

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

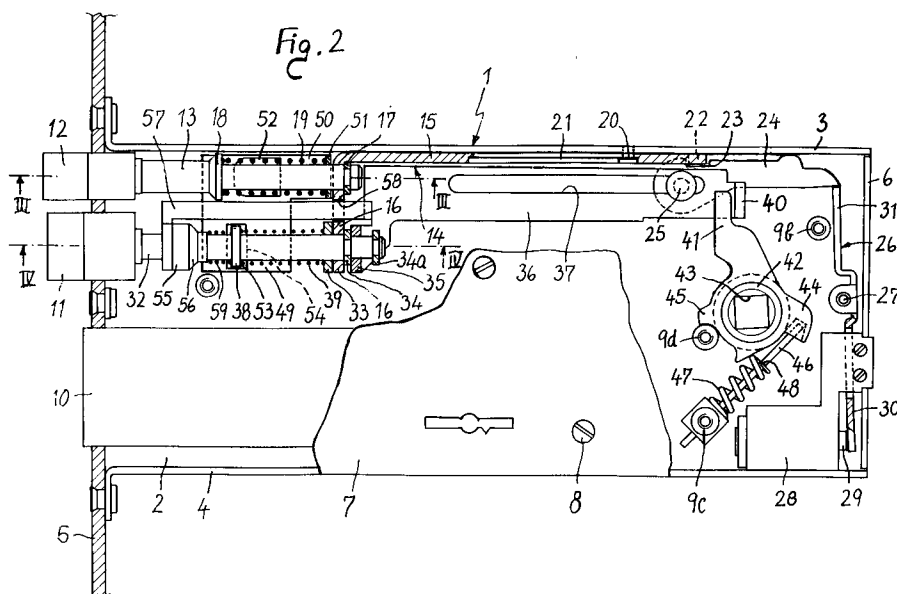
0 566 881 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **93104731.0**(51) Int. Cl.⁵: **E05B 47/06**(22) Date of filing: **23.03.93**(30) Priority: **24.03.92 IT BO920057 U****I-48018 Faenza (Ravenna)(IT)**(43) Date of publication of application:
27.10.93 Bulletin 93/43(72) Inventor: **Errani, Deo**
Via Cavour 46
I-48018 Faenza (Ravenna)(IT)(84) Designated Contracting States:
ES GB(71) Applicant: **C.I.S.A. Costruzioni Italiane**
Serrature Affini S.p.A.
Via Oberdan, 42(74) Representative: **Modiano, Guido, Dr.-Ing. et al**
Modiano & Associati S.r.l.
Via Meravigli 16
I-20123 Milan (IT)(54) **Device for preventing the unlawful opening of an electric lock.**

(57) Device for preventing unlawful opening of an electric lock comprising a spring latch (11), a reloading piston (12), an element (14) which is guided parallel to said spring latch (11) and said reloading piston (12) and can be blocked by a ratchet system (22-26) controlled by an electromagnet (28); and a blocking element (49) for the spring latch (11) which is mounted on the reloading piston (12) and oscillates between a position which blocks the sliding of the spring latch (11) and a position in which free

sliding of the spring latch (11) is allowed; spring means are provided which retain the element (49) in blocking position when the spring latch (11) protrudes from the lock and the piston (12) is inside the lock; cam means (18) are arranged on the reloading piston (12) and allow the movement of the element (49) into the blocking position when the reloading piston (12) is inside the lock for abutting against the doorjamb.

**EP 0 566 881 A1**

The present invention relates to a device for preventing the unlawful opening of an electric lock.

As is known, electric locks are provided with a spring latch and a reloading piston which is elastically coupled to an element which can slide inside the lock by means of a spring and can be blocked by means of a ratchet system actuated by an electromagnet.

In the door closure position, the piston abuts against the doorjamb and the spring remains compressed. By actuating the electromagnet, the ratchet system is released and the spring acts on the sliding element which, in its movement, pulls back the spring latch to which it is connected inside the casing, so as to allow to open the door.

