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(54) **Title**: MECHANICAL LOCKING DEVICE, PARTICULARLY FOR CURTAINS SLIDING ON SLIDES AND THE LIKE

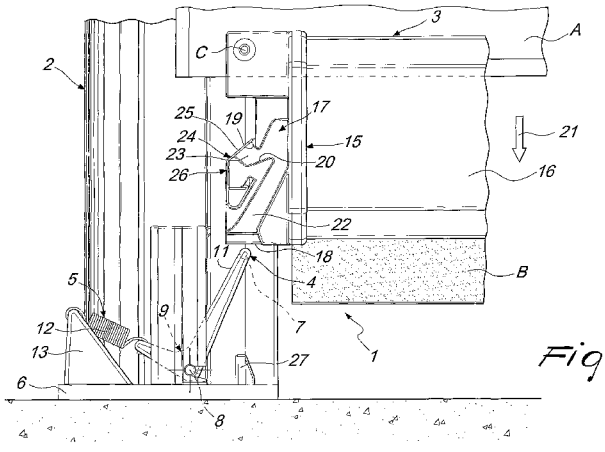

Fig. 1

(57) **Abstract**: The present invention refers to a mechanical locking device (1), particularly for curtains (A) sliding on slides and the like, comprising a slider (4) installed near the lower base (6) and associable with an upright member (2) of a frame for sliding curtains (A) or the like, with the slider (4) being able to oscillate, against or by the action of first elastic means (5), about a position of its equilibrium. Means for removable coupling of the slider (4) are also provided which are associable with the movable crosspiece (3) of the sliding curtain (A) near at least one of its end sections (16) for locking the movable crosspiece (3) near the lower base (6) of the upright member (2). The removable coupling means comprise a shaped channel (17) running from an entry section (18) to an exit section (19) and defining at least one trap section (20), respectively, for guiding the slider (4) during the movement of the movable crosspiece (3) and for locking the slider (4) in the shaped channel (17). The particularity of the invention is that it comprises means (24) for closing the exit section (19), movable from an open position to a closed position for the exit of the slider (4) from the shaped channel (17) through the exit section (19) and adapted to prevent the re-entry of the slider into the shaped channel (17) through the exit section (19).

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MECHANICAL LOCKING DEVICE, PARTICULARLY FOR CURTAINS SLIDING ON SLIDES AND THE LIKE

Technical Field

The present invention refers to a mechanical locking device, particularly for curtains sliding on slides and the like.

Background Art

In the sector of curtains, hangings and the like, vertically sliding curtains are known which can be motorised for their automatic operation, generally constituted by a winding roller onto which and from which, respectively, the curtain winds and unwinds.

For ensuring an effective closure against the light there is a counterweight associable with the curtain at the side opposite to the one associated with the winding roller, which is placed at the upper crosspiece of the window frame on which the curtain is to be installed; in this way it is possible to ensure a correct and constant tensioning of the curtain.

Such counterweight is typically implemented by a moving crosspiece which substantially runs across the entire width of the curtain, from one upright member of the window frame upon which the curtain is installed to the other.

A known technique is to fit such vertically sliding curtains with automatic locking devices adapted to lock and free the curtain as required at its lower end of travel point, i.e. when the moving crosspiece is located at the lower bases of the upright members of the window frame on which the curtain is installed.

Such known automatic locking devices are substantially constituted by a slider/slide system implemented partly on the ends of the moving crosspiece and partly on the upper members of the window frame at their lower bases.

More precisely, the moving crosspiece, at its ends, is fitted with two caps into which shaped channels with a departure path and a return path are

cut, running substantially parallel to each other, with trap sections between one and the other for temporarily locking two respective pins associated with the upright members of the window frame.

According to the known art, such shaped channels can be implemented with various profiles with the common aspect of having the entry section and the exit section both located substantially on the part of the cap facing the lower base of the respective upright member.

In this way, the slider associated with the same upright member, which is generally installed on an elastic support in such a way as to allow it to effect the rocking movements necessary for its movement inside the respective shaped channel, enters such departure path by passing through the entry section with the descent of the moving crosspiece and exits from such return path through the exit section with the re-ascent of the moving crosspiece.

More precisely, with the descent of the moving crosspiece the slider travels all of the departure path until the moving crosspiece arrives at the end of travel point.

At this point, as a result of the return elastic means of the slider, the slider performs a movement that is substantially transversal with respect to the direction of movement of the moving crosspiece, thus moving to occupy the trap section between the two paths and, with a short return movement of the moving crosspiece, the slider engages such trap section in such a way as not to allow the re-ascent of the moving crosspiece and to prevent the passage of light.

To unlock this device, it is sufficient to lower the moving crosspiece again to the end of travel point, in such a way as to make the slider disengage from the trap section and send it, under the effect of its elastic returning action, into the return path.

Subsequently, it is possible to roll up the curtain because the slider no longer encounters obstacles inside the shaped channel.

Such known automatic locking devices are not without drawbacks, among which is the fact that, since there must be a departure path and a return path substantially parallel to each other, each shaped channel of the two caps has large dimensions which imply an increase in the dimensions of the respective cap compared to the dimensions it would have if the locking device were not present.

To prevent such drawback, one could opt for a reduction in the dimensions of the transition sections of the shaped channel.

Such solution would however imply a precision of installation that is excessively high compared with the typical levels of precision used in the construction industry and, in particular, in the window frame industry.

To obtain a perfect installation, i.e. to obtain exact alignments in the order of millimetres, it would be necessary to have restrictions in terms of orthogonality and parallelism of the walls of the spaces in which to install the windows that are unthinkable of if one considers the tolerances employed in the building industry.

Such limit is also due to the fact that the cutting of the slides is often carried out by the installers on-site using portable tools, with evident limits in terms of precision.

A further drawback of known automatic locking devices is that, if the vertically sliding curtain is fitted with drive means for its movement, the drive means that permit the automatic movement of the curtain and, in particular, the ascent and the descent of the curtain during the locking and unlocking phases of the slider/slide system are managed by software that works by self-learning in a very complex manner.

In the installation phase of the curtain in the window frame it is necessary to carry out a calibration of the system by identifying the end of travel zero points necessary for locking/unlocking the slider/slide system.

According to the state of the art, to carry out this self-learning function, it is necessary not to mount the slider first in order to permit the

drive means to execute the complete travel arcs to detect the end of travel points.

Subsequently, the slider is mounted and the locking and unlocking of the slider/slide system are tested by carrying out the calibration of the system, an operation that necessitates the work of an expert installer.

A further drawback of known automatic locking devices is that, once installed, it is not possible to deactivate them, except by dismantling them completely, in order to use the curtain on which they are applied without the curtain becoming locked when completely unrolled.

Disclosure of the invention

The aim of the present invention is to devise a mechanical locking device, particularly for curtains sliding on slides and the like, with reduced dimensions so as not to necessitate oversizing of the cap upon which it is installed and/or installation tolerances that are excessively high.

Within this aim, an object of the present invention is to devise a mechanical locking device, particularly for curtains sliding on slides and the like, which can be deactivated as required by the user without necessarily having to be dismantled.

Another object of the present invention is to devise a mechanical locking device that is simple to provide in practice, is simple to use, and has low costs.

This aim, as well as these and other objects which will become better apparent hereinafter, are achieved by a mechanical locking device, particularly for curtains sliding on slides and the like, comprising a slider installed near the lower base, and associable with an upright member, of a frame for sliding curtains or the like, said slider being able to oscillate, against or by the action of first elastic means, about a position of its equilibrium, means for removable coupling of said slider being also provided, which can be associated with the moving crosspiece of said sliding curtain near at least one of its end sections for locking said moving

crosspiece near said lower base of said upright member, said means for removable coupling comprising a shaped channel running from an entry section to an exit section and defining at least one trap section, respectively, for guiding said slider during the movement of said moving crosspiece and for locking said slider in said shaped channel, characterised in that it comprises means for closing said exit section, such closing means being movable from an open position to a closed position to permit the exit of said slider from said shaped channel through said exit section, and being adapted to prevent the re-entry of said slider into said shaped channel through said exit section.

