



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.11.2007 Bulletin 2007/48

(51) Int Cl.:
B66B 9/16 (2006.01) B66B 9/193 (2006.01)

(21) Application number: **07425287.5**

(22) Date of filing: **16.05.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

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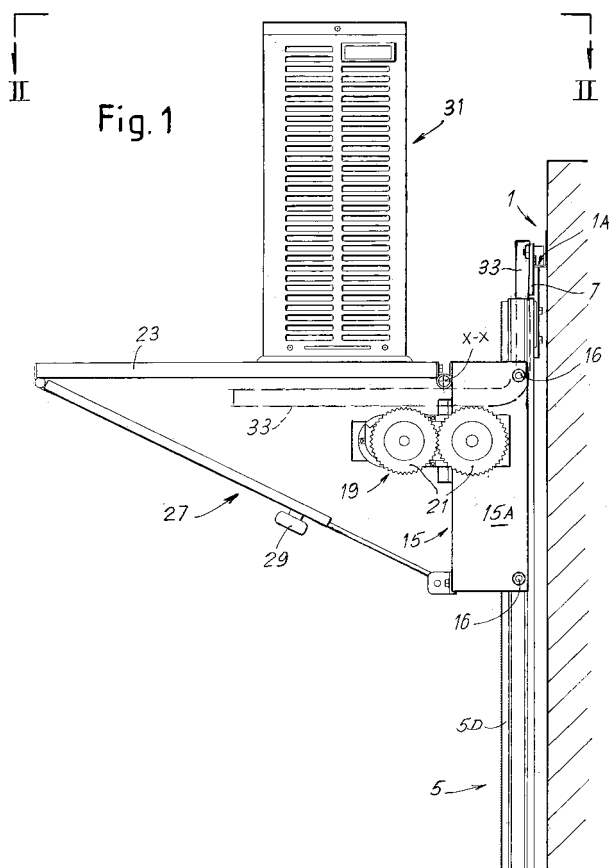
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(30) Priority: **23.05.2006 IT FI20060123**

(54) **Lifting apparatus for wall mounting**

(57) The apparatus comprises a lifting carriage (15) with a supporting surface (23), the carriage being slidable along a load-bearing element (5) extending linearly. The carriage (15) can be made to translate along the load-bearing element (5) by means of a gear motor (19) there-

of, an output gear (22) of which meshes with a rack (5D) integral with said load-bearing element (5). During use, said load-bearing element (5) is suitable to be hung vertical to a wall (P), or nearly vertical in proximity thereto, through extemporaneous connection means (1, 7; 103).



Description

[0001] The invention relates to a lifting apparatus for wall mounting, for example to fasten to a wall in a position raised from the ground the outdoor unit of a split type air conditioner, a wall-mounted boiler or the like. In general, hoists are used for this type of mounting, which however have some drawbacks including the need for a connection point of the hoist at a height above the mounting height of the object to be installed. The use of a hoist is therefore unfeasible when the free height above the installation position of the object is limited by a ceiling or the like in proximity to this position.

[0002] In particular, the invention concerns an apparatus, which comprises a lift carriage with a supporting surface articulated thereto fastenable in a horizontal position, on which to place the object to be mounted and any other materials required for the work, such as tools and the like. The carriage is slidable through guide means along a load-bearing element extending linearly in a vertical or nearly vertical direction.

[0003] According to the invention, the carriage can translate along the load-bearing element by means of a gear motor thereof, the output gear of which meshes with a rack integral with said load-bearing element extending according to the length thereof. Moreover, to mount the object to be installed, said load-bearing element is suitable to be hung vertical to a wall, or nearly vertical, in proximity thereto, through extemporaneous connection means.

[0004] In a preferred embodiment of the invention, said carriage guide means on the load-bearing element comprise two raceways fastened at opposite sides of the load-bearing element and two pairs of wheels fitted to the carriage and suitable to turn with a small degree of clearance inside the respective raceways. Moreover, said load-bearing element can be composed of several linear sections aligned and coupled to one another end to end.

[0005] Said means for fastening the load-bearing element in a vertical position can include a supporting cross member to be fastened in advance to the wall, said cross member being provided with seats suitable to receive members for fastening the upper end of said load-bearing element. Said cross member can also be the same supporting cross member of the object to be mounted on the wall, and in this case also has seats for fixing brackets of the object.

