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(54) TOOL FOR MOUNTING AN OPERATOR FOR MOTORIZED SWING DOORS AND GATES

(57) The present invention concerns a tool (10) for mounting on both a panel of a swing door (2) and a static post (3) an operator (1) for motorizing the opening and closing of the door panel by rotation about a door rotation axis, Zd, said tool comprising:
(a) An elongated post element (10p) comprising a post through hole (11p) located adjacent to a post end of the post element;
(b) An elongated panel element (10d) w comprising a panel through hole located adjacent to a panel end of the panel element, wherein
(c) The panel element and post element are telescopically coupled to one another, so that the panel element and post element can translate with respect to one another, and
(d) Optionally a blocking device (13h, 13n, 13p, 13s) for blocking the translation of the panel element and post element with respect to one another at a position corresponding to a preferred distance, thus setting at a desired value the distance between the post through hole and the panel through hole.

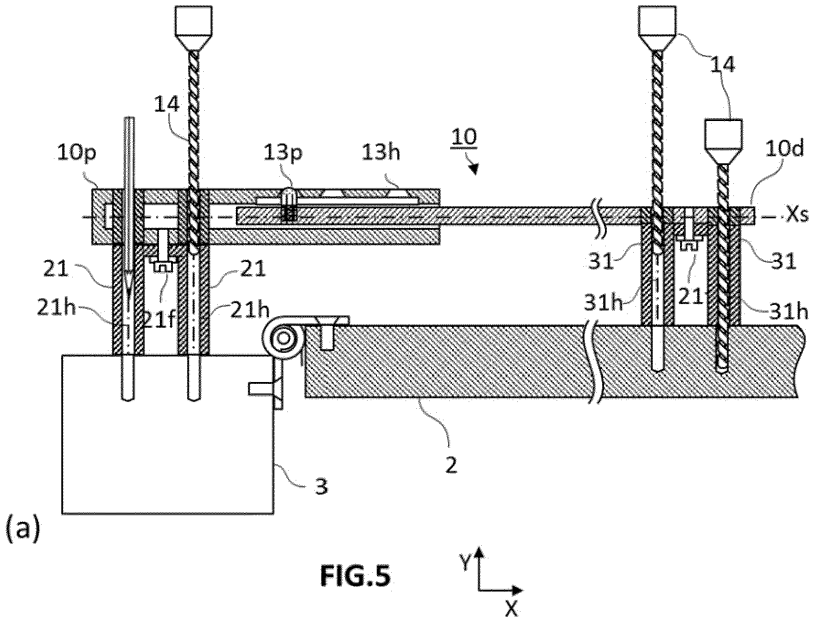

FIG.5

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Description

TECHNICAL FIELD

[0001] The present invention concerns a tool for easily mounting an operator for motorizing a swing door or gate comprising a panel able to swing with respect to a static post. The present invention proposes a versatile tool for flawlessly indicating the exact positions for drilling holes in both panel and static post for mounting a selection of operator models of different sizes and power.

BACKGROUND OF THE INVENTION

[0002] Motorized swing doors or gates (both terms being used herein as equivalents) comprising a shutter swinging open and closed about a door rotation axis, Zd, are commonly used to shut off openings, both industrial such as in warehouses, supermarkets, or in industrial halls, and private, such as the entrance gates to a garage or garden, and the like. These shutters must be at least partially rigid and generally comprise a solid panel or a gate with a relatively rigid frame, enclosing a less rigid structure such as a mesh, bars, fabric, and the like. The term "panel" is used herein to encompass any kind of shutter suitable for use in a swing door.

[0003] One type of motorized swing doors uses an operator as illustrated in Figures 1 and 2, comprising a motor (M) suitable for rotating a worm screw (1ws) about a longitudinal axis, Xs. One end of the operator comprises a static fixing bracket (121) fixed to a static post (3) defining one edge of the opening to be closed, such as to be able to rotate about an operator rotation axis, Zo, parallel to and offset from the door rotation axis, Zd, by means of an operator hinge (1h). An opposite end of the operator comprises a translating fixing bracket (131) comprising a fixing end fixed to the panel (2), and a nut end comprising a thread engaged in the worm screw, such that the rotation of the worm screw with respect to the nut end about the longitudinal axis, Xs, drives the translation of the nut end along said longitudinal axis, Xs. As illustrated in Figure 1(a), the translation of the nut end along the worm screw drives the swinging of the panel about the door rotation axis, Zd, often defined by panel hinges (2h), thus controlling the opening and closing of the swing door.

[0004] The dimensions of an operator vary depending on the brand, the power, the size of the swing door it is designed for, and the like. The installation of a swing door is not straightforward, and requires from an installer extensive measurements both on the static post and the swinging panels. Some installers start by fixing the static fixing bracket to the static post, and then draw their attention to the swinging panel. This technique has two major drawbacks. First, it is very difficult to ensure that the operator will be mounted perfectly normal to the door rotation axis, Zd, as a little misalignment of the screws fixing the static fixing bracket to a post is magnified at the other end of the operator, resulting in a less efficient and aesthetically disturbing motorized swing door. Second, it may happen that once the operator is fixed to a post, the translating fixing bracket cannot be fixed to the panel for structural reasons, as for example being offset with respect to the frame of the panel and facing instead a mesh. The whole work must be started again.

[0005] Some operator suppliers include a paper pattern to be cut off the packaging indicating the positions of the holes required for the mounting of a specific operator. This solution is not optimal as the posts and panels are generally not on a same plane, requiring the folding of the paper pattern and, consequently, the alteration of the distances indicated by the paper pattern.

[0006] There is a need in the art for a tool, which should be permanently present in the tool box of installers of swing door operators, which can assist the installer in mounting operators in a variety of models and sizes, in a shorter time, and requiring no or little measurements. It should be operational even when the static fixing bracket and translating fixing bracket must be fixed to a post and to a panel on different planes, which is not possible with a paper pattern. These and other advantages of the present invention are presented in continuation.

SUMMARY OF THE INVENTION

[0007] The present invention is defined in the appended independent claims. Preferred embodiments are defined in the dependent claims. In particular, the present invention concerns a tool for mounting on both a panel of a swing door (2) and a static post (3) an operator for motorizing the opening and closing of the door panel by rotation about a door rotation axis, Zd, said tool comprising:

(a) A post element which is elongated, extending along a longitudinal axis, Xs, and comprising a post through hole extending normal to the longitudinal axis, Xs, and located adjacent to a post end of the post element;

(b) A panel element which is elongated, extending along the longitudinal axis, Xs, and comprising a panel through hole extending parallel to the post through hole and located adjacent to a panel end of the panel element, wherein

(c) The panel element and post element are telescopically coupled to one another, so that the panel element and post element can translate with respect to one another along the longitudinal axis, Xs, to vary the distance between the post through hole and the panel through hole between a minimal distance, d0, and a maximal distance d1; and

(d) Optionally, a blocking device for blocking the translation of the panel element and post element with respect to one another at a position corresponding to a preferred distance, thus setting at a desired value the distance between the post through hole

and the panel through hole.

[0008] For an easier use, the tool preferably further comprises indications of preferred distances between the post through hole and the panel through hole, corresponding to the dimensions of a selection of preferred models of operators. The indications can be one or more of printed or engraved graphical indications, light indications, and/or sound indications.