Brief description of the drawings

Further characteristics and advantages of the present invention will become better apparent from the detailed description that follows of a preferred, but not exclusive, embodiment of a mechanical locking device, particularly for curtains sliding on slides and the like, according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a front elevation view of a portion of a vertically sliding curtain with the mechanical locking device applied, according to the invention, during the lowering phase of the moving crosspiece of the curtain;

Figure 2 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, with the moving crosspiece of the curtain lowered further and with the slider inserted in the shaped channel;

Figure 3 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, with the moving crosspiece at its lower end of travel point;

Figure 4 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, during the raising of the moving crosspiece of the curtain from the lower end of travel point;

Figure 5 is a front elevation view of the portion of a vertically sliding

curtain shown in Figure 1, with the slider engaged with the trap section;

Figure 6 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, during the lowering of the moving crosspiece of the curtain for disengaging the slider from the trap section;

Figure 7 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, with the slider exited from the shaped channel;

Figure 8 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, during the raising of the moving crosspiece of the curtain with the slider exited from the shaped channel;

Figure 9 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, with the slider returned to its position of equilibrium;

Figure 10 is a front elevation view of the portion of a vertically sliding curtain shown in Figure 1, with the slider positioned in a non-operative position;

Figure 11 is a perspective view of the portion of a vertically sliding curtain shown in Figure 1, with the slider positioned on the closing leaf in an intermediate phase between those shown in Figure 7 and in Figure 8.

Way of carrying out the Invention

With reference to the figures, a mechanical locking device, particularly for curtains A sliding on slides and the like, generally designated by the reference numeral 1, is applicable to a vertically sliding curtain A that may be, for example, motorised for its automatic movement on a frame for sliding curtains A constituted, for example, by two upright members 2 and an upper crosspiece, not shown, from which a curtain A is unrolled, in a vertical direction, which is fitted with a movable crosspiece 3 which may, for example, consist of an aluminium bar and which acts as a counterweight in order to correctly tension the curtain A.

More precisely, for a curtain A like the one described, two devices 1 can be applied to the two upright members 2 and to the ends of the movable

crosspiece 3.

Each device 1 comprises a slider 4 that can oscillate, against or by the action of first elastic means 5, about a position of its equilibrium and is associable with an upright member 2 near the lower base 6 of the upright member 2.

In more detail, the slider 4 comprises a pin 7 oriented substantially in parallel with the hinge axis 8 about which it can oscillate.

Such oscillation is made possible by the presence of a bracket 9 lying on a plane substantially parallel to the sliding plane of the movable crosspiece 3 with its hinge axis 8 and with the upright member 2 substantially perpendicular to the sliding plane.

The bracket 9 is substantially L-shaped and is hinged, at the corner of such L, to the upright member 2 near its lower base 6 and its end sections 10 and 11 are associated, respectively, with the first elastic means 5 and the slider 4.

The pin 7 is jointly fixed, in translation, to the bracket 9 at the first of its end sections 11.

As regards the first elastic means 5, they comprise at least one helical spring 12 interposed between the second of the end sections 10 and a fixed element 13 of the upright member 2.

There are also comprised removable coupling means of the slider 4 associable with the movable crosspiece 3, at its caps 15, located near at least one of its end sections 16 for locking the movable crosspiece 3 when it is located near the lower base 6 of the respective upright member 2.

The removable coupling means comprise a shaped channel 17 running from an entry section 18 to an exit section 19 and defining at least one trap section 20, respectively, for guiding the slider 4 during the movement of the movable crosspiece 3 and for locking the slider 4 in the shaped channel 17.

In greater detail, the entry section 18 and the exit section 19 of the shaped channel 17 are substantially mutually opposite and opposite to the

extension of the shaped channel 17 so as to be substantially aligned with each other along a direction substantially parallel to the direction of translation 21, with the entry section 18 facing the direction of the lower base 6 so as to receive the slider 4.

The shaped channel 17 comprises a first section 22 running from the entry section 18 and inclined with respect to the direction of translation 21 away from the upright member 2 for deviating the slider 4 from the position of equilibrium, a second section 23 running from the exit section 19 substantially parallel to the direction of translation 21 in the direction of the entry section 18.

Conveniently, the trap section 20 runs from the first section 22 to the second section 23 defining a concavity facing the direction of opening of the sliding curtain A, in such a way that the trap section 20 can engage with the slider 4 returned substantially to the position of equilibrium by the first elastic means 5 after having been deviated during the transition of the first section 22.

This geometry defines a profile of the shaped channel 17 that is substantially an inclined S, with the lower end of the S located at the entry section 18 and with the upper end of the S located at the exit section 19.

According to the invention, the device 1 comprises means 24 for closing the exit section 19, movable from an open position to a closed position for the exit of the slider 4 from the shaped channel 17 through the exit section 19 and adapted to prevent the re-entry of the slider 4 into the shaped channel 17 through the exit section 19.

In greater detail, the closing means 24 comprise a closing leaf 25 which can engage to abut with the exit section 19 and defines a sliding plane that is inclined with respect to the direction of translation 21 for deviating the slider 4 from the position of equilibrium in the approach to the upright member 2 during the translation of the movable crosspiece 3 away from the lower base 6.

The leaf 25 is preferably made of harmonic steel, of the type of steel used for springs and the like; its insertion in the respective fixing seat is preferably achieved by slotting in one of its ends; this permits the leaf 25, when subjected to mechanical stresses from the bottom towards the top, to elastically deform itself at its free end. In particular, the deformations will be manifested along its entire length (starting from the constrained end and towards the free end) and will be particularly evident at its constrained end which (with respect to the point of application of the mechanical stress located at the free end) will have a high moment arm.

Advantageously, second elastic means 26 are provided which consist of a flexion spring associated with the removable coupling means that define the closing leaf 25 in such a way as to operate on the closing means 24 against the movement of the closing means 24 from the closed position to the open position.

In addition, in order to achieve a perfect centering of the movable crosspiece 3 with respect to the frame of the sliding curtain A, there is at least one centering element 27 jointly connected to the lower base 6 and engageable in one of the two side walls that delimit the entry section 18 of the shaped channel 17.

The operation of the automatic locking device 1, particularly for vertically sliding motorised curtains A and the like, is explained below.

With particular reference to Figures from 1 to 5, during a first descending movement of the movable crosspiece 3, the pin 7 enters the first section 22 of the shaped channel 17 through the entry section 18.

During such insertion the bracket 9 performs a clockwise rotation with respect to the hinge axis 8, putting the first elastic means 5 under tension.

Such descending movement proceeds until the movable crosspiece 3 comes into contact with the lower bases 6 of the upright members 2.

Subsequently, the movable crosspiece 3 rises until, owing to the elastic returning action of the first elastic means 5, the pin 7 enters the trap

section 20 by settling in the concavity described previously, so as to achieve the locking of the movable crosspiece 3 with respect to the upright members 2.

With particular reference to Figures from 6 to 9, the unlocking of the movable crosspiece 3 with respect to the upright members 2 takes place by lowering the movable crosspiece 3 again so that the pin 7 enters the second section 23 of the shaped channel 17, until the pin 7 rests against the closing leaf 25.

Proceeding with the lowering of the movable crosspiece 3, the pin 7, jointly connected to the bracket 9, is pressed against the closing leaf 25, which is elastically deformed until it allows the pin 7 to exit from the exit section 19 of the shaped channel 17.

As soon as the pin 7 has exited from the second section 23 of the shaped channel 17, the second elastic means 26 return the closing leaf 25 to its initial position.

Once in this condition, the movable crosspiece 3 may be raised thus permitting the opening of the vertically sliding curtain A.

During such raising, the pin 7 slides along the inclined plane defined by the closing leaf 25, deviating the bracket 9 from its position of equilibrium, i.e. making it rotate anticlockwise about the hinge axis 8, until the movable crosspiece 3 has exited from the zone of interest of the bracket 9, so as to permit the bracket 9 to return to its starting position.

With particular reference to Figure 10, if it is not desired to achieve such automatic locking, it is sufficient to manually move the bracket 9 by making it rotate anticlockwise about the hinge axis 8 to accommodate it in a special space defined by the respective upright member 2, outside the zone of interest of the movable crosspiece 3.

Indeed, the pin 7 can be engaged under a special tab, not shown in the figures, thus preventing the elastic reaction of the first elastic means 5 from returning the bracket 9 to its condition of equilibrium.

To unlock it, it is sufficient to slightly lift the locking tab which will deform sufficiently to permit the first elastic means 5 to return the bracket 9 to its condition of equilibrium.

In practice it has been found that the mechanical locking device, particularly for curtains A sliding on slides and the like, according to the present invention, fully achieves the intended aim and objects since it allows the automatic locking and unlocking of a vertically sliding curtain A, be it operated manually or be it operated by drive means, with greatly reduced dimensions in comparison to the state of the art.

