



(11) **EP 2 017 217 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
14.12.2011 Bulletin 2011/50

(51) Int Cl.:
B66C 23/48 ^(2006.01) **B66F 9/18** ^(2006.01)
E04F 21/00 ^(2006.01)

(21) Application number: **08012392.0**

(22) Date of filing: **09.07.2008**

(54) **Device for manipulating an at least substantially plate-shaped object**

Vorrichtung zur Manipulation eines zumindest im wesentlichen plattenförmigen Objekts

Dispositif de manipulation d'un objet en forme au moins sensiblement de plaque

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT
RO SE SI SK TR**

(30) Priority: **16.07.2007 NL 1034139**

(43) Date of publication of application:
21.01.2009 Bulletin 2009/04

(73) Proprietor: **Heesakkers, Wilhelmus Johannes
Hubertus Maria
5708 AD Helmond (NL)**

(72) Inventor: **Heesakkers, Wilhelmus Johannes
Hubertus Maria
5708 AD Helmond (NL)**

(74) Representative: **Dohmen, Johannes Maria
Gerardus et al
Algemeen Octrooi- en Merkenbureau
P.O. Box 645
5600 AP Eindhoven (NL)**

(56) References cited:
**NL-C1- 1 025 468 US-A- 4 714 393
US-A- 4 810 151 US-A- 5 975 826**

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 2 017 217 B1

Description

[0001] The present invention relates to a device for manipulating an at least substantially plate-shaped object according to the preamble of claim 1, as disclosed for example in US 4 714 393, comprising a mobile frame, a column mounted to the frame, a horizontal arm extending from said column, an elongated, flexible pulling element, which is at least passed over a pulley means mounted to the arm, and an engaging element for engaging a plate-shaped object, which engaging element is provided on a free end of the flexible pulling element and which comprises two brackets for engaging two parts of a circumferential edge of the plate-shaped object.

[0002] Quite frequently, plate-shaped objects, for example doors or radiators, need to be manipulated for carrying out certain operations, such as mounting doors. The present application does not exclude the possibility of the present invention being used for manipulating different types of objects having different shapes, such as boxes.

[0003] A device as referred to in the introduction is disclosed in US 4,810,151. Said device comprises a supporting frame, a vertical column mounted on the supporting frame, along which a carriage can move in vertical direction. The carriage is provided with two pivotable gripping arms for gripping a door, whereupon the door can be rotated about a horizontal axis. A drawback of the known device is the limited degree to which manipulation of the door is possible once it is clamped in the gripping arms.

The object of the invention is to solve or at least alleviate the above-described problems. This object is accomplished in that the device further comprises a sliding rod extending vertically downwards from the horizontal arm, parallel to the column, for guiding cooperation in the longitudinal direction of the sliding rod with a guide portion of the engaging element, which guide portion of the engaging element is also arranged for rotating the engaging element about the sliding rod.

[0004] Using a device according to the invention, a single person can manipulate plate-shaped objects of substantial weight and substantial dimensions in a sound manner, and that significantly more freely. The elongated, flexible pulling element provides a possibility of manipulating the plate-shaped object in vertical direction along the sliding rod by hauling in or paying out said pulling element, during which vertical movement the object can also be rotated about the (vertical) axis of the sliding rod, thus making it possible to position the object optimally.

[0005] Preferably, the two brackets are positioned opposite each other for engaging around two opposite parts of a circumferential edge of the plate-shaped object. This feature enables the engaging element to clamp down a plate-shaped object in an optimum manner.

[0006] Preferably, the engaging element further comprises a base body, relative to which at least one of the

brackets can move back and forth in a direction perpendicular to the associated part of the circumferential edge of the plate-shaped object that is to be engaged. Furthermore preferably, the two brackets are movable in a corresponding manner relative to the base body. Thus, a possibility is provided to engage plate-shaped objects of varying dimensions.

[0007] Alternatively, or in combination therewith, it is preferable if the engaging element comprises a base body, with respect to which at least one of the brackets can pivot back and forth about a pivot axis which extends parallel to the longitudinal direction of the associated part of the circumferential edge of the plate-shaped object that is to be engaged. This reduces the risk of the brackets already coming into contact with the plate-shaped object at an undesirable moment before said brackets engage the plate-shaped object, which might lead to the plate-shaped object being damaged. Within this framework it is preferable if the above-described brackets are both pivotable in a corresponding manner relative to the base body.

[0008] If a base body according to one of the preceding preferred embodiments is used, it is furthermore preferable if the engaging element comprises fixing means for releasably fixing the position and/or orientation of at least one bracket relative to the base body, so that the plate-shaped object can be engaged in a reliable manner.

[0009] According to a very important preferred embodiment, the base body comprises a first base body part and a second base body part, said first base body part being provided on the guide portion and comprising an engaging portion to be engaged by a hook-shaped member attached to the free end of the flexible pulling element, and said second base body part being rotatable jointly with the brackets with respect to said first base body part about an axis of rotation that extends perpendicularly to the plate-shaped object. The rotation of the two base body parts relative to each other makes it possible to change not only the position of the plate-shaped object, by means of a translating manipulation parallel to the (vertical) longitudinal axis of the sliding rod and rotation about said longitudinal axis, but also the orientation thereof. The present preferred embodiment thus makes it possible to first engage an elongated plate-shaped object in a flat, horizontal orientation thereof and subsequently manipulate said object to a vertical orientation by rotating the two base body parts relative to each other. Since the guide portion is provided on the first base body part, potential movements of the second base body part with the plate-shaped object relative to the first base body part are not restricted by the use of the guide portion.

[0010] The sliding rod preferably has a circular cross-section, so that rotation of the guide portion of the engaging element about the sliding rod can be facilitated in a simple manner.

[0011] A stable construction is obtained in particular if the sliding rod extends vertically upwards from the frame.

[0012] Another preferred embodiment of the device

according to the invention is characterised in that the engaging element is provided with at least one further bracket for engagement around a part of a circumferential edge of the plate-shaped object that is oriented perpendicular to the two parts of the circumferential edge that are engaged by the two opposite brackets. In this way an adequate support of the plate-shaped objects by the engaging element can take place both when the longitudinal direction of the plate-shaped object is horizontally oriented and when said longitudinal direction is vertically oriented. In particular, but not exclusively, a situation in which the plate-shaped object is a door may be considered in this regard.

[0013] To facilitate the placement of such a door in a door frame upon mounting the door, the brackets, in the engaging position thereof, extend outside the associated parts of the circumferential edge of the plate-shaped object, for example a door, over a distance of 1.5 - 4.0 mm. Thus it can be guaranteed by using the brackets that the circumference of the door will be correctly spaced from the door jambs.

[0014] To render the device according to the invention (more) suitable for transport in a vehicle, the mobile frame preferably comprises a base for effecting a manually detachable, form-locked connection between the frame and the column. The column can thus be disconnected from the mobile frame in a simple manner.

[0015] Within the same framework, the column preferably comprises at least two column members in line with each other, which are connected together in a manually detachable, form-locked manner. The advantage that is thus obtained is not only that transport of the device will be easier, because of the comparatively small dimensions of the parts of which the device is built up, but also that it is also possible to use only one of the column members for specific applications, for example if the mobile frame is simply used as a handtruck, without specific facilities being provided for manipulating the plate-shaped object.

[0016] Preferably, the horizontal arm is connected to the column in a manually detachable, form-locked manner, so that also the horizontal arm can be disconnected from the remaining part of the device in a simple manner.

[0017] With a view to extending the device according to the invention, the frame is preferably provided with connecting means for connecting an extension element for extending the device to the frame. In this way it is possible, for example, to increase a load-bearing area formed by a part of the frame.

[0018] The connecting means preferably comprise at least one opening on the side remote from the column for receiving the extension element.

[0019] Said at least one opening is preferably formed by two open ends of parallel tubular members forming part of the frame. The presence of such parallel tubular members is thus optimally utilised.

[0020] In general it can be stated that the device is preferably provided with a winch for a winding up the

flexible pulling element, whilst the device is furthermore preferably provided with a motor for driving said winch.

[0021] Preferably, the guide portion of the engaging element is provided with wheels for guiding cooperation with the sliding rod. In particular when relatively heavy objects are to be manipulated, a low-friction guidance is ensured in this manner.

[0022] The present invention will now be explained in more detail by means of a description of a preferred embodiment of a device according to the invention with reference to the following figures:

Figure 1 is a perspective view of a hoisting device not forming part of the present invention;

Figures 2a and 2b show the piece of plate material lifted by the hoisting device of figure 1 in a vertical orientation and in a horizontal orientation, respectively;

Figures 3a and 3b show two alternative embodiments of an engaging element that can be used with the hoisting device of figure 1;

Figure 4 is a perspective view of a preferred embodiment of a device according to the invention used as a hoisting device;

Figures 5 and 6 show a part of an engaging element as may be used with a device according to figure 1 or figure 4;

Figure 7 shows the device of figure 4 being used in mounting a door;

Figure 8 is a perspective view of another preferred embodiment of a device according to the invention used as a hoisting device;

Figure 9 shows a modified version of the device of figure 1, figure 4 or figure 8, not forming part of the present invention;

Figures 10a and 10b show another use of the device of figure 1, figure 4 or figure 8;

Figure 11 shows an alternative embodiment of the first base body part of figure 4;

Figure 12 shows an alternative embodiment of the fork means of figure 8.

