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(71) Applicant: **Cirilli, Alessandro**
60035 Jesi (AN) (IT)

(72) Inventor: **Cirilli, Alessandro**
60035 Jesi (AN) (IT)

(74) Representative: **Baldi, Claudio**
Ing. Claudio Baldi s.r.l.
Viale Cavallotti 13
P.O. Box 187
60035 Jesi (Ancona) (IT)

(54) **Device used to open and close Vasistas windows.**

(57) The present invention relates to a device used to open and close Vasistas windows, which is actuated by means of a single rope (2), in which the lock (S) comprises an oscillating plate (4) for coupling with the pin (1), which interferes with a retention catch (6) actuated by the opening lever (7) by means of a flexible blade (8) that interferes with a cam (4e) obtained on the oscillating plate (4).

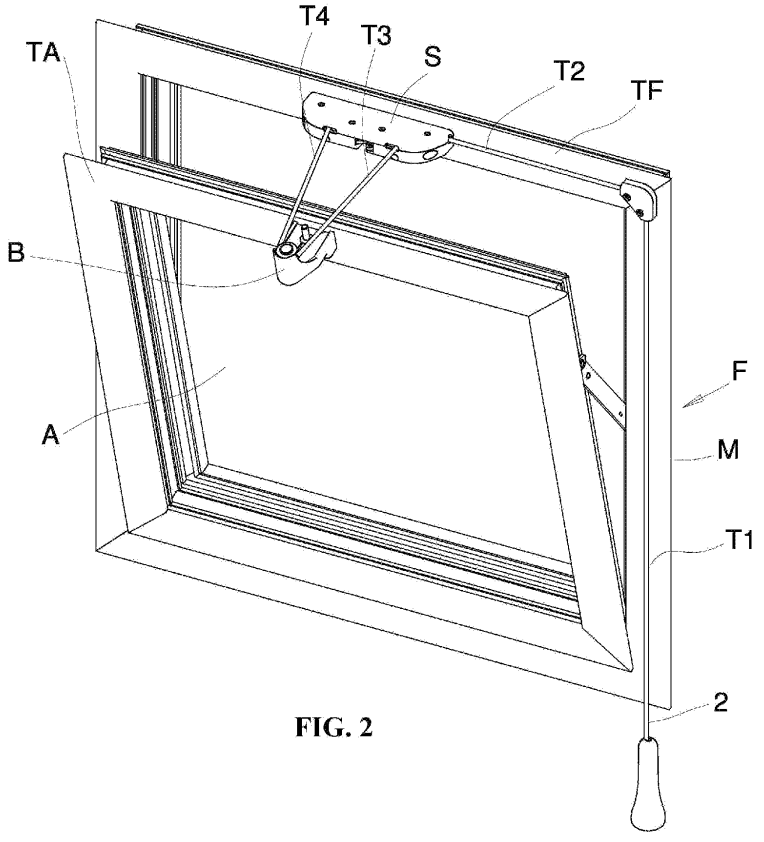

FIG. 2

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Description

[0001] The present patent application relates to a device used to open and close Vasistas windows, which is actuated by means of a single rope.

[0002] Although different types of locks for Vasistas windows are currently available on the market, the present description refers to the locks for windows that are exclusively provided with Vasistas opening and are situated at such a height that they cannot be reached by the operator manually.

[0003] Different locks are used in this group of Vasistas windows, the most typical comprising a latch with relevant housing. The latch is fixed to the upper side of the frame of the fall-front window and the housing is fixed to the crosspiece of the fixed frame of the window.

[0004] The lock is opened when the latch is removed from its housing, overcoming the antagonist force of a return spring associated with the latch.

[0005] When the window is situated at such a height that the operator cannot reach the latch manually, the lock is provided with suitable remote control means, the most common ones being a rod ending with a hook used to hook the latch by means of an eyelet.

[0006] After having inserted the hook into the eyelet, the operator simply needs to pull the rod downwards to open the window, which will stop after a predefined opening angle by an ordinary end-of-travel stop mechanism.

[0007] Instead of using the rod to push the window against the fixed frame, the operator can close the window by means of a rope provided in some models of Vasistas windows.

[0008] More precisely, by means of a suitable pulley system, the rope is tensioned to pull the fall-front window against the fixed frame of the window, favouring the elastic snap coupling between the latch and the relevant housing.

[0009] In order to avoid using the rod to open the window, a type of locks in which the latch is retracted by means of a second rope has been devised.

[0010] Moreover, some of the devices used to open and close Vasistas windows use a single rope; however, these devices have not been very successful on the market, due to the mounting system and large dimensions, which are characterised by large volume, intrusiveness and anti-aesthetical characteristics.

[0011] In fact, in addition to the single rope, this type of devices comprises a pin fitted with the fixed frame of the window and a large lock fitted to the upper crosspiece of the window, in such a way that the lock is even more visible and bulky when the window is in the maximum opening position.

[0012] The purpose of the present invention is to obtain a device used to open Vasistas windows provided with only one rope, which comprises a small lock that incorporates all the mechanisms that are necessary to hook and release the pin of the lock.

[0013] A further purpose of the present invention is to obtain a device used to open and close Vasistas windows provided with only one rope, which comprises a small lock designed in such a way that it can be fitted to the fixed frame of the window, while the pin is designed to be fitted to the upper crosspiece of the frame of the fall-front window.

[0014] These and other advantages, which will become evident in the description below, have been achieved by the device of the invention, whose main characteristics are illustrated in the first claim.

[0015] The said device comprises a lock-assembly designed to be fitted to the wall or the upper crosspiece of the window fixed frame, which contains all the mechanisms that are necessary to lock and release the pin with vertical axis fitted to the upper crosspiece of the window frame in opposite position to the box-shaped lock-assembly.