Such reduction in dimensions makes it possible to have a shaped channel with a transition section that is sufficiently large to permit the recovery of any play owing to the installation of the window frame with the typical tolerances of the building industry and, in particular, of the window frame industry.

In particular, from analysing the operation, the reduction in dimensions and bulk corresponds to a higher reduction in the travel of the slider 4 with respect to the shaped channel 17, if compared with known devices.

Both vertically and horizontally, the slider 4 will need to move, with respect to the channel 17, through a distance in the order of around ten millimetres or even less (in reality the vertical travel is achieved by the channel 17 which moves in joint connection with the crosspiece 3, whereas the horizontal travel is actually achieved by the slider 4).

In particular, the vertical travel of the crosspiece 3 (and therefore of the channel 17) necessary to pass from the configuration where the slider 4 is locked (the configuration shown in Figure 5) to the configuration of its exit from the channel 17 (the configuration shown in Figures 6 and 11) will be of a very few millimetres: according to one particular embodiment such travel can even be just 6 mm.

A further advantage of the mechanical locking device according to the

present invention is to be able to easily deactivate the mechanical locking device without undermining the operation of the sliding curtain A.

This functionality is useful, for example, on a day of strong wind, for preventing the risk of breaking the curtain A owing to excessive load.

A further advantage of the mechanical locking device, according to the present invention, is that it permits an easy calibration of the drive means if present.

Indeed, for both of the foregoing advantages, the slider can be locked inside the rail defined by the respective upright member and therefore the drive means can be operated to self-learn the "ZERO POINTS" even when the device is completely assembled and installed.

The mechanical locking device, particularly for curtains A sliding on slides and the like, thus conceived, is capable of numerous modifications and variations, all within the scope of the appended claims.

For example it will be possible to fit the locking device 1 with a gasket seal B designed to prevent draughts coming from below the crosspiece 3 in cases where the curtain A is intended to protect the environment which it delimits both from the cold and from the wind.

Attention is also drawn to the presence of a hole C on the top of the cap 15, at the zone crossed by the curtain A for its fixing to the crosspiece 3.

It is possible to insert a locking screw into this hole C which will have the function of stably constraining the curtain A to the crosspiece, ensuring that any relative movements are prevented. The application of other methods for fixing the curtain A to the crosspiece 3 and/or to the cap 15 is not excluded.

Given that the number of caps 15 according to the device 1 is two, placed at the opposite ends of the crosspiece 3, it should be noted that when the slider 4 is locked in the trapped position inside the channel 17 (configuration shown in Figure 5) the “V”-shaped conformation of the channel 17 (the slider 4 being engaged at the lower vertex of the “V”) will

ensure an automatic centering of the crosspiece 3 and of the curtain A: any misalignments will be distributed between the two opposing caps 15 with consequent optimal centering of the curtain A.

In addition, all the details may be replaced by other technically equivalent elements.

In practice the materials employed, as long as they are compatible with the specific use, as well as the dimensions and the contingent shapes, may be any according to requirements and to the state of the art.

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 interpretation of each element identified by way of example by such reference signs.

CLAIMS

1. A mechanical locking device (1), particularly for vertically sliding motorised curtains (A) and the like, comprising a slider (4) installed near the lower base (6) and associable with an upright member (2) of a frame for sliding curtains (A) or the like, said slider (4) being able to oscillate, against or by the action of first elastic means (5), about a position of its equilibrium, means for removable coupling of said slider (4) being also provided, which are associable with the movable crosspiece (3) of said sliding curtain (A) near at least one of its end sections (16) for locking said movable crosspiece (3) near said lower base (6) of said upright member (2), said removable coupling means comprising a shaped channel (17) running from an entry section (18) to an exit section (19) and defining at least one trap section (20), respectively, for guiding said slider (4) during the movement of said movable crosspiece (3) and for locking said slider (4) in said shaped channel (17), characterised in that it comprises means (24) for closing said exit section (19), said closing means (24) being movable from an open position to a closed position to permit the exit of said slider (4) from said shaped channel (17) through said exit section (19), and being adapted to prevent the re-entry of said slider (4) into said shaped channel (17) through said exit section (19).

2. The device (1) according to claim 1, characterised in that it comprises second elastic means (26) acting on said closing means (24) against the movement of said closing means (24) from said closed position to said open position.

3. The device (1) according to one or more of the preceding claims, characterised in that said closing means (24) comprise a closing leaf (25) which can be engaged to abut with said exit section (19) and define a sliding plane that is inclined with respect to the direction of translation (21) of said movable crosspiece (3) for deviating said slider (4) from said position of equilibrium in the approach to said upright member (2) during the translation

of said movable crosspiece (3) away from said lower base (6).

4. The device (1) according to one or more of the preceding claims, characterised in that said second elastic means (26) comprise a flexion spring associated with said removable coupling means and defining said closing leaf (25).

5. The device (1) according to one or more of the preceding claims, characterised in that it comprises a bracket (9) substantially L-shaped and hinged, at the corner of said L, to said upright member (2) near said lower base (6), the end sections (10, 11) of said bracket (9) being associated, respectively, with said first elastic means (5) and with said slider (4), said bracket (9) lying on a plane substantially parallel to the sliding plane of said movable crosspiece (3) with its hinge axis (8) with said upright member (2) substantially perpendicular to said sliding plane of said movable crosspiece (3).

6. The device (1) according to one or more of the preceding claims, characterised in that said slider (4) comprises a pin (7) oriented substantially parallel to said hinge axis (8) and jointly connected in translation to said bracket (9) at a first one of said end sections (10).

7. The device (1) according to one or more of the preceding claims, characterised in that said first elastic means (5) comprise at least one helical spring (12) interposed between a second one of said end sections (11) and a fixed element (13) of said upright member (2).

8. The device (1) according to one or more of the preceding claims, characterised in that said entry section (18) and said exit section (19) of said shaped channel (17) are substantially mutually opposite and opposite with respect to said shaped channel (17) and are substantially aligned with each other along a direction substantially parallel to said direction of translation (21), said entry section (18) facing said lower base (6).

9. The device (1) according to one or more of the preceding claims, characterised in that said shaped channel (17) comprises a first section (22)

running from said entry section (18) and inclined with respect to said direction of translation (21) away from said upright member (2) for deviating said slider (4) from said position of equilibrium, a second section (23) running from said exit section (19) substantially parallel to said direction of translation (21) in the direction of said entry section (18), said at least one trap section (20) running from said first section (22) to said second section (23) and defining a concavity facing the direction of opening of said sliding curtain (A) for its engagement with said slider (4) returned substantially to said position of equilibrium by said first elastic means (5).

10. The device (1) according to one or more of the preceding claims, characterised in that it comprises at least one centering element (27) jointly connected to said lower base (6) and engageable in said entry section (18) of said shaped channel (17) for centering said movable crosspiece (3) with respect to said frame of said sliding curtain (A).

11. The device (1) according to one or more of the preceding claims, characterised in that the relative travel, in both directions of motion, both in the vertical direction and in the horizontal direction, of said slider (4) with respect to said channel (17) is less than or equal to 15 mm, and preferably less than 10 mm.

