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(54) Device for locking a door

(57) The invention relates to a device for locking a door which can be mounted in a door (1), comprising: a housing, an operable push element (3a,3b) which is connected to the housing and which is tiltable relative to the housing when activated, a bolt (5) movable between a locking position and an opening position, and a rotatable coupling element (4a,4b) coupled between the bolt and the push element for causing, through a rotation of the coupling element, a movement of the bolt from the locking position to the opening position upon activation of the push element. The invention is characterized in that the push element is arranged in an access to a chamber in the housing, that in a starting position the push element is adapted to block the access to the chamber, and that the push element is tilted into the chamber when activated, wherein the chamber is accessible to the user.

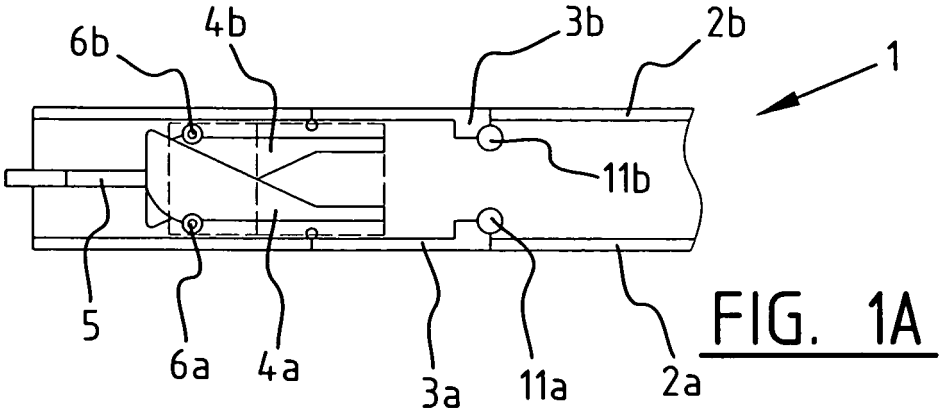

FIG. 1A

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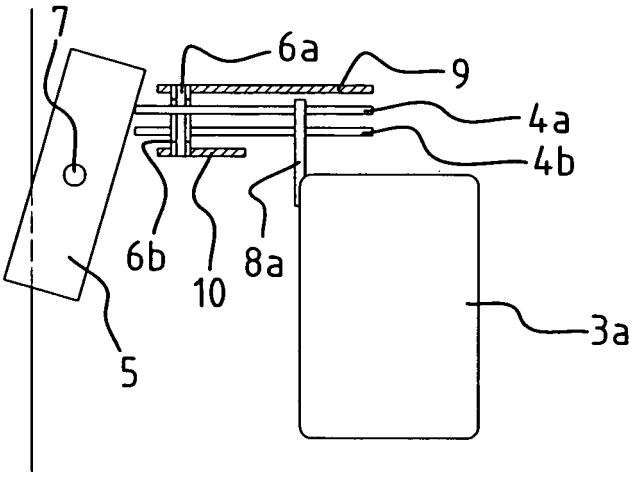


FIG. 1B

Description

[0001] The present invention relates to a device for locking a door, comprising a press and/or pull element which can be connected to the door.

[0002] Inside doors are typically equipped with a spring-mounted locking bar which can be moved from a locking position to an opening position by means of a doorhandle. Doors are further available which are provided with a press element which is electronically connected to a locking element such that the door can be opened by simply pressing a button.

[0003] Known from US 2,784,993 is a doorhandle with a tilting pull element, a coupling element and a movable bolt.

[0004] The present invention has for its object to provide an improved mechanism which can be concealed in practically invisible manner in an inside door as an alternative to a doorhandle.

[0005] For this purpose the invention is distinguished in that the device comprises a housing, an operable push element which is preferably connected to the housing and which is tiltable relative to the housing when activated. The device preferably further comprises a bolt movable between a locking position and an opening position, and a rotatable coupling element coupled between the bolt and the push element for causing, through a rotation of the coupling element, a movement of the bolt from the locking position to the opening position upon activation of the push element. Owing to a simple and robust embodiment of the device, the device can be incorporated in a door. Activation by a user operating the push element herein results in unlocking. The pushing movement on the push element is transmitted via the coupling element to the bolt, which is carried from the locking position to the open position. The door in which the device is mounted can hereby be opened. The housing of the device can be incorporated in the door, or a part grasp the housing is formed by the door. The object of the invention is achieved in that the push element is arranged in an access to a chamber in the housing and that in a starting position the push element is adapted to block the access to the chamber. In the starting position of the device the user thus does not have access to the chamber. It is further recommended that the device is free of further gripping means for operation. The door in which the device is arranged can hereby not be grasped in the starting position, or hardly so, and cannot be opened. The user only has the possibility of activating the push element. According to the invention the push element will tilt into the chamber when activated, wherein the chamber is accessible to the user. The user is hereby able to grasp for instance the chamber for further operation. Through activation the door is unlocked via the coupling element, and can for instance be pushed open. According to the invention a device is thus provided which can be fully incorporated in a door, which can lock the door and which can open the door upon operation of the push element, wherein the push element is free of further specific gripping means.