In one kind of electric lock, which is the subject of a copending Italian patent application BO 92A 000106 by the same Applicant, and is entitled "Electric lock provided with opening handle acting directly on the spring latch", in the door closure position the spring latch is kept elastically engaged in the selvage, so that it can be moved inside the lock when acting unlawfully with a forcing tool inserted between the doorjamb and the front edge of the door.

The technical aim of the present invention is to provide a device which can block any movement of the spring latch of electric locks in the door closure position.

This aim is achieved with a device for preventing the unlawful opening of an electric lock comprising: a casing provided with a front wall; a spring latch and a reloading piston which are guided in openings of said front wall at right angles thereto; an element which is slidably guided in said casing parallel to said spring latch and said reloading piston and can be blocked by a ratchet system controlled by an electromagnet; said reloading piston having a stem which is elastically connected to said sliding element; said spring latch having a stem which is guided in said sliding element and is provided with engagement means for said sliding element suitable to allow said sliding element to pull the spring latch into the casing during the opening step; a spring which acts on a collar of the spring latch in the direction in which said spring latch protrudes from the front wall of the casing; characterized in that it comprises a spring latch blocking element mounted on said reloading piston and oscillating between a position which blocks the sliding of the spring latch and a position in which the spring latch slides freely; further comprising spring means, which retain said element in blocking position when the spring latch protrudes from the casing and the piston is inside the casing, and cam means, which are arranged on said reloading piston and allow the movement of said element into said blocking position when the reloading piston is

inside the casing when abutment against the doorjamb occurs.

Further advantages of this invention will become apparent from the description of a preferred non-exclusive embodiment of the device, illustrated by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a view of an electric lock of the type provided with an opening handle which acts directly on the spring latch, on which the device according to the present invention can be applied;

figure 2 is a view of said lock, provided with the device according to the present invention;

figure 3 is a sectional view taken along the plane III-III of figure 2;

figures 4 and 5 are two sectional views, taken along the plane IV-IV of figure 2, corresponding to two operational situations of the device.

With reference to the above figures, the reference numeral 1 generally designates the casing of the lock, which comprises a back wall 2 around which a peripheral wall extends; said peripheral wall is composed of an upper wall 3, a lower wall 4, a front wall 5 and a rear wall 6. The reference numeral 7 designates the cover for closing the casing, which is fixed by means of screws 8 which engage in threaded bushes 9a, 9b, 9c and 9d rigidly coupled to the back wall 2.

Three openings are defined in the front wall 5, through which the bolt 10, the spring latch 11 and the reloading piston 12 protrude outside the casing.

The reloading piston 12 has a cylindrical stem 13, one end of which engages a sliding element 14, hereinafter termed slider. Said slider 14 is constituted by an L-shaped strip having a portion 15 adjacent to the upper wall 3 and the other portion 16 normal to said wall 3.

The end of the stem 13 is guided into a hole of the portion 16 and is provided with a ring 17 for abutting on the portion 16, acting as shoulder. A collar 18 is defined on the stem 13 and acts as rest for an end of a spring 19 fitted on the stem 13; the opposite end of said spring 19 abuts against the portion 16 of the slider 14.

An elastic connection is thus provided between the piston 12 and the slider 16; by virtue of this connection, the spring 19 keeps the portion 16 in abutment against the ring 17, nonetheless allowing the stem 13 to move with respect to the portion 16 in contrast with the action of the spring 19.

The portion 15 of the slider is guided along the wall 3 of the casing by a pin 20 which slides in a slot 21 of the portion 15; the portion 15 is furthermore provided, at the end of the edge adjacent to the back wall 2, with a tooth 22 sliding on the back wall 2.

The tooth 22 is suitable to engage a notch 23 defined on the edge of a pawl 24 which is articulated about a pivot 25 which protrudes from the back wall 2. The pawl 24 can oscillate between a position which blocks the slider 14, which occurs when the tooth 22 engages the notch 23 (a position shown in the figure), and a position for releasing the slider 14, which occurs when the pawl 24 is turned by an angle whereat the tooth 22 disengages the notch 23 to allow the portion 15 to slide toward the rear wall 6.