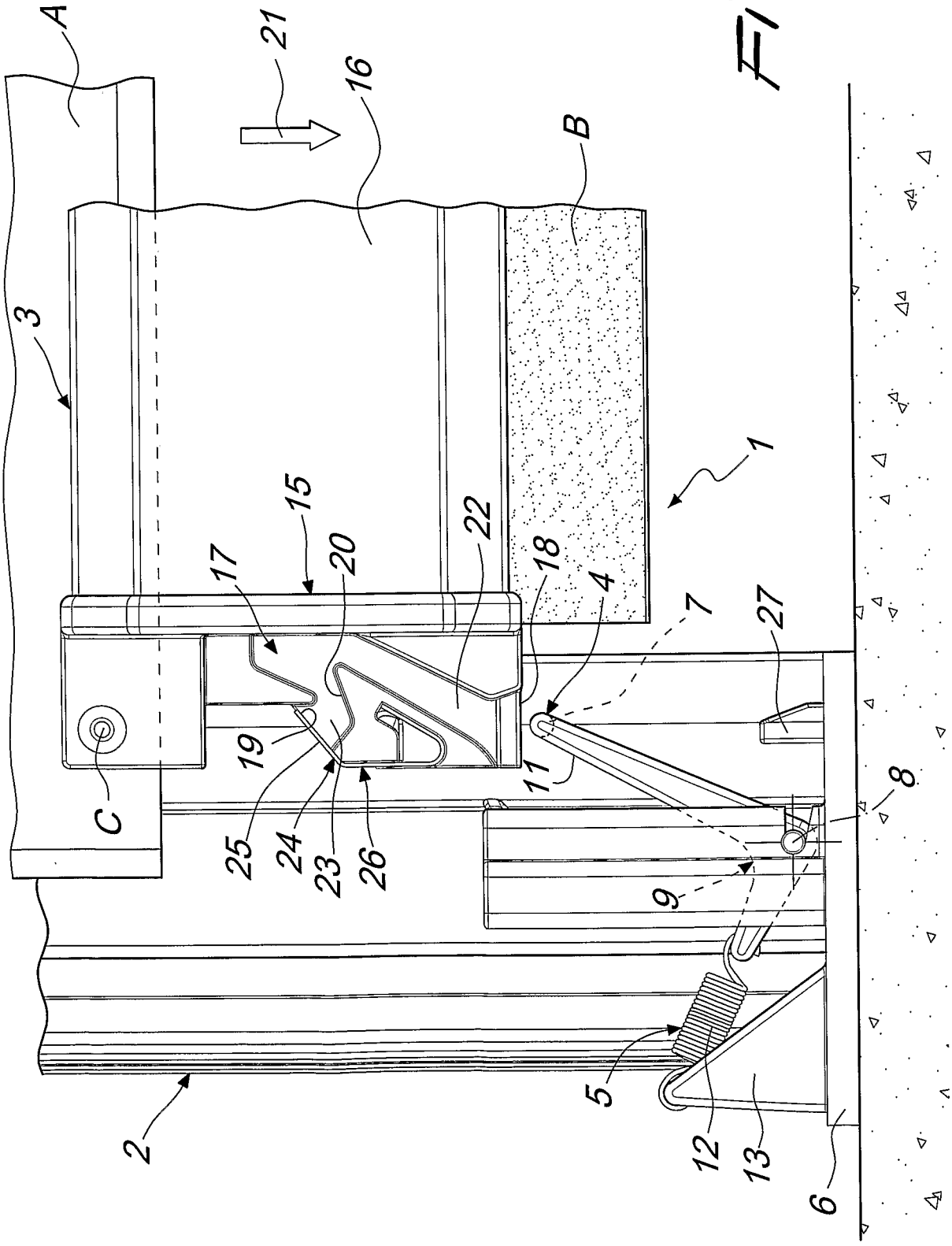
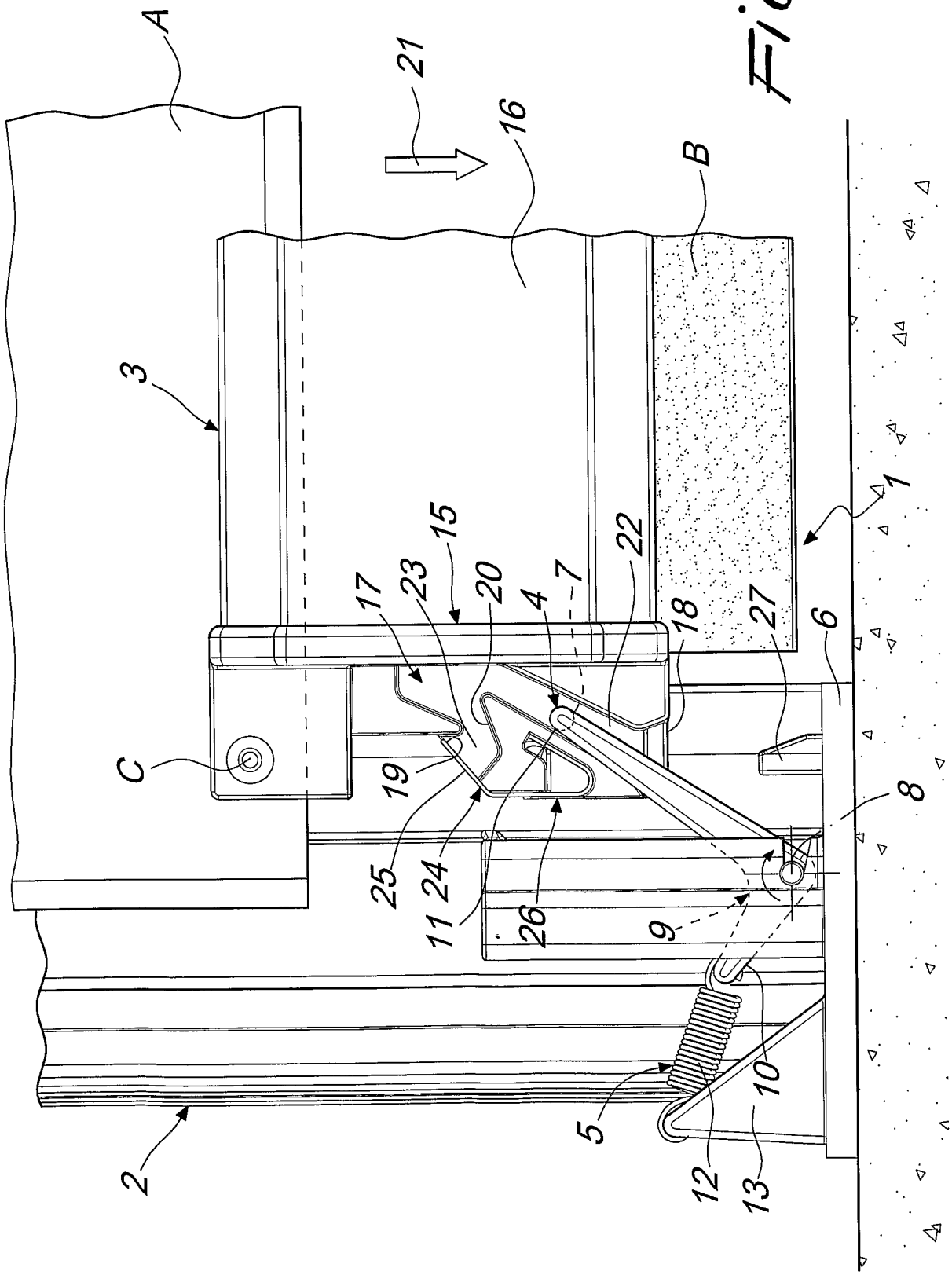


