



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.05.2012 Bulletin 2012/19

(51) Int Cl.:
E05F 15/12^(2006.01)

(21) Application number: **10190398.7**

(22) Date of filing: **08.11.2010**

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

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(54) **Mounting system for a rotary actuator**

(57) Herein described is a mounting system (MC) comprising a motorised rotary actuator (10) for gates, doors or the like, and a support element (30) for coupling the actuator to a stable construction (W), such as for ex-

ample a wall.

In order to simplify the installation one from among the actuator or the support element comprises a structure which is (i) adapted to receive a portion of the other and (ii) configured for holding it directly by interposing parts.

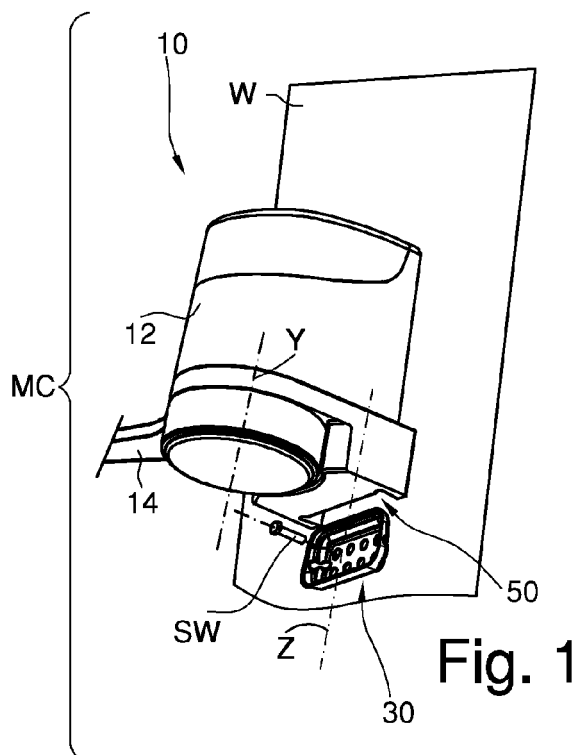


Fig. 1

Description

[0001] The invention regards a mounting system for a rotary actuator for displacing moveable barriers, in particular doors or door leaves for civil and industrial use.

[0002] Rotary actuators such as those described in EP 1 936 090 are used for rotating doors or gate leaves. These actuators are mainly made up of an electromechanical gear motor enclosed in a casing and a mechanical arm, of the connecting rod-crank type, cinematically connected to the shaft of the motor.

[0003] The actuator is fixed to a support (e.g. a wall or a metal column) through a C-shaped bracket. The support is perforated, the bracket is fastened thereto and an end of the casing is inserted into a concavity formed by the sides of the bracket, fastening it by means of screws.

[0004] Part of the casing must be inserted into the bracket through a horizontal movement, and the bracket alone is not capable, after the insertion, of stably supporting the actuator without the risk of falling. Thus, the installation is uncomfortable and requires the collaboration of at least two persons: one for fixing the screws and the other for holding the motor at the correct position. Mounting by only one installer requires the creation of an artificial support for the motor, but the time required for mounting increases considerably and several attempts are always required.

[0005] The main object of the invention is that of overcoming the drawback regarding the uncomfortable installation, by providing an actuator of the described type that is capable of simplifying the mounting operations.

[0006] Such object is obtained through a mounting system on a fixed construction defined in claim 1.

[0007] The system provides for that either the actuator or an element for supporting it comprises a structure which is (i) adapted to receive a portion of the other and (ii) configured for holding this portion directly by interposing parts. The main advantage lies in the fact that the interposition of parts allows coupling the actuator and the support element without using screws or other fastening means. A correct mounting manoeuvre to make them integral with each other, which can be performed by one person alone, is enough to perform the job.

[0008] The interposition of parts can be obtained simply by providing the actuator or the support member with a pocket- or guide-shaped recess, wherein the portion of the other can be slidingly inserted thereinto. The direction of insertion can be horizontal and/or vertical, and the actuator remains held along a direction substantially orthogonal to the first, for example it cannot be detached from the fixed construction by pulling it horizontally.