The pawl 24 is retained in blocking position by a lever 26 pivoted in a rocker-like manner on a pivot 27 and subjected to the action of an electromagnet 28 installed in the casing 1. The electromagnet 28 is provided with a core 29 which is actuated outwards by an internal spring, so that it is in contact with the lower arm 30 of the lever 26. When the electromagnet 28 is not energized, the core 29 acts, by virtue of the internal spring, on the lower arm 30 of the lever 26, so as to make the upper arm 31 oscillate into abutment against the bush 9b in the position for retaining the pawl 24. Vice versa, when the electromagnet 28 is energized, the lever 26 turns in the other direction, allowing the pawl 24 to oscillate downwards until it abuts against the bush 9b; in this condition, the tooth 22 is disengaged from the notch 23.

The spring latch 11 is also provided with a stem 32 which is parallel to the stem 13 and guided through a plate 33 which is blocked between the back wall 2 and the cover 7 of the casing and constitutes a fixed stroke limiter.

The end of the stem 32 is slidably guided through the portion 16 of the slider, and a lug 35 is coupled to said end between a pair of rings 34, 34a; said lug is folded at right angles to the back wall 2 and is part of a bar 36 which extends next to the portion 15 of the slider 14. The rings 34, 34a are spaced by such an amount as to allow the lug 35 a certain play on the stem 32.

A slot 37 is defined in the bar 36 parallel to the portion 15 of the slider 14 and is engaged by the pivot 25, which thus keeps the bar 36 guided.

A collar 38 is defined on the stem 32, and an end of a spring 39 rests against it; the spring 39 is fitted on the stem 32, and its opposite end rests against the plate 33.

The spring 39 is less rigid than the spring 19 and keeps the spring latch 11 in a position in which it protrudes from the front wall; this position is defined by the abutment of the lug 35 against the plate 33 with the interposition of the portion 16, which remains clamped between the plate 33 and the lug 35.

The end of the bar 36 which is opposite to the lug 35 has a wing 40 which is also folded at right angles to the back wall 2 and on which a lever 41

can act; said lever 41 is radially coupled to the hub 42 to which the handle for manual actuation of the lock is rotationally coupled. The bar 36 is used to operatively connect the lever 41 to the stem 32 of the spring latch.

The hub 42 is rotatably supported in circular seats of the back wall 2 and of the cover 7 of the casing, and is provided with a square hole 43 in which the square pivot of the handle engages with a side fit.

The hub 42 is provided with two lugs 44, 45 which are arranged diametrically. A strut 46 acts on the lug 44; it is loosely guided into the bush 9c and actuated by a spring 47 which acts between said bush 9c and a shoulder 48 of the strut 46. By virtue of the spring 47, the hub 42 is kept in an angular position defined by the abutment of the lug 45 against the bush 9d; in this position, the lever 41 is disengaged from the wing 40.

The operation of the described lock is as follows.

In the door closure position, the spring latch 11 is engaged in the related selvage and thus protrudes from the front wall 5. At the same time, the piston 12 abuts against the doorjamb and is arranged inside the casing. Since the electromagnet 28 is not energized, the core 29 pushes the lever 26 so that it abuts against the bush 9b, so as to prevent the oscillation of the pawl 24 and block the sliding of the slider 14. As a consequence of this, during door closure, when the piston 12 retracts into the casing, the stem 13 slides with respect to the portion 16 of the slider and the spring 19 is compressed.

If one wishes to open the door by electrical actuation, energization of the electromagnet 28 causes the rotation of the lever 26, so that the pawl 24 is free to rotate. Due to the compression of the spring 19 which occurred during door closure, the slider 14 acts with the tooth 22 against the edge of the notch 23, forcing the pawl 24, which is no longer blocked by the lever 26, to rotate into the position which allows the slider 14 to slide freely. The sliding of the slider 14 pulls the spring latch 11 by means of the coupling of the portion 16 on the stem 32. Retraction of the spring latch 11 entails the compression of the spring 39, since said spring, as mentioned, is less rigid than the spring 19.