[0016] The components include an oscillating plate that cooperates with a catch and is provided with a hook, which is designed to hook and hold the pin when the lock is closed, preventing the window from opening.

[0017] To release the oscillating plate from the catch, the operator simply needs to pull the rope that actuates the opening lever contained in the lock-assembly, which in turns makes the catch oscillate, releasing the oscillating plate.

[0018] When the window is open and the rope is released, a flexible blade actuated by a suitable cam temporarily releases the opening lever from the catch, in such a way that the catch is not retracted when the rope is pulled again to close the window. In fact, to close the window the operator simply needs to pull the rope again; by means of a pulley system, the rope pulls the window against the wall until the pin penetrates deeply into the lock-assembly and is hooked to it.

[0019] Once the window is closed, when the rope is no longer tensioned, the interference of the flexible blade with the cam ends and the opening lever is engaged with the catch in such a way that, when the operator pulls the rope again, the catch is retracted and the oscillating plate is released, opening the window.

[0020] For major clarity the description of the lock of the invention continues with reference to the enclosed drawings, which only have an illustrative, not limiting purposes, whereby:

Fig. 1 is a diagrammatic view of the components of the device of the invention.

Fig. 2 is a diagrammatic view of the device of the invention installed in a Vasistas window, shown in open position.

Fig. 3 is an axonometric exploded view of all the components contained in the lock-assembly.

Figs. 4 to 9 are plan views of the different positions of the various elements contained in the lock-assembly during the opening and closing of the fall-front window.

Fig. 4A is an axonometric enlarged view of the os-

cillating plate and relevant catch shown in the same position as the components in fig. 4.

Fig. 6A is an axonometric enlarged view of the oscillating plate and relevant catch shown in the same position as the components in fig. 6.

[0021] With reference to fig. 1, the device of the invention is composed of a box-shaped body (C) that houses the lock (S) used to lock and release the pin (1) with vertical axis, which is part of a block (B) designed to be fitted above the upper crosspiece (TA) of the frame of the panel (A) of the window (F).

[0022] The box-shaped body (C) is fitted to the upper crosspiece (TF) of the fixed frame of the window (F), as shown in fig. 2.

[0023] The lock (S) contained in the box-shaped body (C) is actuated by means of a rope (2) used to open the lock (S) and close the panel (A), while automatically locking the pin (1) inside the lock (S).

[0024] The box-shaped body (C) is composed of an upper half-shell (CS) and a lower half-shell (CI) provided with housings for the various components and relevant return springs.

[0025] It must be noted that the rope (2) moves along the following travel:

- a first perfectly vertical section (T1) before the upright (M) of the fixed frame of the window (F);
- a second horizontal section (T2) before the upper crosspiece (TF) of the fixed frame of the window (F);
- a third section (T3) between the box-shaped body (C) and the block (B);
- a fourth, last section (T4) between the block (B) and the box-shaped body (C) with the fixing points of the end of the rope (2) that enters the box-shaped body (C) with the section (T2) and comes out with the section (T3).

[0026] The lower half-shell (CI) is provided with a first pin (3) with vertical axis used to pivot an oscillating plate (4), a second pin (5) with vertical axis used to pivot a catch (6) and an opening lever (7), above which a flexible blade (8) is mounted.

[0027] The lower half-shell (CI) is also provided with two housings (9 and 10) for two return torsional springs (11 and 12), respectively for the oscillating plate (4) and the catch (6), and a third housing (13) for a compression spring (14) to return the lever (7).

[0028] With reference to fig. 6A, the oscillating plate (4) is provided with a hole (4a) that houses the pivoting pin (3) and a hook (4b) with suitable configuration to hook and release the pin (1).

[0029] The plate (4) is also provided with a wing (4c) in opposite position to the hook (4b), which is shaped in such a way that it cooperates with the catch (6) that is suitably provided with a tooth (6a) that touches the wing (4c), when the lock is closed, as shown in fig. 4A.

[0030] The catch (6) is provided with a hole (6b) for the insertion of the pivoting pin (5) and a hole (6c) for the insertion of a connection peg (8a) situated below the flexible blade (8).

[0031] The blade (8) is composed of a rectilinear section (8b) that surmounts the lever (7) and a curved shelf (8c) that surmounts the oscillating plate (4).

[0032] The rectilinear section (8b) is provided at the end with a hole for the rivet (15) for fixing to the lever (7), which oscillates together with the blade (8).

[0033] The lever (7) is shaped as a square with a longer wing (7a) and a shorter wing (7b), provided with a hole (7c) in coaxial position to the hole (6b) in order to be coupled with the pivoting pin (5).

[0034] The wing (7a) is provided with an ear (7d) with fixing holes for the end of the rope (2), and a tooth (7e) used to centre the return spring (14) that is compressed when the rope (2) is tensioned with a force (T).

[0035] The vertex of the L-shaped lever (7) is provided with a slot (7f) that houses (when the lock is closed) the peg (8a) with suitable length to pass over the slot (7f) and through the hole (6c) of the catch (6).

[0036] Both the catch (6) and the oscillating plate (4) are respectively provided with a hole (6d and 4d) for insertion of the hooked end (11 a and 12a) of the spring (11 and 12).

[0037] The spring (11) exerts a thrust on the oscillating plate (4) that tends to rotate it at the end of the opening travel, while the spring (12) tends to push the catch (6) against the plate (4) in such a way that the tooth (6a) interferes with the wing (4c) of the oscillating plate (4).

[0038] Finally, it must be noted that the lower half-shell (CI) has a central transversal notch (I) to let the pin (1) come in and out with respect to the box-shaped body.

[0039] For a better understanding of the lock (S) of the invention, the description continues with reference to the operative steps in which the components cooperate to open or close the window (F) where it is mounted.