[0009] The tool preferably comprises a blocking device. Different blocking devices can be used for setting the distance between the post through hole and the panel through hole. In one embodiment, the blocking device comprises the following elements:

- discrete openings distributed on the post element along the longitudinal axis, Xs, facing corresponding indications , and
- a pin (13p) resiliently mounted in a recess of the panel element, such that
- when the pin is forced down into the recess, the panel element is free to translate along the longitudinal axis, Xs, with respect to the post element, and
- when the pin faces a discrete opening, it is free to resiliently pop out of the recess and to partially engage into the discrete opening, such that the translation of the panel element is blocked with respect to the post element at a position wherein the distance between the post through hole and the panel through hole is according to the corresponding indication facing the discrete through hole.

[0010] In an alternative embodiment, the blocking device comprises the following elements:

- An elongated slot extending on the post element along the longitudinal axis, Xs, with indications distributed along the elongated slot,
- A pin rigidly mounted on the panel element and engaged through the elongated slot, and
- A nut engaged in the pin, such that the nut can be moved from a translating position, wherein the panel element is free to translate along the longitudinal axis, Xs, with respect to the post element, to a tight position, wherein the panel element is blocked with respect to the post element.

[0011] In yet an alternative embodiment, the blocking device comprises the following elements:

- An elongated slot extending on the post element along the longitudinal axis, Xs, with notches extending transverse to and distributed along the elongated slot, with indications distributed along the elongated slot, and facing corresponding notches, and
- A lever engaged in the elongated slot, and mounted on the panel element such as to resiliently rotate about an axis parallel to the longitudinal axis, Xs, and biased such that when facing a notch, the lever naturally engages into the notch, thus blocking the translation of the panel element with respect to the post element at a position wherein the distance between the post through hole and the panel through hole is according to the corresponding indication facing the notch.

[0012] A nut can optionally be engaged on the lever so as to allow the blocking of the translation of the panel element at any position between two notches.

[0013] A bubble level can advantageously be integrated in either the post element or the panel element. The bubble level ensures that the tool is held in perfect alignment with a reference orientation without requiring any fastidious measurements.

[0014] For taking account of any offset between the surface of the post on which the post fixing bracket must be fixed and the surface of the panel on which the panel fixing bracket must be fixed, the tool may further comprise:

- a post mock bracket fixed to the post element at the level of the post through hole, and
- a panel mock bracket fixed to the panel element at the level of the panel through hole.

The post mock bracket and panel mock bracket simulate a post fixing bracket and a panel fixing bracket of an operator of the type corresponding to the selected operator and to the swing door.

[0015] In a preferred embodiment, the post mock bracket comprises a post channel, which is in registry with the post through hole when the post mock bracket is coupled to the post element, such that a drill bit of diameter required for fixing a corresponding post fixing bracket can run through both post through hole and post channel. Similarly, the panel mock bracket may comprise a panel channel, which is in registry with the panel through hole when the panel mock bracket is coupled to the panel element, such that a drill bit of diameter required for fixing a corresponding post fixing bracket can run through both panel through hole and panel channel to drill a hole in the panel. With this embodiment, the holes required for mounting the operator can be drilled directly through the post and panel through holes with the tool still in position, thus greatly facilitating the mounting of the operator.

[0016] If the fixing brackets of the operator require more than one screw for fixing them the post and panel, the tool may comprise a second or more post through hole(s) located adjacent to the post through hole, and a second or more panel through hole(s) located adjacent to the panel through hole. In such case, the tool preferably comprises a set of post mock brackets comprising at least two post mock brackets with a corresponding number of post channels, which are in registry with a corresponding number of post through holes when the set of post mock

brackets is coupled to the post element. Similarly, it may comprise a set of panel mock brackets comprising at least two panel mock brackets with a corresponding number of panel channels, which are in registry with a corresponding number of panel through holes when the set of panel mock brackets is coupled to the post element. With this configuration a drill bit of diameter required for fixing a corresponding post fixing bracket can be run through each post through holes and corresponding post channels.

[0017] The present invention also concerns a method for mounting an operator onto a swing door for motorizing the opening and closing of a door panel, said method comprising the following steps:

(a) Providing a tool as defined above,
(b) Translating the panel element with respect to the post element to a position such that the distance between the post through hole and the panel through hole corresponds to the dimensions of the operator,
(c) Applying the tool onto the swing door at the desired position of the operator,
(d) Optionally marking the positions of the holes to be drilled in the post and panel of the swing door, as indicated by the positions of the post through hole and panel through hole,
(e) Drilling holes in the post and panel of the swing door at the positions indicated by the post through hole and panel through hole, and
(f) Fixing the post fixing bracket and panel fixing bracket of the operator with screws engaged into the holes drilled in step (e).

Brief description of the Figures

[0018] For a fuller understanding of the nature of the present invention, reference is made to the following detailed description taken in conjunction with the accompanying drawings in which:

Figure 1: shows (a) a top view and (b) a front view of a motorized swing door comprising an operator, illustrating the principle of such operator.

Figure 2: shows (a) a top view and (b) a front view of an operator to be mounted onto a swing door.

Figure 3: shows various embodiments of tools according to the present invention.

Figure 4: Shows (a) a tool with mock brackets for accommodating an offset between the planes defined by a post and a panel, and (b) different embodiments of such mock brackets.

Figure 5: shows (a) the use of the tool for drilling holes on a post and on a panel, and (b) the mounting of an operator with screws applied onto the holes drilled in (a).

Figure 6: Shows a tool with mock brackets, (a) exploded view, and (b) assembled view.

DETAILED DESCRIPTION OF THE INVENTION

[0019] The present invention concerns a tool for easily and reproducibly mounting a motorized operator onto a swing door for motorizing the opening and closing of a door panel of said swing door by rotation about a door rotation axis, Zd. The working principle of such operators is well known in the art and is explained in the Background Art section supra in relation with Figure 1. One of the great difficulties for mounting operators of the type illustrated in Figure 2, is on the one hand, their weight, which makes them difficult to handle and, on the other hand, the fact that they must be mounted onto two elements which move with respect to one another (a post and a swinging door), and which usually define different planes. The tool of the present invention is very useful for mounting a variety of operators of different sizes and brands, and requiring no or little measurements. Once the tool is set for mocking a given model of operator, it can be adapted to swing doors of any type, any configuration, and any dimensions.

[0020] As illustrated in Figure 3, a tool (10) according to the present invention for mounting on both a panel of a swing door (2) and a static post (3) an operator (1) as discussed above comprises the following elements.

(a) A post element (10p) which is elongated, extending along a longitudinal axis, Xs, and comprising a post through hole (11p) extending normal to the longitudinal axis, Xs, and located adjacent to a post end of the post element;
(b) A panel element (10d) which is elongated, extending along the longitudinal axis, Xs, and comprising a panel through hole extending parallel to the post through hole (11d) and located adjacent to a panel end of the panel element, wherein
(c) The panel element and post element are telescopically coupled to one another, so that the panel element and post element can translate with respect to one another along the longitudinal axis, Xs, to vary the distance between the post through hole and the panel through hole between a minimal distance, d0, and a maximal distance d1.

[0021] The tool may preferably further comprise a blocking device (13h, 13n, 13p, 13r, 13s) for blocking the sliding of the panel element and post element with respect to one another at a position corresponding to a preferred distance, thus setting at a desired value the distance between the post through hole and the panel through hole.

[0022] The telescopic relationship between the post element and the panel element allowing the translation of

one with respect to the other is very useful for mocking the dimensions of operators of different models. Translation can be achieved by simply sliding the panel element with respect to the post element, like in a slide rule. Alternatively, translation can be driven by a rack and pinion mechanism, which can be manual or motorized, wherein a pinion mounted in rotation on one of the post or panel element is engaged in a rack fixed to the other of the post and panel elements. Rotation of the pinion drives the translation. In a preferred embodiment, the tool further comprises indications (17) of preferred distances between the post through hole and the panel through hole, corresponding to the dimensions of a selection of preferred models of operators. For example, all the models of a given brand, or the major operators of various brands for a given type of swing doors. The indications (17) can be one or more of the following types: printed or engraved graphical indications, light indications, and/or sound indications.

