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(54) Title: POWERED LATCH SYSTEM FOR PICKUP TRUCK TAILGATE

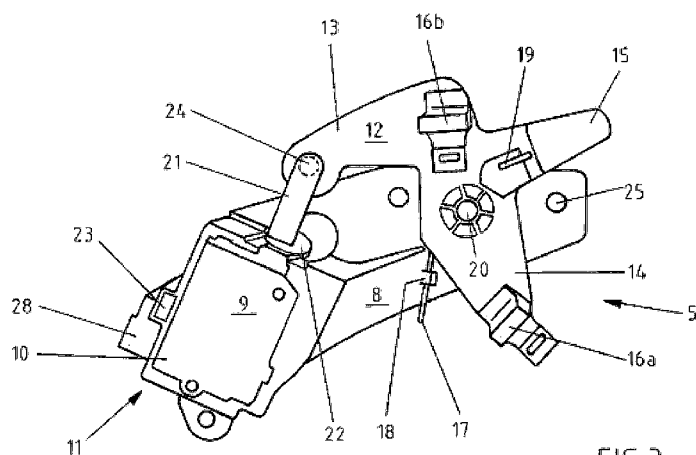


FIG. 3

(57) Abstract: The invention concerns a powered latch system for remote release of a tailgate (2) movably mounted to the rear end of a pickup truck (1) for pivoting between an upright closed position and a generally horizontal open position to provide access to a rear bed storage area with upstanding sidewalls (3) extending along opposite sides, wherein the powered latch system comprising a base plate (8) for mounting actuating mechanism members to the tailgate (2) and a powered actuator (9) for remotely actuating an actuating mechanism (5) of the powered latch system, wherein a housing (10, 11) of the powered actuator (9) for housing a powered actuator drive is formed partly by the base plate (8). Reduced wear and production costs can be obtained.



Powered latch system for pickup truck tailgate

FIELD OF THE INVENTION

5 The present invention relates to a powered latch system for remote release of a tailgate of a pickup truck.

BACKGROUND OF THE INVENTION

10 Pickup trucks typically include a tailgate that swings between an upright closed respectively latched position to a horizontal open position to provide access to the rear bed storage area.

15 Document US8532873 B1 discloses a latch release for tailgates of pickup trucks, whose content is incorporated by reference herein.

Secure latching of the tailgate is of crucial importance to prevent
20 unplanned opening during driving and thus reducing life threatening risks.

For that reason, the base plate for mounting a powered actuator and other functional components for release of the tailgate was commonly made of metal to secure sufficient strength and long life reliability.

25 However, the vibrations during driving especially in combination with the material combination of a base plate made of metal and a powered actuator housing made of a soft or particularly polymeric material, which is firmly attached onto the base plate by means of
30 mechanical fasteners or other suitable arrangement like screw connections, can lead to wearing of the soft respectively polymeric parts, especially of the powered actuator housing.

The purpose of the invention is therefore to provide a further
35 developed powered latch system for remote release of a tailgate of a pickup truck.

SUMMARY OF THE INVENTION

For the solution of the problem serves a powered latch system for remote release of a tailgate according to the main claim. Preferred
5 embodiments are described in the dependent claims.

The problem is solved by means of a powered latch system for remote release of a tailgate movably mounted to the rear end of a pickup truck for pivoting between an upright closed position and a generally
10 horizontal open position to provide access to a rear bed storage area with upstanding sidewalls extending along opposite sides, wherein the powered latch system comprising a base plate for mounting actuating mechanism members to the tailgate and a powered actuator for remotely actuating an actuating mechanism of the powered latch
15 system, wherein a housing of the powered actuator for housing an powered actuator drive is formed partly by the base plate.

The features of each embodiment as well as features of the above description and the features of the figure description can be combined
20 with each other and combined with the subject matter of the aspects of the invention and each claim.

All combinations of one or more embodiments and/or aspects of the invention with one or more claims is hereby disclosed.

Multiple variations and modifications are possible in the embodiments and between the aspects of the invention and the embodiments of the invention described herein. In some instances, some features of the present invention may be employed without a corresponding use of the
30 other features. Accordingly, it is appropriate that the foregoing description be constructed broadly and understood as being given by way of illustration and example only, the spirit and scope of the invention being limited only by the appended claims.

Details and further advantages are provided in the following description of the figures which depicts a preferred execution example with the necessary details and individual components.

BRIEF DESCRIPTION OF THE DRAWINGS

5 It is shown:

Figure 1: pickup truck with a tailgate and a powered latch system.