[0006] The coupling means enable use of the device on two sides of a door. In addition, the device can hereby take a considerably flatter form, and thickening of the door can be dispensed with when the device is mounted in or on the door. The whole device can be received in the door, whereby a price-increasing finish becomes possible.

[0007] The chamber preferably comprises a gripping means for gripping of the device by a user, the gripping means being accessible upon activation. The user can hereby for instance open the door by first unlocking by means of activation, wherein a gripping means becomes accessible due to the activation and the user can open the door, for instance by pulling it toward him/her. According to the invention the push element has a dual function, i.e. operation of the unlocking on the one hand and making the chamber accessible and thereby making it possible for a user to grip the device on the other.

[0008] In a favourable embodiment a biasing means is provided which holds the push element fixedly in the starting position. The biasing results in the access to the chamber always being blocked. In addition, the biasing means can bias the device in the locked position.

[0009] The biasing means is preferably a spring means. The spring means is provided for the purpose of holding at least one of the group of coupling element, push element or bolt in a locking position or starting position.

[0010] It is further favourable to embody the bolt tiltably between a locking position and an opening position. The tilting shaft is preferably mounted in the door. The shaft is preferably a transverse shaft oriented perpendicularly of the door. The bolt of the door can hereby protrude into for instance a lock plate mounted in the door post.

[0011] The coupling element is preferably mounted rotatably around a vertical shaft.

[0012] Further developed possible embodiments are described in the appended dependent claims.

[0013] The invention provides an assembly which consists of three parts and which co-acts in moving a mechanism, such as a lock of a door, out of the locked position. The pushing movement of the user is converted in effective manner into a tilting of the coupling element and a movement of the bolt. The bolt is preferably tiltable, but can also be slidable. The tilting movement of the coupling element is then converted into a sliding movement.

[0014] The push element preferably operates the coupling means through a direct coupling. A pushing movement results in a rotation of the push element and in a rotation of the coupling element. The coupling element preferably moves toward the bolt.

[0015] In a preferred embodiment the coupling element is coupled to the bolt close to an end of the bolt, preferably the end of the bolt which is received in the mechanism. The other end of the bolt is received in the lock plate, which

forms part of the door frame in which the door is preferably arranged in rotating manner.

[0016] By operating the push element the bolt is moved out of the locking position, preferably in that the bar is fully taken up in the mechanism, and the locking is broken. The door can now be opened.

[0017] The push element is preferably incorporated in the door in which the mechanism is arranged. It is hereby possible to dispense with a doorhandle. In addition, the mechanism is prefabricated as a unit and is arranged integrally in the door, whereby fitting costs are reduced.

[0018] The invention also relates to a door provided with a device according to the invention.

[0019] The bolt is preferably coupled to the coupling means or to the mechanism. This is possible by means of biasing, for instance by means of a spring or a magnetic element. The biasing ensures automatic locking of the door/the mechanism when the door is closed. The bolt 'drops' into the lock. In one embodiment the coupling elements and/or the push/pull element are also biased.

[0020] The invention provides an efficient mechanism for locking and unlocking of a door. Because use is made of a number of tiltably coupled elements, the costs of the mechanism are kept low while a robust device is obtained which is little susceptible to wear.

[0021] The push element is preferably a component of a side of the door. The push element and the part of the housing in which the push element is incorporated are preferably arranged in the surface of the side of the door. The push element and the housing of the device do not protrude. A smooth side of the door is hereby obtained. Although such a device is known from US 2,649,322, the application of the rotatable coupling element is not known. The inventor has however realized that the coupling element provides a particular advantage in respect of the flat embodiment of the device.