[0023] The hoisting device 1 shown in figure 1, not forming part of the present invention but merely serving as a clarification thereof, comprises a frame 2, a vertical column 3 and a horizontal arm 4. The frame 2 comprises a rectangular framework built up of tubular longitudinal girders 5a, 5b and tubular cross girders 6a, 6b, 6c. Between the cross girders 6b and 6c, the frame 2 is further provided with a vertically oriented tubular base 7, in which the lower end of the tubular column 3 is accommodated. The column 3 to that end has a smaller cross-section at the location of the base 7. The column 3 rests on the upper edges of the base 7.

[0024] Castors 8 are provided at the four corner points of the framework, so that the frame 2 is mobile. To make it easier to move the frame 2 and thus the hoisting device 1, a horizontal manipulating rod 9 is mounted to the col-

umn 3, which manipulating rod can be engaged by the operator of the hoisting device 1 for moving the hoisting device 1 to a desired position.

[0025] The arm 4 is of the telescopic type and comprises arm members 10a, 10b, which arm member 10a can slide into and out of the arm member 10b as indicated by the double arrow 11. At one end of the arm 4, the arm member 10b is provided with a downwardly extending tubular connecting piece 12, which is accommodated in the open upper end of the tubular column 3 with a close fit.

[0026] The hoisting device 1 further comprises two pulleys 12, 13 mounted to the ends of the arm 4, over which a hoisting cable 14 is passed. The hoisting cable 14 can be wound and unwound by means of an electric motor 15, which is mounted to the frame 2 at the location of the cross girder 6c and which also functions as a counterweight. The electric motor 15 is controlled by means of a remote control device 49.

[0027] The hoisting device 1 further comprises an engaging element 16, which is shown in more detail in figures 2a and 2b and which is intended to engage a plate-shaped object 17, such as a door or a radiator. The engaging element 16 comprises a first telescopic, tubular arm member 18 and a second telescopic, tubular arm member 19, which second arm member 19 can telescope into and out of the first arm member 18. The position of the first arm member 18 and the second arm member 19 relative to each other can be fixed by tightening the fixing bolt 20. Brackets 21, 22 are mounted to the free ends of the first arm member 18 and the second arm member 19, respectively, which brackets engage the object 17 around two opposite longitudinal edges 23, 24 of the object 17. The engaging element 16 further comprises a flanged retaining strip 25, whose ends are connected to the side of the first arm member 18 remote from the object 17. The first arm member 18 and the retaining strip 25 jointly define a slotted passage 26. A ring 27 is provided around the retaining strip 25, which ring can move along the retaining strip 25 along the length of the slotted passage 26. Mounted to the free end of the cable 14 is a hook member 28, which is capable of engaging the ring 27.

[0028] Once the object 17 has been engaged by the engaging element 16 and the hook member 28 engages the ring 27, the object 17 can be lifted by suitably driving the electric motor 15. The object 17 can be easily transported by subsequently moving the hoisting device 1. In figures 1 and 2a the object 17 has a vertical orientation, in which the ring 27 is located in the U-shaped bend in the retaining strip 25. Figure 2b shows an alternative situation, in which the object 17 has a horizontal orientation. In that situation, the ring 27 has been moved along the retaining strip 25 to a position centrally between the brackets 21 and 22. To fix the position of the ring 27 relative to the retaining strip 25 temporarily, the retaining strip 25 is optionally provided at suitable positions with stop edges 29 facing towards the first arm member 18. Although only two such stop edges 29 are shown in fig-

ures 1-2b, a different number of stop edges may be provided, of course.

[0029] Figures 3a and 3b show two alternative engaging elements 30, 31, by means of which it is also possible to effect a vertical orientation as well as a horizontal orientation of an object 17 upon manipulation thereof. Insofar as parts forming part of the engaging elements 30, 31 are comparable to parts forming part of the engaging element 16, identical numerals will be used to indicate said parts and a further description of said parts will not be given.

[0030] Instead of being provided with a retaining strip 25 with a ring 27, the engaging element 30 shown in figures 3a is provided with a simple, straight longitudinal strip 33 provided with a hole 34 to be engaged by the hook member 28 upon manipulation of objects in the vertical orientation thereof, and with holes 35a, 35b to be engaged by the hook member 28 upon manipulation of an object 17 in the horizontal orientation of said object 17.

[0031] In the engaging element 31 shown in figure 3b, the longitudinal strip 33 has been substituted for the elongated ring 35 near the bracket 22, which ring is to be engaged the hook member 28 by upon manipulation of an object in the vertical orientation thereof, and for the corrugated rod 36. The corrugated shape of said rod 36 defines several positions where the hook member 28 can engage for manipulating an object 17 in the horizontal orientation thereof.

[0032] Figure 4 shows a hoisting device 51 forming part of the present invention and which is quite similar to the hoisting device 1. Like parts are indicated by the same numerals and will not be discussed in more detail hereinafter. At the front side of the cross girder 6a, the frame 2 is provided with a retaining sleeve 52 having a closed bottom. Near the pulley 12, the arm 4 is provided with a retaining sleeve 53. In the situation shown in figure 4, the telescopic arm 4 is in its fully retracted position, so that the central axes of the retaining sleeve 52 and the retaining sleeve 53 are in line with each other. The hoisting device 51 further comprises a round sliding rod 54, whose ends are positioned within the retaining sleeve 52 and the retaining sleeve 53. The sliding rod 54 extends vertically, parallel to the column 3.

[0033] The hoisting device 51 further comprises an engaging element 55 having a first base body part 56 and a second base body part 57. The first base body part 56 comprises a tubular guide portion 58, whose internal diameter corresponds to the external diameter of the sliding rod 54, as well as a connecting plate 59, which is tangentially connected to the guide portion 58 and which is provided with a hole 60 to be engaged by the hook member 28. The first base body part 56, and thus the engaging element 55, can be moved up and down as a whole along the sliding rod 54 by suitably driving the electric motor 15. In addition to that, the first base body part 56 can rotate about the central axis of the sliding rod 54.

[0034] The second base body part 57 is connected to the first base body part 56, being rotatable about the axis

of rotation 61 in the directions indicated by the double arrow 62. Said axis of rotation 61 extends perpendicularly to the object 71 to be manipulated. The second base body part 57 comprises three telescopic-type arms 62, 63, 64, which are provided with brackets 65, 66, 67 at the ends thereof, which brackets engage around two longitudinal edges 68, 69 and the transverse edge 70, respectively, of the plate-shaped object 71, in this case a door.

[0035] Figure 5 shows an end of one of the arms 62, 63, 64 of the second base body part 57. The position of the telescopic arm members 72, 73 relative to each other can be fixed by means of a clamping element 74, which is connected to the telescopic arm member 73 and which is movable along the slotted hole 75 in the arm member 72. The brackets 65, 66, 67 are pivotally connected to the free end of the arm member 73 about the pivot axis 76. The brackets 65, 66, 67 can be fixed in their pivoted position by tightening the handle 98.

[0036] Figure 6 shows an alternative configuration of (the ends of) the arms 62, 63, 64. In this embodiment, a rack-and-pinion mechanism is used, which comprises a gear 77, which can be rotated by means of a handle 78, and which is connected to the end of the arm member 79 that is located on the side of a bracket 65, 66, 67. Arm member 80 is provided with a tooth portion 81 meshing with the gear 77. Turning the handle 78 will result in the arm member 80 sliding into or out of the arm member 79. The arm members 79 and 80 can be locked in their relative position by means of the fixing pin 82. The brackets 65, 66, 67 can be fixed in their pivoted positions by means of a wing nut 83.

[0037] Figure 7 shows the manner in which the hoisting device 51 is used for mounting a door 71 in a door frame 83. The thickness d (see figure 5) of the brackets has been selected so that it is ensured that the circumferential edges of the door 71 will be spaced a desired distance from the circumferential edges of the frame 83. In practice a thickness d ranging from 2-3 mm has been found to be quite satisfactory.

[0038] The hoisting device 101 as shown in figure 8 and forming part of the present invention is to a significant degree similar to the hoisting device 51. Like parts are indicated by the same numerals. In comparison with the hoisting device 51, the engaging element 55 has been substituted for fork means 102 comprising forks 103 capable of supporting an object 104. The fork means 104 can be moved up and down along a sliding rod 54 by means of an electric motor 15, in a manner that corresponds to the way in which the first base body part 56 of the hoisting device 51 can be moved along the sliding rod 54. In addition to sliding movement, the fork means 102 is also capable of rotating movement about the central axis of the sliding rod 54, as indicated by the arrow 105, similarly to the way in which the engaging element 55 of the hoisting device 51 is rotatable about the central axis of the sliding rod 54.