[0040] With reference to fig. 4, when the lock is closed, the oscillating plate (4) is oriented in such a way that the hook (4b) prevents the pin (1) from coming out of the box-shaped body (C).

[0041] As shown in fig. 4A, the tooth (6a) of the catch (6) obstructs the rotation of the oscillating plate (4) that tends to eject the pin (1) from the box-shaped body (C) under the thrust of the spring (11).

[0042] Fig. 4A shows that the peg (8a) is inserted into the hole (6c) and into the slot (7f), thus coupling the lever (7) with the catch (6).

[0043] In such a position, in order to open the lock (S) the operator simply needs to pull the rope (2) to rotate the lever (7) around the pin (5), as shown in fig. 5; because of the connection peg (8a), the rotation determines the rotation of the catch (6), thus releasing the wing (4c) from the tooth (6a).

[0044] When the interference between the catch (6) and the oscillating plate (4) ends, the oscillating plate (4) rotates until the end of the opening travel, under the thrust of the spring (12), in such a way that the pin (1) comes

out of the box-shaped body (C) and the panel (A) opens, as shown in fig. 6.

[0045] Fig. 6A shows the behaviour of the flexible blade (8) as soon as the plate (4) rotates at the end of the opening travel.

[0046] The plate (4) incorporates a protruding cam (4e) that interferes with the shelf (8c) at the end of the opening travel of the plate (4), determining the upward flexion of the shelf (8c) that makes the peg (8b) come out of the hole (6c) of the catch (6), eliminating the connection between the lever (7) and the catch (6), which moves forward towards the plate (4) under the thrust of the return spring (12), as shown in fig. 6A.

[0047] When the window is open, as soon as the tension on the rope (2) ends, the lever (7) resumes the initial idle position under the thrust of the return spring (14), as shown in fig. 7.

[0048] In this position the peg (8b) is aligned with the hole (6c), but is not able to penetrate it since the blade (8) remains bent upwards due to the interference of the ending section (8c) with the cam (4e), in such a way that the lever (8) is no longer able to drive the catch (6) into rotation, when it is driven into rotation together with the lever (7) following to the new tensioning of the rope (2).

[0049] In order to close the window, the operator must pull the rope (2) to generate - due to the travel imposed on the rope (2) by the pulleys (N) - a force (FO) that pushes the panel (A) against the fixed frame of the window (F), with consequent forced reinsertion of the pin (1) in the box-shaped body (C) where the pin (1) drives the plate (4) into rotation, thus being automatically hooked by the hook (4b).

[0050] Fig. 8 shows the closing phase, when the lever (7) is rotated and the spring (14) is compressed because the rope (2) is tensioned.

[0051] Fig. 8 also shows that during the backward rotation of the plate (4), under the thrust of the pin (1), the interference between the blade (8) and the cam (4e) ends when the hook (4b) of the plate (4) passes over the tooth (6a) of the catch (6), which is pushed by the return spring (12) and is engaged again with the appendix (4c) of the plate (4), which is therefore stopped with the pin (1) in hooked position, as shown in fig. 9.

[0052] In this position, the operator simply needs to release the rope (2) in such a way that the spring (14) brings the lever (7) back to idle position and the blade (8) with it, thus reinserting the peg (8b) inside the hole (6c) obtained on the catch (6), as soon as the peg (8b) and the hole (6c) are realigned one above the other, thus restoring the connection of the catch (6) with the lever (7), as shown in fig. 4A.

Claims

1. Device used to open and close Vasistas windows, of the type comprising a box-shaped body (C) that houses a lock (S), a pin (1) interfaced with the lock (S) and a single rope (2) used to open the lock (S) and close the panel

   (A) of the window (F), in which the lock (S) comprises:

   - a first pin (3) used to pivot an oscillating plate (4) provided with a hook (4b) and associated with a return spring (11);
   - a second pin (5) used to pivot a lever (7) associated with a return spring (14) and a catch (6) associated with a return spring (12) provided with a tooth (6a) designed to engage with a wing (4c) of the plate (4); device being **characterised in that**
   - the lever (7) is coupled with a flexible blade (8) that ends with a shelf (8c) and provided with a lower connection peg (8) inserted through a slot (7f) of the lever (7) and through a hole (6c) obtained on the catch (6);
   - the rope (2) moves through the support of the pin (1) and actuates the lever (7) directly;
   - the oscillating plate (4) is provided with a protruding cam (4e) that interferes with the shelf (8c) only at the end of the opening travel of the oscillating plate (4), determining the upward flexion of the shelf (8c) that makes the peg (8b) come out of the hole (6c) of the catch (6), eliminating the connection between the lever (7) and the catch (6);

2. Device used to open and close Vasistas windows as claimed in the above claim, **characterised in that** the blade (8) is composed of a rectilinear section (8b) that surmounts a lever (7) and a curved shelf (8c) that surmounts the oscillating plate (4), in which the rectilinear section (8b) is provided at the end with a hole for the rivet (15) used for fixing to the lever (7).

3. Device used to open and close Vasistas windows as claimed in one of the above claims, in which the interference between the blade (8) and the cam (4e) - during the backward rotation of the plate (4) under the thrust of the pin (1) - ends when the hook (4b) of the plate (4) passes over the tooth (6a) of the catch (6), which is pushed by the return spring (12) and is engaged again with the appendix (4c) of the plate (4), which is therefore stopped with the pin (1) hooked to the hook (4b).