[0009] Preferred and advantageous variants of the invention are defined in the dependent claims, which in particular define many variants of the support member to which more than one configuration for the recess may correspond, even different from what illustrated here. The recess may be arranged both on the actuator and on the support member.

[0010] A very advantageous shape-coupling between the actuator and support member, from the point of view of simplicity and stability, has been found to be the conical one, e.g. between a T, C or L-shaped pocket or guide and a complementary part slidably insertable.

[0011] The invention also contemplates the single actuator and the single support member configured to be coupled with each other as previously described.

[0012] The advantages of the inventive concept shall however be clearer from the following description of a preferred embodiment of a mounting system, which refers to the attached drawing wherein:

Fig. 1 shows a perspective view of the system formed by an actuator and a support member when not connected;

Fig. 2 shows a perspective view of the actuator and the support member when connected;

Fig. 3 shows a front view of the support member;

Fig. 4 shows a sectional view of the support member according to plane IV-IV;

Fig. 5 shows a perspective view of the support member;

Fig. 6 shows part of the rear of the actuator when connected to the support member;

Fig. 7 shows a sectional view of the actuator alone according to plane VII-VII;

Fig. 8 shows a sectional view of the actuator and the support member connected according to plane VII-VII;

Fig. 9 shows a variant of the support member;

Fig. 10 shows a front view of a second variant of the support member;

Fig. 11 shows a sectional view of the support member of fig 10 according to plane XI-XI;

Fig. 12 shows part of the rear of the actuator when not connected to the support member;

Fig. 13 shows a sectional view of the actuator alone according to the vertical plane XIII-XIII;

Fig. 14 shows a sectional view of the support member of fig 3 according to plane XIV-XIV.

[0013] Figures 1 and 2 show a mounting system MC for a rotary actuator 10, having an external casing 12 and a moveable arm 14. The actuator 10 contains an internal electromechanical gear motor (not shown) for displacing barriers like gates, doors or the like, through the moveable arm 14 which rotates in a horizontal plane around a vertical axis Y. The terms *horizontal* and *vertical* are herein used with reference to the ground plane.

[0014] The actuator 10 is to be fixed during the installation to a fixed construction W, such as for example a wall or a column, usually orthogonal to the horizontal plane of manoeuvre of the arm 14.

[0015] Fixing occurs through a support member in the form of a bracket 30 which cooperates with a seat or recess 50 provided at the rear part of the casing 12.

[0016] The recess 50, with horizontal and vertical sec-

tions clearly visible in figures 7 and 13, has a capsized-bell-shaped concavity (along axis Y), open at the bottom and closed at the top. The concavity is substantially trapezium-shaped, open at the larger base, so as to form a capsized pocket.

[0017] With reference to fig. 7 the shape of the recess 50 along a horizontal plane can be observed. It has a flat front wall 54 and two side walls 60, opposite with respect to each other, which extend curving towards the centre of the recess 50 to form two side tabs 56. The tabs 56 have, inwards the recess 50, two free surfaces 58, which are approximately parallel to and arranged at a given distance from the wall 54. The two side walls 60, 62 diverge with respect to each other in the direction of the depth of the recess 50 (towards the inside of the actuator 10).

[0018] With reference to fig 13 the shape of the recess 50 along a vertical plane can be observed instead. It comprises a flat and closed top 82 and the side walls 60, 62 converge upwards. It should be observed that the walls indicated with 60, 62 coincide in the sections of figures 7 and 13, and thus they have an inclination with respect to a vertical and a horizontal plane.

[0019] A lip 64, facing towards the centre of the recess 50 and downwards, projects cantilevered from the top 82. The lip 64 is joined with the wings 56, and together they form a side of the abovementioned pocket, which - for the sake of simplicity - is an open side but it could also be entirely closed.

[0020] From the description above, it is also observable that the recess 50 substantially forms and has the same function of a T-shaped guide.

[0021] The bracket 30 is a piece of deep-drawn sheet, configured to have a hooking portion for coupling to the casing 12 and a fixing portion for fixing to the fixed construction W. Production by deep-drawing is very convenient: it is simple, inexpensive and it has a high yield with low production of wastes.