Figure 2: pickup truck with a cap liftgate with a powered latch system.

Figure 3: detailed view of the base plate with powered actuator.

10 The invention concerns a powered latch system for remote release of a tailgate 2 movably mounted to the rear end of a pickup truck 1 for pivoting between an upright closed position and a generally horizontal open position to provide access to a rear bed storage area with upstanding sidewalls 3 extending along opposite sides, wherein the
15 powered latch system comprising a base plate 8 for mounting actuating mechanism members to the tailgate 2 and a powered actuator 9 for remotely actuating an actuating mechanism 5 of the powered latch system, wherein a housing 10, 11 of the powered
20 actuator 9 for housing an powered actuator drive is formed partly by the base plate 8.

A powered actuator drive can be basically an electric motor and a gear. Housing generally refers to an immediate protective cover. When
25 for example a housing of a drive, wherein the drive is surrounded and covered by the housing, is placed on a plate, then said plate is not a housing or part of said housing.

Formed partly by the base plate 8 means that the base plate 8 is
30 formed such way that part of the base plate 8 forms respectively build up respectively represents part of the housing 10, 11 of the powered actuator 9.

Preferably, the actuating mechanism 5 is a central actuating
35 mechanism 5 capable to translate a first rod 7a for remotely releasing a first latching mechanism 6a engageable to one of the sidewalls 3 and

to translate a second rod 7b for remotely releasing a second latching mechanism 6b engageable to the opposite sidewall 3.

Central generally refers to a central arrangement between the first and
5 second latching mechanism 6a, 6b.

Translate a first or second rod 7a, 7b means push according to a preferred embodiment, but can also mean pull.

10 Engageable means able to latch or release.

Actuating mechanism members are basically members that form said central actuating mechanism 5 such as an actuator, a lever etc.

15 Because the housing 10, 11 of the powered actuator 9 for housing an powered actuator drive is formed partly by the base plate 8, a reduced wearing of the housing 10, 11 of the powered actuator 9 can be achieved under vibrations during driving. A very long lifetime and high reliability of the powered latch system is obtained. Furthermore, an
20 assembly can be realized very fast and with very low effort. Production costs can be reduced.

In one embodiment, the housing 10, 11 comprises a separate actuator housing part 10, wherein the separate actuator housing part 10 is
25 attachable to a base plate actuator housing part 11, which is formed by the base plate 8.

Separate means that the actuator housing part 10 and the base plate actuator housing part 11 – thus also the base plate 8 – were
30 manufactured in separate production processes and/or different materials.

Little wearing and low production expense can thereby be obtained.

35 In one embodiment, the base plate 8, the base plate actuator housing part 11 of the base plate 8 and/or the actuator housing part 10 are made of polymeric material or plastic.

Through the material combination polymeric material and polymeric material instead of metal and polymeric material, little wearing and long lifetime can be achieved. High reliability and reduced safety risk can be obtained.

Preferably, the base plate 8 is a one-piece part. In particular, the base plate actuator housing part 11 and the base plate 8 are the same one-piece part, wherein the base plate actuator housing part 11 only represents an area of the base plate 8.

In one embodiment, the powered actuator is completely surrounded by the base plate 8 in a section parallel to a plane extension of the base plate 8.

Thereby, high strength of the base plate 8 made of polymeric material or plastic instead of metal can be achieved.

In one embodiment, the base plate actuator housing part 11 has a U-shape.

In one embodiment, a pit of the base plate actuator housing part 11 is big enough to house preferably at least 80%, even more preferred 90% of an electric motor of the powered actuator 9 and/or the gear of the electric motor.

Pit generally refers to some sort of recess, hollow or clearance.

High integration, housing strength and little wearing can be obtained by the preceding two embodiments.

In one embodiment, the base plate 8 and/or the base plate actuator housing part 11 form an opening and the actuator housing part 10 is formed and arranged in a way that the actuator housing part 10 partly pass through that opening. In other words, the base plate actuator housing part comprises an opening and the actuator housing part partly pass through said opening.

Opening generally refers to a pass through hole.

Preferably, said opening forms a pass-through from the top side of the
5 base plate 8 and/or the base plate actuator housing part 11 to the
bottom side.

Little wearing and low production expense can thereby be obtained.

10 In one embodiment, the actuator housing part 10 is mounted to the
base plate 8 and/or the base plate actuator housing part 11 by means
of a form-fit connection.