[0006] Therefore, with the apparatus according to the invention, after having hung the load-bearing element on the wall and after having inserted the carriage in the guide by meshing said gear with the rack, an operator can raise and lower the carriage by means of a push-button panel or a remote control for the various mounting phases and can work in the installation position with the aid of a ladder resting against the wall near said position.

[0007] Said means for fastening in an approximately vertical position can also comprise hooks fastened in proximity to the upper end of the load-bearing element,

on the opposite side thereof to the rack, said hooks being suitable to hang the load-bearing element to an upper rung of a ladder resting against the wall, instead of directly on the wall.

[0008] With the described arrangement, all the members involved in lifting (gear motor, rack, load-bearing elements, etc.) are below the installation position of the object to be lifted, and therefore substantially differing from prior art apparatus in which at least the lifting rope and the pulleys around which the rope is entrained are located above said position. In this way, the apparatus according to the invention, whether hung on a wall or on a ladder, also allows installation in proximity to a ceiling or the like.

[0009] The invention will be better understood by following the description and accompanying drawing, which show a non-limiting embodiment of the invention. In the drawing:

Figures 1 and 2 respectively show side and plan views of the apparatus attached to a wall for the installation of the outdoor unit of a split type air conditioner;

Figures 3, 4 and 5 show front, plan and side views, respectively, of a preliminary phase of attachment of the lifting apparatus to the wall;

Figure 6 shows an enlarged view of the detail VI in Figure 5;

Figure 7 shows a side view of the lifting apparatus according to the invention during use, attached to a ladder;

Figure 8 shows an enlarged view of the detail VIII in Figure 7.

[0010] Referring to a first example the use will be disclosed of the lifting apparatus according to the invention attached to a wall on which the outdoor unit of a split type air conditioner is to be installed. Referring to Figures 3 to 6, in a preliminary phase and using a ladder resting against the wall P, the operator fastens to the wall P, in the final position of use, a supporting cross member 1 of said unit by means of bolts 3 and respective wall plugs (not shown). The supporting cross member 1 extends horizontally and has an L-shaped cross section with a lower raceway 1A.

[0011] The operator then fastens the upper end of a section of a load-bearing element 5 of the lifting apparatus to the cross member 1, an end plate 7 having previously been fastened to said section by means of screws 9 (Figure 6). For said attachment clamping bolts 11 are used, which are fastened against the rear surface of the plate 7 by means of studs 13 integral with said bolts and respective nuts. In this way the plate 7, and consequently the load-bearing element 5, are clamped at the edge of the raceway 1A of the cross member, a projection 7A of the plate 7 providing a check surface under the raceway 1A to prevent accidental upward detachment of the load-bearing element 5 from the supporting cross member 1.

[0012] The load-bearing element 5 is then extended downwards by adding thereto other similar sections in an end-to-end connection, extending said element 5 until it is in proximity to the ground.

[0013] Each section of the load-bearing element 5 has a body formed of a rectilinear drawn tube 5A, which laterally has a pair of opposed U-shaped guides 5B, 5C, and to which a rack 5D is frontally fastened, the guides and the rack extending for the entire length of the element 5.

[0014] Referring also to Figures 1 and 2, a carriage 15 (Figure 1), substantially formed of a body 15A of U-shaped folded sheet metal, is then attached to the load-bearing element 5. Inside the legs of the U and at the ends of the body 15A there are attached, by means of pins 16, idle wheels 17 (Figure 2) suitable to turn with a small degree of clearance inside said guides 5B, 5C of the load-bearing element 5. At an outer surface of the body 15A a gear motor 19 is fastened (Figure 1) which, by means of a pair of gears 21, operates a gear 22 (Figure 2), inside the body 15A and meshing with the rack 5D of the load-bearing element 5. Obviously, the apparatus is equipped with safety members (not shown in the drawing), such as protective casings for the gears, limit stops both for lifting and for lowering, and any other members required to comply with standards.

[0015] Hinged to the carriage according to a horizontal axis X-X (Figure 1) is a supporting surface 23, which can be fastened in a horizontal position by means of a strut 27 of adjustable length with a screw fixing knob 29, to allow leveling of the supporting surface 23.