[0022] The fixing portion is represented by a flat base 32, which is perforated to facilitate the use of screws SW (see fig. 1) for the rigid connection to the construction W.

[0023] The hooking portion, which projects cantilevered from the fixing one, comprises an isosceles trapezium profile, as shown by figure fig. 3, and symmetric with respect to a median vertical axis Z which is parallel to axis Y during use.

[0024] From the sectional view of figures 4 and 14 it is observable that the larger base is open and the smaller base is made up of a flat base part 32. The bracket 30, also towards the depth direction, has a substantially "isosceles trapezium" profile or T-shaped.

[0025] Fig. 4 shows that the oblique sides of the "trapezium" are formed by walls 36 which are shaped to form a sort of "S". The walls 36 comprise a portion 40 which is parallel to the base part 32 and portions 35, 37 which are oblique to the base 32 and diverging with respect to the base 32 outwards.

[0026] From a side sectional view, the bracket 30 ap-

pears like in figure 14. Again it suggests as a whole a profile that is trapezium-shaped, with the smaller base corresponding to the base 32, the larger base open and a rectilinear segment 38 formed at the end of an oblique side. The segment 38 corresponds to a flat surface which forms the entire upper edge of the bracket 30 and can serve as a support, also see fig. 3.

[0027] The hooking portion is the entire projecting cantilevered part of the bracket 30, in particular from the portions 35, 40 and the segment 38.

[0028] It should be observed that the bracket 30, just like all the other variants, preferably has a symmetric structure with respect to a vertical axis Z median to the long sides.

[0029] During the assembly, the base 32 is screwed to the construction W keeping the long sides of the bracket 30 horizontal, with the edge 34 thus projecting from the construction W. The actuator 10 is neared to the bracket 30, placing it thereon and aligning the hooking portion of the bracket with the recess 50 (fig. 1). The bracket 30 is fitted into the recess 50 by lowering the actuator 10 (fig. 2 and fig. 6), so that the hooking portion slides between the tabs 56 and the bottom 54.

[0030] In particular from fig. 8 it is observable that the hooking portion of the bracket 30 comprises the portions 35, 36 and 40 and the peripheral edge 34. By inserting the bracket 30 into the recess 50, the edge 34 contacts the bottom 54, the portions 35 contact the walls 60, 62 and the section 38 abuts against the top 82.

[0031] After insertion, the tabs 56 have moved in the back of the hooking portion, in particular behind the portion 40 on which they lay. Therefore, the tabs 56 hold the bracket 30 and prevent horizontal detachment thereof along three sides, as observable in fig. 6. The weight of the actuator 10 ensures a stable insertion thanks to the shape-coupling, conical in this case, present between the hooking portion and the walls 60 and 62.

[0032] In order to allow the correct insertion of the bracket 30 into the recess 50, the lateral walls of both should preferably have complementary inclinations, for perfectly fitting with respect to each other and avoid mechanical clearances.

[0033] It is observed that in the bracket 30 the portions 35 sticking out from the base 32 form a contact surface with the concave walls 60, 62, hence allowing pressure-wedging the bracket 30 into the recess 50. This conical coupling not only allows an automatic centring by the reaction of the walls 60, 62, but it confers more stability the more the actuator 10 weights. Though it increases stability, the support segment 38 is not necessarily required to abut into the recess 50 at the end-of-stroke position.

[0034] Fig. 9 illustrates a variant of the support member in form of a bracket 70. It comprises a flat and median portion 72 for fixing to the construction W and a hooking portion formed by two lateral projections 74 which extend from the portion 72 getting further from the plane containing the latter. The projections 74 form convolutions

with an external surface having a profile analogous to the hooking portion of the bracket 30, i.e. the external edges of the convolutions have a profile complementary to the recess 50. Preferably, the two convolutions have the outmost lateral surfaces converging with respect to each other, and/or they have conical form.

[0035] The flat portion 72 is fixed to the construction W, while the convolutions are inserted into the recess 50, analogously to what has been previously described and with the same effects.