If one wishes to open the door manually, clockwise rotation of the hub 42 by means of the action of the handle engaged in the square hole 43 makes the lever 41 pull the bar 36 and the stem 32, which is rigidly coupled in the lug 35. The movement of the bar 36 occurs independently of the movement of the slider 14, which remains blocked, since the pawl 24 is kept in blocking position by the lever 26.

The pulling of the stem 32 causes the retraction of the spring latch 11 and the compression of the spring 39 against the plate 33 so that, when the action of the handle ends, the spring 39 returns the spring latch to its protruding position.

With locks of the described type, if the bolt 10 has not been moved into the closure position, it is possible to act unlawfully from outside on the spring latch 11 to make it retract into the casing 1 and thus open the door.

The device according to the present invention obviates this (see figures 2, 3, 4 and 5); by virtue of this device, the spring latch is blocked as soon as the reloading piston retracts into the casing when it abuts against the doorjamb.

The device comprises a plate 49 which is arranged between the back wall 2 of the casing and the stems 13 and 32 of the reloading piston 12 and of the spring latch 11. The plate 49 has a tab 50 extending below the stem 13; one end of said tab is folded so as to form a wing 51. A hole is defined in the wing 51, and the stem 13 of the piston 12 is guided therethrough. The wing 51 is interposed between the spring 19 and the portion 16 of the slider 14. As more clearly shown in figure 3, the wing 51 forms, together with the plate 49, an angle of less than 90°, so that when the plate 49 is pressed against the portion 16 by virtue of the spring 19, it is raised from the back wall 2 and rests against the lower edge of the collar 18.

Two slots 52, 53 are defined in the plate 49: the first slot is arranged below the portion of the stem 13 which is comprised between the collar 18 and the wing 51; the second slot is arranged below the collar 38 of the spring latch 11. This position of the slots 52, 53 is related to the situation in which the spring latch 11 and the piston 12 are outside the casing 1.

The slot 52 is elongated in the direction of the stem 13, and has such a width as to allow the collar 18 to enter it with a peripheral portion. Thus, in practice, the collar 18 acts like a cam which, according to its position, keeps the plate at two levels. The slot 53 also has dimensions sufficient to receive a peripheral portion of the collar 38, and one edge 54 thereof is meant to abut against the collar 38, as will become apparent hereinafter.

A bush 55 is slidably guided on the stem 32 between the collar 38 and the spring latch 11, and is provided with a conical end 56. The bush 55 is connected to the bar 36 by a bridge 57 which extends between the stems 13 and 32 and through a recess 58 of the portion 16 of the slider 14. A spring 59 arranged on the stem 32 between the bush 56 and the collar 38 keeps the lug 35 in abutment against the ring 34, so that the play with which the lug 35 is guided between the rings 34, 34a is determined by the distance between the lug

35 and the ring 34a.

The spring latch blocking action performed by the described device when the door is closed is evident if one bears in mind that in the door closure position the piston 12 is inside the casing (dot-and-dash position of figure 3) and the plate 49 abuts against the slider 14, which is in turn blocked by the pawl 24.

Since in this position the collar 18 is located at the slot 52, the action of the spring 19 on the wing 51 lifts the plate 49, which moves the slot 53 so that it is engaged by the collar 38 (see figure 4). Therefore, any attempts to make the spring latch 11 retract into the casing to unlawfully open the door are thwarted by the abutment of the collar 38 against the edge 54 of the slot 53.

However, normal opening of the door is allowed both electrically and by manual actuation. In fact, since the plate 49 is kept rigidly coupled to the slider 14 by the spring 19, and since the slider 14 is engaged on the stem 32, if the electromagnet 28 is actuated the spring 19 causes the simultaneous pulling of the plate 49 and of the spring latch 11.

On the other hand, when the lock is actuated manually by turning the lever 41, the play between the lug 35 and the ring 34a allows a preliminary small movement of the bar 36 which, by means of the bridge 57, pulls the bush 55 along the stem 32, allowing the conical end 56 (see figure 5) to act on the plate 49, lowering it and disengaging the collar 38 from the slot 53. In this manner, when the lug 35 has moved into abutment against the ring 34a, the further stroke of the bar 36 pulls and completely retracts the spring latch into the casing.

