

Title: Mounting arrangement for a door Actuator

Description

The present invention relates to a mounting arrangement for a door operator for actuating a door, including a mounting plate, which mounting plate is configured to be mounted to a reception such as a door leaf, a door transom, a wall, a ceiling or the like, wherein the door operator is attached to the mounting plate.

State-of-the-art

A mounting arrangement for a door operator for actuating a door is known from the document DE 20 2007 005 265 U1, wherein the door operator can be screwed to the mounting plate. For this purpose, the mounting plate is initially attached to a reception, such as a door leaf, a door transom, a wall, a ceiling or the like, such as to subsequently screw the door operator to the mounting plate. The mounting plate has threaded bores into which screws can be screwed. The door operator has a housing, wherein the screws pass through holes in the housing prior to being screwed into the threaded bores of the mounting plate. The result is a screw connection of the door operator to the mounting plate, which is visible from the outside. In order to cover the screw connections, door operators very often have a cover, which, once mounting the door operator is completed, is placed onto the housing. The result is a complicated arrangement of a cover, wherein, without utilizing a cover, the screw connection, which is realized in an orthogonal

direction towards the mounting plate, remains visible for a viewer. Furthermore, a tool is required in order to carry out the screw connection for attaching the door operator to the mounting plate.

The document DE 78 25 463 U1 shows another arrangement for mounting a door operator to a mounting plate, wherein retaining grooves with complementarily configured opposite projections are provided between the door operator and the mounting plate. Thus, the principle of a groove guidance, respectively of a dovetail guidance is realized, and the door operator needs to be pushed onto the mounting plate from the side. Subsequently, a spreader member, in the shape of a threaded pin, is tightened and a pressing action is achieved between the retaining groove and the projection. As a consequence, the door operator is clamped in the inserting direction, wherein a form closure geometry is realized by means of the groove guidance. However, the required machining of the retaining groove and of the projection is disadvantageous. Furthermore, again a tool is required in order to manipulate the spreader member, in particular the threaded pin.

Therefore, it is the object of the present invention to provide an arrangement for mounting a door operator to a mounting plate, which has a simple structural design, and in particular can be carried out without a tool.

This problem is solved based on an arrangement for mounting a door operator to a mounting plate according to the generic part of claim 1 in conjunction with the characterizing features.

Advantageous further developments of the invention are indicated in the dependent claims.

Disclosure of the invention

The invention includes the technical teaching that the mounting plate has at least one latching means and the door operator has at least one counter-latching means, wherein, for disposing the door operator at the mounting plate in a retaining manner, the latching means can latch in the counter-latching means.

By disposing latching means and counter-latching means between the door operator and the mounting plate, it is possible to arrange a door operator at a mounting plate without tools. In this case, the latching means may be disposed at both, the door operator and the mounting plate, such that complementarily to the arrangement of the latching means, the counter-latching means may be likewise provided at the door operator or at the mounting plate.

With particular advantage, the latching means may be configured in the shape of a latching tongue and/or the counter-latching means may be configured in the shape of a recess. For latching, the latching tongue may latch in the recess such that, already by means of latching, the door operator is reliably secured to the mounting plate. In the present case, the term 'latching tongue' describes a spring-shaped element having an elongate extension, wherein the latching tongue may form a portion of the mounting plate or of the door operator, a portion which is in particular spring-resilient. The

recess forms an undercut or a depression in the door operator or in the mounting plate such that the spring-resilient latching tongue can snap in the undercut or in the depression. Once the latching means has snapped into the counter-latching means, the door operator is protected against automatically releasing from the mounting plate.

As another advantage, the mounting plate may have at least one retaining portion, which, for arranging the door operator at the mounting plate in a clamping manner, positively engages in at least one corresponding counter-retaining portion in the door operator. It is thereby achieved, that, by means of a simple positive connection, the door operator can be clamped onto the mounting plate. In this case, the clamping arrangement of the door operator at the mounting plate describes a geometric form closure, which however is determined such that the door operator is already disposed at the mounting plate without play and able to bear load. The retaining portion, which can engage in the counter-retaining portion, is provided for this purpose. In this case, the engagement is positive in that the door operator is clamped on the mounting plate by the form closure. The force transmission, which is required for a secure arrangement of the door operator at the mounting plate, is effected via the clamping engagement of the retaining portion in the counter-retaining portion. The inventive latching of the latching means in the counter-latching means at the interface between the door operator and the mounting plate particularly serves for a captive arrangement, wherein the latching of the latching means in the counter-latching means may be configured as well as force

transmitting and thus as the exclusive connection between the door operator and the mounting plate.