[0022] Other features and advantages will become apparent from the description of a number of non-limitative exemplary embodiments, with reference to the accompanying drawings, in which:

figures 1(A) and (B)	are respectively a top view and a cross-sectional view of a first embodiment of the mechanism according to the invention in the locking position;
figures 2(A) and 2(B)	are respectively a top view and a cross-sectional view of the first embodiment shown in figure 1 in the pressed-in position of the press/pull element;
figures 3(A) and (B)	are respectively a top view and a cross-sectional view of a second embodiment of the mechanism according to the invention in the locking position;
figures 4(A) and (B)	are respectively a top view and a cross-sectional view of the second embodiment shown in figure 3 in the pressed-in position of the press element.

[0023] The same components are designated with the same reference numerals in the drawings of the different embodiments.

[0024] Figures 1 and 2 show a door 1 with a first wall 2a and a second wall 2b. Arranged in the door is a first embodiment of the mechanism according to the invention. Note that a press/pull element 3a, 3b and associated coupling element 4a, 4b is arranged on each side of the door, although it is equally possible to provide such a mechanism on only one side and to provide a different mechanism on the other side.

[0025] The mechanism has a frame which is formed here for instance by two fixing plates 9,10. The diverse shafts for tilting and/or spring means for biasing can be mounted on the frame. The frame and the mechanism can be prefabricated and can be placed integrally in a lock opening of a door.

[0026] Push element 3a, 3b here takes the form of a flap which is mounted in the plane of the door and which is connected to the door for pivoting around a shaft 11a, 11b parallel to the plane of the door. Flap 3a, 3b is provided with a pin 8a which co-acts with coupling element 4a, 4b.

[0027] The shown embodiment is a push element 3a. The user can grip the mechanism by pushing against surface 3a, for instance by hand. The door can hereby also be pulled/opened toward the user. Displacing the pressing plate in fact creates a handgrip which is not visible in the starting position. This is a considerably value-enhancing effect.

[0028] A bolt 5 is mounted in door 1 for tilting between a locking position (figure 1) and an opening position (figure 2) around a transverse shaft 7 directed perpendicularly of the door.

[0029] Coupling element 4a, 4b is mounted rotatably around a vertical shaft 6a, 6b and forms a coupling between bolt 5 and flap 3a, 3b for the purpose of causing a tilting of bolt 5 from the locking position (figure 1) to the opening position (figure 2) through a tilting of coupling element 4a, 4b when flap 3a, 3b is activated.

[0030] Coupling element 4a, 4b functions as a lever element with a first leg 12a,12b which co-acts with press/pull element 3a,3b and a second leg 13a,13b which co-acts with bolt 5. In the shown embodiment the coupling element is a substantially triangular plate with a first corner point and a first and second side 12a,b and 13a,b meeting at this corner point. The vertical rotating shaft 6a,b is situated close to the side of the door on which the press/pull element is arranged, and the second side is smaller than the thickness of the door such that this side can for instance be moved from a position perpendicular to the door (figure 1) to an oblique position (figure 2), whereby bolt 5 is tilted to the opening position.

[0031] The coupling element enables a flat embodiment of the device according to the invention, while the device

enables operation of the door from two sides.

[0032] In order to hold each coupling element 4a, 4b in a rest position (figure 1) there is provided a first spring means which simultaneously also holds flap 3a, 3b at rest.

[0033] It can be clearly seen in the figures that the device according to the invention can be built into and incorporated in a door. The device has no parts protruding from the sides of the door. An aesthetic effect is hereby achieved which is value-enhancing. The push elements are flush with the sides of the door.

[0034] The housing is always incorporated in the door. The housing is adapted for placing of the various hinges and bearings. In another embodiment the housing of the device is formed by the door itself. Operations are then carried out in the door itself for placing of the hinges and bearings.

[0035] Figure 2a shows how push element 3a is tilted into the door. This is possible because the door is cut-away at this position. An open space is present there which forms a chamber. The push element is placed such that the chamber is not accessible from the outside in the starting position as shown in figure 1a. The respective push elements close off the respective accesses to the chamber lying between the push elements in the door. Only after activation of one of the push elements, wherein the push element is moved into the chamber, is the chamber accessible from outside.

[0036] In the unlocked position, after activation of the push element, a user can for instance grip an edge of the chamber and thereby pull the door toward him/her, whereby the door can be opened. The edge of the chamber is then a gripping means. In the starting position a gripping means which can be gripped by a user is not present on the side of the door. Only after activating the push element does a gripping means become available. In another embodiment an additional gripping means is present in the chamber between push elements 3a,3b.