[0023] Once the panel element and post element have been telescopically set at a desired configuration, the distance between the post through hole and the panel through hole thus obtained must be blocked at the desired position. In a first embodiment, the panel element is designed to slide with respect to post element with some friction. Once the desired position of the panel element with respect to the post element is reached, the panel element cannot slide without the application of some force. This embodiment is attractive because very simple. Care must be taken, however, to not inadvertently move the panel element with respect to the post element during handling of the tool. For a safer handling of the tool, it is preferred to provide a blocking device for blocking the relative positions of the post and panel elements at the desired configuration. Different types of blocking devices are illustrated as preferred embodiments in Figure 3.

[0024] For example, Figure 3(a) illustrates a tool according to the present invention, wherein the blocking device comprises the following elements:

- discrete openings (13h) distributed on the post element along the longitudinal axis, Xs, facing corresponding indications (17), L1, L2, L3, etc., and
- a pin (13p) resiliently mounted in a recess of the panel element, such that
- when the pin is forced down into the recess, the panel element is free to slide along the longitudinal axis, Xs, with respect to the post element, and
- when the pin faces a discrete opening, it is free to resiliently pop out of the recess and to partially engage into the discrete opening, such that the sliding of the panel element is blocked with respect to the post element at a position wherein the distance between the post through hole and the panel through hole is according to the corresponding indication facing the discrete through hole.

[0025] The pin in Figure 3(a) is illustrated as resiliently mounted on a helicoidal spring. Other resilient systems can be used instead, such as mounting a pin on a leaf spring, on a viscoelastic support material (e.g., a foam, or an elastomer), and any other systems known by a person of ordinary skill in the art, without departing from the present invention.

[0026] This embodiment is particularly interesting for a company supplying a limited number of operator models, each corresponding to the position of a discrete opening. It does not afford, however, flexibility for mocking an alternative operator model, having dimensions others than the ones corresponding to the pre-set positions of the discrete openings.

[0027] In an alternative embodiment, illustrated in Figure 3(b), the blocking device comprises the following elements:

- An elongated slot (13s) extending on the post element along the longitudinal axis, Xs, with indications (17), L1, L2, L3, etc., distributed along the elongated slot,
- A pin rigidly mounted on the panel element and engaged through the elongated slot, and
- A nut (13n) engaged in the pin, such that the nut can be moved from a translating position, wherein the panel element is free to translate along the longitudinal axis, Xs, with respect to the post element, to a tight position, wherein the panel element is blocked with respect to the post element.

[0028] This solution affords a great flexibility as the distance between the post through hole and the panel through hole can be varied continuously between the minimal distance, d0, and the maximal distance d1. Pre-set distances corresponding to the operator models most often used can be identified by the indications (17). Absent pre-set positions, and because the position of the panel element with respect to the post element can be varied continuously, care must be taken to accurately set the position of the panel element to accurately correspond to the desired distance between the post through hole and the panel through hole.

[0029] In a third embodiment illustrated in Figure 3(c), the blocking device comprises the following components:

- An elongated slot (13s) extending on the post element along the longitudinal axis, Xs, with notches (13N) extending transverse to and distributed along the elongated slot, with indications (17) distributed along the elongated slot, and facing corresponding notches, and
- A lever (13L) engaged in the elongated slot, and mounted on the panel element such as to resiliently rotate about an axis parallel to the longitudinal axis, Xs, and biased such that when facing a notch, the lever naturally engages into the notch, thus blocking the translation of the panel element with respect to

the post element at a position, wherein the distance between the post through hole and the panel through hole is according to the corresponding indication facing the notch.

[0030] In a preferred embodiment, the blocking system illustrated in Figure 3(c) may further comprise a nut (13n) suitable for engaging the lever, so that the distance between the post through hole and the panel through hole can be varied continuously and blocked at any position, even between two notches. This embodiment is interesting as in combines full flexibility of deciding the desired distance between the post through hole and the panel through hole and, at the same time, comprising pre-set positions accurately and easily corresponding to the dimensions of a number of specific operator models.

[0031] In a fourth embodiment illustrated in Figure 3(d), the panel element is slidingly engaged into a rail of the post element and comprises a protrusion (13r) fitting a series of notches (13N) distributed along the rail at preset positions, L1 to L3. The relative dimensions of the panel element and the rail, as well as the resiliency of the material of the protrusion allow the sliding of the panel element between two notches. When the protrusion reaches a notch, the user feels a stop in the sliding. By pulling a little harder, the protrusion can disengage from the notch and slide further to the next notch.

[0032] The foregoing embodiments are illustrated and described with the panel element being slidingly inserted in the post element, preferable in a receiving rail of the post element. It is clear that the inverted configuration with the post element being slidingly inserted into the panel element is perfectly equivalent and is encompassed by the present invention. A person of ordinary skill in the art knows very easily how to position the pins, protrusions, notches and levers illustrated in Figure 3 in such equivalent configurations.

[0033] An operator is quite heavy to handle and can measure 50 to 120 cm of length. One major difficulty when mounting operators is to ensure that they are mounted normal to the door rotation axis, Zd, i.e., in most cases, mounting the operator horizontally. The tool of the present invention is very light. It can be made of aluminium, stainless steel, polymer, or even wood. In order to give the installer a direct indication of the alignment of the tool, the tool preferably comprises a bubble level (1 5) integrated in either the post element or the panel element (cf. Figures 3 and 4(a)). With a tool set to mock the dimensions of an operator of a given model and type, an installer can simply position the tool at a desired position on a swing door, check the alignment of the tool with the bubble level and mark the positions of the holes required for mounting the operator, without making a single measurement. As an alternative to marking the position of the holes illustrated in Figure 4(a), left hand side (21), some embodiments of the present invention discussed more in detail below allow the direct drilling of the holes as the tool is still in position, as shown in Figure 4(a), right hand side (31), in Figure 5(a), and in Figure 6.

[0034] If the surface of the static post (3) on which holes must be drilled to fix the post fixing bracket (121) of the operator and the surface of the panel (2) on which holes must be drilled to fix the panel fixing bracket (131) are substantially on a same plane (or level), then the tool can be used as described above. In most cases, however, as illustrated in Figures 1(a) and 5, this is not the case, and the static post (3) and door panel (2) are offset, defining different planes. If the post through hole and the panel through hole of the tool are on a same plane, and the post and panel define different planes, there is a danger that the holes drilled on the post and panel be slightly offset with respect to their desired positions, because the tool was not held parallel to the plane defined by the panel. To prevent such problem from occurring, it is preferred that the tool further comprises:

- a post mock bracket (21) fixed to the post element at the level of the post through hole, and
- a panel mock bracket (31) fixed to the panel element at the level of the panel through hole.

[0035] Such mock brackets are illustrated in Figures 4 to 6, with several illustrative embodiments illustrated in Figure 4(b) to (e). The post and panel mock brackets (21, 31) serve to reproduce on the tool the lengths of the post and panel fixing brackets (121, 131) fixing the operator to the post and panel, respectively. The mock brackets (21, 31) can be coupled to the tool with coupling means (21 f), such as a screw (as illustrated in Figures 4 and 6, or any other coupling means known by a person of ordinary skill in the art without departing from the present invention. For example, as illustrated in Figure 4(a) left hand side (21) and in Figure 4(e), a screw can run through the post and/or panel through hole and engage into an inner thread of the post and/or panel mock bracket, respectively. This embodiment does not allow a hole to be drilled on the post and/or panel directly through the tool, as the post and/or panel through holes are filled by the screws. In this embodiment, the installer can mark the positions of the holes to be drilled on the post and/or panel with a pen. After removing the tool, holes can be drilled at the marked positions. In Figure 4(a), left hand side (21), the outer circumference of the mock bracket (21) can be marked. In the embodiment illustrated in Figure 4(e), a clearing in the mock bracket allows access of a pen to the inner circumference of the mock bracket, which may in some cases be more accurate.