[0039] Figure 9 shows a hoisting device 110, which

does not form part of the present invention, but merely serves as a clarification thereof, provided with an extension element 111. The extension element 111 comprises two tubular vertical guides 112, which are connected at their bottom ends via a connecting plate 113 and which are connected at their upper ends, below the arm 4, via a bracket 114. Said bracket 114 might optionally be connected to the arm 4 (in a manner not shown). At a point exactly above the connecting plates 113, the guides 112 are provided with horizontally oriented insert tubes 115, which extend within the longitudinal girders 5a, 5b of the frame 2.

[0040] The extension element 111 comprises a fork means 116 provided with forks 117 and guide members 118. Said guide members cooperate with the guides 112 for moving the fork means 116 up and down along the guides 112 by suitably driving the electric motor 15.

[0041] Figures 10a and 10b show an alternative use of the hoisting device 1, 51 or 101, in which various parts of the hoisting device 1, 51 or 101 have been removed. The column 3 is built up of two parts, the lower part 120 of which still forms part of the device shown in figures 10a and 10b. The frame 2 has been extended with an extension element 121, which may in fact be regarded as an extension of the framework, which increases the load-bearing area defined by the framework, so that the hoisting device 101 will be more suitable for use as a handtruck as shown in figure 10b for transporting objects 122. The extension element 121 comprises longitudinal girders 123, 124 and a cross girder 125. The free ends of the longitudinal girders extend through the open ends of the longitudinal girders 5a, 5b.

[0042] The open ends of the longitudinal girders 5a, 5b can also be utilised for other types of extension elements, for example as shown in figure 1, in which the extension element comprises a conveyor roller 131 which on the one hand increases the load-bearing area defined by the framework and which on the other hand makes it easier to place objects on the support surface.

[0043] Figure 11 shows a first base body part 56' as an alternative embodiment of the first base body part 56 as shown in figure 4 and described in the foregoing. Instead of a sliding contact between the tubular guide member 58 and the sliding rod 54, a rolling contact is realised by means of wheels 560, which likewise provides a satisfactory, low-friction guidance. The wheels 560 have a concave rolling surface with a radius of curvature that substantially corresponds to the radius of the sliding rod 54. Upon vertical translation of the first base body part 56' along the sliding rod 54, the wheels 560 will roll over the surface of the sliding rod 54, whilst the wheels 560 will slide over the surface of the sliding rod 54 upon rotation of the base body part 56' about the sliding rod 54.

[0044] Figure 12 shows an engaging element configured as fork means 102' as an alternative embodiment of the fork means 102 shown in figure 8 and described in the foregoing. The guidance of the fork means 102' by means of wheels 1020 along the sliding rod 54 has been

realised in a similar manner as with the first base body part 56' of figure 1. Both in the case of the construction shown in figure 11 and in the case of the construction shown in figure 12, the point of engagement of the hook member 28 relative to the point of engagement of the load of the object to be manipulated has been selected so that the wheels 560, 1020 are to a limited degree urged against the sliding rod 54 in horizontal direction in use.

Claims

1. A device (51,101) for manipulating an at least substantially plate-shaped object (71,104), comprising a mobile frame (2), a column (3) mounted to the frame, a horizontal arm (4) extending from said column, an elongated, flexible pulling element (14), which is at least passed over a pulley means (12, 13) mounted to the arm, and an engaging element (55) for engaging a plate-shaped object, which engaging element is provided on a free end of the flexible pulling element and which comprises two brackets (65,66,67; 103) for engaging two parts of a circumferential edge (68,69,70) of the plate-shaped object, **characterised in that** the device further comprises a sliding rod (54) extending vertically downwards from the horizontal arm, parallel to the column, for guiding cooperation in the longitudinal direction of the sliding rod with a guide portion (58) of the engaging element, which guide portion of the engaging element is also arranged for rotating the engaging element about the sliding rod.
2. A device according to claim 1, **characterised in that** the two brackets (65, 66) are positioned opposite each other for engaging around two opposite parts (68,69) of a circumferential edge of the plate-shaped object.
3. A device according to claim 1 or 2, **characterised in that** the engaging element further comprises a base body (57), relative to which at least one of the brackets can move back and forth in a direction perpendicular to the associated part of the circumferential edge of the plate-shaped object that is to be engaged.
4. A device according to claim 2 or 3, **characterised in that** the engaging element comprises a base body (57), with respect to which at least one of the brackets can pivot back and forth about a pivot axis which extends parallel to the longitudinal direction of the associated part of the circumferential edge of the plate-shaped object that is to be engaged.
5. A device according to claim 3, or 4, **characterised in that** the engaging element comprises fixing means (82,98) for releasably fixing the position and/or orientation of at least one bracket relative to the base body.
6. A device according to claim 3, 4 or 5, **characterised in that** the base body comprises a first base body part (56) and a second base body part (57), said first base body part being provided on the guide portion (58) and comprising an engaging portion (60) to be engaged by a hook-shaped member (28) attached to the free end of the flexible pulling element (14), and said second base body part being rotatable jointly with the brackets with respect to said first base body part about an axis of rotation (61) that extends perpendicularly to the plate-shaped object.
7. A device according to any one of the preceding claims, **characterised in that** the sliding rod (54) has a circular cross-section.
8. A device according to any one of the preceding claims, **characterised in that** the sliding rod (54) extends vertically upwards from the frame (2).
9. A device according to any one of the preceding claims 2-8, **characterised in that** the engaging element (55) is provided with at least one further bracket (67) for engagement around a part (70) of a circumferential edge of the plate-shaped ' object that is oriented perpendicular to the two parts of the circumferential edge that are engaged by the two opposite brackets (65,66)
10. A device according to any one of the preceding claims, **characterised in that** the brackets, in the engaging position thereof, extend outside the associated parts of the circumferential edge of the plate-shaped object over a distance of 1.5 - 4.0 mm.
11. A device according to any one of the preceding claims, **characterised in that** connecting means are provided for connecting an extension element to the frame.
12. A device according to claim 11, **characterised in that** the frame has at least one opening on the side remote from the column for receiving an extension element with which the device can be extended.
13. A device according to any one of the preceding claims, **characterised in that** the device is provided with a winch for a winding up the flexible pulling element.
14. A device according to any one of the preceding claims, **characterised in that** the guide portion of the engaging element is provided with wheels (560; 1020) for guiding cooperation with the sliding rod.

Patentansprüche

1. Vorrichtung (51, 101) zur Handhabung mindestens eines im Wesentlichen plattenförmigen Gegenstandes (71, 104), mit einem mobilen Gestell (2), einer am Gestell angebrachten Säule (3), einem sich von der Säule erstreckenden horizontalen Arm (4), einem länglichen, flexiblen Zugelement (14), das mindestens über eine am Arm angebrachte Seilrolleneinrichtung (12, 13) geführt ist, und einem Eingriffelement (55) zum Angreifen an einem plattenförmigen Gegenstand, wobei das Eingriffelement an einem freien Ende des flexiblen Zugelements vorgesehen ist und zwei Halter (65, 66, 67; 103) zum Angreifen an zwei Abschnitten eines Umfangsrandes (68, 69, 70) des plattenförmigen Gegenstandes aufweist, **dadurch gekennzeichnet, dass** die Vorrichtung darüber hinaus eine Gleitstange (54) umfasst, die sich parallel zur Säule vom horizontalen Arm vertikal nach unten erstreckt, zum Führungszusammenspiel in der Längsrichtung der Gleitstange mit einem Führungsabschnitt (56) des Eingriffelements, wobei der Führungsabschnitt des Eingriffelements auch dazu eingerichtet ist, das Eingriffelement um die Gleitstange zu drehen.

5

10
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die beiden Halter (65, 66) einander entgegengesetzt angeordnet sind, um zwei entgegengesetzte Abschnitte (68, 69) eines Umfangsrandes des plattenförmigen Gegenstandes zu umgreifen.

15

20
3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Eingriffelement darüber hinaus einen Grundkörper (57) aufweist, wobei sich mindestens einer der Halter relativ zu diesem Grundkörper in einer zu dem zugehörigen, in Eingriff zu nehmenden Abschnitt des Umfangsrandes des plattenförmigen Gegenstandes senkrechten Richtung vor- und zurückbewegen kann.

25

30
4. Vorrichtung nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** das Eingriffelement einen Grundkörper (57) aufweist, wobei mindestens einer der Halter relativ zu diesem Grundkörper um eine parallel zu der Längsrichtung des zugehörigen, in Eingriff zu nehmenden Abschnitts des Umfangsrandes des plattenförmigen Gegenstandes verlaufende Schwenkachse hin und her schwenken kann.

35

40
5. Vorrichtung nach Anspruch 3 oder 4, **dadurch gekennzeichnet, dass** das Eingriffelement eine Fixierungseinrichtung (82, 98) umfasst, um die Lage und/oder Ausrichtung von mindestens einem Halter relativ zum Grundkörper lösbar zu fixieren.