Fig. 1

Fig. 2



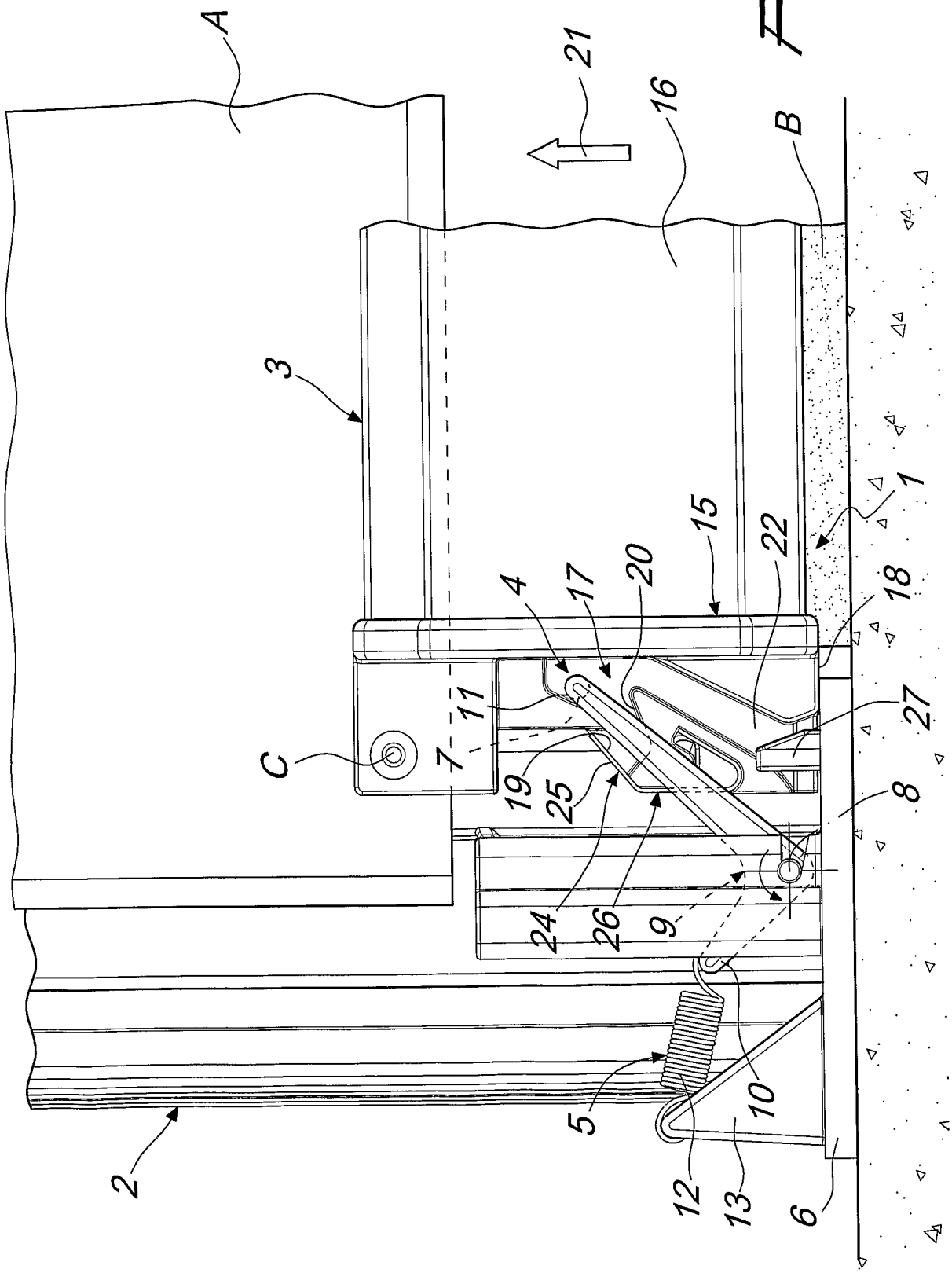


Fig. 3

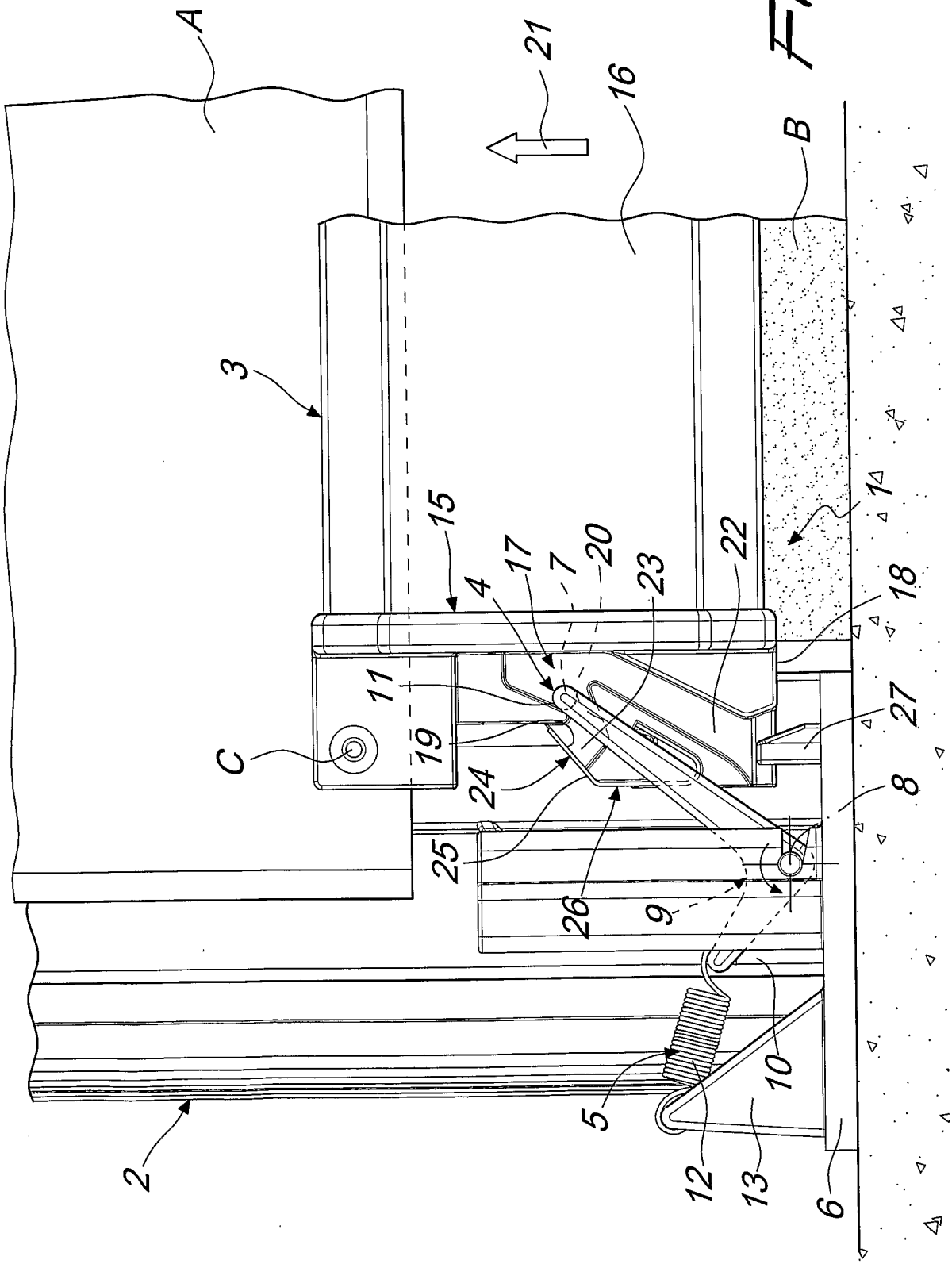


Fig. 4