[0036] In a preferred embodiment illustrated in Figure 5(a), the coupling means (21 f) for coupling the mock brackets to the tool allows holes to be drilled in the post and panel directly through the post and panel through holes. In this case,

- the post mock bracket can comprise a post channel (21 h), which is in registry with the post through hole when the post mock bracket is coupled to the post

element, such that a drill bit of diameter required for fixing a corresponding post fixing bracket can run through both post through hole and post channel, and

- the panel mock bracket comprises a panel channel (31 h), which is in registry with the panel through hole when the panel mock bracket is coupled to the panel element, such that a drill bit of diameter required for fixing a corresponding post fixing bracket can run through both panel through hole and panel channel to drill a hole in the panel (2)

[0037] Examples of this embodiment are illustrated in Figures 4(a) right hand side (31), 4(b) to (d), and 5(a). For example, as illustrated in Figure 4(a) right hand side (31), a mock bracket can be coupled to the tool by inserting the channel of the mock bracket into a receiving means and securing it. The receiving and securing means can include a threaded surface, or a bayonet, or the like. Alternatively, as shown in Figures 4(b) to (d) and 5, a screw can be used to couple a base of the mock bracket onto the tool, without obstructing the corresponding bracket channels.

[0038] Often, a fixing bracket must be fixed to a post or panel with at least two screws. For this reason, sets of multi-mock brackets can be used, requiring a single coupling means (21 f) for coupling all the mock brackets corresponding to the total number of screws required for fixing a corresponding fixing bracket (121, 131) in registry with a corresponding number of post and/or panel through holes (11p, 11d). Such sets comprise as many mock brackets as screws required for coupling a fixing bracket to an element of a swing door. In Figures 4(c) and 5, sets comprising two mock brackets (21, 31) are illustrated, corresponding to an operator model to be coupled to a swing door by means of two screws for each of the post and panel fixing brackets (121, 131).

[0039] Because the offset between the planes defined by the post and panel of a swing door depends on the swing door, operator suppliers offer a selection of fixing brackets of pre-set sizes and lengths. In some cases, however, specific swing door configurations may require taylor-made fixing brackets, of sizes different from the selection. For this reason, a preferred embodiment comprises post and/or panel mock brackets, which lengths can be varied to adapt to any swing door configuration. Examples of such mock brackets are illustrated in Figure 4(a) right hand side (31) and 4(d). They generally comprise a base element (21 b) in which a mobile element (21 a) is inserted such that the position of the mobile element can be varied with respect to the base element. For example, as illustrated in Figure 4(a) and (d), the mobile element (21 a) can slide along an inner channel of the base element (21 b), and the relative positions of the two elements can be secured with a screw applying a pressure on the mobile element. Alternatively, the mobile element may comprise an outer thread engaged in an inner thread of the base element. By rotating the mobile element, the length of the mock bracket can be varied.

[0040] In the embodiment illustrated in Figure 5(b), the post and panel fixing brackets (121, 131) of an operator (1) are each fixed to the post and panel of a swing door, respectively, by means of two screws. The post and panel fixing brackets of the operator have different lengths determined by the configuration of the swing door. In order to mount the operator onto the swing door, a tool as illustrated in Figure 5(a) can be used. Said tool is as described above and comprises sets of several post and panel mock brackets (21, 31).

[0041] In particular, the tool comprises a set of post mock brackets comprising (at least) two post mock brackets with a corresponding number of post channels. The post channels of the (at least) two post mock brackets are mounted in registry with a corresponding number of post through holes, such that a drill bit (14) of diameter required for fixing a corresponding post fixing bracket (121) can run through each post through holes and post channels.

[0042] Similarly, the tool comprises a set of panel mock brackets comprising (at least) two panel mock brackets with a corresponding number of panel channels. The panel channels of the (at least) two panel mock brackets are mounted in registry with a corresponding number of panel through holes when the set of panel mock brackets is coupled to the post element, such that a drill bit of diameter required for fixing a corresponding panel fixing bracket can run through each panel through holes and corresponding panel channels.

[0043] In an alternative embodiment illustrated in Figure 6, the mock brackets (21, 31) can be mounted transverse to the longitudinal axis, Xs. It may happen, indeed, that in order to mount an operator with the longitudinal axis, Xs, horizontal, the post and panel fixing brackets must be positioned offset with respect to the horizontal. By using appropriate spacers as shown in Figure 6, the relative positions of the fixing brackets can be varied. Another advantage of this embodiment, is that the post and panel fixing brackets (121, 131) can be used with the fixing tool, acting as post and panel mock brackets (21, 31). This is highly advantageous as it reduces the number of mock brackets an installer must carry with him and, above all, reduces the risk of selecting a wrong set of mock brackets.

[0044] As shown in Figure 5, the operator (1) illustrated in Figure 5(b) can be mounted onto a swing door without taking a single measurement by using a tool (10) as illustrated in Figure 5(a). The light and easy to handle tool (10) is positioned on the post with the post mock bracket (21) located at the desired position of the post fixing bracket (121). With the help of a bubble level (1 5) the tool can be aligned very easily and the panel mock bracket (31) falls into position onto the panel indicating the corresponding positions of the fixing means of the panel fixing bracket (131). The installer can decide either to mark the respective positions of the holes with a pen,

and drill holes at the marked positions after removal of the tool, or it can drill directly through the channels of the mock brackets, with the tool still in position.

[0045] Once the holes have been drilled at the corresponding positions on the post and the panel, the operator can be mounted onto the swing door by screwing the post and panel fixing brackets to the post and panel, respectively. The operator is thus mounted in a fraction of the time required to date without a tool according to the present invention, and more reliably, as the positions of the various holes can be determined very easily and very reproducibly.

[0046] The tool of the present invention is a simple, inexpensive tool which greatly simplifies the mounting of operators for motorized wing doors with the following steps:

(a) Providing a tool as described above,
(b) Translating the panel element with respect to the post element to a position such that the distance between the post through hole and the panel through hole corresponds to the dimensions of the operator,
(c) Applying the tool onto the swing door at the desired position of the operator,
(d) Optionally marking the positions of the holes to be drilled in the post and panel of the swing door, as indicated by the positions of the post through hole and panel through hole,
(e) Drilling holes in the post and panel of the swing door at the positions indicated by the post through hole and panel through hole, and
(f) Fixing the post fixing bracket (121) and panel fixing bracket (131) of the operator with screws engaged into the holes drilled in step (e).