[0016] The drawing shows the installation, by means of the lifting equipment thus mounted, of an outdoor unit 31 of a split type air conditioner having frontal dimensions greater in width than those of the supporting surface 23. In Figure 1 the unit 31 is shown raised to a level slightly above the final installation level defined by the pair of L-shaped brackets 33 on which the unit rests; said brackets are inserted laterally and the upper end thereof is fastened to the cross member 1 at the level of the raceway 1A. Once the brackets 33 are fastened in position, the carriage with the supporting surface 23 is lowered until the unit 31 is resting on the brackets 33 to which it is fastened in the final position of use.

[0017] Figure 7 shows attachment of the lifting apparatus according to the invention to an asymmetrical ladder 101 resting against a wall P, for a purpose similar to the one described above.

[0018] The apparatus comprises a load-bearing element 5 and a carriage 15 provided with an adjustable supporting surface 23 identical to those described above. In this case the end plate of the load-bearing element 5 is not required and, on the opposite side with respect to the rack 5D, on the body 5A thereof, there are attached a pair of hooks 103 (see also Figure 8) suitable to hang the load-bearing element 5, and consequently the entire apparatus, on a rung of the ladder 101. For the remaining part, the use of the apparatus is similar to that already

described.

[0019] It is understood that the drawing only shows an example provided purely as a practical demonstration of the invention, as said invention can vary in forms and arrangement without however departing from the scope of the concept underlying the invention. Any reference numbers in the appended claims are provided to facilitate reading of the claims with reference to the description and do not limit the scope of protection represented by the claims.

Claims

1. A lifting apparatus for wall mounting, for example to fasten to a wall (P) in a position raised from the ground, the outdoor unit of split type air conditioner, a wall-mounted boiler or the like, comprising a lifting carriage (15) with a supporting surface (23) hinged thereto to be fastened in a horizontal position, the carriage being slidable through guide means along a linearly extending load-bearing element (5), **characterized in that**, for lifting, the carriage (15) can translate along the load-bearing element (5) by means of a gear motor (19) thereof, an output gear (22) of which meshes with a rack (5D) integral with said load-bearing element (5) extending along the length thereof, and **in that**, for use of the apparatus, said load-bearing element (5) is suitable to be hung vertical to the wall (P), or nearly vertical in proximity thereto, through extemporaneous connection means (1, 7; 103).
2. Apparatus as claimed in claim 1, **characterized in that**, in the position of use, all the elements of which it is composed, and in particular the lifting members (5, 5D, 19, 22) are located below the mounting position of the object to be lifted.
3. Apparatus as claimed in claim 1 or 2, **characterized in that** said guide means of the carriage (15) on the load-bearing element (5) comprise two raceways (5B, 5C) fastened at opposite sides of the load-bearing element (5) and two pairs of wheels (17) attached to the carriage (15) and suitable to turn with a small degree of clearance inside the respective raceways (5B, 5C).
4. Apparatus as claimed in claim 1, 2 or 3, **characterized in that** said load-bearing element (5) is composed of several linear sections aligned and coupled to one another end-to-end.
5. Apparatus as claimed in one or more of the previous claims, **characterized in that** said means for fastening the load-bearing element (5) in a vertical position comprise a cross member (1) to be fastened in advance to the wall, said cross member (1) being

provided with seats (1A) suitable to receive screw clamping elements (11) which allow stable clamping of said seats with the upper end of said load-bearing element (5).

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6. Apparatus as claimed in claim 4, **characterized in that** said cross member (1) also comprises fastening seats (1A) of the object (31), to fasten it to the wall (P) through said cross member (1).

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7. Apparatus as claimed in one or more of claims 1 to 4, **characterized in that** said means for fastening in an approximately vertical position also comprise hooks (103) integral with the upper end of the load-bearing element (5) suitable to hang said load-bearing element to an upper rung of a ladder (101) resting against the wall (P), the apparatus thus being hung from and resting on said ladder.

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8. Lifting apparatus for wall mounting; all as described above and represented by way of example in the accompanying drawing.