[0036] Fig. 10 illustrates another variant of the support member in form of a bracket 90. It comprises a flat fixing portion 96 for fixing to the construction W and a hooking portion formed by a projection 92 which extends with an inflection 73 from the portion 96 spacing apart from the plane containing the latter. The projection 92 comprises a plate which lies on a plane parallel to that of the portion 94 and it has external edges which complementarily reproduce the profile of the recess 50 shown in fig. 13. Namely, the plate has lateral edges 94 converging upwards, see fig. 10, and complementary to the walls 60, 62.

[0037] During the assembly, the portion 96 is fixed to the construction W, while the projection 92 is wedged into the recess 50, as described previously.

Claims

1. Mounting system (MC) comprising

- a motorised rotary actuator (10) for gates, doors or the like,
- a support member (30) for attaching the actuator to a fixed construction (W), such as for example a wall,

characterised in that

one from among the actuator or the support member comprises a structure which is (i) adapted to receive a portion of the other and (ii) configured for holding it directly by interposing parts.

2. System (MC) according to claim 1, wherein the structure comprises a pocket- or guide-shaped recess such to allow that the portion of the other can be slidably inserted therein along a first horizontal and/or vertical direction and remains held therein along a direction substantially orthogonal to the first.

3. System (MC) according to claim 2, wherein the recess comprises portions configured to be positioned, after insertion, in back of said portion of the other so as to hold it.

4. System (MC) according to claim 3, wherein the portions configured to be positioned comprise parts of the recess which are, when the actuator is mounted, vertical.

5. System (MC) according to one of the preceding claims, wherein said structure and said portion of the other comprise complementary walls or surfaces adapted to form a mutual conical-type shape-coupling.

6. System (MC) according to one of the preceding claims, wherein the support member comprises a fixing portion for fixing to the fixed structure (W) and a hooking portion to be coupled with the structure, the fixing portion and the hooking portion substantially lying on different planes.