45

50
6. Vorrichtung nach Anspruch 3, 4 oder 5, **dadurch gekennzeichnet, dass** der Grundkörper einen ersten Grundkörperabschnitt (56) und einen zweiten Grundkörperabschnitt (57) aufweist, wobei der erste Grundkörperabschnitt am Führungsabschnitt (58) vorgesehen ist und einen Eingriffabschnitt (60) aufweist, der von einem hakenförmigen Element (28) in Eingriff zu nehmen ist, das am freien Ende des flexiblen Zugelements (14) befestigt ist, und der zweite Grundkörperabschnitt gemeinsam mit den Haltern in Bezug auf den ersten Grundkörperabschnitt um eine Drehachse (61) drehbar ist, die sich senkrecht zum plattenförmigen Gegenstand erstreckt.

55
7. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Gleitstange (54) einen kreisförmigen Querschnitt hat.

5
8. Vorrichtung nach einem der vorhergehenden Ansprüche **dadurch gekennzeichnet, dass** sich die Gleitstange (54) vom Gestell (2) vertikal nach oben erstreckt.

15
9. Vorrichtung nach einem der vorhergehenden Ansprüche 2 bis 8, **dadurch gekennzeichnet, dass** das Eingriffelement (55) mit mindestens einem weiteren Halter (67) zum Umgreifen eines Abschnitts (70) eines Umfangsrandes des plattenförmigen Gegenstandes versehen ist, der senkrecht zu den beiden Abschnitten des Umfangsrandes liegt, die von den beiden entgegengesetzten Haltern (65, 66) in Eingriff genommen sind.

25
10. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sich die Halter in ihrer Eingriffsrichtung um einen Abstand von 1,5 bis 4,0 mm über die zugeordneten Abschnitte des Umfangsrandes des plattenförmigen Gegenstandes nach außen erstrecken.

35
11. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** Verbindungsmittel vorgesehen sind, um am Gestell ein Verlängerungselement anzuschließen.

45
12. Vorrichtung nach Anspruch 11, **dadurch gekennzeichnet, dass** das Gestell auf der von der Säule entfernten Seite mindestens eine Öffnung aufweist, um ein Verlängerungselement aufzunehmen, mit dem die Vorrichtung verlängert werden kann.

55
13. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Vorrichtung mit einer Winde versehen ist, um das flexible Zugelement aufzuwickeln.

65
14. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Führungsabschnitt des Eingriffelements mit Rädern

75

(560; 1020) zum Führungszusammenspiel mit der Gleitstange versehen ist.

Revendications

1. Dispositif (51, 101) pour manipuler un objet (71, 104) en forme au moins sensiblement de plaque ; comprenant un châssis mobile (2), une colonne (3) montée au châssis, un bras horizontal (4) s'étendant depuis ladite colonne, un élément tracteur flexible allongé (14), qui passe au moins par-dessus un moyen de poulie (12, 13) monté au bras, et un élément de mise en prise (55) pour mettre en prise un objet en forme de plaque, lequel élément de mise en prise est monté sur une extrémité libre de l'élément tracteur flexible et qui comprend deux supports (65, 66, 67, 103) pour mettre en prise deux parties d'un bord circonférentiel (68, 69, 70) de l'objet en forme de plaque, **caractérisé en ce que** le dispositif comprend en outre une tringle coulissante (54) s'étendant verticalement vers le bas depuis le bras horizontal, parallèle à la colonne, pour guider une coopération dans la direction longitudinale entre la tringle coulissante et une portion guide (58) de l'élément de mise en prise, laquelle portion guide de l'élément de mise en prise est également agencée pour faire tourner l'élément de mise en prise autour de la tringle coulissante.
2. Dispositif selon la revendication 1, **caractérisé en ce que** les deux supports (65, 66) sont positionnés de façon opposée l'un à l'autre pour une mise en prise autour de deux parties opposées (68, 69) d'un bord circonférentiel de l'objet en forme de plaque.
3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** l'élément de mise en prise comprend en outre un corps de base (57), par rapport auquel au moins un des deux supports peut se déplacer d'avant en arrière dans une direction perpendiculaire à la partie associée du bord circonférentiel de l'objet en forme de plaque qui doit être mis en prise.
4. Dispositif selon la revendication 2 ou 3, **caractérisé en ce que** l'élément de mise en prise comprend un corps de base (57), par rapport auquel au moins un des supports peut pivoter vers l'arrière et vers l'avant autour d'un axe de pivot qui s'étend parallèlement à la direction longitudinale de la partie associée du bord circonférentiel de l'objet en forme de plaque qui doit être mis en prise.
5. Dispositif selon la revendication 3 ou 4, **caractérisé en ce que** l'élément de mise en prise comprend des moyens de fixation (82, 98) pour fixer de manière libérable la position et/ou l'orientation d'au moins un support par rapport au corps de base.

5

10

15

20

25

30

35

40

45

50

55

6. Dispositif selon la revendication 3, 4 ou 5, **caractérisé en ce que** le corps de base comprend une première partie de corps de base (56) et une seconde partie de corps de base (57), ladite première partie de corps de base étant formée sur la portion guide (58) et comprenant une portion de mise en prise (60) devant être mise en prise par un organe en forme de crochet (28) attaché à l'extrémité libre de l'élément tracteur flexible (14), et ladite seconde partie de corps de base pouvant être mise en rotation conjointement avec les supports par rapport à ladite première partie de corps de base autour d'un axe de rotation (61) qui s'étend perpendiculairement vers l'objet en forme de plaque.
7. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la tringle coulissante (54) a une section en coupe circulaire.
8. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la tringle coulissante (54) s'étend verticalement vers le haut depuis le châssis (2).
9. Dispositif selon l'une quelconque des revendications précédentes 2 à 8, **caractérisé en ce que** l'élément de mise en prise (55) est pourvu d'au moins un support (67) de plus pour la mise en prise autour d'une partie (70) d'un bord circonférentiel de l'objet en forme de plaque qui est orientée perpendiculairement aux deux parties du bord circonférentiel qui sont mises en prise par les deux supports opposés (65, 66).
10. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les supports, dans leur position de mise en prise, s'étendent à l'extérieur des parties associées du bord circonférentiel de l'objet en forme de plaque sur une distance de 1,5 à 4,0 mm.
11. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** des moyens de raccordement sont pourvus pour raccorder un élément d'extension à châssis.
12. Dispositif selon la revendication 11, **caractérisé en ce que** le châssis comprend au moins une ouverture sur le côté éloigné de la colonne pour recevoir un élément d'extension avec lequel le dispositif peut être étendu.
13. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** le dispositif est pourvu d'un treuil pour enrouler l'élément tracteur flexible.
14. Dispositif selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la portion guide

de l'élément de mise en prise est pourvue de roues (560 ; 1020) pour guider la coopération avec la tringle coulissante.