After opening the door, the springs 19 and 39 return the spring latch 11 and the piston 12 into the position in which they protrude from the casing 1 and in which the collar 18 rests on the plate 49 (figure 3), keeping the collar 38 disengaged from the slot 53.

It should be noted that when the spring latch 12 and the piston 11 retract into the casing simultaneously by abutting against the doorjamb during closure, the plate 49 continues to rest on the collar 18 until the collar 38 has moved beyond the slot 53.

When the door is in closed position, the spring latch 11 engages the related selvage, whereas the piston 12, by remaining inside the casing, engages the slot 52, allowing the plate 49 to rise and allowing the collar 38 to engage the slot 53, so as to block any sliding of the spring latch which is not due to manual or electric actuation.

The device thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, as well as the contingent shapes and dimensions, may be any according to the requirements.

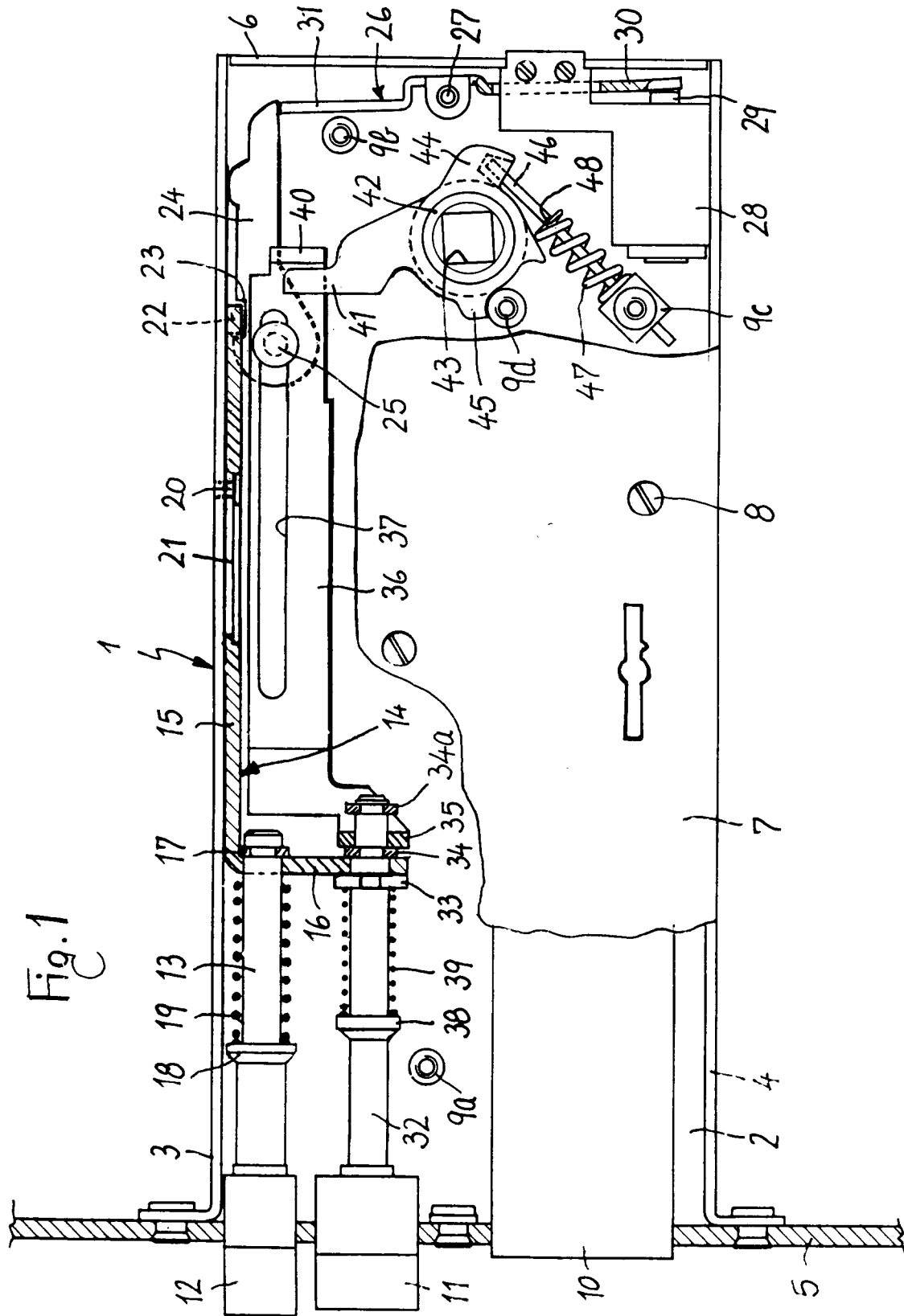
Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