#	feature
1 h	operator hinge
1 ws	wormscrew
1	operator
2 h	panel hinge
2	panel
3	static post
10 d	panel element
10 p	post element
10	tool
11 d	panel through hole
11 p	post through hole
13 h	blocking device:
13 L	lever
13 n	blocking device: nut

(continued)

#	feature
13 N	blocking device: notch
13 p	blocking device: pin
13 r	protrusion
13 s	blocking device: elongated slot
14	drill bit
15	bubble level
17	indications of preferred distances
21	post mock bracket
21 a	Mobile element
21 b	Base element
21 f	coupling means for post mock bracket
21 h	post channel
31	panel mock bracket
31 f	coupling means for post channel
31 h	panel channel
121	post fixing bracket
131	panel fixing bracket

Claims

1. A tool (10) for mounting on both a panel of a swing door (2) and a static post (3) an operator (1) for motorizing the opening and closing of the door panel by rotation about a door rotation axis, Zd, said tool comprising:

(a) A post element (10p) which is elongated, extending along a longitudinal axis, Xs, and comprising a post through hole (11p) extending normal to the longitudinal axis, Xs, and located adjacent to a post end of the post element;
(b) A panel element (10d) which is elongated, extending along the longitudinal axis, Xs, and comprising a panel through hole extending parallel to the post through hole (11d) and located adjacent to a panel end of the panel element, wherein
(c) The panel element and post element are telescopically coupled to one another, so that the panel element and post element can translate with respect to one another along the longitudinal axis, Xs, to vary the distance between the post through hole and the panel through hole between a minimal distance, d0, and a maximal distance d1.

2. Tool according to claim 1, further comprising a blocking device (13h, 13n, 13p, 13s) for blocking the translation of the panel element and post element with respect to one another at a position corresponding to a desired value of the distance between the post through hole and the panel through hole.

3. Tool according to claim 1 or 2, further comprising indications (1 7) of preferred distances between the post through hole and the panel through hole, corresponding to the dimensions of a selection of preferred models of operators.

4. Tool according to claim 2, wherein the blocking device comprises:

• discrete openings (13h) distributed on the post element along the longitudinal axis, Xs, facing corresponding indications (17), and
• a pin (13p) resiliently mounted in a recess of the panel element, such that
• when the pin is forced down into the recess, the panel element is free to translate along the longitudinal axis, Xs, with respect to the post element, and
• when the pin faces a discrete opening, it is free to resiliently pop out of the recess and to partially engage into the discrete opening, such that the translation of the panel element is blocked with respect to the post element at a position wherein the distance between the post through hole and the panel through hole is according to the corresponding indication facing the discrete through hole.

5. Tool according to claim 2, wherein the blocking device comprises:

• An elongated slot (13s) extending on the post element along the longitudinal axis, Xs, with indications (1 7) distributed along the elongated slot,
• A pin rigidly mounted on the panel element and engaged through the elongated slot, and
• A nut (13n) engaged in the pin, such that the nut can be moved from a translating position, wherein the panel element is free to translate along the longitudinal axis, Xs, with respect to the post element, to a tight position, wherein the panel element is blocked with respect to the post element.

6. Tool according to claim 2, wherein the blocking device comprises:

• An elongated slot (13s) extending on the post element along the longitudinal axis, Xs, with notches (13N) extending transverse to and distributed along the elongated slot, with indications (17) distributed along the elongated slot, and facing corresponding notches, and
• A lever (13L) engaged in the elongated slot, and mounted on the panel element such as to resiliently rotate about an axis parallel to the longitudinal axis, Xs, and biased such that when facing a notch, the lever naturally engages into the notch, thus blocking the translation of the panel element with respect to the post element at a position wherein the distance between the post through hole and the panel through hole is according to the corresponding indication facing the notch.

7. Tool according to any one of the preceding claims, further comprising a bubble level (1 5) integrated in either the post element or the panel element.

8. Tool according to any one of the preceding claims, further comprising:

• a post mock bracket (21) fixed to the post element at the level of the post through hole, and
• a panel mock bracket (31) fixed to the panel element at the level of the panel through hole,

the post mock bracket and panel mock bracket simulating a post fixing bracket (121) and a panel fixing bracket (131) of an operator of the type corresponding to the selected operator and to the swing door.

9. Tool according to the preceding claim 8, wherein,

• the post mock bracket comprises a post channel (21 h), which is in registry with the post through hole when the post mock bracket is coupled to the post element, such that a drill bit of diameter required for fixing a corresponding post fixing bracket can run through both post through hole and post channel, and
• the panel mock bracket comprises a panel channel (31 h), which is in registry with the panel through hole when the panel mock bracket is coupled to the panel element, such that a drill bit of diameter required for fixing a corresponding post fixing bracket can run through both panel through hole and panel channel to drill a hole in the panel (2).

10. Tool according to any one of the preceding claims, comprising a second post through hole located adjacent to the post through hole, and comprising a second panel through hole located adjacent to the panel through hole.

11. Tool according to claims 8 and 10, wherein the tool comprises,

• A set of post mock brackets comprising at least two post mock brackets with a corresponding number of post channels, which are in registry with a corresponding number of post through holes when the set of post mock brackets is coupled to the post element, such that a drill bit of diameter required for fixing a corresponding post fixing bracket can run through each post through holes and corresponding post channels, and

• A set of panel mock brackets comprising at least two panel mock brackets with a corresponding number of panel channels, which are in registry with a corresponding number of panel through holes when the set of panel mock brackets is coupled to the post element, such that a drill bit of diameter required for fixing a corresponding panel fixing bracket can run through each panel through holes and corresponding panel channels.

12. Tool according to any one of the preceding claims, wherein the indications (1 7) are of one or more of the following types:

- Printed or engraved graphical indications,
- Light indications, and/or
- Sound indications.

13. Method for mounting an operator onto a swing door for motorizing the opening and closing of a door panel, said method comprising the following steps:

(a) Providing a tool according to any one of the preceding claims,
(b) Translating the panel element with respect to the post element to a position such that the distance between the post through hole and the panel through hole corresponds to the dimensions of the operator,
(c) Applying the tool onto the swing door at the desired position of the operator,
(d) Optionally marking the positions of the holes to be drilled in the post and panel of the swing door, as indicated by the positions of the post through hole and panel through hole,
(e) Drilling holes in the post and panel of the swing door at the positions indicated by the post through hole and panel through hole, and
(f) Fixing the post fixing bracket (121) and panel fixing bracket (131) of the operator with screws engaged into the holes drilled in step (e).

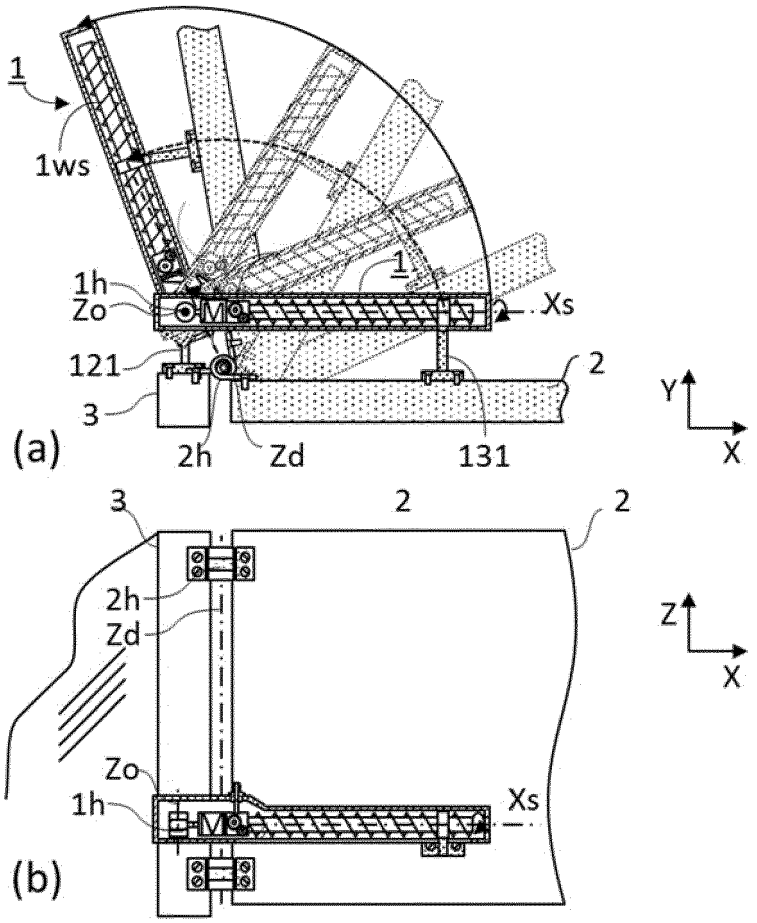
1
1ws
1h
Zo
121
3
2h
Zd
131
Xs
2
Y
X
(a)
3
2
2
2h
Zd
Zo
1h
Xs
Z
X
(b)