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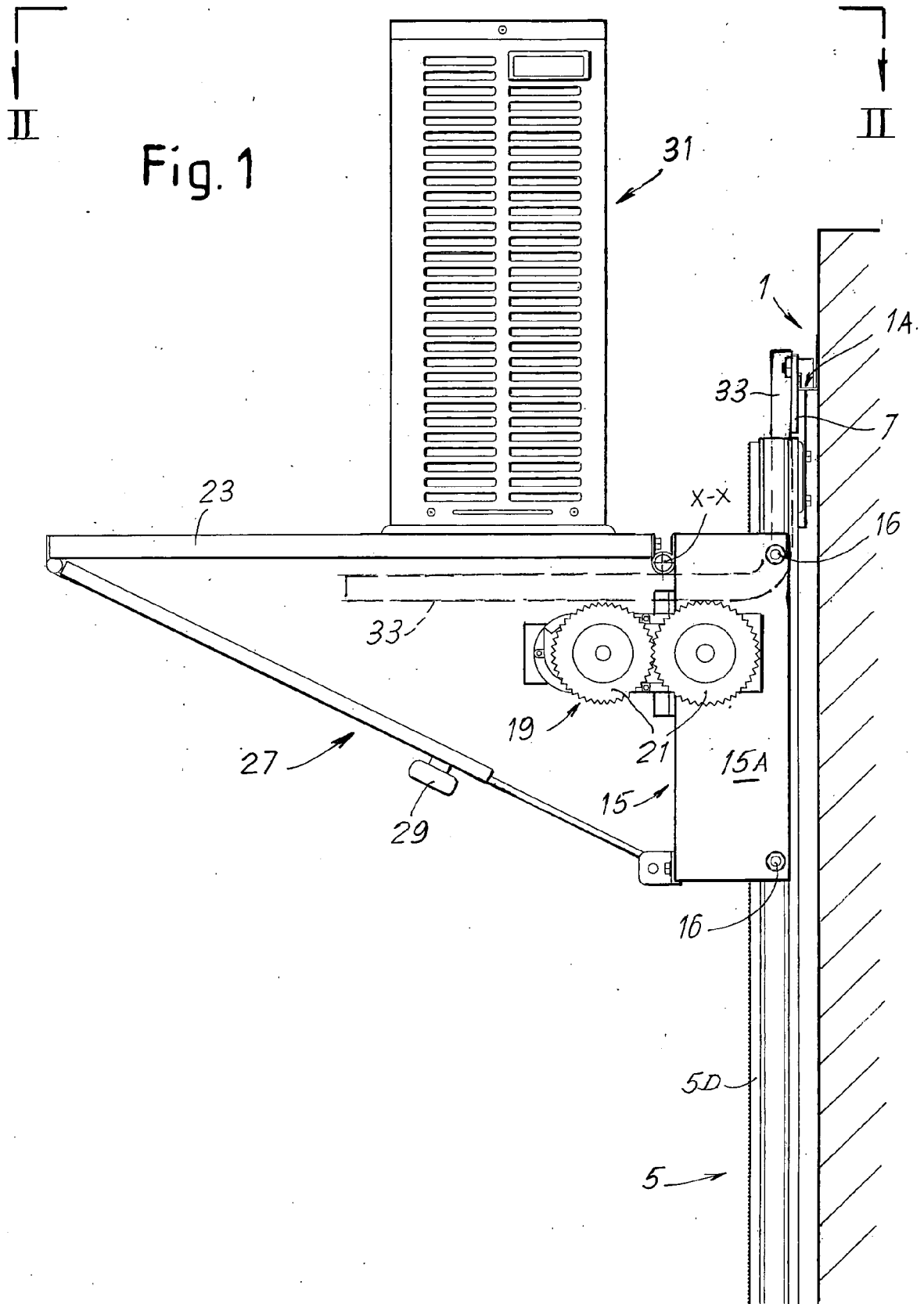
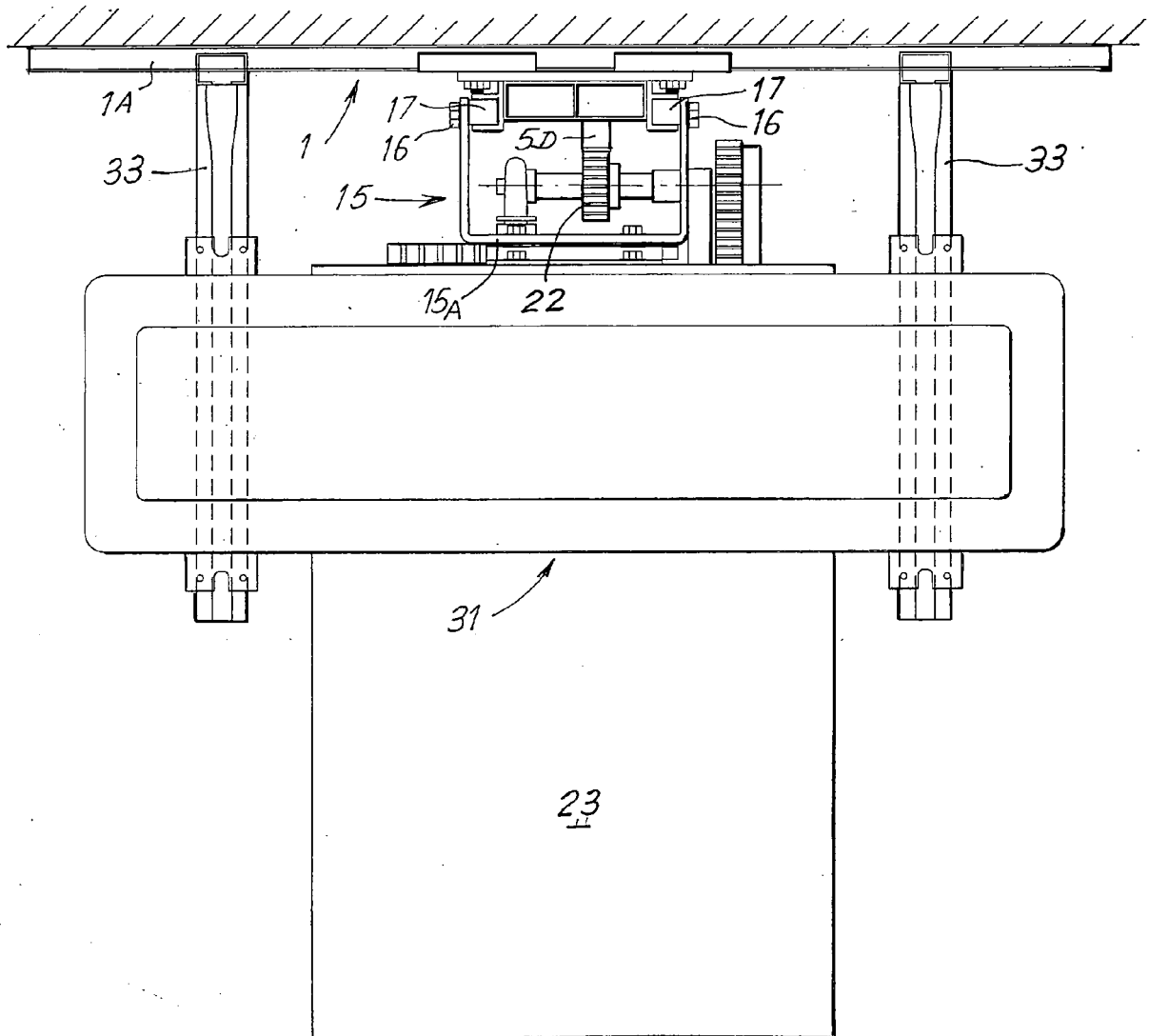
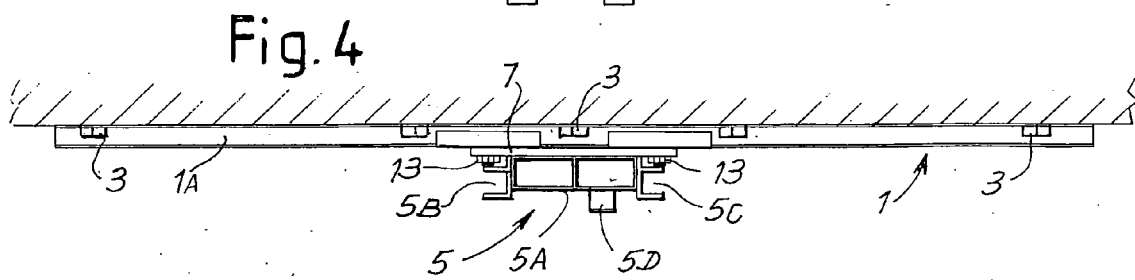