5

10

15

20

25

30

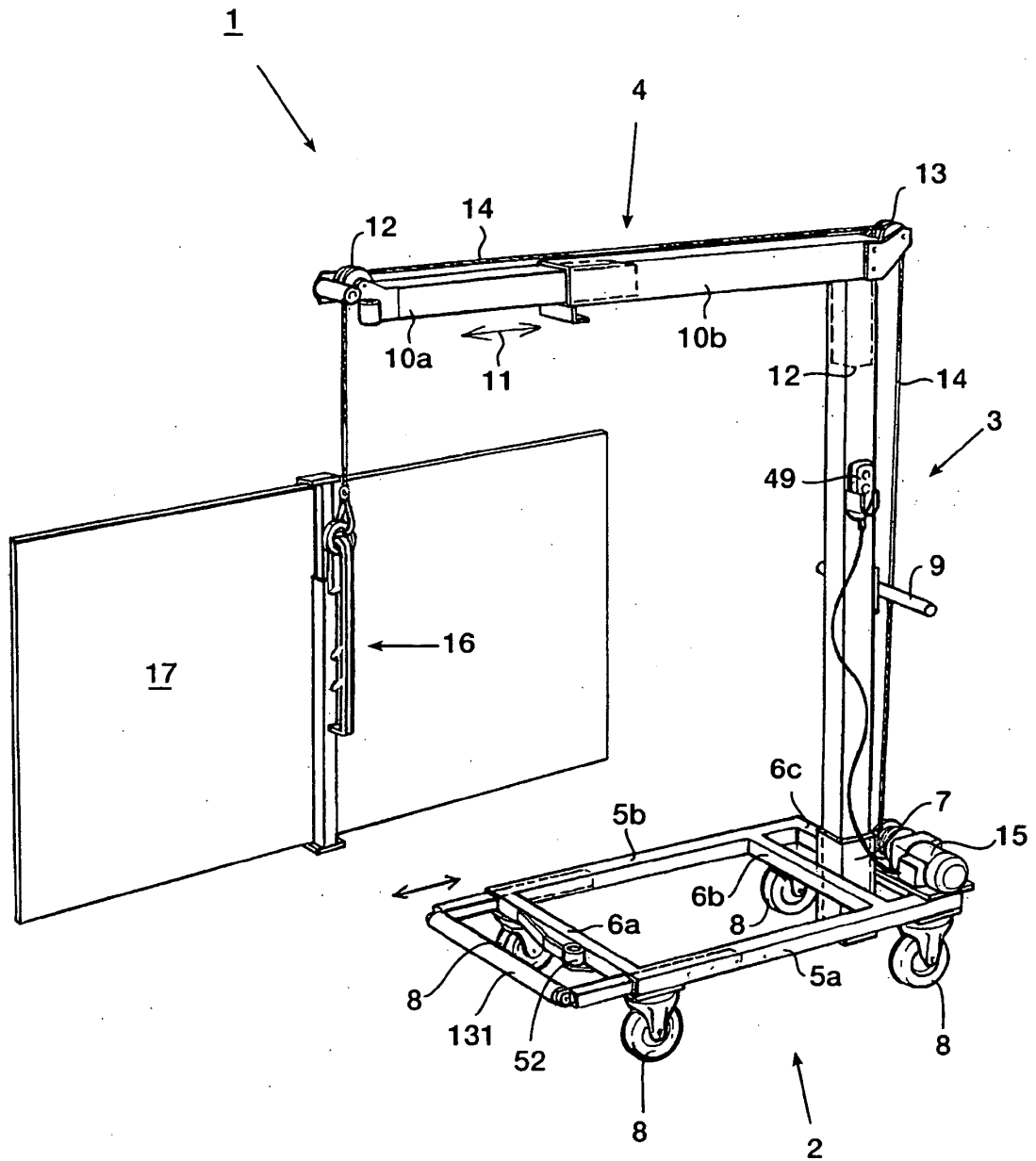
35

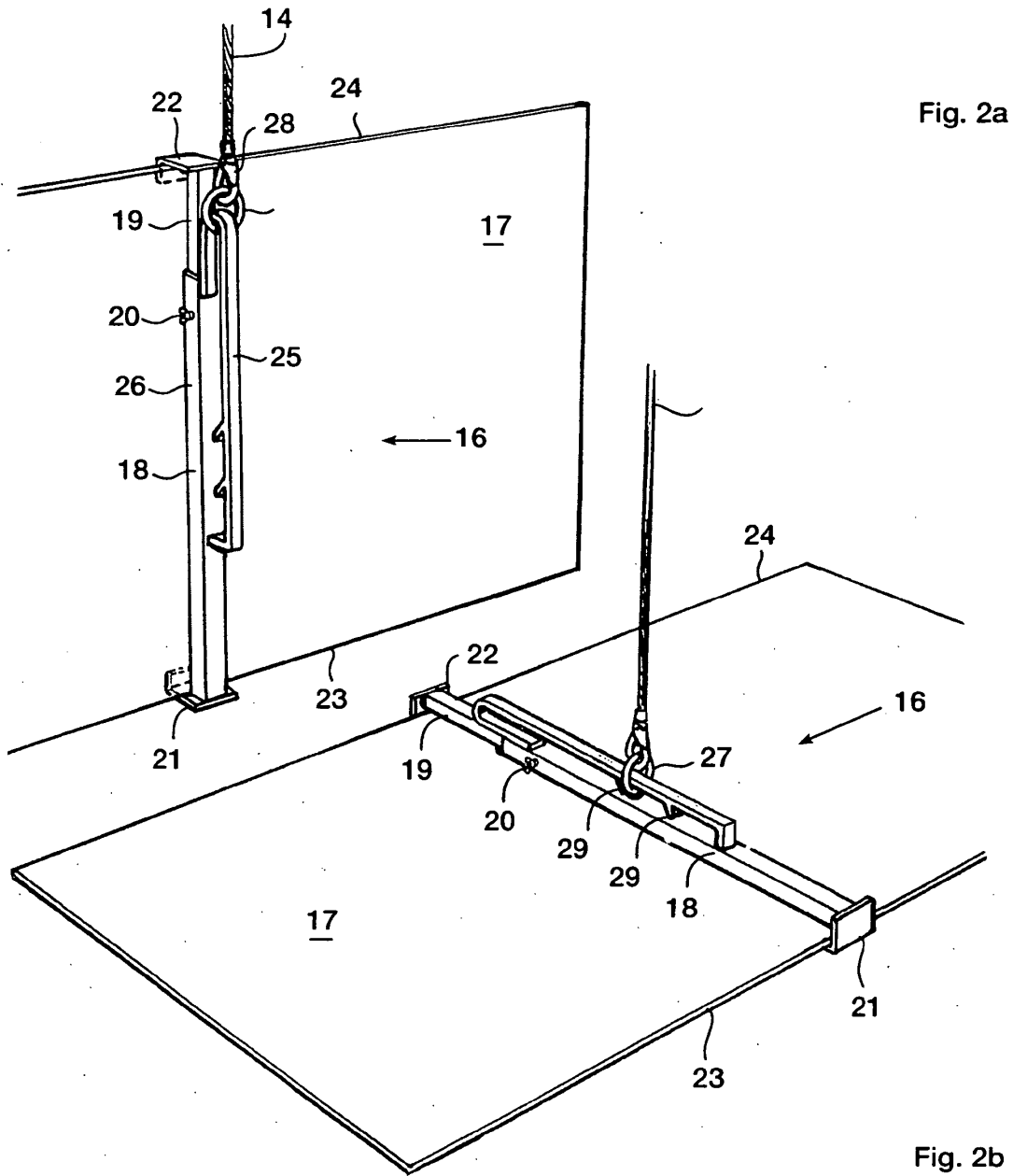
40

45

50

55





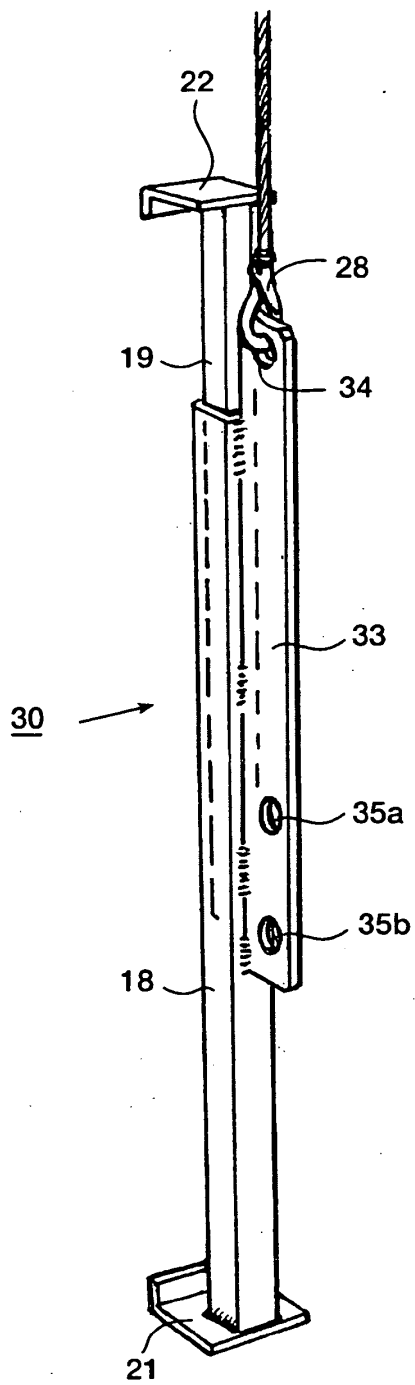


Fig. 3a