Advantageously, the retaining portion and the counter-retaining portion can be configured such that the door operator, by being orthogonally placed and subsequently being laterally displaced on the mounting plate, can be disposed at the latter. The latching tongue may form an area, which protrudes from the extension plane of the mounting plate and is in particular a flexible area, and/or the recess may form an undercut area in the door operator. As a consequence, by laterally displacing the door operator on the mounting plate, the latching tongue can be brought to a position where it covers the recess in such a way that the latching tongue latches in the recess. With the simultaneous lateral displacement, the retaining portion is brought into positive engagement in the counter-retaining portion, in order to establish a clamped arrangement of the door operator at the mounting plate. The lateral sliding movement of the door operator on the mounting plate is performed until the latching tongue covers the recess so that the latching tongue snaps into the recess. When the latching tongue snaps into place in the recess, the door operator has reached the desired position on the mounting plate, and at the same time the retaining portion reliably engages in the counter-retaining portion such that a connection able to bear load, i.e. which is force-transmitting, is achieved between the door operator and the mounting plate.

The mounting plate is in particular configured from a stamped-bent-sheet metal component, preferably as one-piece, wherein, moreover advantageously, the latching means is stamped and/or bent from the sheet metal component by at least one stamping-bending method. Furthermore, the retaining portion may be produced by a stamping-bending method, wherein preferably the latching means and the retaining portion are manufactured by areas which are stamped and bent out of the mounting plate. The retaining portion may be configured wing-shaped for example and bent out of the plane of the mounting plate in order to engage in a counter-retaining portion in the door operator. The retaining portion needs to be bent out of the mounting plate for this engagement, because otherwise the retaining portion would bear against the reception, to which the mounting plate is mounted. In order to achieve furthermore that the latching means is able to snap into the recess in the door operator, the latching tongue likewise needs to be bent out of the plane of the mounting plate.

The mounting plate may have an elongate extension, wherein at least one latching tongue has a longitudinal extension, which points into the direction of the elongate extension of the mounting plate. In particular the longitudinal extension of the latching tongue needs to point into the elongate extension of the mounting plate, as the door operator is laterally moved above the mounting plate, until the latching tongue snaps into the recess in the door operator. As an alternative, the lateral movement of the door operator above the mounting plate can be performed transversely to the elongate extension of the mounting plate, in order to have both the retaining

portion clamp in the counter-retaining portion and the latching tongue snap into the recess. Consequently, the latching tongue may be likewise configured transversely to the elongate extension of the mounting plate.

According to a possible embodiment, at least one latching tongue may be disposed in the centre of the mounting plate, in particular in the area of a long end at the mounting plate.

As an alternative or in addition, at least one latching means may be disposed at the mounting plate laterally in the area of a longitudinal edge, wherein preferably two latching means are disposed at the mounting plate at opposite longitudinal edges. The counter-latching means corresponding to the latching means, in particular the recesses in the door operator, are likewise fitted either in the centre, preferably in the area of a long end of the door operator, or in the lateral area of the door operator. Thereby, each latching means can be brought to cover a recess in the door operator.

The one or more latching means may be configured to be spring-resilient in such a way that the latter can be released from being latched in the counter-latching means by means of a bending action. If the latching means is configured as a latching tongue, the latter needs to be bent back into the direction towards the extension plane of the mounting plate. The latching tongue can thereby be bent back and out of the recess in the door operator, in order to enable the lateral displacing movement of the door operator in the direction of disengagement, in particular in the direction of

disengagement of the retaining portion out of the counter-retaining portion.

The door operator may have a housing, wherein the at least one counter-latching means is disposed at the housing. Furthermore, the mounting plate may be enclosed by the housing, once the door operator is disposed at the mounting plate. Consequently, the mounting plate is not visible for a viewer, once the door operator is attached to the reception via the mounting plate.

At least one opening may be fitted into the housing of the door operator, through which a bending action onto the latching means is allowed, in particular by means of a tool. The opening may have the shape of a slot for example, which is disposed at a location where the latching tongue can be reached by a tool. If the bending action is performed by means of a tool through the opening in the housing of the door operator, bending the latching means needs to be performed in such a way that the latching means will be released from the counter-latching means. It is in particular required to maintain the bending action on the latching means by means of the tool while the door operator is displaced again on the mounting plate, laterally in the direction opposite to the joining direction. The door operator is displaced, until the recess is no longer covered by the latching tongue such that no re-latching will occur if the tool is removed.