4. Device used to open and close Vasistas windows as claimed in one of the above claims, in which the rope (2) makes the following travel:

   - a first perfectly vertical section (T1) before the upright of the fixed frame of the window (F);
   - a second horizontal section (T2) before the up-

per crosspiece (TF) of the fixed frame of the window (F);
- a third section (T3) between the box-shaped body (C) and the block (B) that supports the pin (1);
- a fourth, last section (T4) between the block (B) and the box-shaped body (C) with the fixing points of the end of the rope (2) that enters the box-shaped body (C) with the section (T2) and comes out with the section (T3).

5. Device used to open and close Vasistas windows as claimed in one of the above claims, **characterised in that** the box-shaped body (C) is composed of an upper half-shell (CS) and a lower half-shell (CI) with a central transversal notch (I) to let to let the pin (1), as well as all the housings for the various components that form the lock (S), including the pulleys (N) of the rope (2).

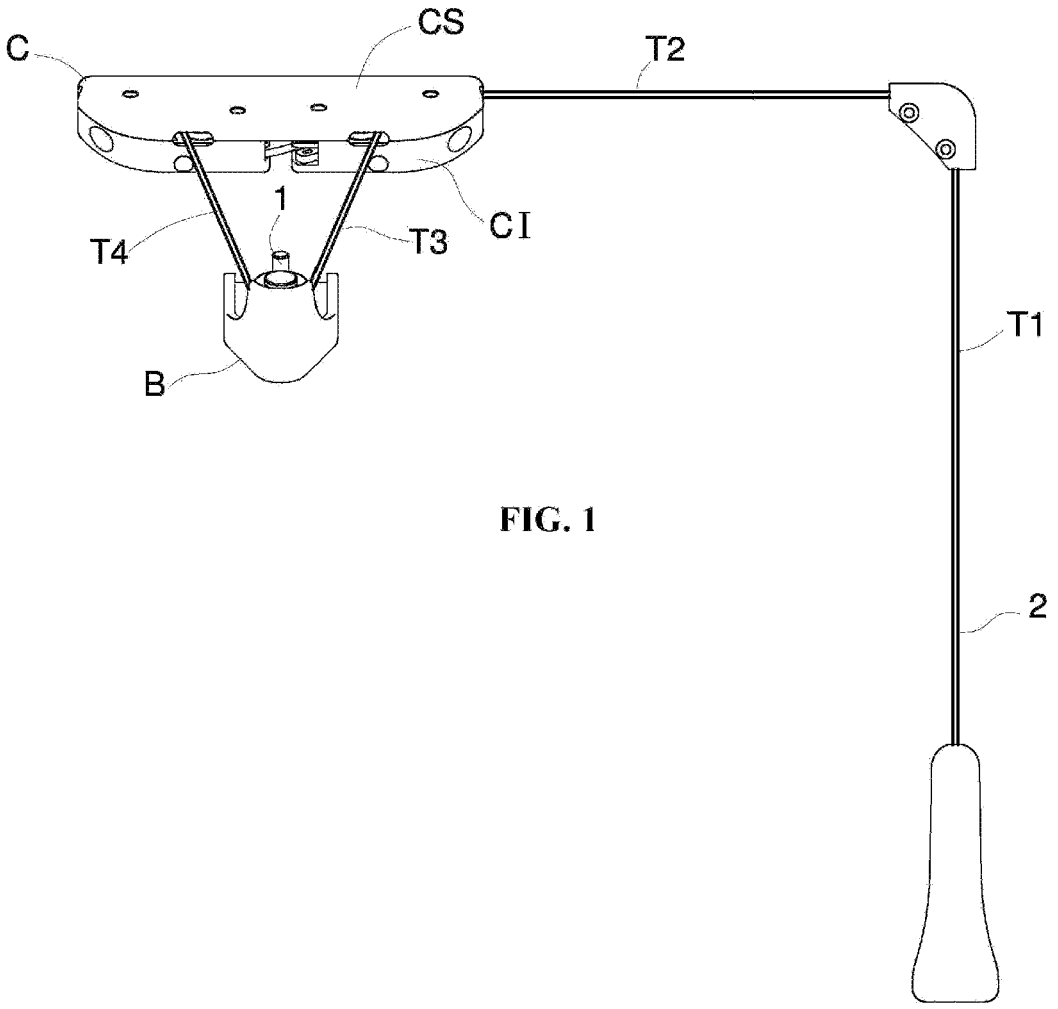

FIG. 1

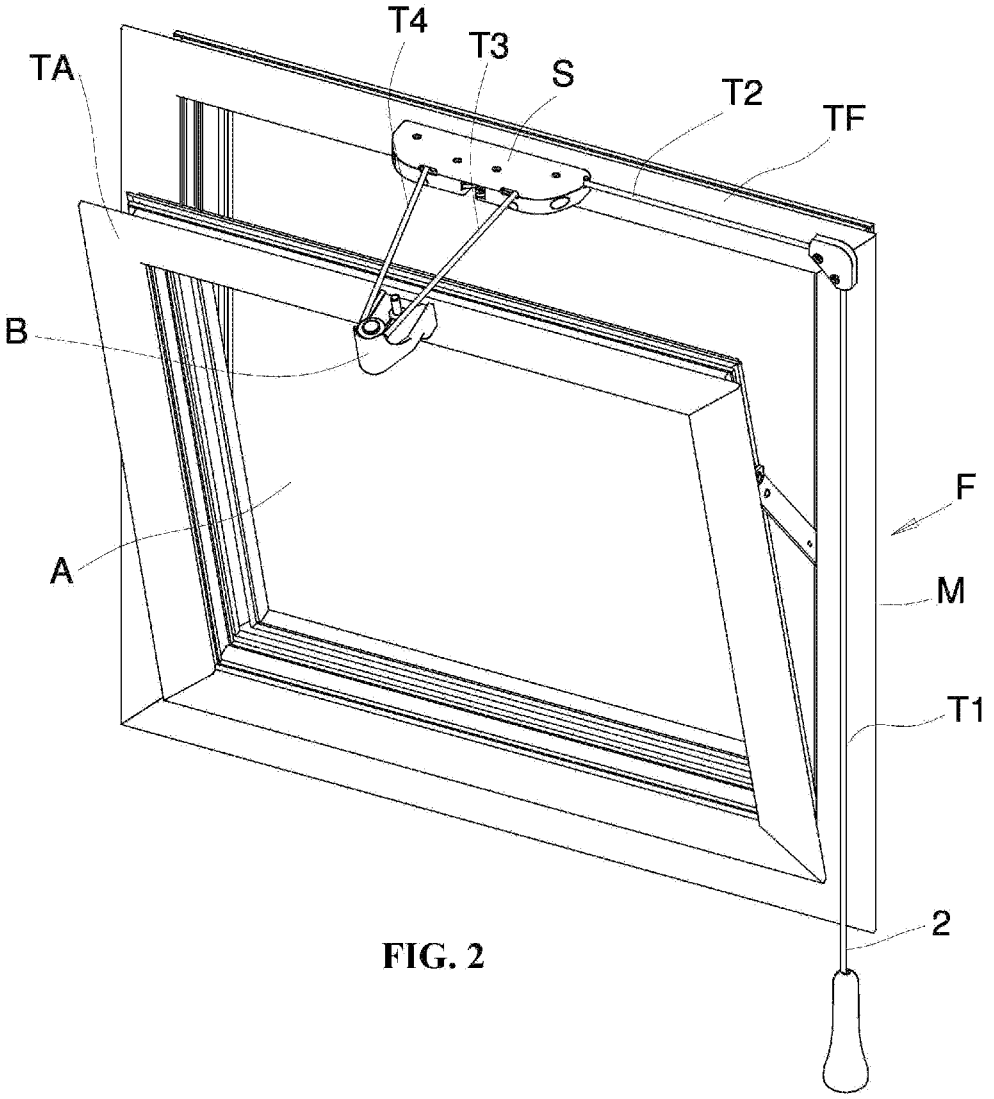

FIG. 2

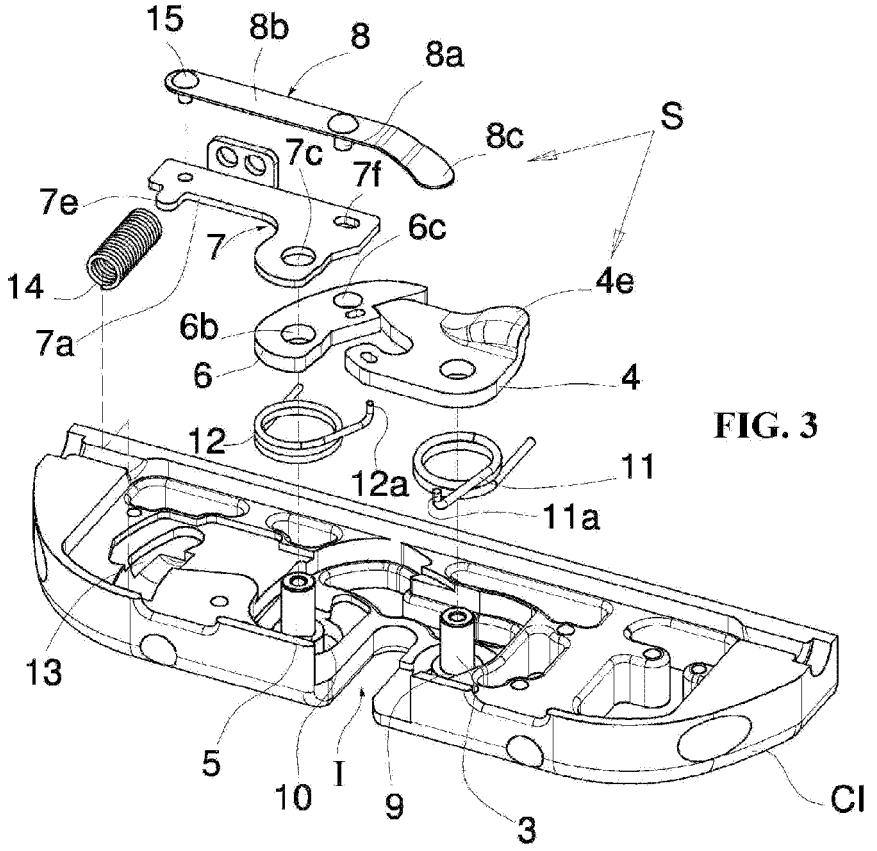
15
8b
8
8a
8c
S
7c
7f
7e
7
6c
14
4e
6b
7a
6
4
12
11
12a
11a
13
5
10
I
9
3
Cl