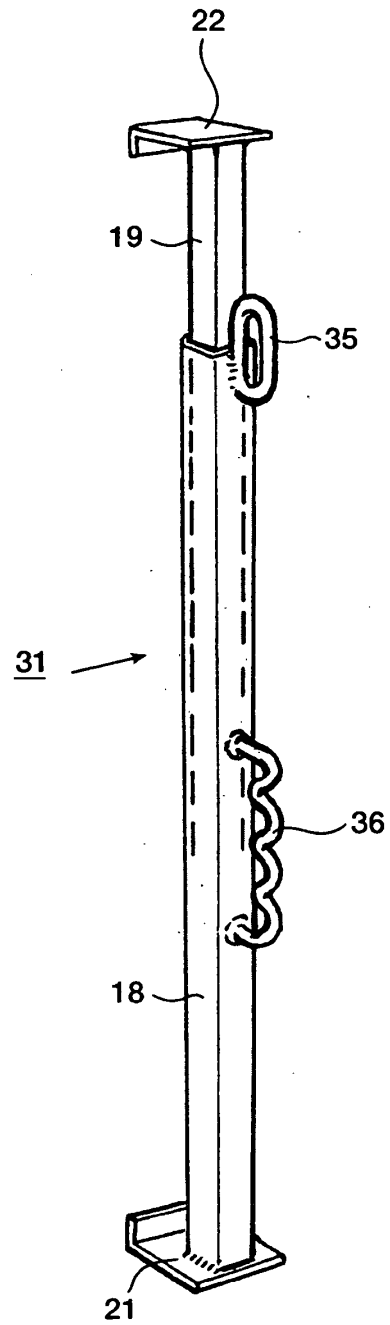


Fig. 3b

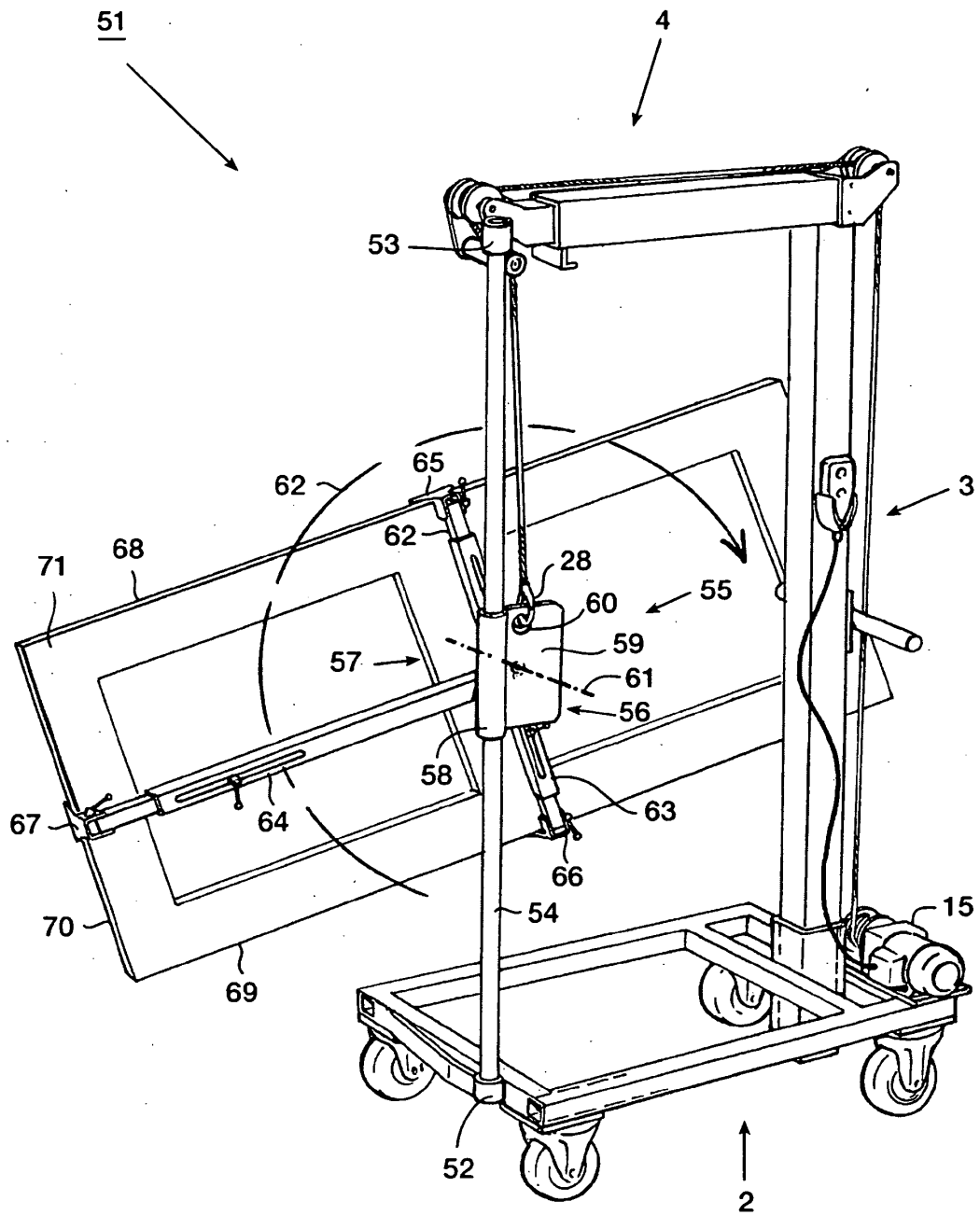
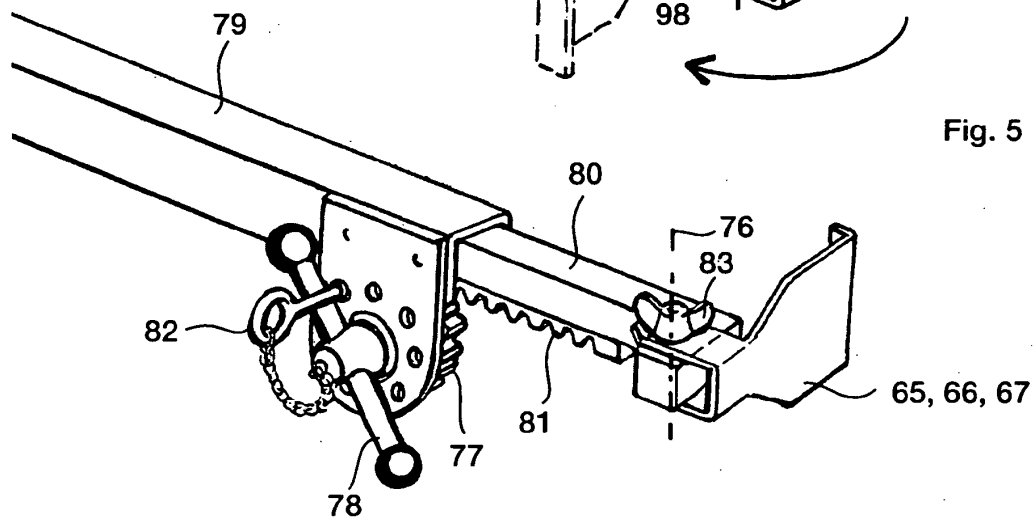
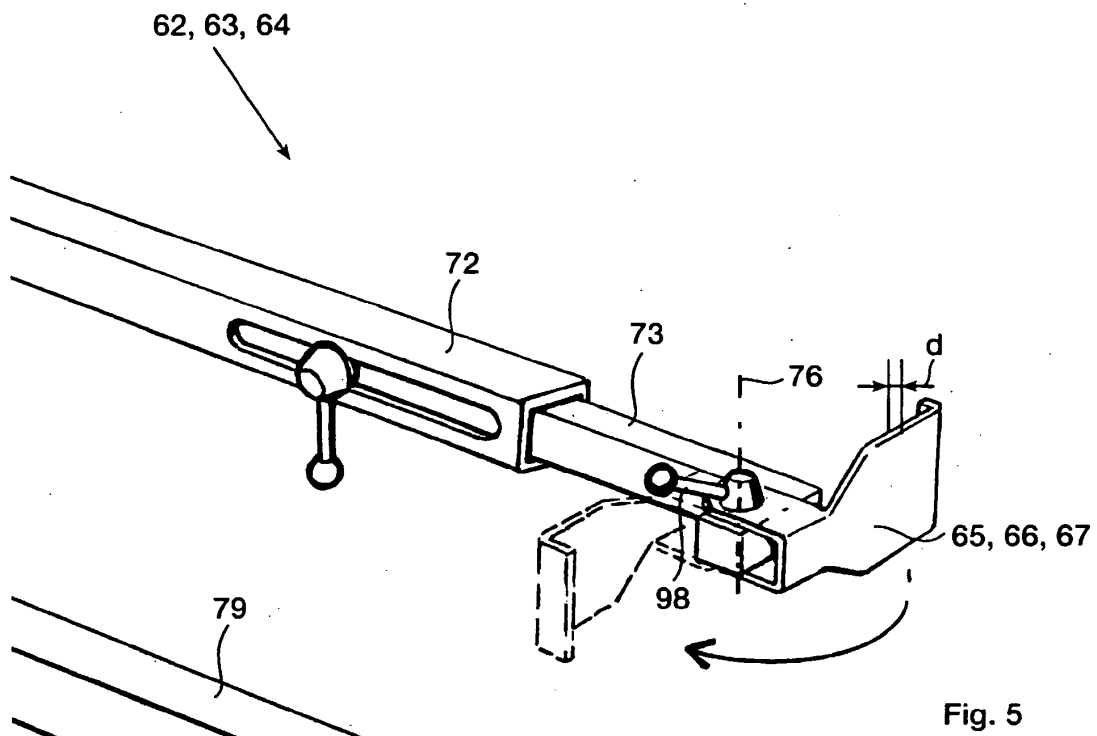