Preferred embodiments

Hereinafter, further measures enhancing the invention will be illustrated in more detail in conjunction with the description of preferred embodiments of the invention based on the Figures, in which:

Figure 1: shows a first embodiment of a door operator with a housing and a counter-latching means,

Figure 2: shows a first embodiment of a mounting plate in a perspective view with a latching means,

Figure 3: shows a sectional view of a latched arrangement of a door operator at a mounting plate,

Figure 4: shows another embodiment of a door operator with a housing and counter-latching means fitted therein,

Figure 5: shows another embodiment of a mounting plate with latching means for latching in the counter-latching means of the housing of the door operator, and

Figure 6: shows a detailed view of a latching connection according to the embodiment of Figure 5.

The Figures 1, 2, and 3 show a first embodiment of a mounting arrangement for a door operator 10 for actuating a door. The door operator 10 is represented by its housing 18 in a perspective illustration according to Figure 1. The mounting plate 11 is configured as a stamped-bent-sheet metal component and shown in

a perspective view in Figure 2. Figure 3 shows a cross-sectional view of a housing 18, which is disposed and latched to a mounting plate 11.

The mounting plate 11 serves for being mounted to a reception such as a door leaf, a door transom, a wall, a ceiling or the like. For this purpose, the mounting plate 11 has through-holes 21 such as to be able to utilize screws and to pass them through the through-holes, in order to screw the mounting plate 11 to a reception.

The mounting plate 11 has wing-shaped conformed retaining portions 14, wherein altogether four retaining portions 14 are provided and disposed at the mounting plate as pairs opposite each other, extending in lateral direction away from the mounting plate 11. The housing 18 has counter-retaining portions 15 into which the retaining portions 14 are able to engage in a clamping manner. For this purpose the retaining portions 14 are bent upwards out of the basic extension plane of the mounting plate 11. If the housing 18 is initially placed orthogonally onto the mounting plate 11 and subsequently laterally displaced in longitudinal direction on the mounting plate 11, the retaining portions 14 configured as link-plates can engage in the counter-retaining portions 15, which are provided as undercuts, respectively as notches inside the housing 18. Once the housing 18 is disposed at the mounting plate 11, the housing 18 encloses the mounting plate 11.

The mounting plate 11 has a latching means 12a which is configured as a latching tongue 12a. The latching tongue 12a has a

longitudinal extension which points into the direction of the elongate extension of the entire mounting plate 11. Complementarily to the latching tongue 12a, in its inside, the housing 18 has a counter-latching means 13a, which is configured as a recess 13a.

Once the housing 18 is placed onto the mounting plate 11 from the orthogonal direction, the housing 18 is laterally displaced, wherein the housing 18 is laterally displaced above the mounting plate 11 until the recess 13a covers the latching tongue 12a. In this case, the spring-resilient latching tongue 12a can snap into the recess 13a. In the lateral position, in which the latching tongue 12a can snap into the recess 13a, the housing 18 is located above the mounting plate 11 in its mandatory position. At the same time, in this position, the retaining portions 14 can be inserted into the counter-retaining portions 15 in a clamping manner, wherein the clamping action delimits the lateral displacing movement of the housing 18 with regard to the mounting plate 11. The result is a secure arrangement of the door operator 10 at the mounting plate 11, wherein the force absorption is effected via the retaining portions 14 in the counter-retaining portions 15 and wherein maintaining the retaining position of the housing 18 above the mounting plate 11 is achieved and thus secured by latching the latching tongue 12a in the recess 13a.

Once the latching tongue 12a latches in the recess 13a, the retaining portions 14 simultaneously reach their clamped position in the counter-retaining portions 15. Consequently, a movement of the housing 18 above the mounting plate 11 is limited, respectively blocked in a first direction by means of the latching tongue 12a

latching in the recess 13a, and in a second opposite direction by means of the retaining portions 14 being clamped in the counter-retaining portions 15. The result is a secure and captive arrangement of the door operator 10 at the mounting plate 11. In order to allow for releasing the door operator 10 from the mounting plate 11, the housing 18 has an opening 19 through which a tool can pass. The opening 19 is located in the prolongation of the longitudinal extension of the latching tongue 12a. Once a tool passes through the opening 19 into the housing 18, a bending action can be exerted onto the latching tongue 12a. This bending action is able to remove the latching tongue 12a from the recess 13a, and the housing 18 can be removed again from the mounting plate 11. In this case, bending the latching tongue 12a is effected in the direction of the extension plane of the mounting plate 11, and while the latching tongue 12a is pushed out of the recess 13a by the tool passing through the opening 19, the housing 18 needs to be longitudinally displaced above the mounting plate 11 until the recess 13a no longer covers the latching tongue 12a.