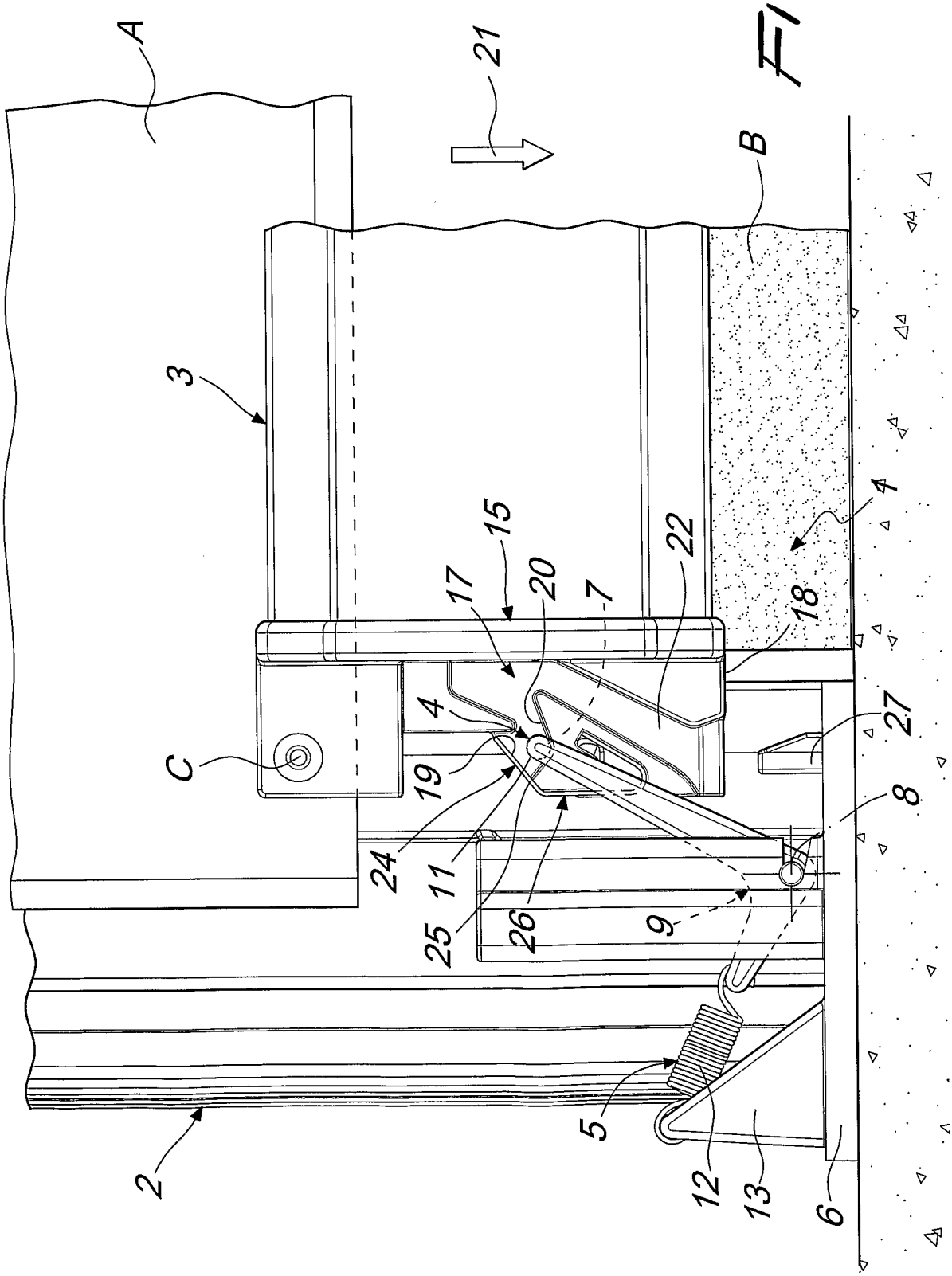


Fig. 5

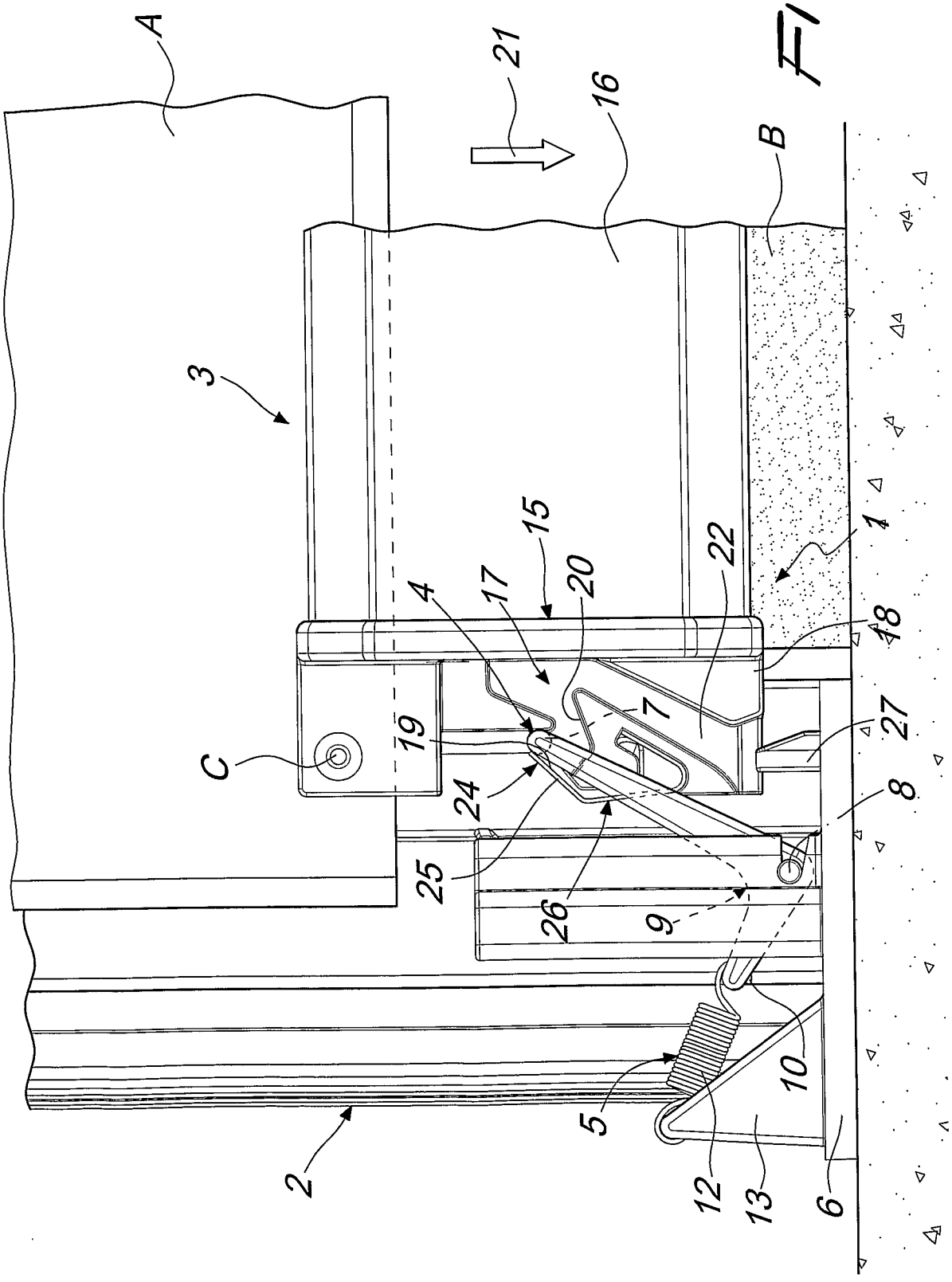


Fig. 6

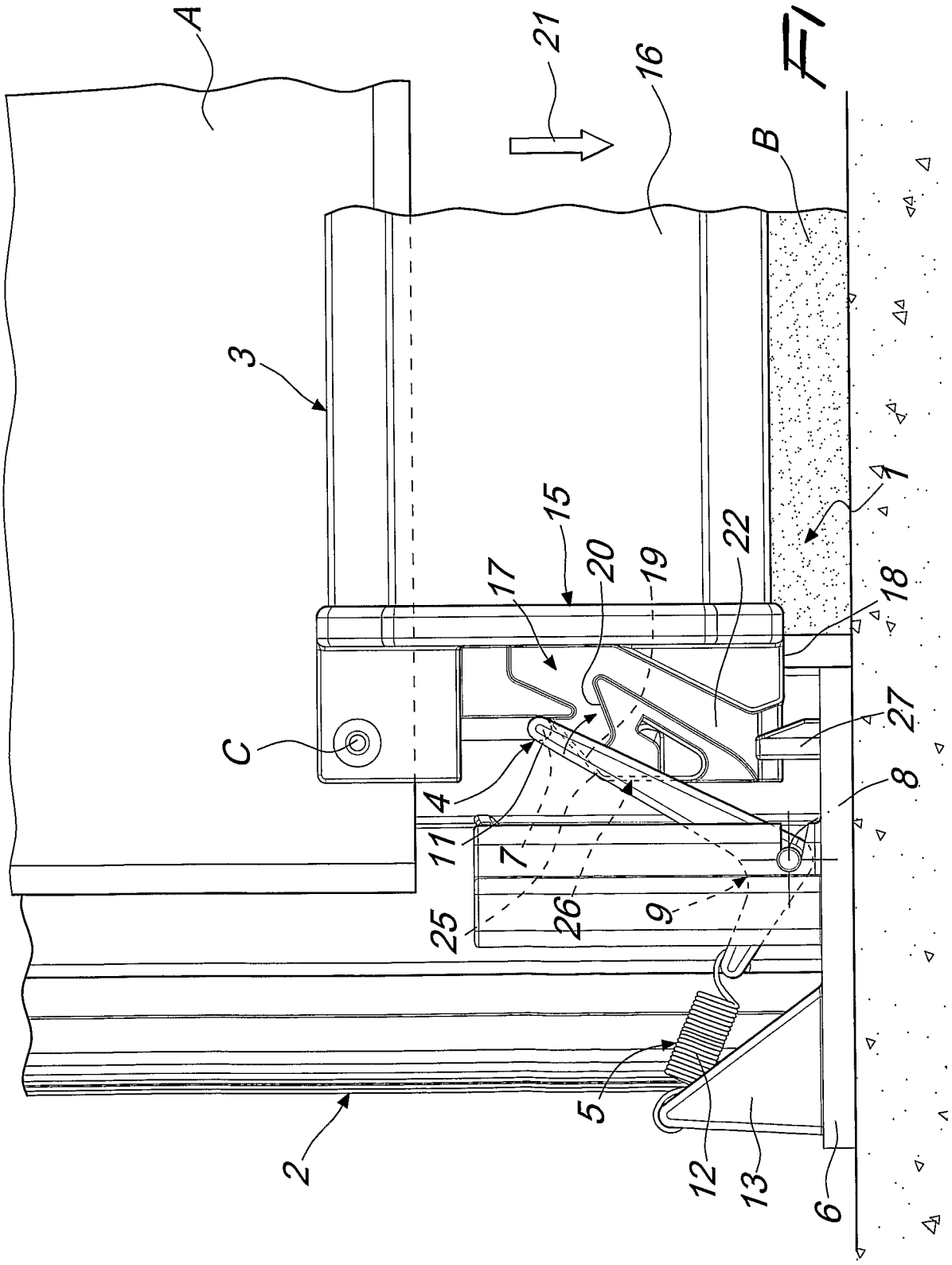


Fig. 7