FIG.1

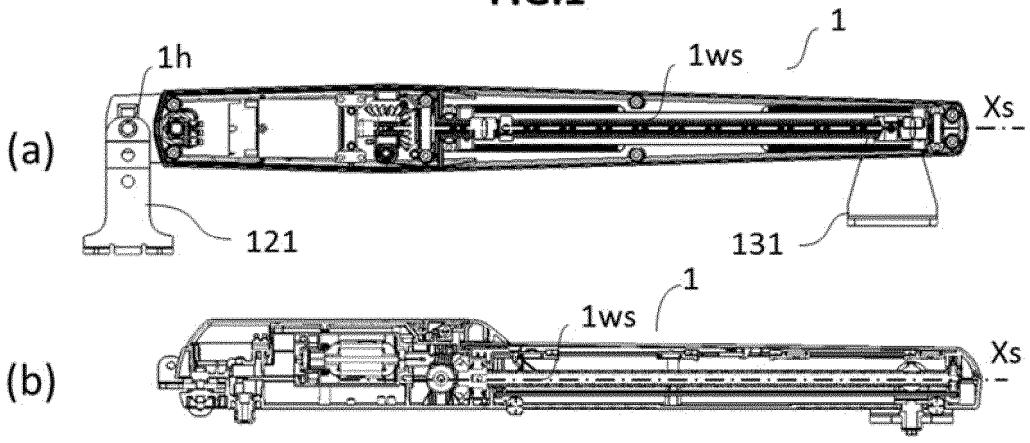
1h
1ws
1
Xs
(a)
121
131
1
1ws
Xs
(b)

FIG.2

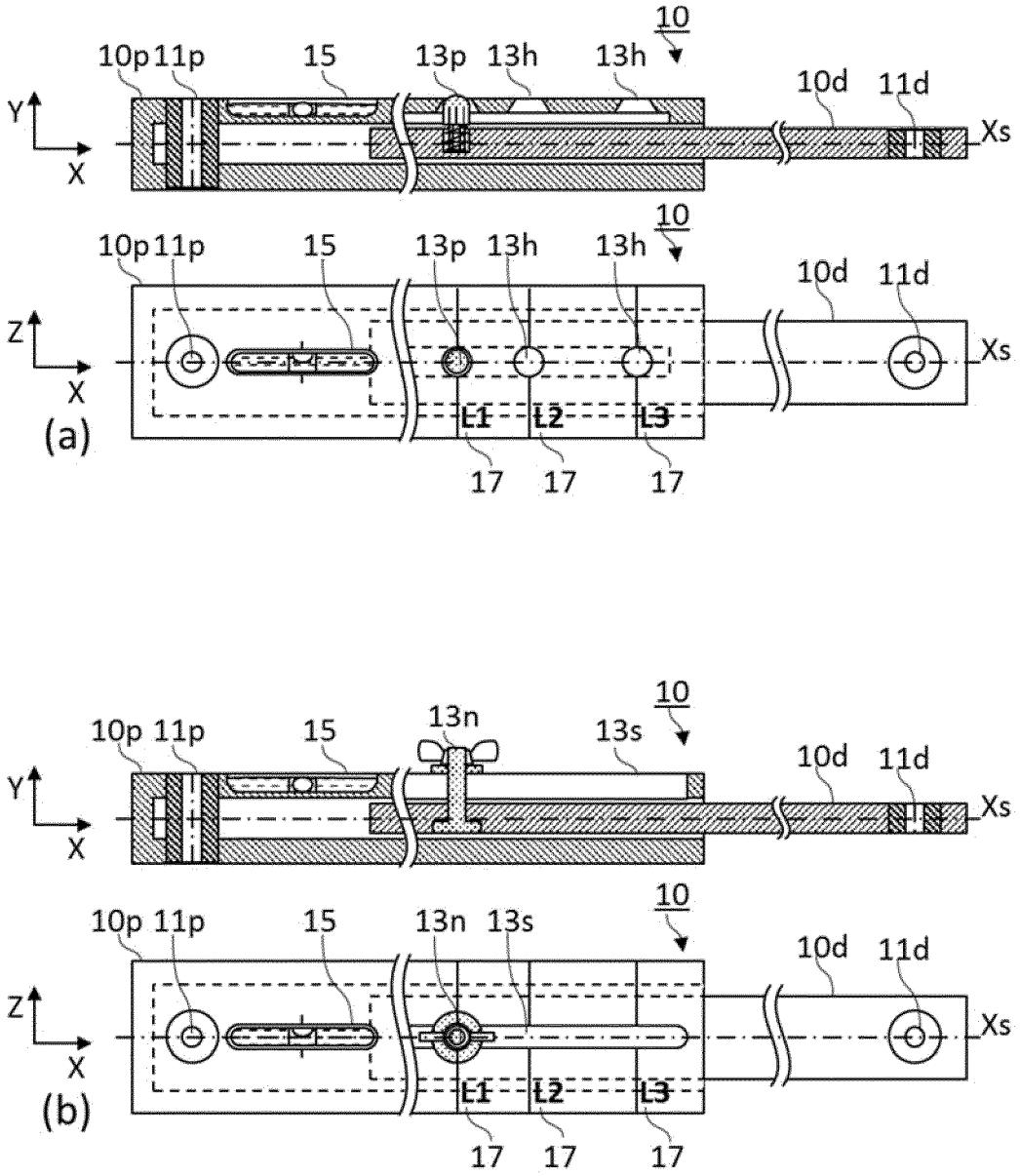
10
10p
11p
15
13p
13h
13h
10d
11d
Xs
Y
X
Z
(a)
L1
L2
L3
17
17
17
13n
13s
(b)