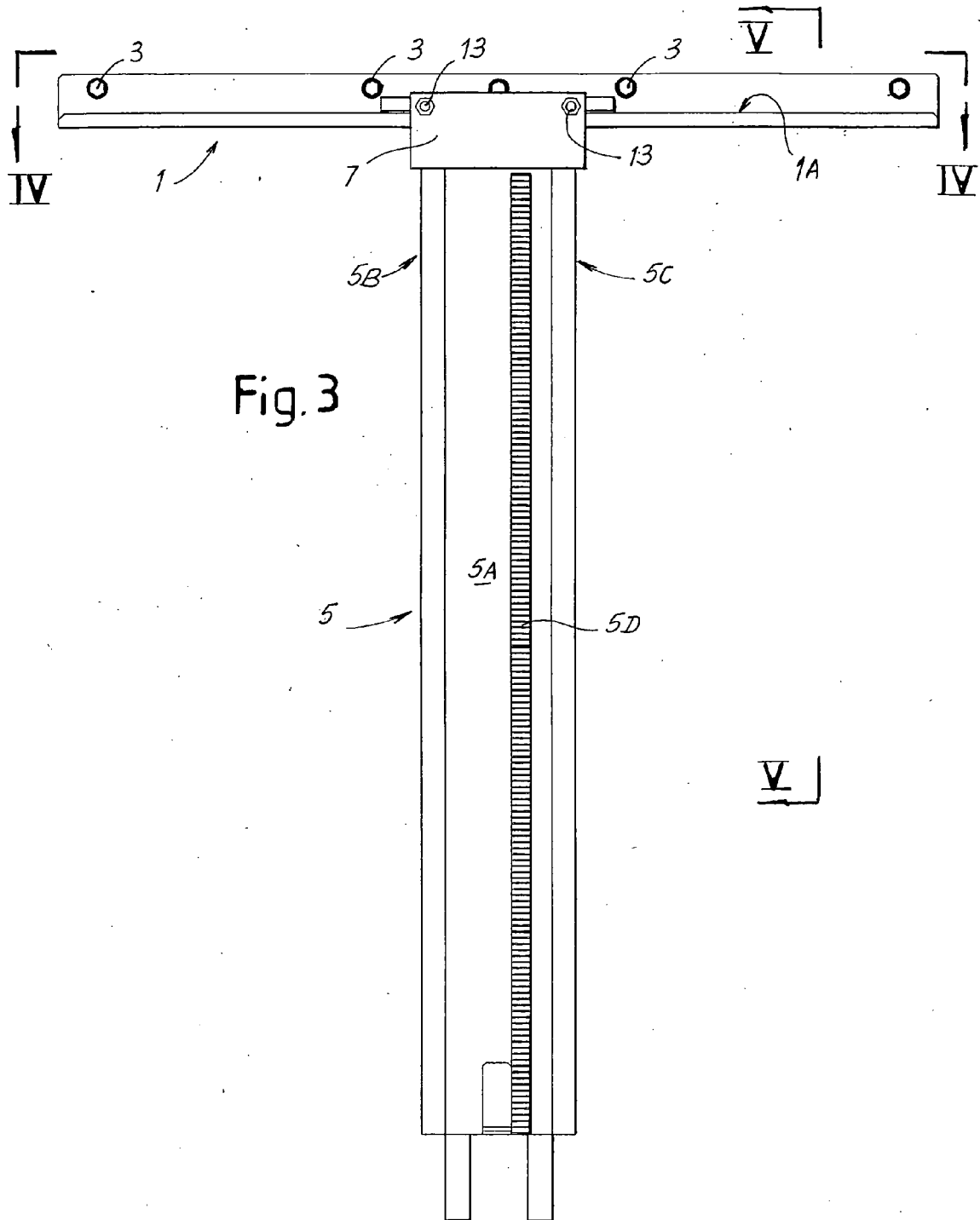
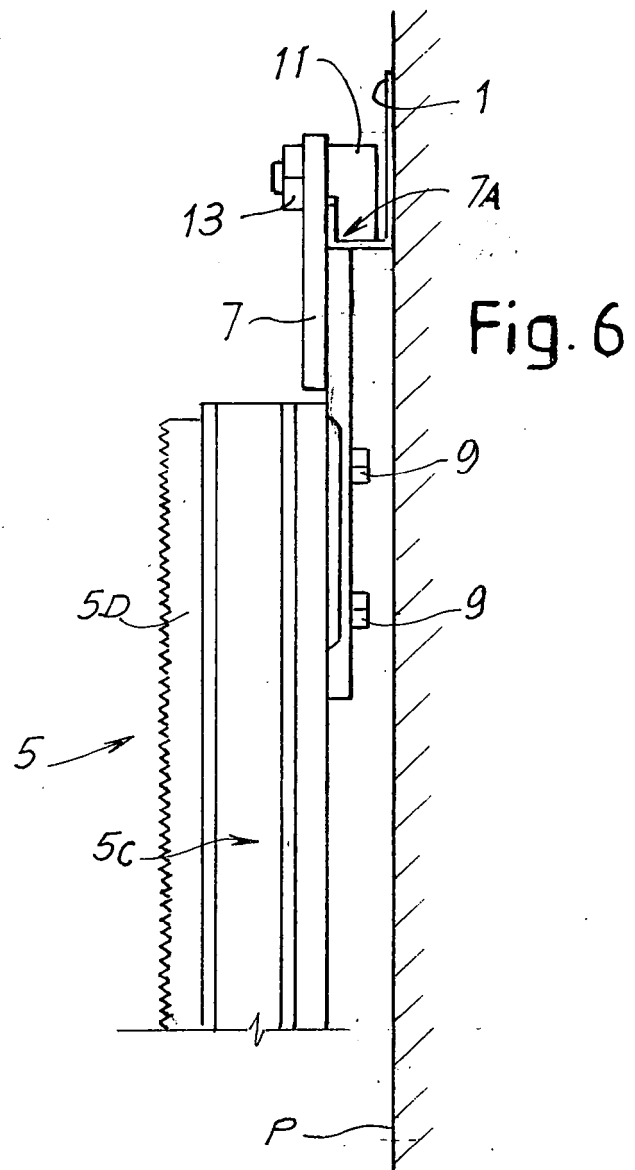
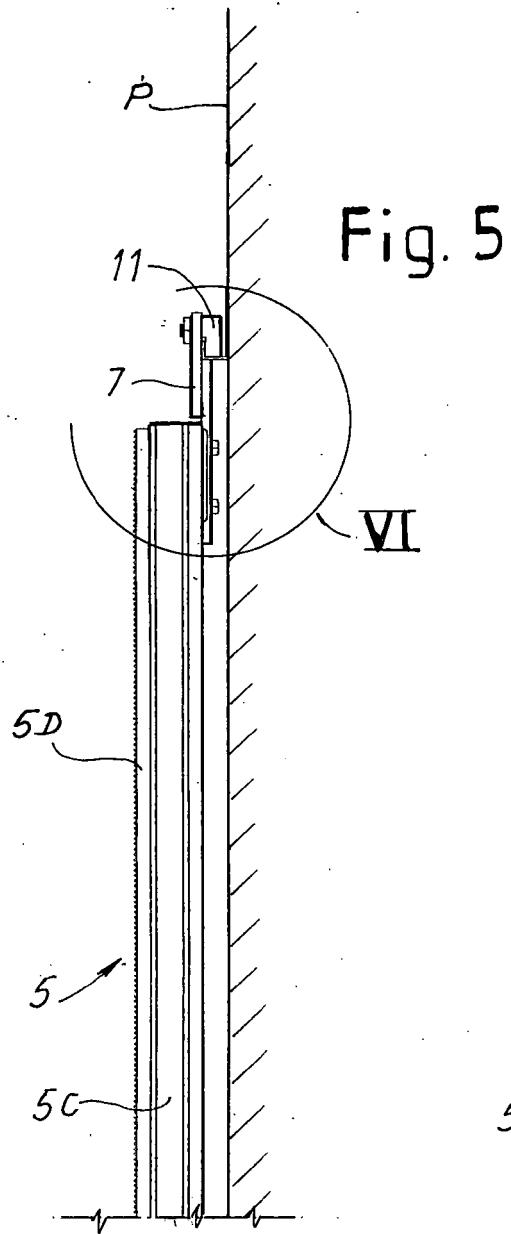
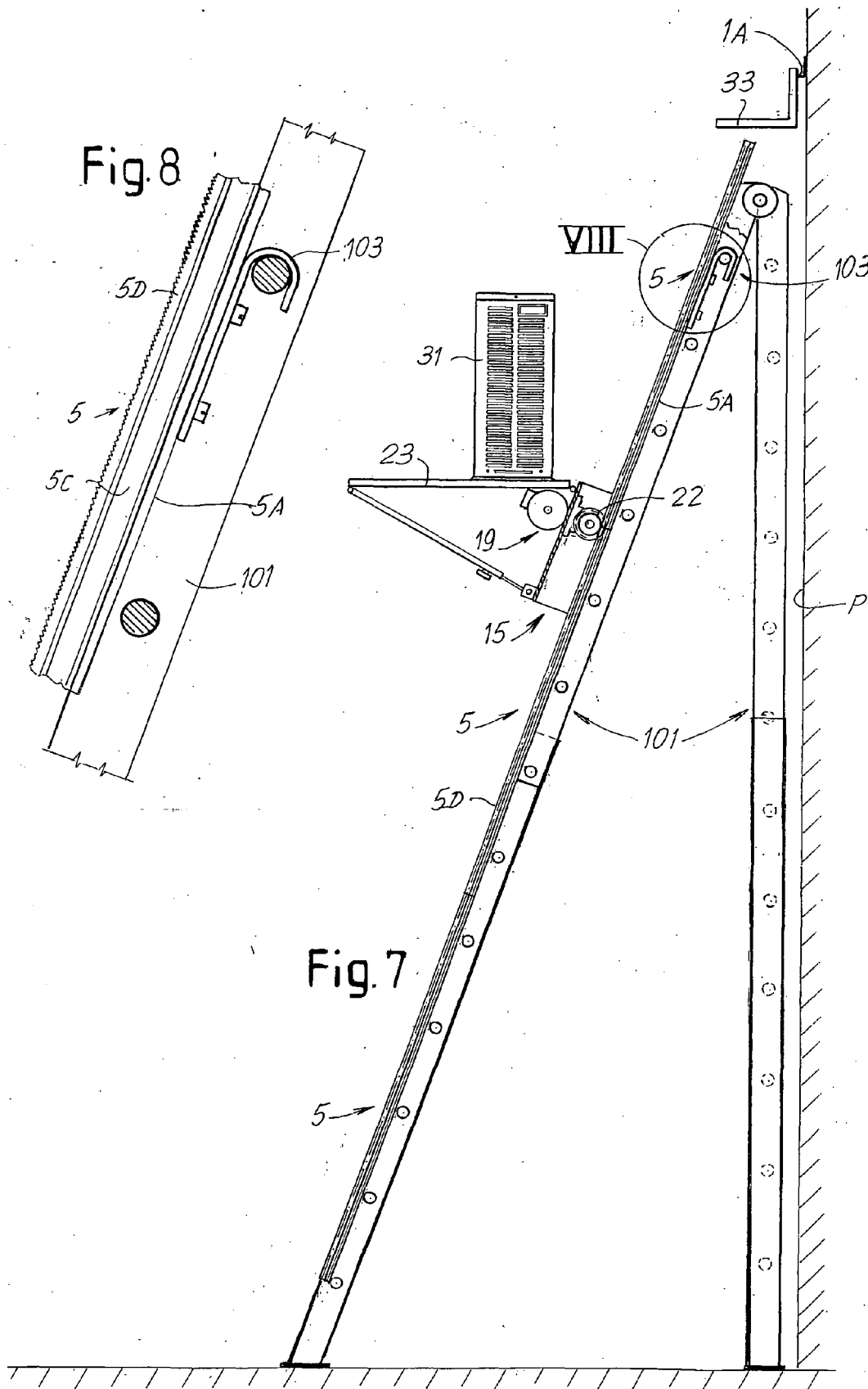


Fig. 2











European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5287

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 September 2007	Examiner ECKENSCHWILLER, A
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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			

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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 42 5287

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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