FIG. 3

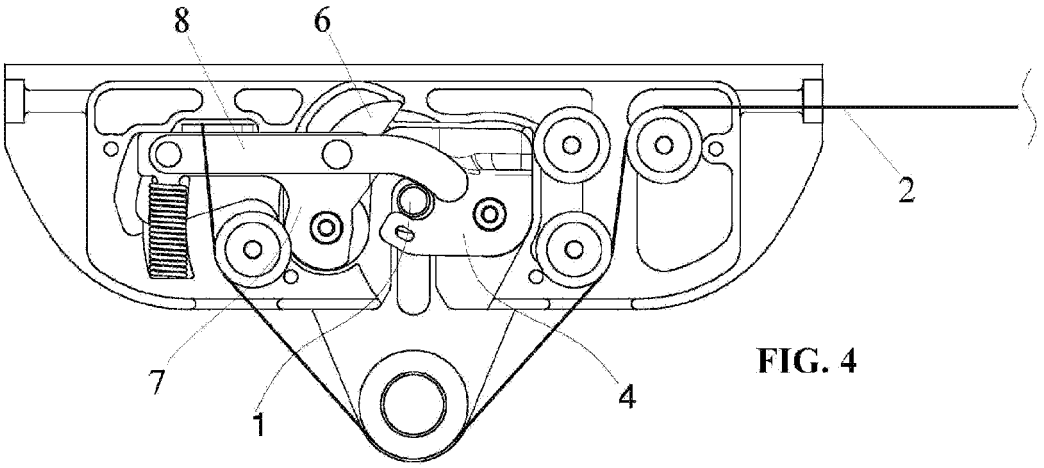
8
6
2
7
1
4

FIG. 4

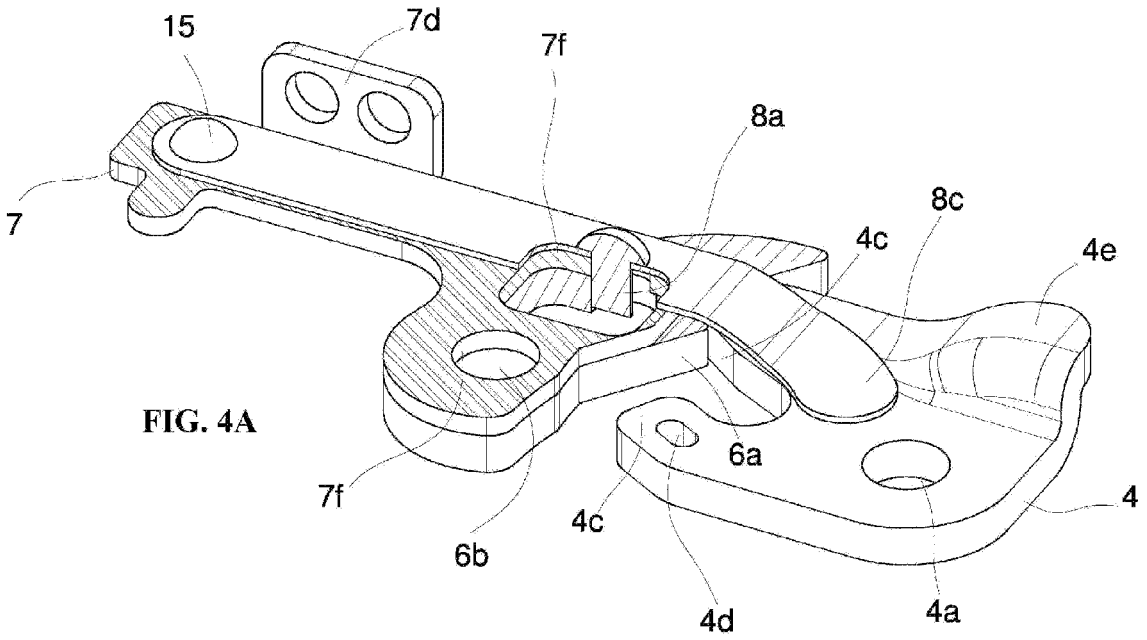

FIG. 4A

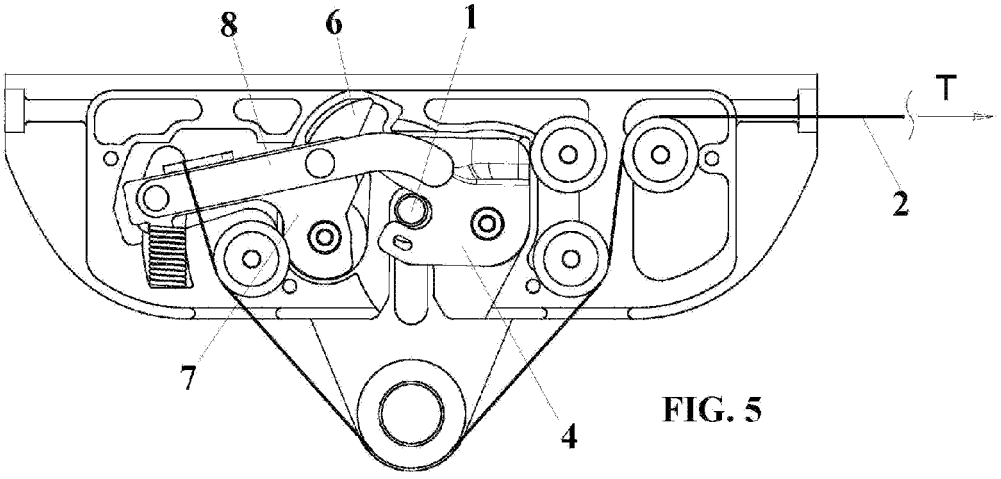

FIG. 5

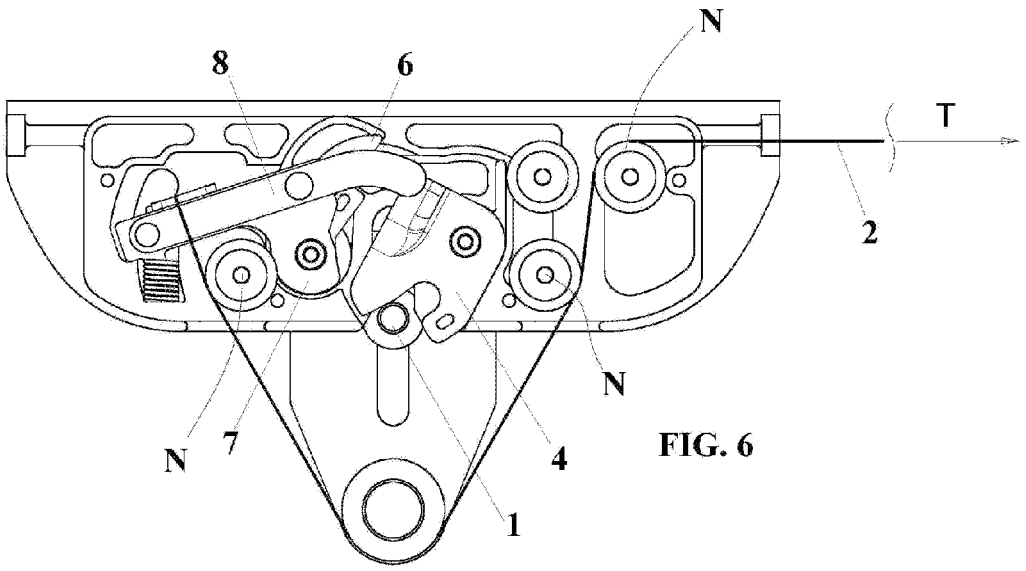

FIG. 6

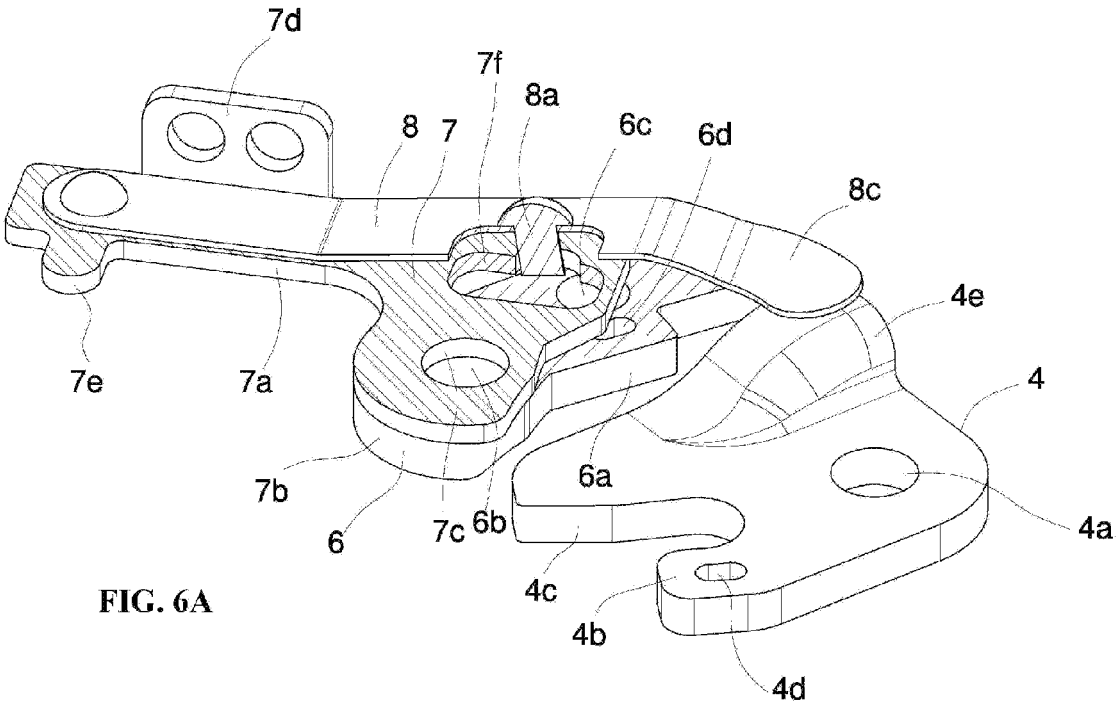

FIG. 6A

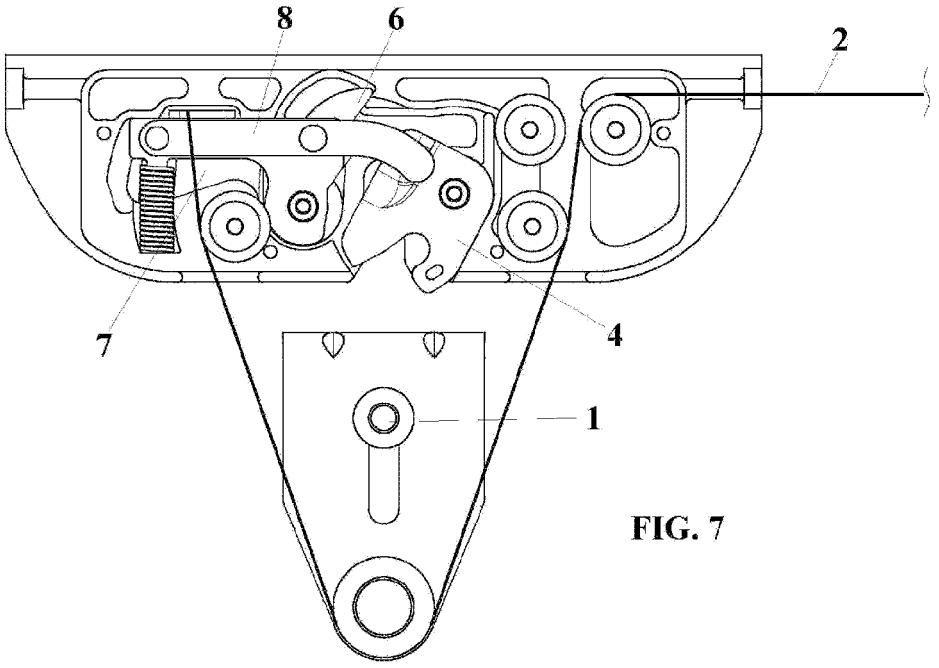

FIG. 7