FIG.3

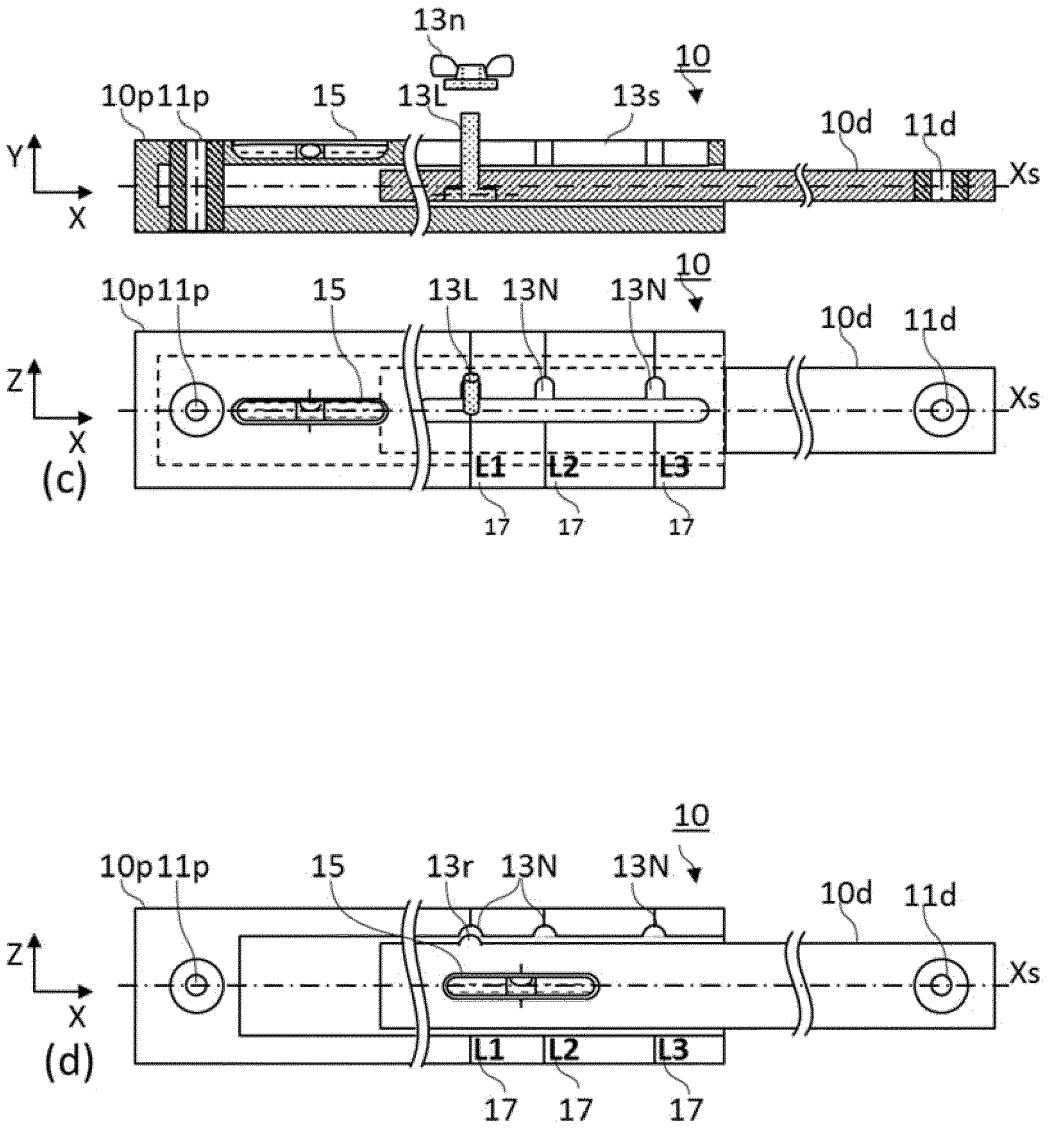
13n
10
10p
11p
15
13L
13s
10d
11d
Xs
Y
X
10
10p
11p
15
13L
13N
13N
10d
11d
Xs
Z
X
(c)
L1
L2
L3
17
17
17
10
10p
11p
15
13r
13N
13N
10d
11d
Xs
Z
X
(d)
L1
L2
L3
17
17
17

FIG.3 (cont.)

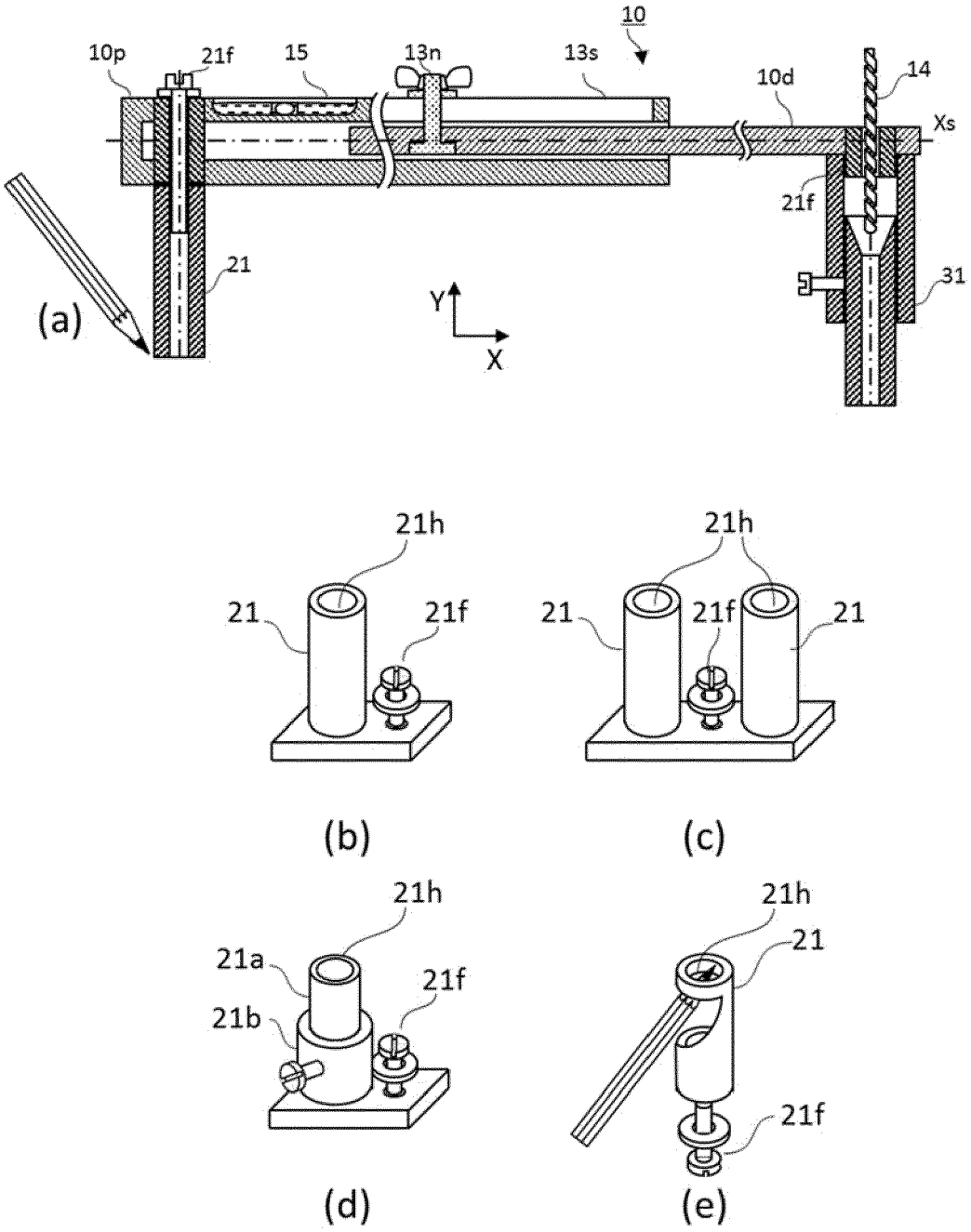
10
10p
21f
15
13n
13s
10d
14
Xs
21f
21
31
(a)
Y
X
21h
21
21f
(b)
21h
21
21f
21
(c)
21h
21a
21f
21b
(d)
21h
21
21f
(e)