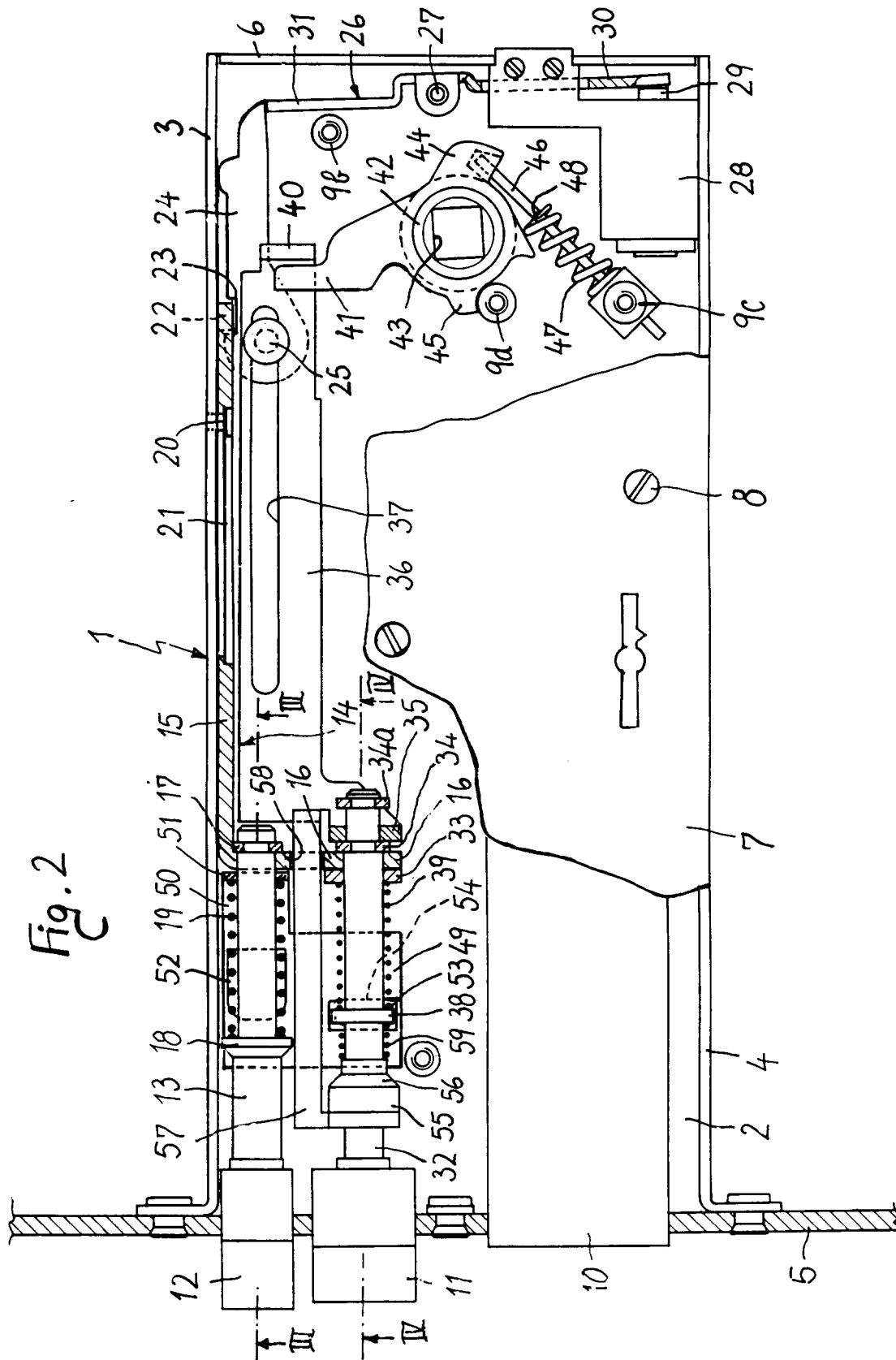
Claims

1. Device for preventing the unlawful opening of an electric lock comprising: a casing (1) provided with a front wall (5); a spring latch (11) and a reloading piston (12) which are guided in openings of said front wall at right angles thereto; a sliding element (14) which is slidably guided in said casing (1) parallel to said spring latch and said reloading piston and can be blocked by a ratchet system (22-26) controlled by an electromagnet (28); said reloading piston (12) having a stem (13) which is elastically connected to said sliding element (14); said spring latch (11) having a stem (32) which is guided in said sliding element and provided with engagement means (34) for said sliding element (14) which are suitable to allow said sliding element (14) to pull the spring latch (11) inside the casing (1) during the opening step; a spring (39) which acts on a collar (38) of the spring latch in the direction in which said spring latch protrudes from the front wall (5) of the casing (1); characterized in that it comprises a blocking element (49) for the spring latch (11) which is mounted on said reloading piston (12) and oscillates between a position which blocks the sliding of the spring latch (11) and a position in which the spring latch (11) slides freely; further characterized in that it comprises spring means, which retain said element (49) in the blocking position when the spring latch protrudes from the casing (1) and the piston (12) is inside the casing (1), and cam means (18) arranged on said reloading piston (12), said cam means (18) allowing the movement of said element (49) into said blocking position when the reloading piston (12) is inside the casing (1), when abutment against the doorjamb occurs.
2. Device according to claim 1, characterized in that said blocking element is constituted by a plate (49) provided with a wing (51) which

defines, together with said plate, an angle of less than 90° and is provided with a hole through which the stem (13) of the reloading piston (12) is guided; said wing (51) is interposed between said sliding element (14) and a spring (19) which rests on a collar (18) of said stem (13) and constitutes said cam means; two slots (52, 53) are furthermore provided on said plate (49) and can be engaged by said collars (18, 38) so that, when the reloading piston (12) is retracted into the casing (1) during door closure, the collar (18) of its stem engages a slot (52), whereas the collar (38) of the stem (32) of the spring latch (11) engages the other slot (53), blocking the sliding of the spring latch.

3. Device according to claim 2, characterized in that the stem (32) of the spring latch (11) is loosely coupled to a bar (36) which is operatively associated with the hub (42) of a spring latch actuation handle; the bar is connected, by means of a bridge (57), to a bush (55) which is guided on the stem of the spring latch; a spring (59) is arranged between said bush (55) and said collar (38) of the spring latch; said bush (55) is shaped so as to act on the plate (49) during the initial portion of the sliding of the bar (36) which is allowed by said play and so as to move said collar (38), said collar (38) disengaging from the respective slot (53) of the plate.