Fig. 4



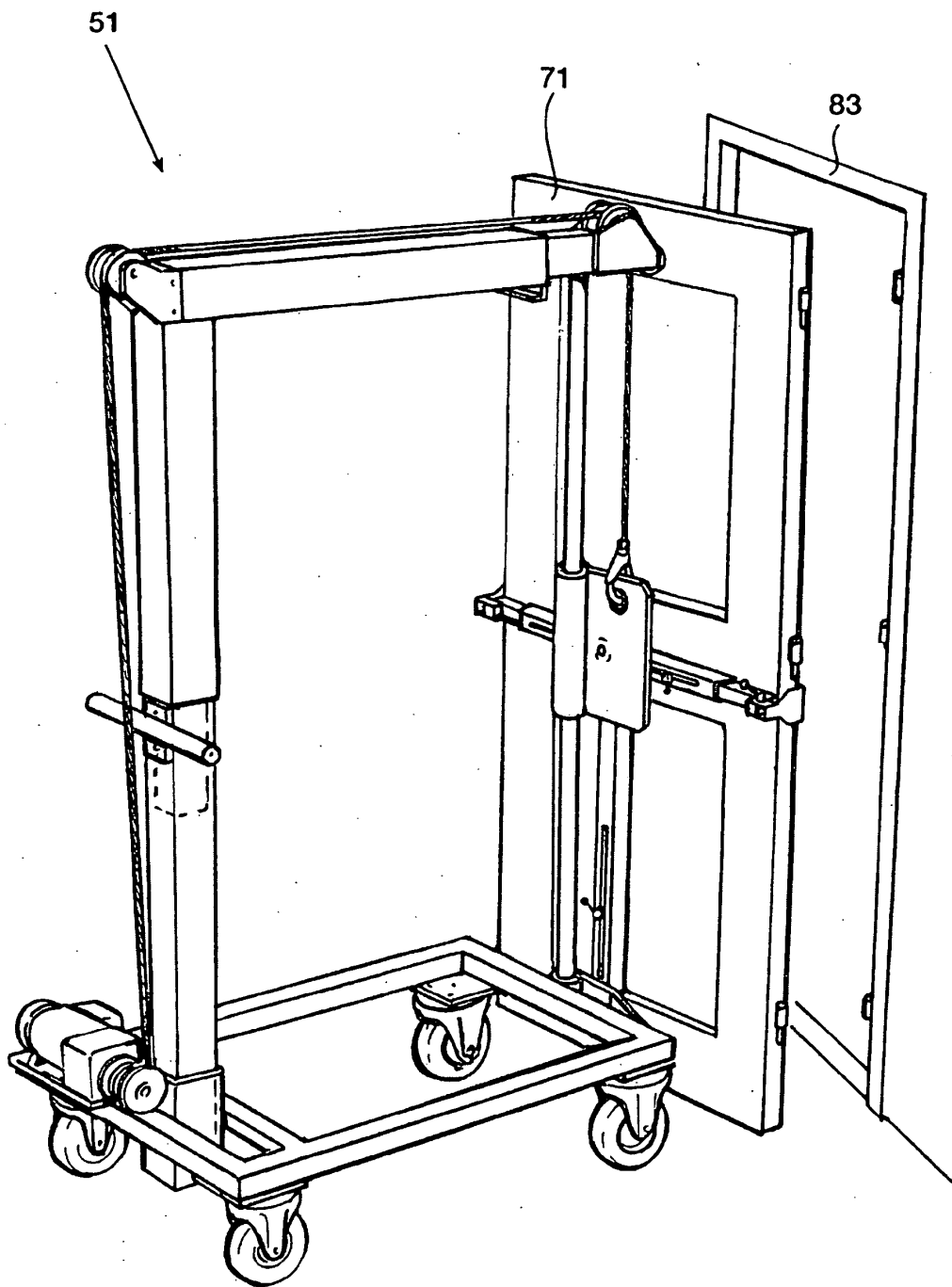


Fig. 7

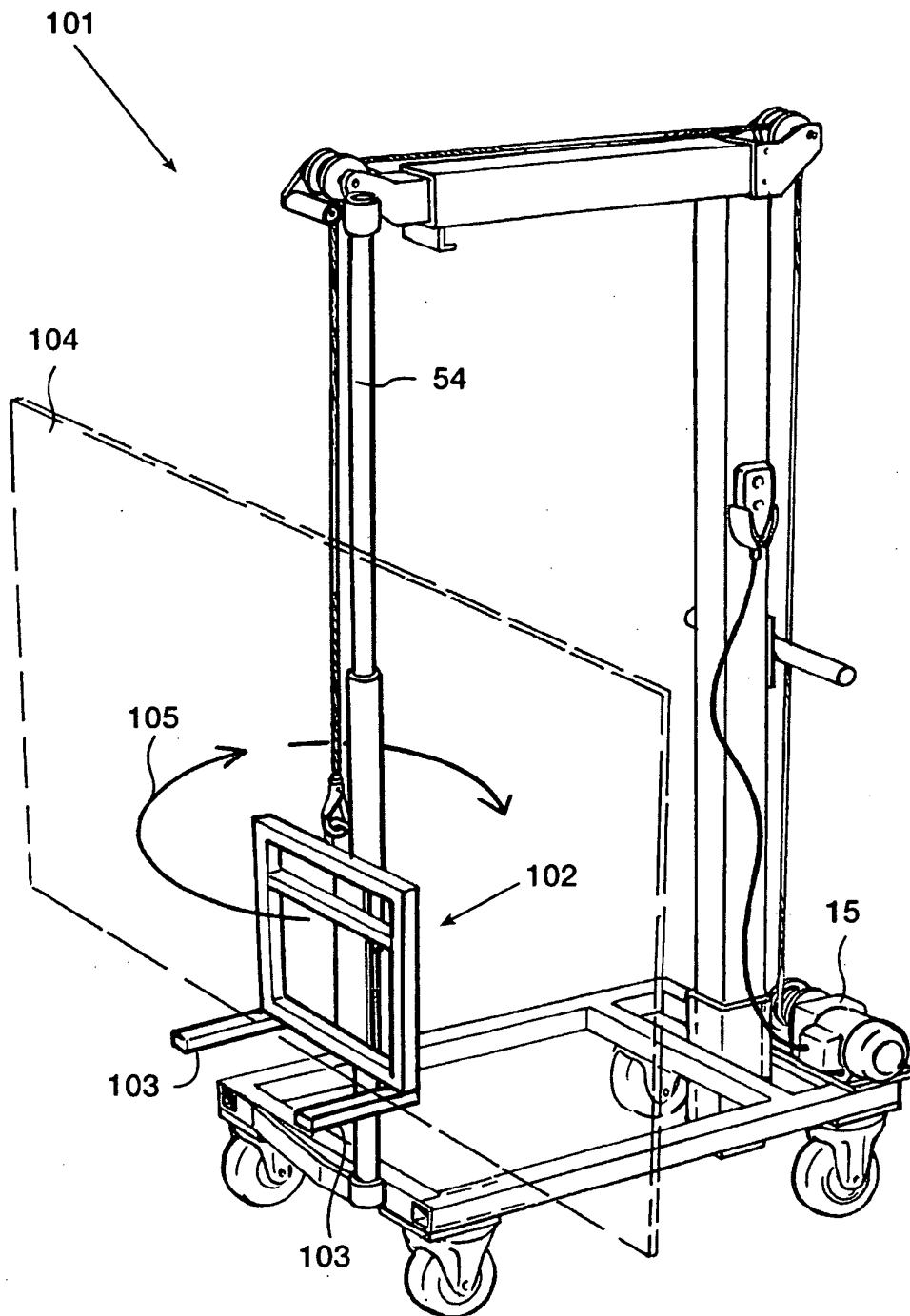


Fig. 8

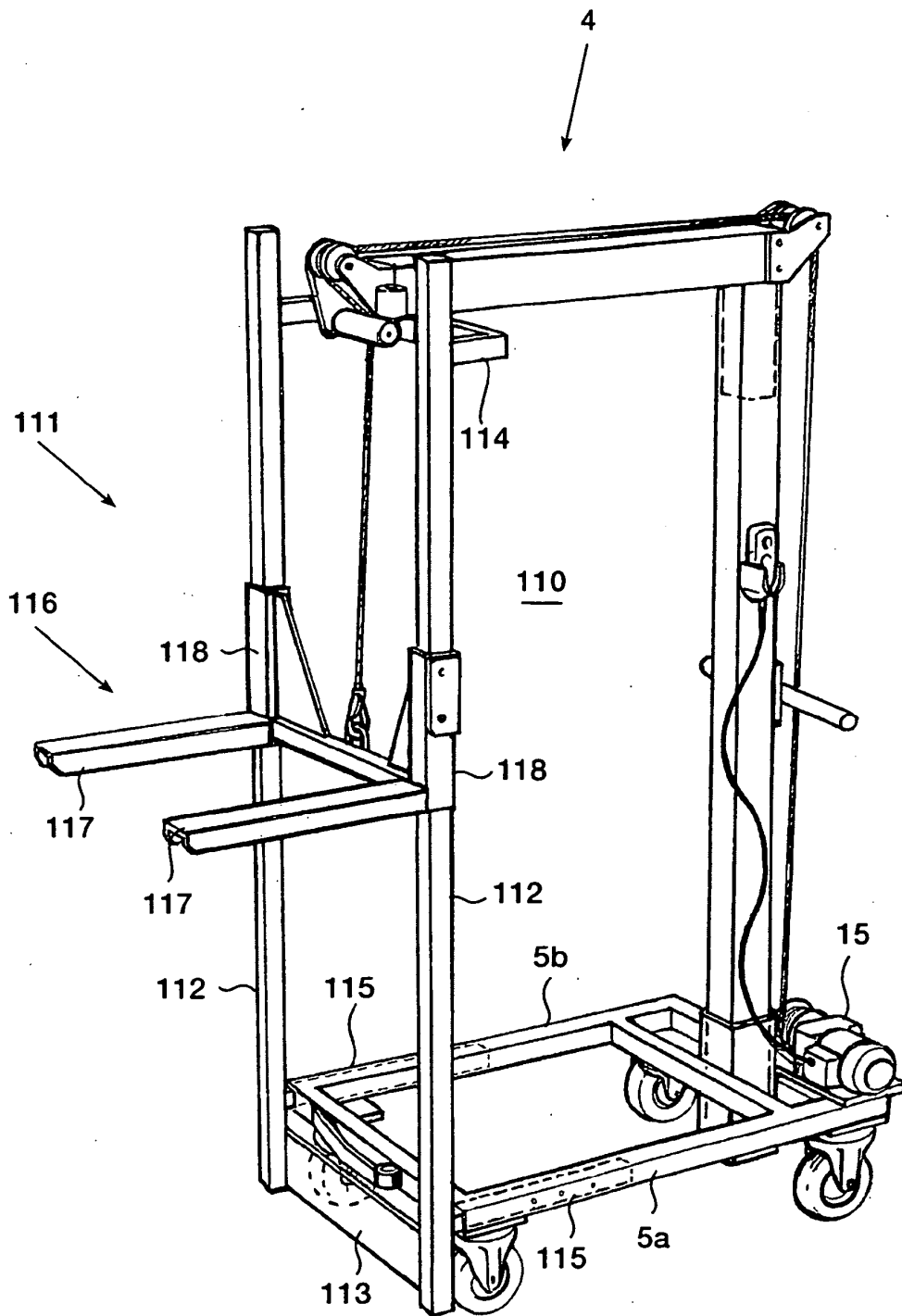


Fig. 9