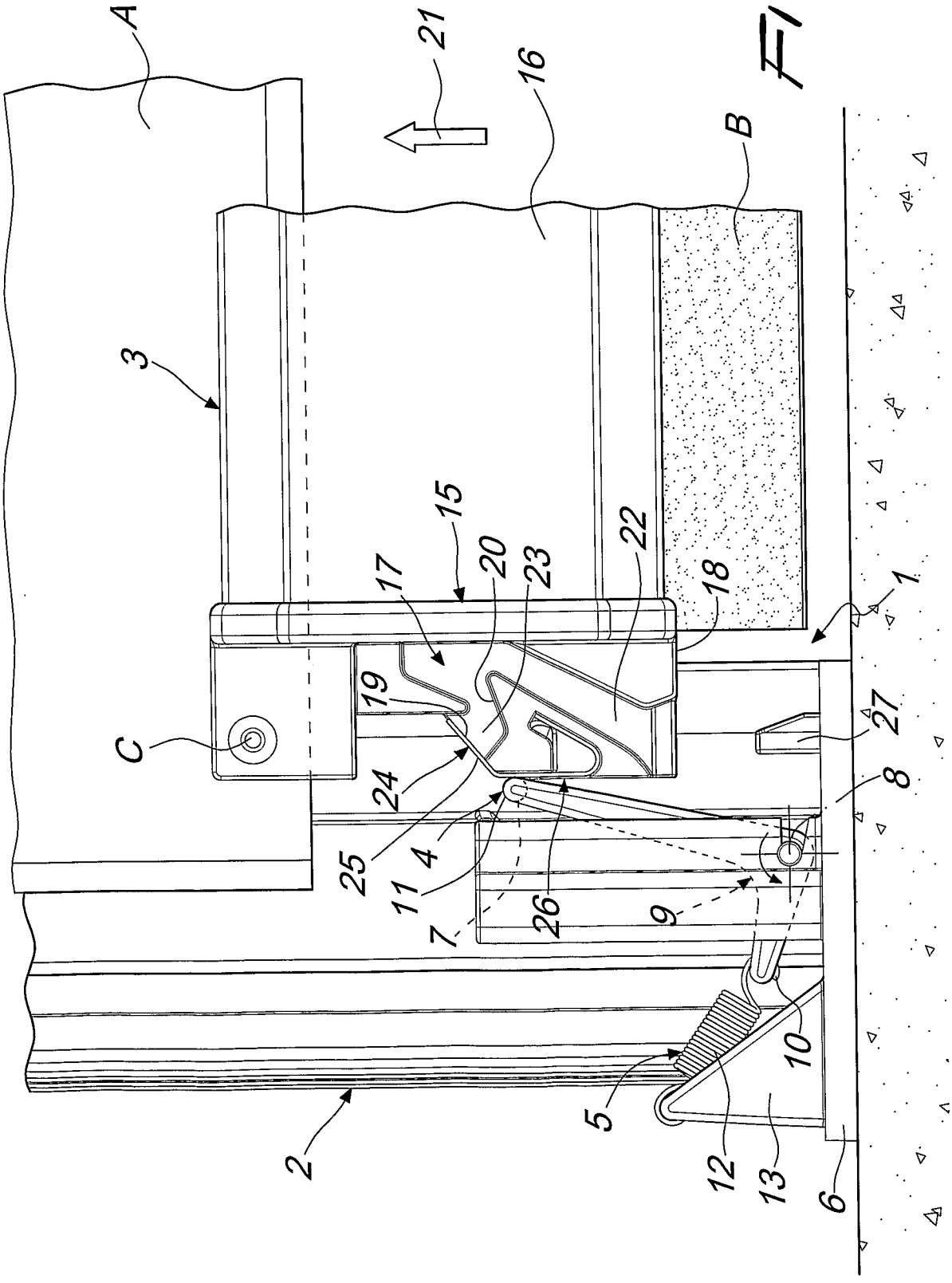


Fig. 8

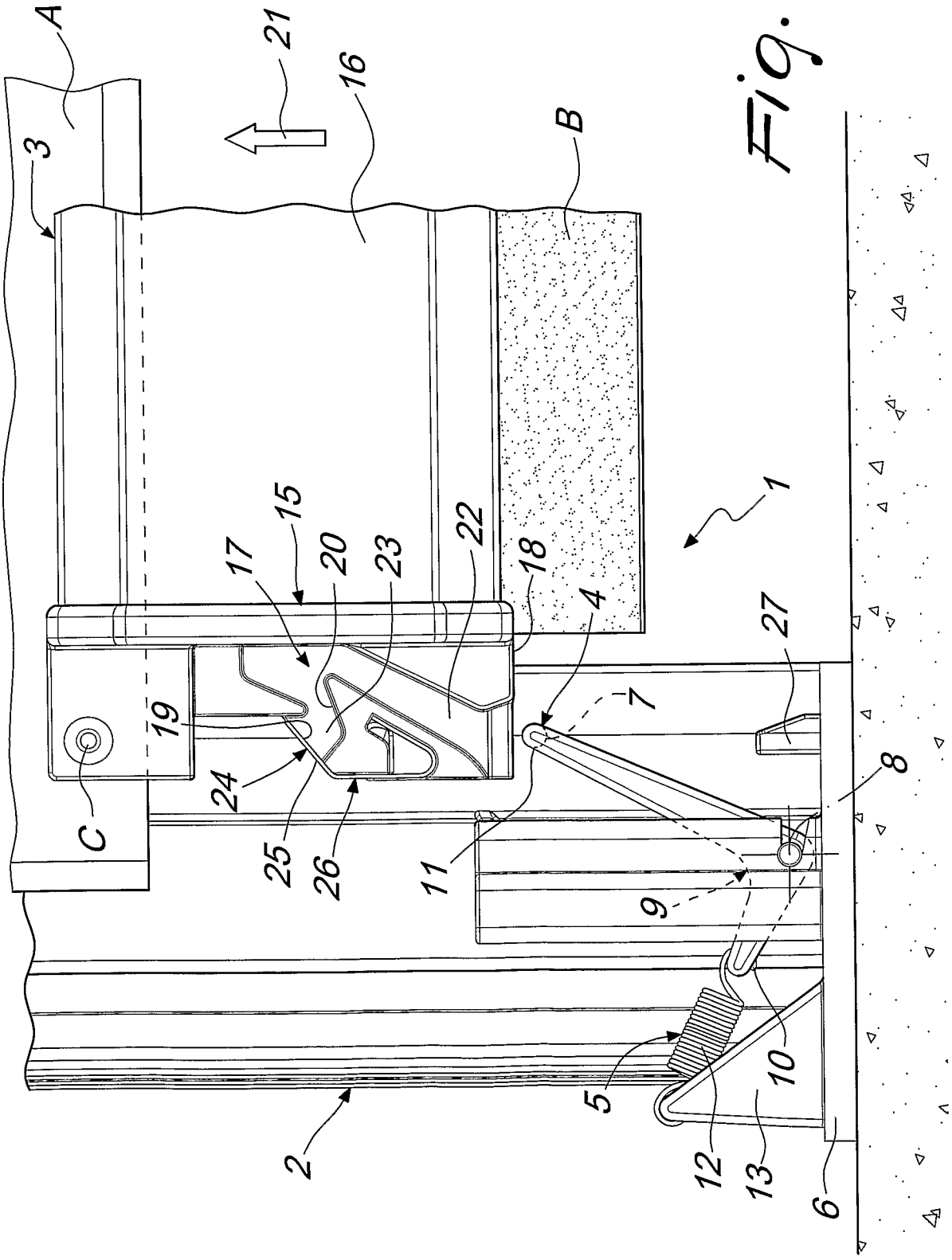
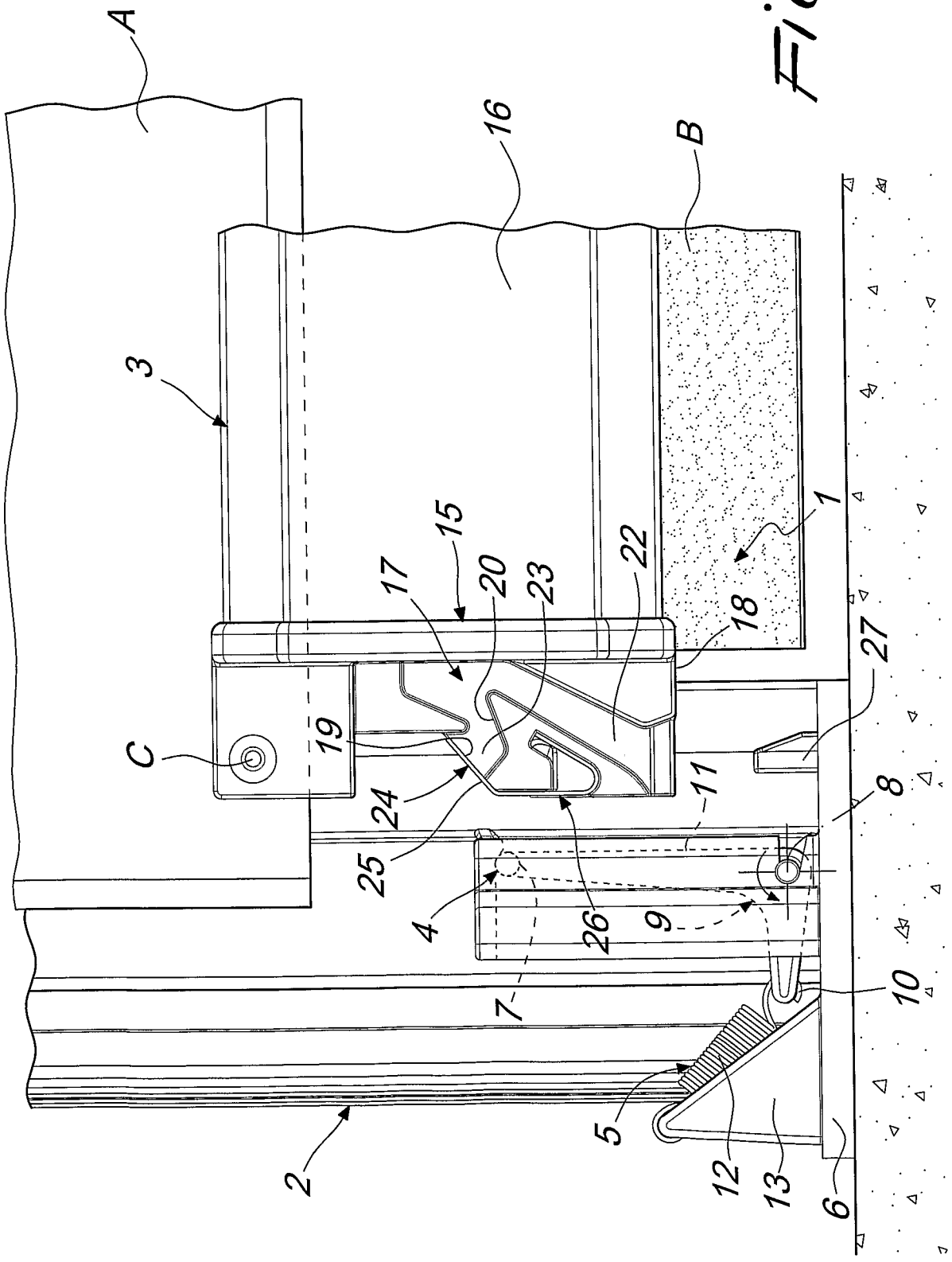