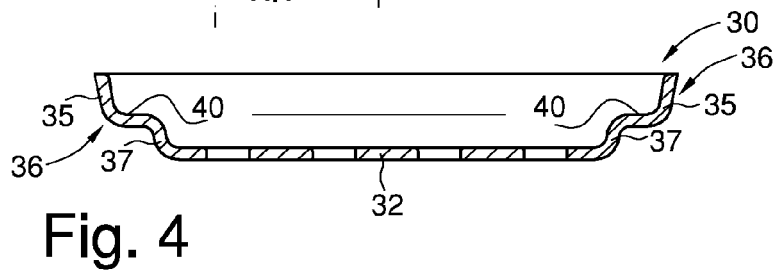
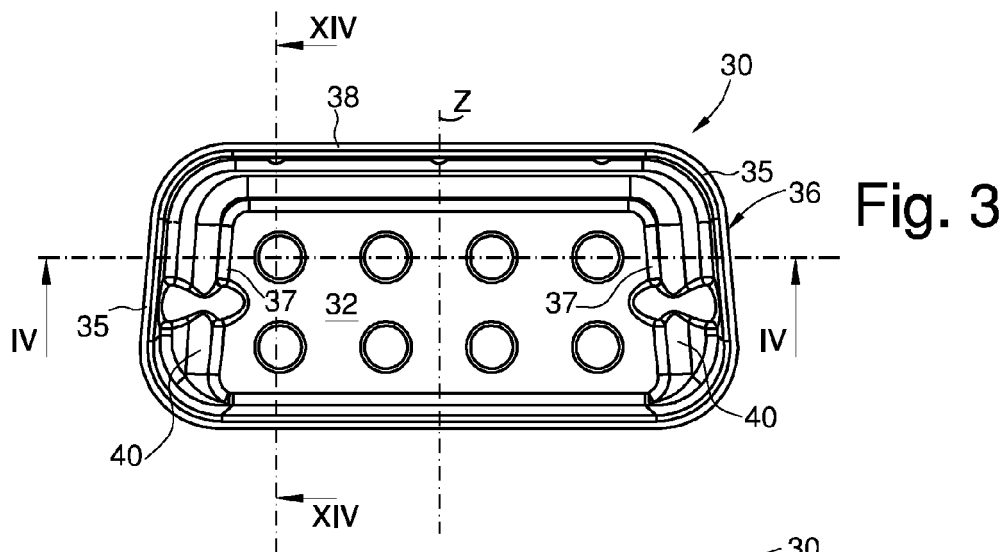
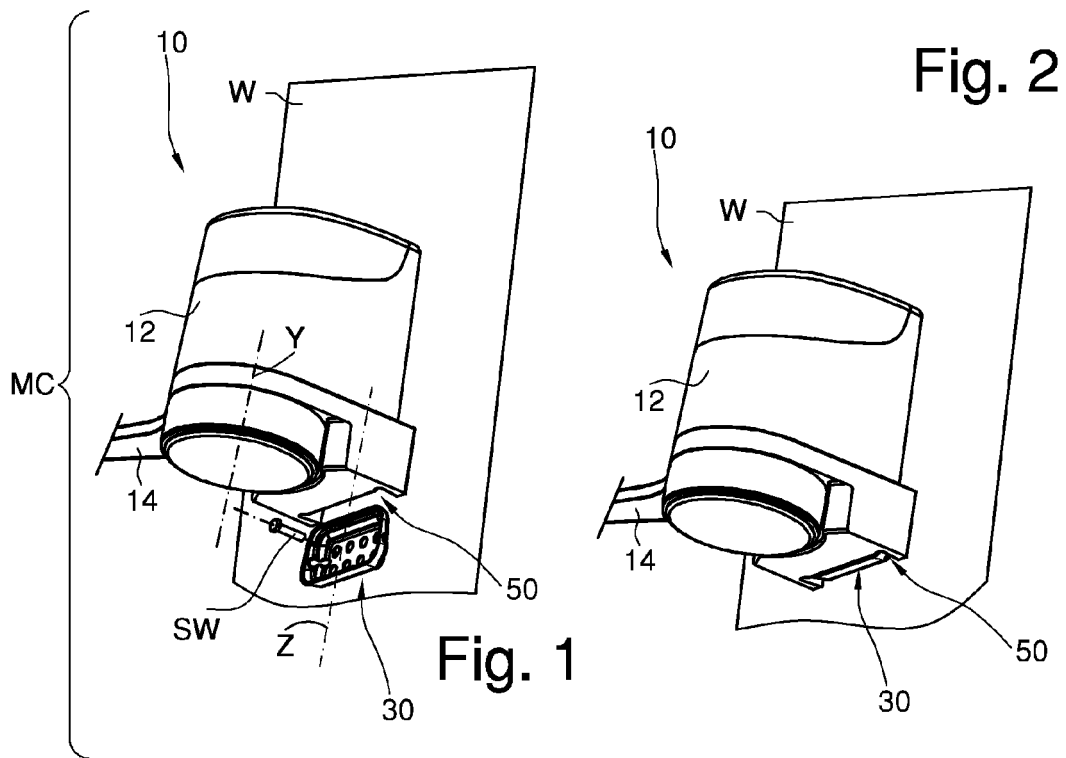
7. System (10) according to claim 6, wherein the support member comprises a flat base from which the hooking portion extends lying on a parallel and offset plane.

8. System (10) according to one of the preceding claims 1 to 5, wherein the support member comprises a flat central body from which two projections forming conical convolutions extend.

9. System (10) according to one of the preceding claims, wherein the support member is a deep-drawn sheet with a peripheral edge which constitutes a hooking portion for engaging the actuator.

10. Actuator as defined in one of the preceding claims.

11. Support member, couplable with an actuator as defined in claim 10, **characterised in that** it is defined like in one of claims 1 to 9.