FIG.4

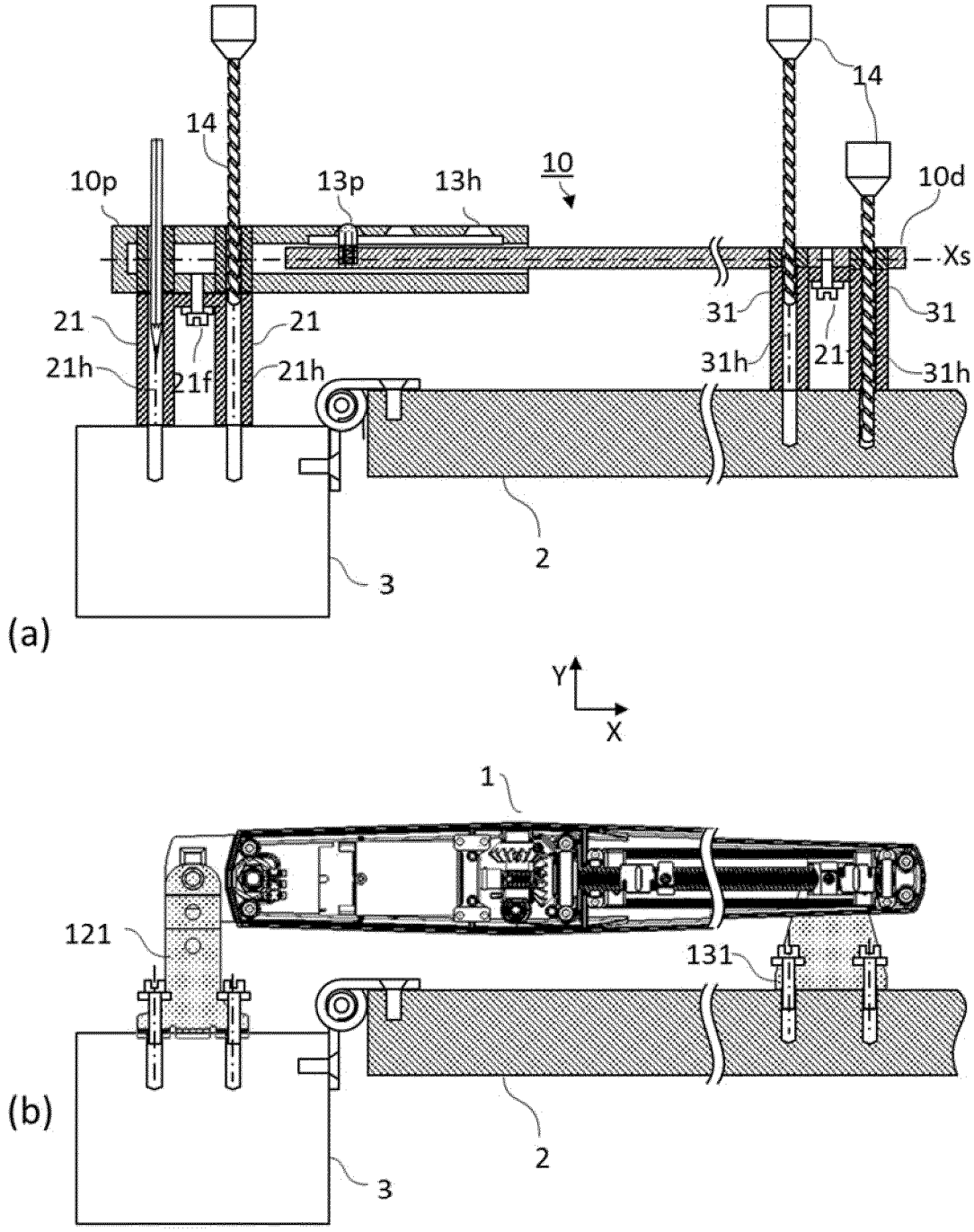
(a)
14
14
10p
13p
13h
10
10d
Xs
21
21
21h
21f
21h
31
31
21
31h
31h
2
3
Y
X
(b)
1
121
131
2
3

FIG.5

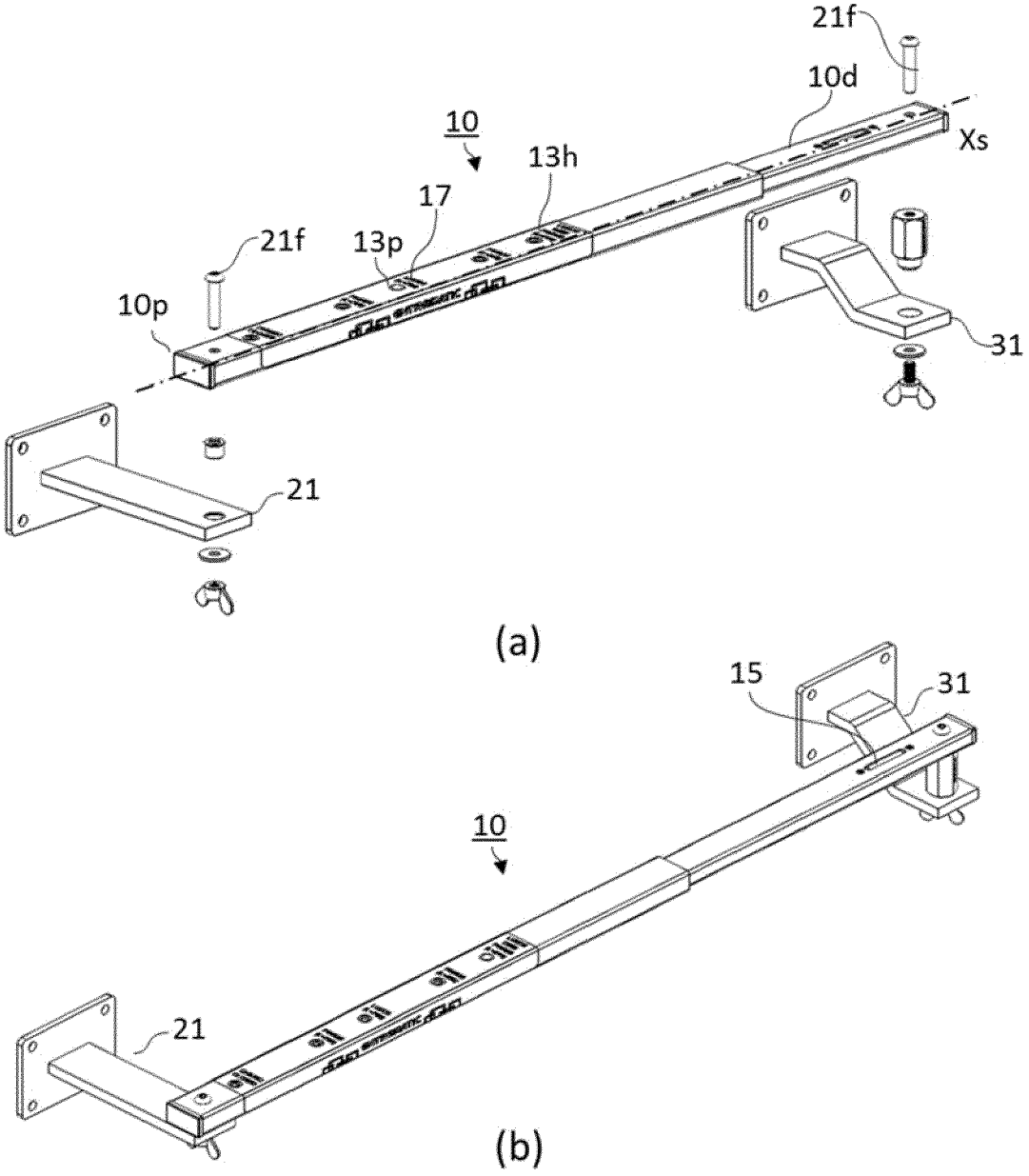

FIG.6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 20 5585

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Place of search	Date of completion of the search	Examiner
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