Fig. 9

Fig. 10



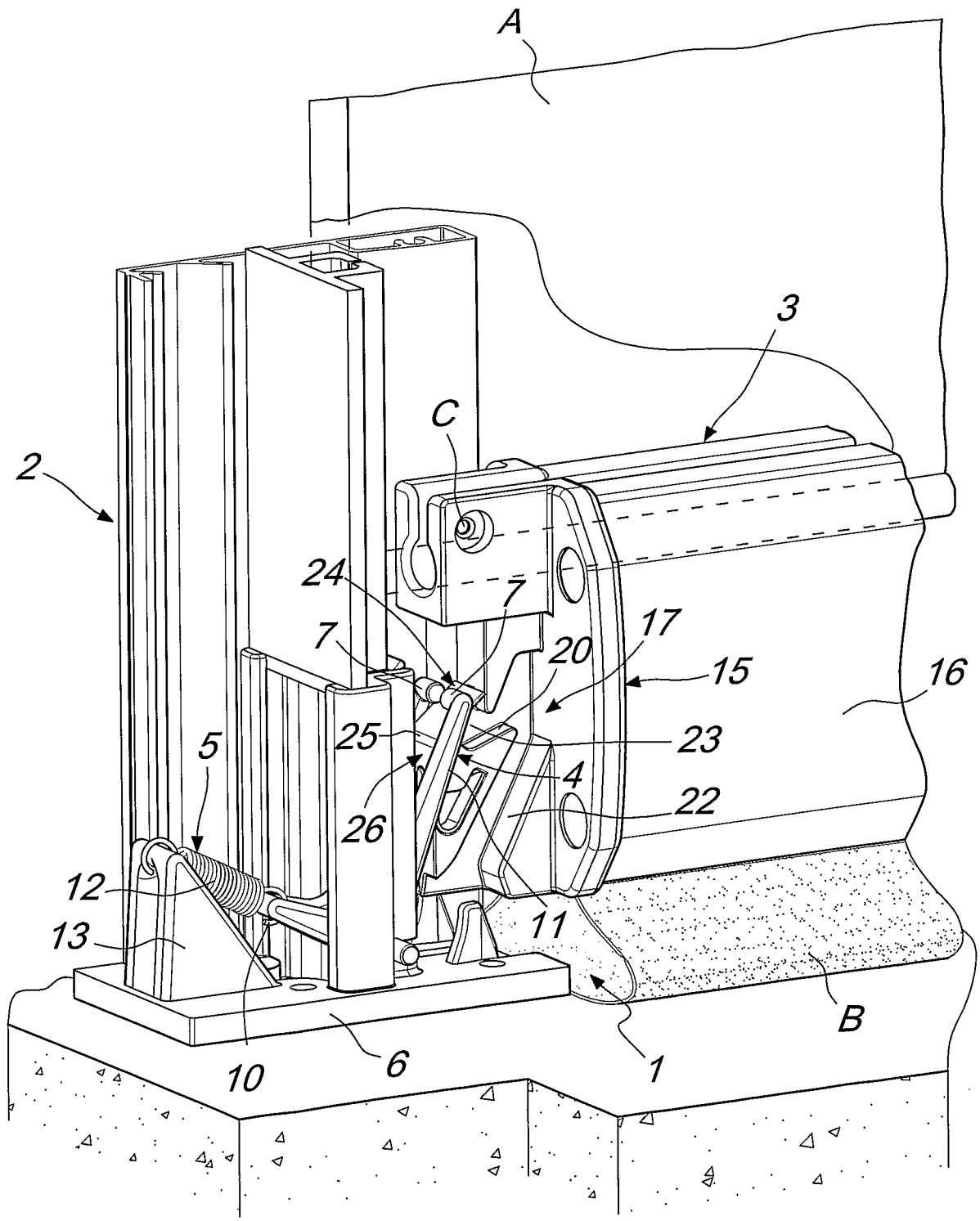


Fig. 11

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2010/000065

A. CLASSIFICATION OF SUBJECT MATTER
INV. E06B9/58 E06B9/82
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	EP 0 305 081 A2 (HUNTER DOUGLAS IND BV [NL]) 1 March 1989 (1989-03-01) the whole document -----	1,3,5-11 2,4
Y	DE 44 27 298 A1 (WAREMA RENKHOFF GMBH & CO KG [DE]) 15 February 1996 (1996-02-15) the whole document -----	2,4

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 March 2011	23/03/2011

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Geivaerts, Dirk

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IT2010/000065

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0305081 A2	01-03-1989	DE 3865598 D1	21-11-1991
		ES 2025781 T3	01-04-1992
		GB 2211540 A	05-07-1989
DE 4427298 A1	15-02-1996	NONE	