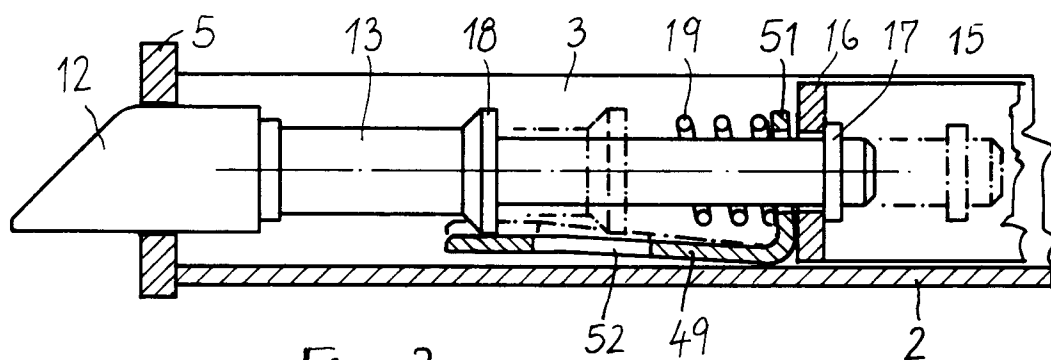


Fig. 3

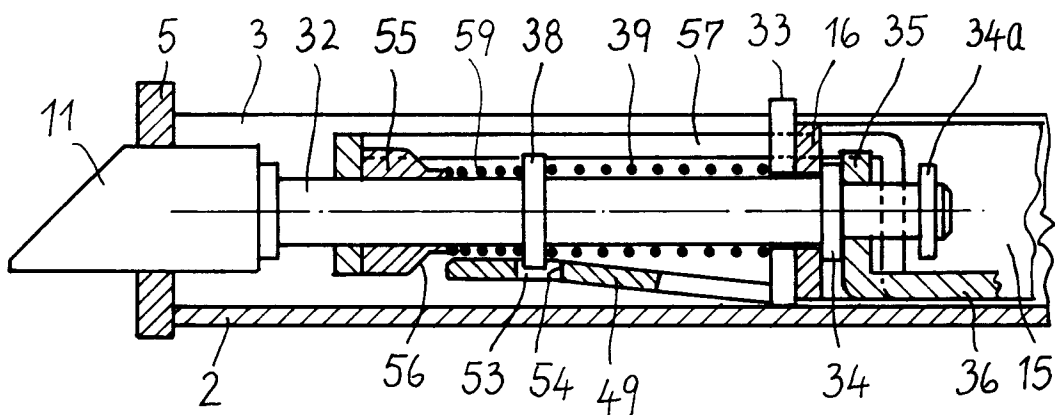


Fig. 4

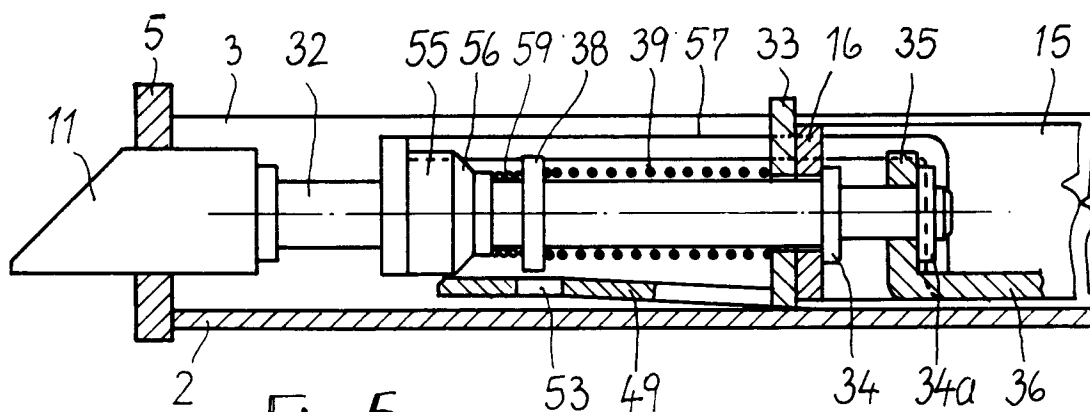


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 93 10 4731

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.5)
X	FR-A-1 394 247 (CISA S.P.A.) * the whole document *	1	E05B47/06
A	US-A-2 591 647 (WELCH) * column 1, line 43 - column 2, line 52; figures *	2	
A	FR-A-1 484 810 (GUIDOTTI) * the whole document *	1	
A	EP-A-0 292 361 (CREATIONS D. GUIDOTTI) * abstract; figures *	1,2	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 JUNE 1993	Examiner GIMENEZ BURGOS R.
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 I : document cited for other reasons & : member of the same patent family, corresponding document	