[0037] The operation of the mechanism will now be elucidated briefly on the basis of the first embodiment shown in figures 1 and 2. In figure 1 the system is at rest. The door is closed because locking plate 5 hooks into a lock plate (not shown). When flap 3a is pressed in with the hand as shown in figure 2, this operation causes coupling element 4a to tilt to an activated position in which the second leg 13a of the coupling element presses against bolt 5 and thus moves it into the opening position, whereby door 1 is unlocked.

[0038] There can be a coupling between bolt 5 and coupling elements 4a and 4b, whereby the bolt is held in the locked position, for instance by means of spring means or a magnet. The spring means can be arranged at various positions, for instance also between pull/push elements 3a and 3b. Elements 3a,3b,4a,4b and 5 are hereby held in the locked position.

[0039] In an embodiment the bolt takes a sloping form so that it can tilt from the locked position when the door is moved from an opened position to the closed position. The bolt will not then block the closing but will move independently to the unlocked position, whereby the door can be closed. Immediately after closing, the bias will move the bolt back to the locking position and the bolt drops into the lock plate (not shown).

[0040] Figures 3 and 4 show a second embodiment of the mechanism according to the invention. The operation of this mechanism is largely the same. In the figure a mechanism is only shown on a side 2a of door 1, although an optionally similar mechanism can be provided on the other side.

[0041] There are differences in coupling element 4 and press/pull element 3. The coupling element is here not triangular but V-shaped, with a first leg 12 and a second leg 13. The press/pull element is here a pressable button 3 with which the first leg 12 is pressed in, the coupling element tilts and the second leg presses against bolt 5 in order to unlock the door.

[0042] The invention is not limited to the exemplary embodiments illustrated above, and the skilled person will appreciate that many modifications can be envisaged without departing from the scope of the invention, this scope being defined solely by the following claims.

Claims

1. Device for locking a door which can be mounted in a door, comprising:

- a housing,
- an operable push element which is connected to the housing and which is tiltable relative to the housing when activated,
- a bolt movable between a locking position and an opening position, and
- a rotatable coupling element coupled between the bolt and the push element for causing, through a rotation of the coupling element, a movement of the bolt from the locking position to the opening position upon activation of the push element, **characterized in that** the push element is arranged in an access to a chamber in the housing, that in a starting position the push element is adapted to block the access to the chamber, and that the push element is tilted into the chamber when activated, wherein the chamber is accessible to the user.

2. Device as claimed in claim 1, wherein a gripping means for gripping of the device by a user is arranged in the

chamber, the gripping means being accessible upon activation.

3. Device as claimed in claim 1 or 2, wherein a biasing means holds the push element fixedly in the starting position.

4. Device as claimed in claim 3, wherein the biasing means is a spring means provided for the purpose of holding at least one of the group of coupling element, push element or bolt in a locking position or starting position.

5. Device as claimed in any of the claims 1-4, wherein the bolt is tiltable.

6. Device as claimed in claim 5, wherein the bolt can be mounted in a door and is tiltable around a transverse shaft oriented perpendicularly of the door.

7. Device as claimed in any of the claims 1-6, wherein the coupling element is mounted rotatably around a vertical shaft.

8. Device as claimed in claim 7, wherein the coupling element substantially has the cross-sectional form of a triangle with a first corner point and a first and second adjacent side, wherein the vertical rotating shaft is situated close to this corner point and the push element co-acts with the first side and the bolt with the second side.

9. Device as claimed in any of the foregoing claims, wherein the push element can be connected to the door for pivoting around a shaft parallel to the plane of the door.

10. Device as claimed in any of the foregoing claims, wherein the coupling element is a lever element with a first leg which co-acts with the push element and a second leg which co-acts with the bolt.

11. Device as claimed in any of the foregoing claims, wherein the coupling element is plate-like.

12. Device as claimed in any of the foregoing claims, wherein the push element is provided with a vertical pin which, when the push element is pressed in, carries the coupling element from its rest position to an activated position, whereby the bolt moves to the opening position.

13. Door having mounted therein a device for locking a door as claimed in any of the claims 1-12, wherein the push element is arranged on at least one side of the door, and wherein the bolt protrudes out of the door in the locking position.

14. Door as claimed in claim 13 to the extent dependent on claim 8, wherein the second side is smaller than the thickness of the door.