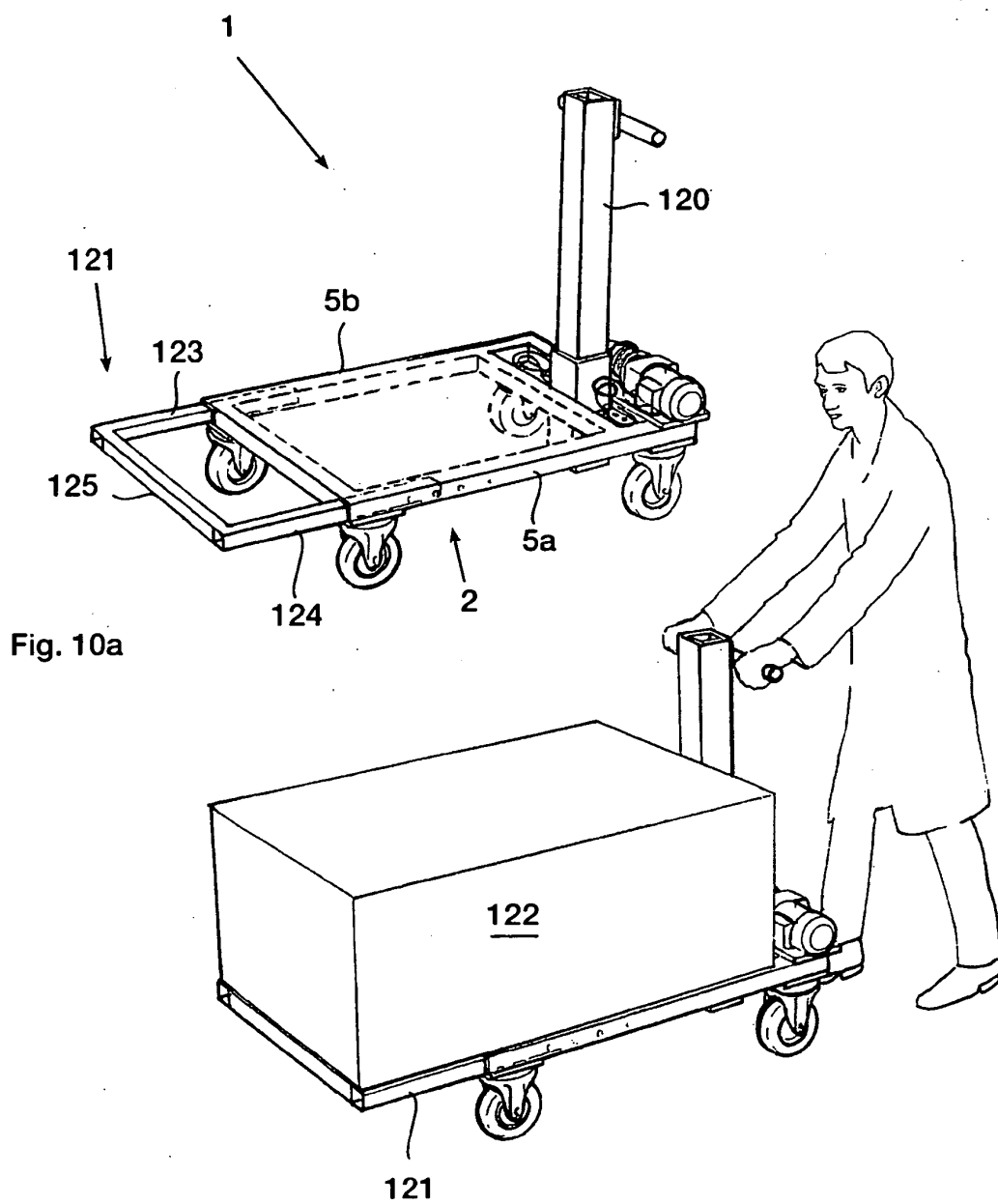


Fig. 10b

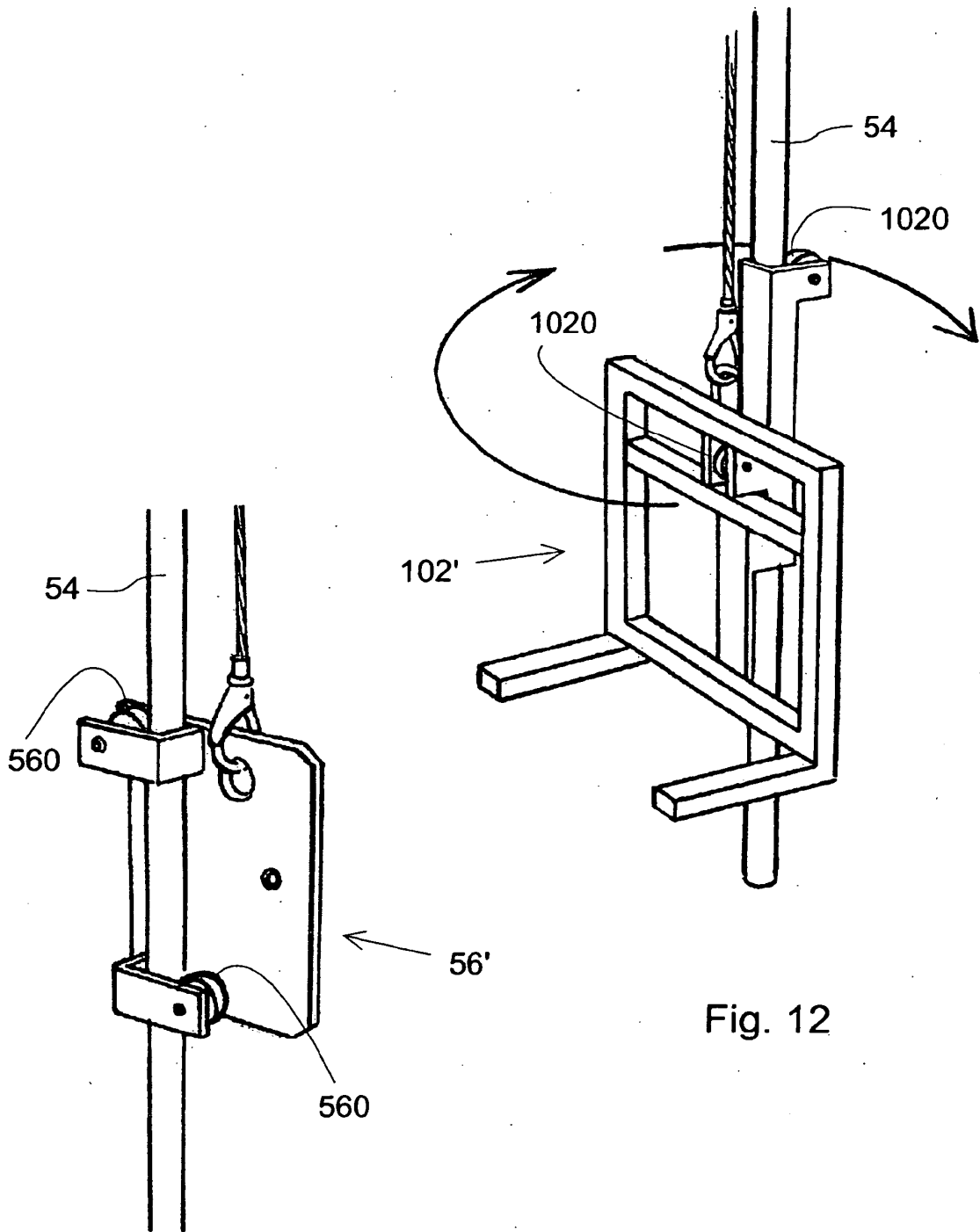


Fig. 11

Fig. 12

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4714393 A [0001]
- US 4810151 A [0003]