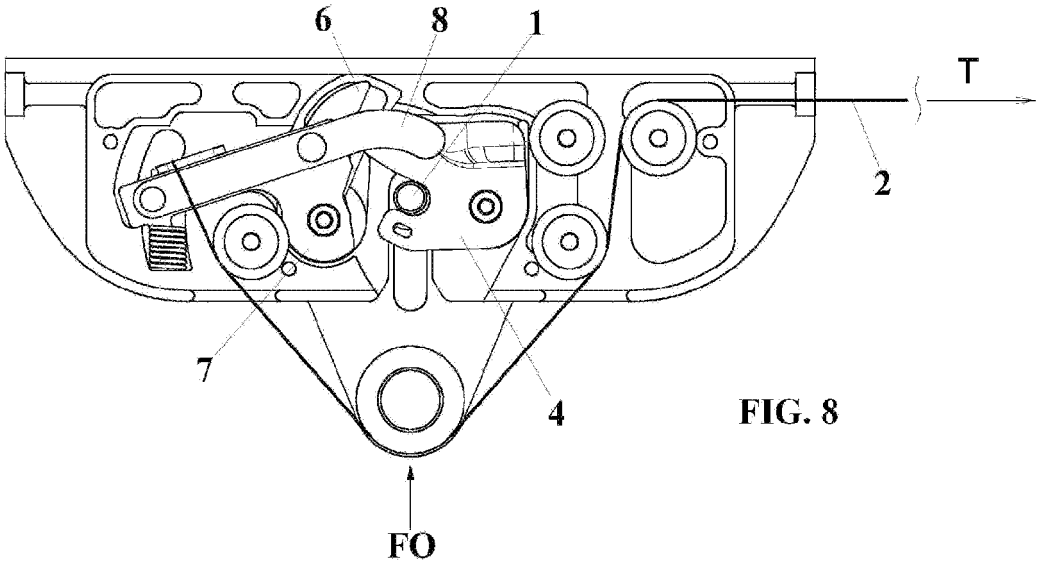

FIG. 8

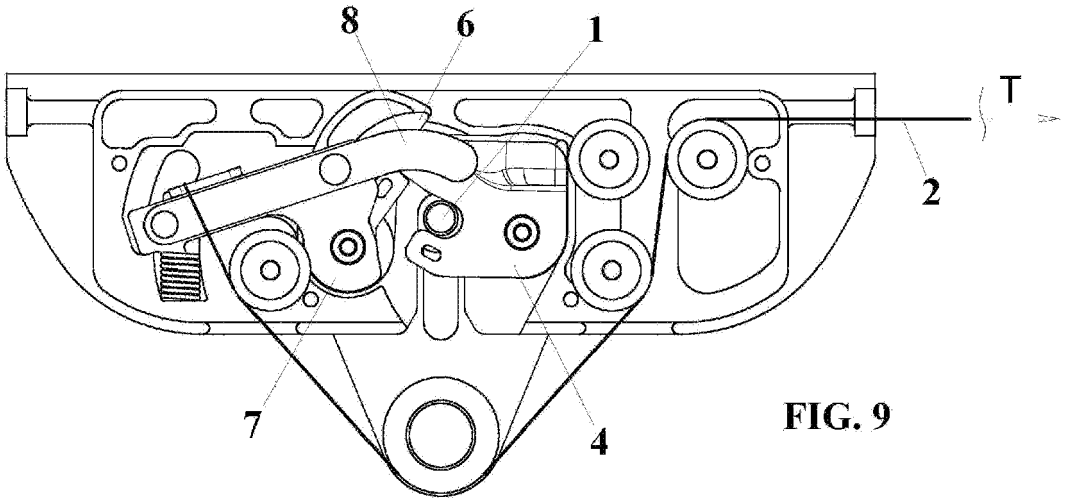

FIG. 9

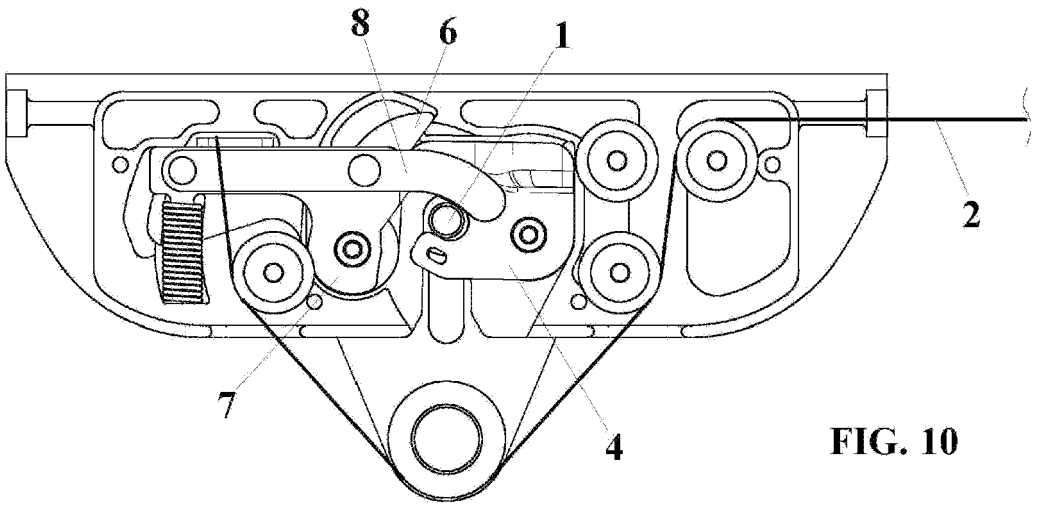

FIG. 10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 08 10 1146

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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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 April 2008	Di Renzo, Raffaele

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 10 1146

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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10-04-2008

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