15. Door as claimed in claim 13 or 14, wherein the push element is a flap mounted in the plane of the door.

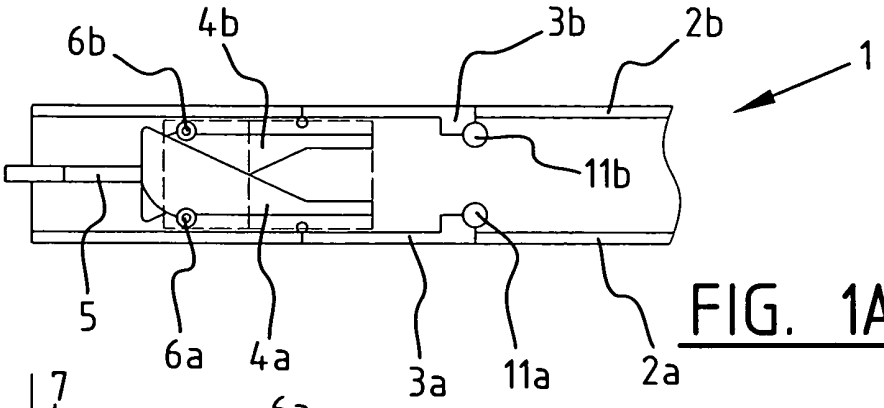


FIG. 1A

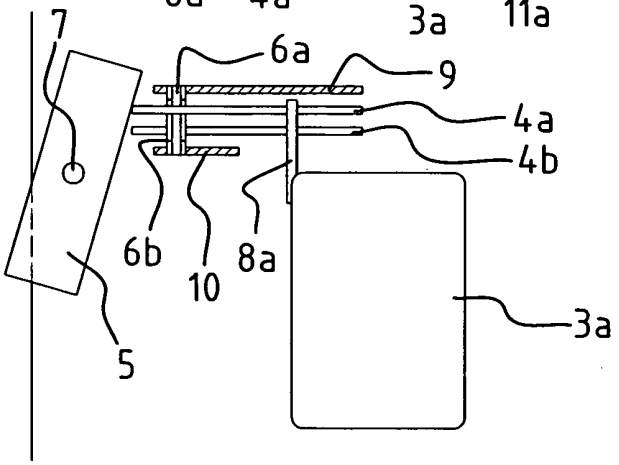


FIG. 1B

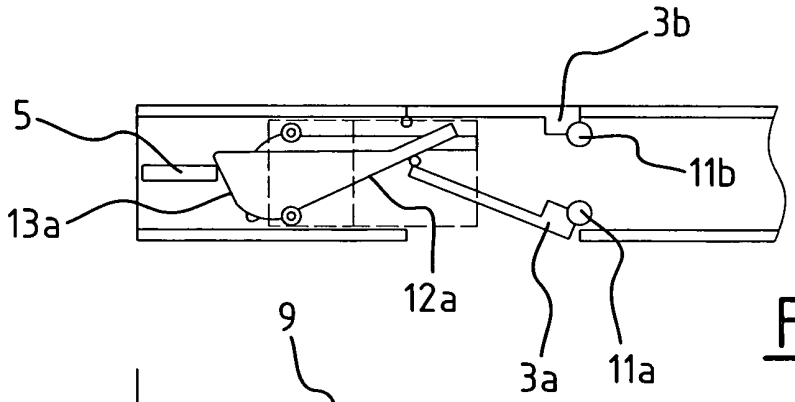


FIG. 2A

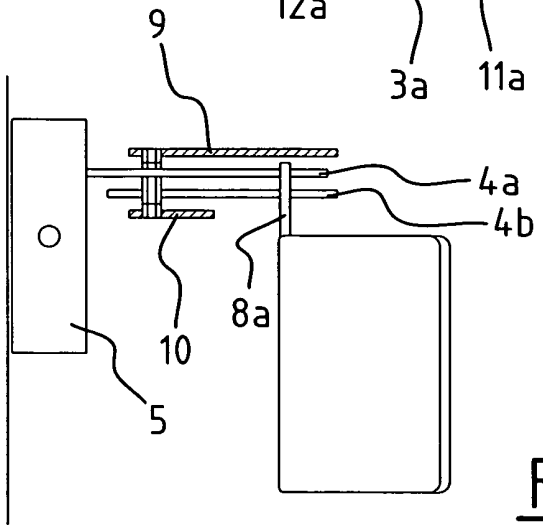
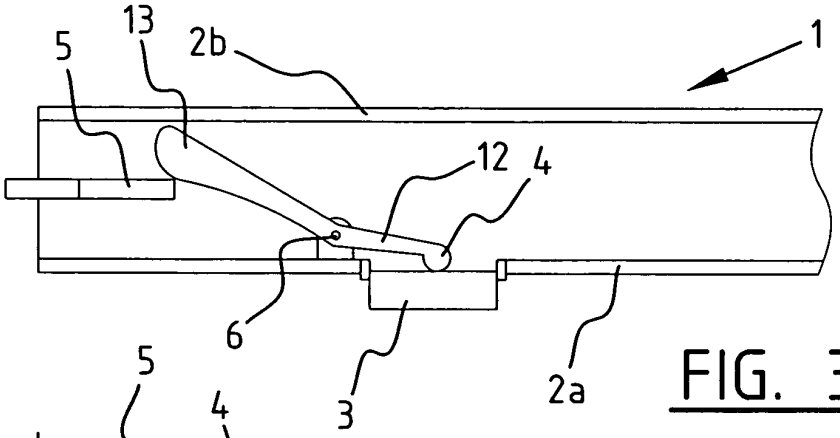