Figure 3 shows an arrangement of the housing 18 on the mounting plate 11, while the latching tongue 12a is latched in the recess 13a. The disposition of the opening 19 illustrates that a tool allows to perform a bending action on the latching tongue 12a in that the (non-illustrated) tool can apply pressure on the back side of the latching tongue 12a. Accordingly, the latching tongue edge 22 moves back from the recess edge 23, and the housing 18 can be removed from the mounting plate 11 in the direction of the arrow to the right.

Figures 4, 5, and 6 show another embodiment of a mounting arrangement for a door operator 10 to be arranged on a mounting plate 11. The door operator 10 is illustrated in a perspective view in Figure 4 by means of its housing 18. The mounting plate 11 is illustrated in a perspective view in Figure 5, wherein Figure 6 shows a detailed view of the mounting plate 11 in an arrangement with a latching tongue 12a.

According to this embodiment, the mounting plate 11 has a first and a second latching tongue 12b at opposite longitudinal edges 17, which form the lateral delimitation of the mounting plate 11 in the direction towards its elongate extension. In the same way as described in the first embodiment, the mounting plate 11 has retaining portions 14, which allow for a clamping engagement in the counter-retaining portions 15 inside the housing 18 of the door operator 10.

Complementarily to the disposition of latching tongues 12b at the longitudinal edges 17 of the mounting plate 11, located inside, the housing 18 has counter-latching means 13b in the shape of recesses 13b. The latching tongues 12b, bent out of the plane of the mounting plate 11, may latch in the recesses 13b in the housing 18, once the recesses will cover the latching tongues 12b.

Openings 20 are provided in the lateral areas of the housing 18, in order to be able to utilize a tool in the same way as described in the first embodiment, by means of which the latching tongues 12b can

be disengaged from latching in the recesses 13b in the housing 18. Subsequently, the housing 18 can be displaced in lateral direction. In this case, it is required to insert a tool simultaneously in both shown openings 20, and to push the latching tongues 12b out of the recesses 13b, because only then the housing 18 can be displaced in longitudinal direction above the mounting plate 11 in order to release the retaining portions 14 from the counter-retaining portions 15.

Figure 6 shows a detailed view of a latching tongue 12b at the longitudinal edge 17 of the mounting plate 11. The detailed view elucidates that the mounting plate 11 is manufactured as a stamped-bent-sheet metal component, wherein the latching tongue 12b is bent out of the plane of the mounting plate 11 in a stamping-bending method. Furthermore, the latching tongue 12b has a releasing slant 24, in order to release the latching tongue 12b just by a slight bending action from the recess 13b in the housing 18, if need arises. Another latching tongue 12c is shown by a dashed line and represents an alternative geometrical shape of a latching tongue 12. The latter may likewise fulfill the function of a latching means 12b, which can latch in a counter-latching means 13b.

The invention in its configuration is not limited to the above presented preferred embodiments. On the contrary, a number of variants is conceivable, which make use of the presented solution, even with basically different types of embodiments. All features and/or advantages, including the constructional details or spatial dispositions, resulting from the claims, the description or the

drawings, may be essential to the invention, both by themselves and in their most various combinations. For example the first embodiment can be combined with the second embodiment, such that a first latching tongue 12a is provided in the mounting plate 11 in the area of the long end 16, wherein in the same mounting plate 11 further latching tongues 12b may be provided at the laterally provided longitudinal edges 17. The first embodiment shows a latching tongue 12a provided in the centre of the mounting plate 11, wherein likewise two lateral latching tongues 12a may be provided in the mounting plate 11 in the area of the long end 16. Accordingly, the housing 18 has two openings 19 and both latching tongues 12a would have to experience a bending action simultaneously in order to be able to release the housing 18 from the mounting plate 11. For this purpose, tools in the shape of special insert forks may be utilized, having a geometry matching the geometry of the opening(s). The door operator 10 could be thus prevented from being removed from the mounting plate 11 by means of a standard tool, such as a slot-head screwdriver. Furthermore, it can be provided to close off the openings 19 by means of plugs. Moreover, these plugs could be screwable set screws which require a special tool for being unscrewed from the housing 18. It would be only then that the openings 19, 20 would be exposed in order to utilize a tool to exert a bending action on the latching tongues 12a, 12b. It is possible to avoid in particular that unauthorized people would be able to perform adjustments at the door operator 10 or even theft of the door operator 10 is efficiently prevented.

