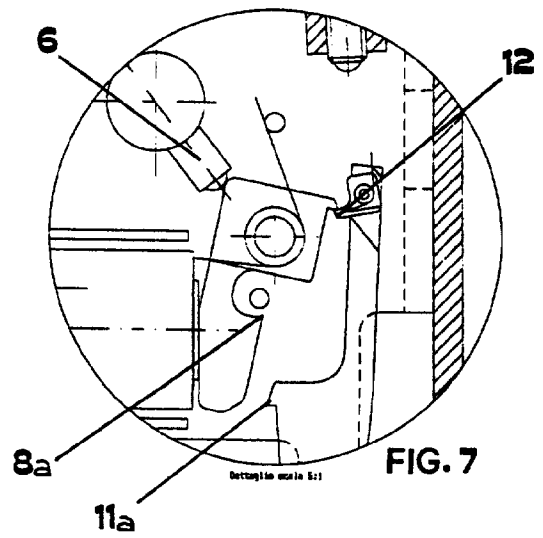
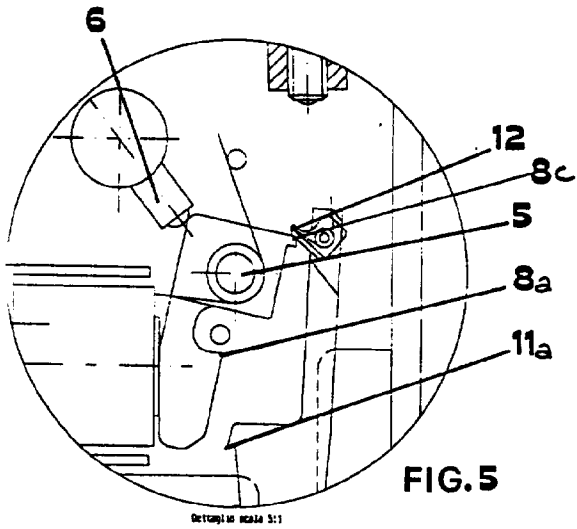
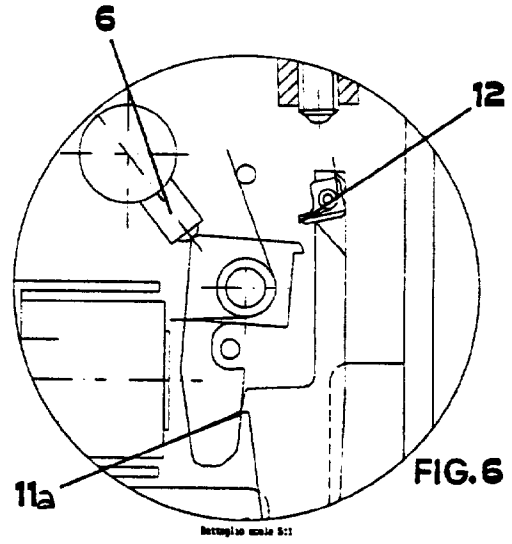
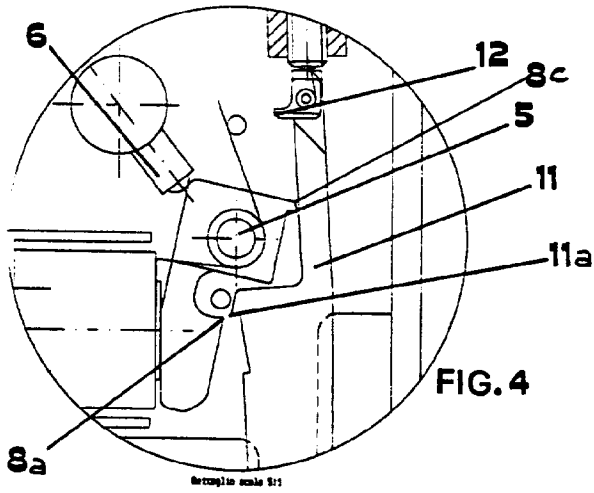
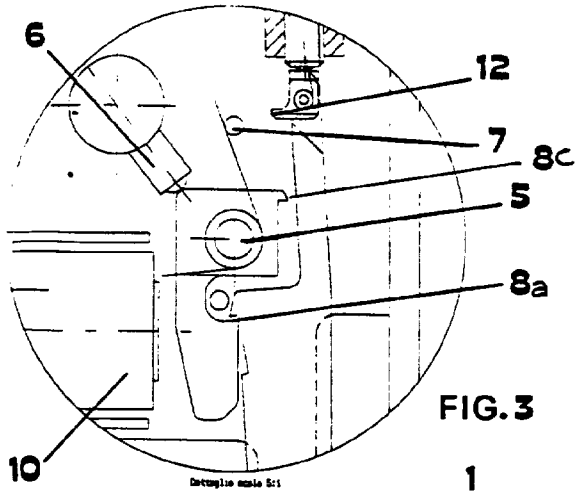


FIG 2





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EUROPEAN SEARCH REPORT

Application Number  
EP 98 83 0452

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	WO 84 01180 A (LEVINE) 29 March 1984 * page 5, line 14 - page 8, line 8; figures 1-4 *	1-4	E05B47/02
A	WO 97 16614 A (LANIGAN, MIRABELLA, CHALKO) 9 May 1997 * page 4, line 21 - page 9, line 10; figures 1-6 *	1,3-7	
A	WO 94 27260 A (VAN DALFSEN) 24 November 1994 * page 9, line 21 - page 10, line 10; figure 4 *	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E05B
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>30 October 1998</b>	Examiner <b>Herbelet, J.C.</b>
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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