FIG. 2B



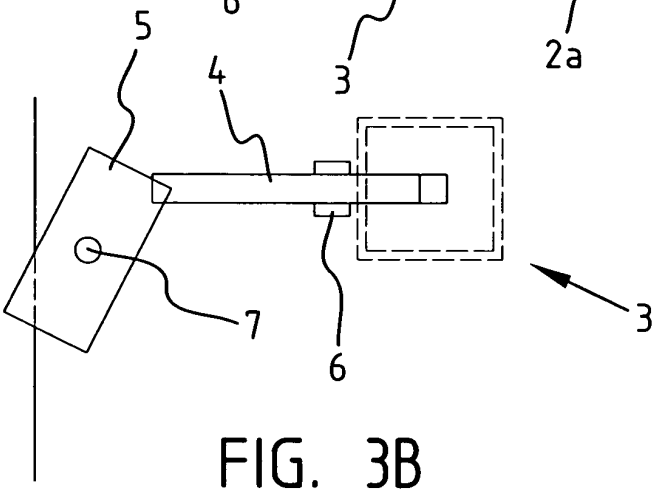
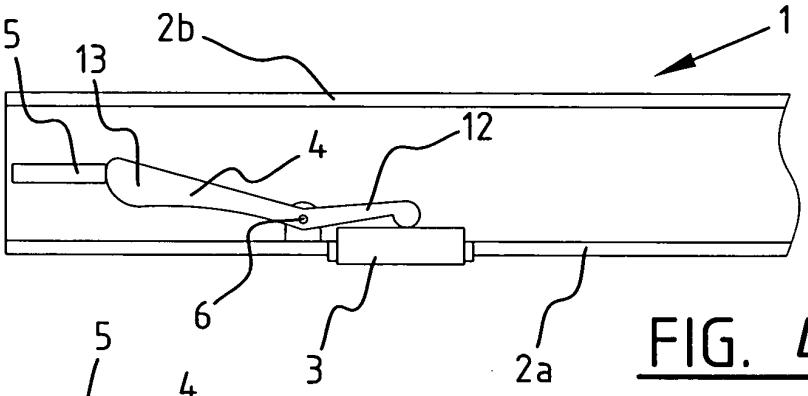


FIG. 3A

FIG. 3B



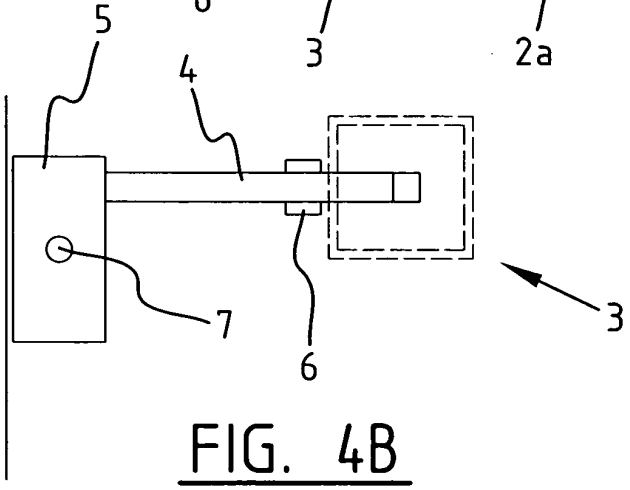


FIG. 4A

FIG. 4B

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EUROPEAN SEARCH REPORT

Application Number
EP 06 07 6326

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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	24 October 2006	Henkes, Roeland

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
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