List of reference numerals

10	door operator
11	mounting plate
12a	latching means, latching tongue
12b	latching means, latching tongue
12c	latching means, latching tongue
13a	counter-latching means, recess
13b	counter-latching means, recess
14	retaining portion
15	counter-retaining portion
16	long end
17	longitudinal edge
18	housing
19	opening
20	opening
21	through-hole
22	latching tongue edge
23	recess edge
24	releasing slant

Patent claims

1. A mounting arrangement for a door operator (10) for actuating a door, including a mounting plate (11), which mounting plate (11) is configured to be mounted to a reception such as a door leaf, a door transom, a wall, a ceiling or the like, wherein the door operator (10) is attached to the mounting plate (11),
characterized in that the mounting plate (11) has at least one latching means (12a, 12b) and the door operator (10) has at least one counter-latching means (13a, 13b), wherein the latching means (12a, 12b) is latchable in the counter-latching means (13a, 13b) for arranging the door operator (10) at the mounting plate (11) in a retained manner.
2. A mounting arrangement according to claim 1,
characterized in that the latching means (12a, 12b) is configured as a latching tongue (12a, 12b) and/or in that the counter-latching means (13a, 13b) is configured as a recess (13a, 13b).
3. A mounting arrangement according to claim 1 or 2,
characterized in that the mounting plate (11) has at least one retaining portion (14), which, for arranging the door operator (10) at the mounting plate (11) in a clamped manner, positively engages in at least one corresponding counter-retaining portion (15) in the door operator (10).

4. A mounting arrangement according to claim 3, **characterized in that** the retaining portion (14) and the counter-retaining portion (15) are configured such that the door operator (10) can be arranged at the mounting plate (11) by being orthogonally placed and laterally displaced on the mounting plate (11).
5. A mounting arrangement according to any of the claims 2 to 4, **characterized in that** the latching tongue (12a, 12b) forms an area, which protrudes from the extension plane of the mounting plate (11), in particular a flexible area, and/or in that the recess (13a, 13b) forms an undercut area in the door operator (10).
6. A mounting arrangement according to any of the aforementioned claims, **characterized in that**, by laterally displacing the door operator (10) on the mounting plate (11), the latching tongue (12a, 12b) can be brought to cover the recess (13a, 13b) in such a way that the latching tongue (12a, 12b) latches in the recess (13a, 13b).
7. A mounting arrangement according to any of the aforementioned claims, **characterized in that** the mounting plate (11) is configured from a stamped-bent-sheet metal component, preferably as one piece, and/or in that the latching means (12a, 12b) is stamped and/or bent

out of the sheet metal component by at least one stamping-bending method.

8. A mounting arrangement according to any of the aforementioned claims, **characterized in that** the mounting plate (11) has an elongate extension, wherein at least one latching tongue (12a, 12b) has a longitudinal extension which points into the direction of the elongate extension of the mounting plate (11).
9. A mounting arrangement according to any of the aforementioned claims, **characterized in that** at least one latching tongue (12a) is disposed in the centre of the mounting plate (11), in particular in that at least one latching tongue (12a) is disposed at the mounting plate (11) in the centre in the area of a long end (16).
10. A mounting arrangement according to any of the aforementioned claims, **characterized in that** at least one latching means (12b) is disposed at the mounting plate (11) laterally in the area of a longitudinal edge (17), preferably in that two latching means (12b) are disposed at the mounting plate (11) at longitudinal edges, which are opposite to each other.
11. A mounting arrangement according to any of the aforementioned claims, **characterized in that** the at least one latching means (12a, 12b) is configured to be spring-resilient such as to be releasable from a latched

engagement in the counter-latching means (13a, 13b) by means of a bending action.

12. A mounting arrangement according to any of the aforementioned claims, **characterized in that** the door operator (10) has a housing (18), wherein the at least one counter-latching means (13a, 13b) is disposed at the housing (18).
13. A mounting arrangement according to any of the aforementioned claims, **characterized in that** the mounting plate (11) is enclosed by the housing (18), once the door operator (10) is disposed at the mounting plate (11).
14. A mounting arrangement according to any of the aforementioned claims, **characterized in that** at least one opening (19, 20) is provided in the housing (18) of the door operator (10), through which a bending action is allowed onto the latching means (12a, 12b), in particular allowed by means of a tool.