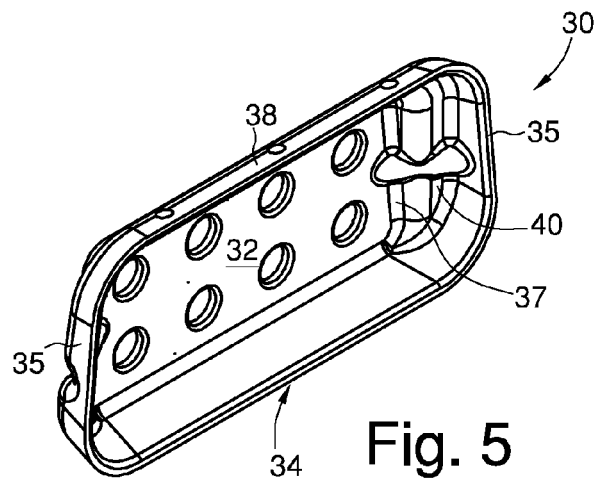


Fig. 5

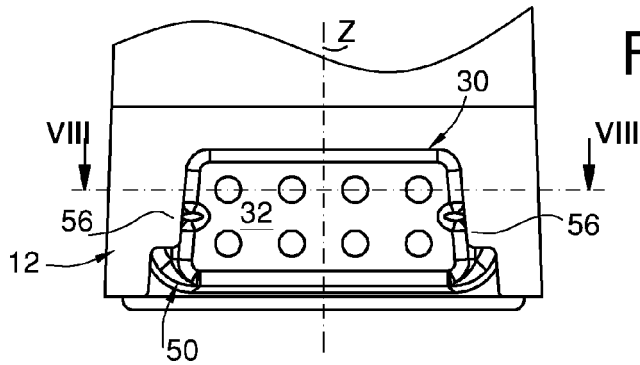


Fig. 6

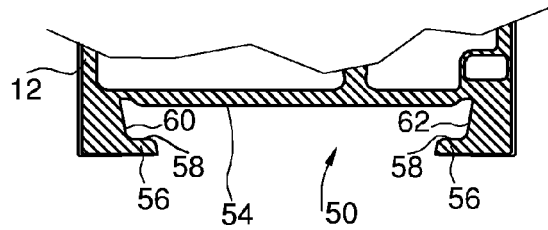


Fig. 7

Fig. 8

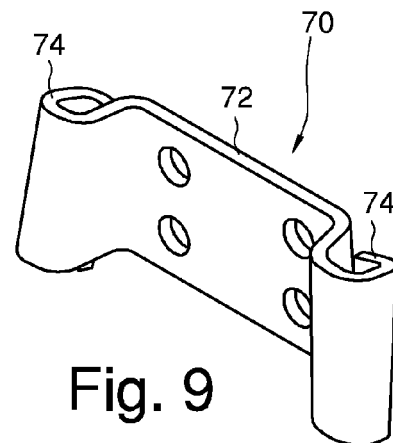
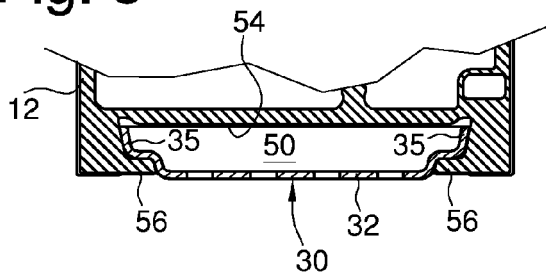
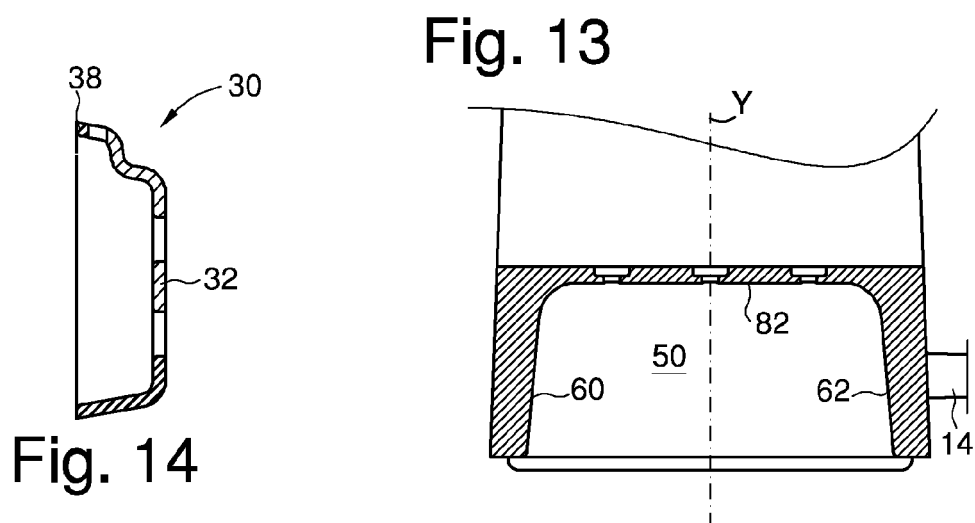
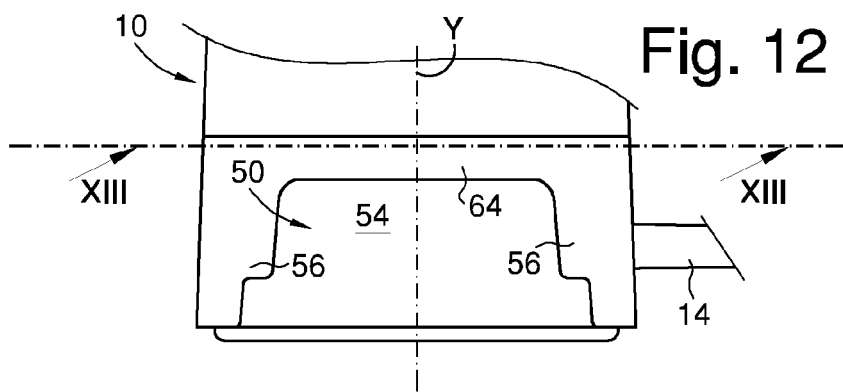
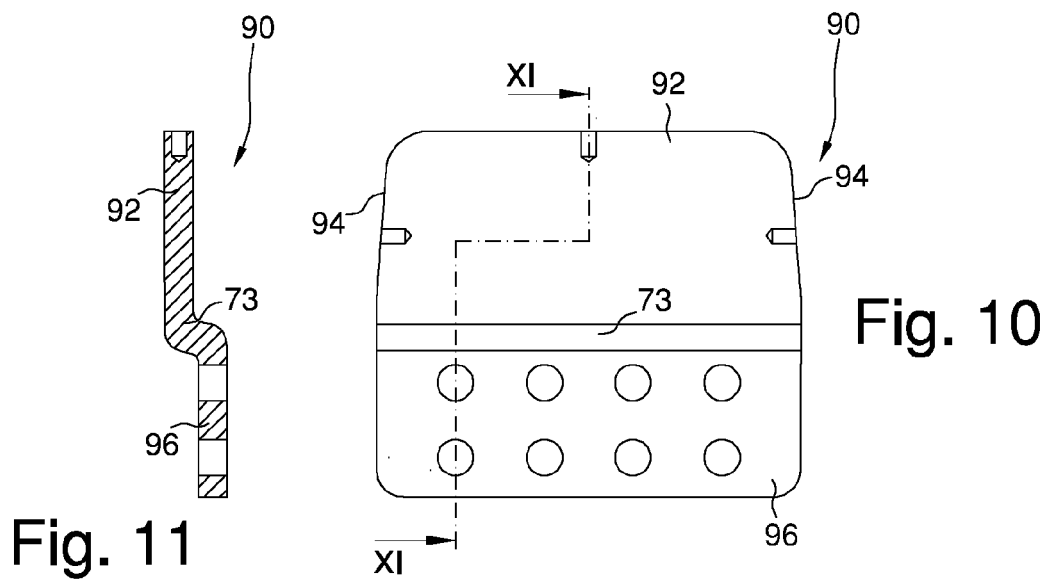


Fig. 9





EUROPEAN SEARCH REPORT

 Application Number
EP 10 19 0398

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 April 2011	Examiner Mund, André
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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REFERENCES CITED IN THE DESCRIPTION

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