Form-fit connection means that the actuator housing part 10 is
15 integrated into the base plate 8 and/or the base plate actuator
housing part 11 such way that after assembly, surfaces of the actuator
housing part 10 and the base plate 8 and/or base plate actuator
housing part 11 are pressed against each other in a direction of load
and/or vibration during operation and driving. For example, between at
20 least 10%, preferably 20%, even more preferred 30% and/or at most
60%, preferably 50%, even more preferred 40% of the surface of
actuator housing part 10 can form said form-fit connected. Such
surfaces are generally not restricted to cap like parts at the top side of
the actuator housing part 10 and can be also a part of the actuator
25 housing part 10, which is passing through said opening in the base
plate 8 and/or the base plate actuator housing part 11.

In one embodiment, the actuator housing part 10 is mounted to the
base plate 8 and/or the base plate actuator housing part 11 by means
30 of a clip 23.

In one embodiment, the actuator housing part 10 is mounted to the
base plate 8 and/or the base plate actuator housing part 11 by means
of injection molding of the actuator housing part 10 into the base plate
35 8 and/or the base plate actuator housing part 11.

By means for the foregoing three embodiments, a reduced wearing of the housing 10, 11 of the powered actuator 9 can be achieved under vibrations during driving. A very long lifetime and high reliability of the powered latch system is obtained. Furthermore, an assembly can be realized very fast and with very low effort. Production costs can be reduced.

In one embodiment, an output member housing gate 22 for allowing an output member 21 to transmit motion and/or forces from the powered actuator drive inside the housing 10, 11 to a latching mechanism 6a, 6b outside the housing 10, 11 is mostly formed by the base plate actuator housing part 11, preferably to a portion of at least 80%.

In one embodiment, a multi lever arm 12, which is rotatable mounted on the base plate 8 to transmit motion and/or forces from the powered actuator to a first latching mechanism 6a engageable to one of the sidewalls 3 and/or a second latching mechanism 6b engageable to the opposite sidewall 3, is made of a polymeric material or plastic.

Reduced wearing can be achieved. Having also the base plate 8 made of polymeric material or plastic, reduced weight and high corrosion resistance can be also achieved.

In one embodiment, the multi lever arm 12 comprises a manual actuation arm 15 for transmitting motion and/or forces generated by manual actuation of a handle 4 for manual release of the first and second latching mechanism 6a, 6b, wherein the manual actuation arm 15 is dimensioned bulky and/or having at least doubled – preferably tripled – thickness compared to the plane extension thickness of the multi lever arm 12.

Thereby, high strength of the manual actuation arm 15 made of polymeric material or plastic instead of metal can be achieved.

In one embodiment, the multi arm lever 12 comprise a pivot bearing 20 for allowing rotation about a pivot or pin, wherein the pivot bearing 20 – preferably as an area of a one-piece multi arm lever 12 – having a

ring-shaped support structure reinforced by means of support ribs and/or having at least doubled thickness compared to the plane extension thickness of the multi lever arm 12.

- 5 Thereby, high strength of the multi arm lever 12 made of polymeric material or plastic instead of metal can be achieved.

Optional details of preferred embodiments are described in the following.

10 Figure 1 shows a pickup truck 1 with a tailgate 2 at the rear end of the pickup truck 1 enabling to load and unload the rear bed storage area between the opposing sidewalls 3. The tailgate 2 can be release by means of a switch at the handle 4 or in the driver's cabin. The user can
15 also manually release the tailgate 2 by pulling the handle 4. Either way, the tailgate 2 will open by moving from an upright closed position and a generally horizontal open position (drawn with dotted line). The actuating mechanism 5 can be arranged at the tailgate 2. A first rod 7a is connecting the actuating mechanism 5 with a first latching
20 mechanism 6a and a second rod 7b is connecting the actuating mechanism 5 with a second latching mechanism 6b.

Figure 2 shows another embodiment, in which the powered latching system is implemented on the liftgate 27 of a topper or cap 26 of a
25 pickup truck 1. Pickup trucks can have a topper or cap 26 for permanent or temporary covering the rear bed storage. Such caps or toppers typically have such liftgate 27 to load or unload the covered storage area. The liftgate can be usually pivoted around an axis at the top side such that the liftgate is rotated upwards for opening and
30 downwards for closing. The opening direction can be biased.

In both embodiments shown in Figures 1 and 2, releasing the latch will lead to opening of the tailgate 2 or liftgate 27, respectively. Thus, one direction powered actuation of the powered actuator is sufficient to
35 fulfill the required functionality of remote release. Motion of the latch in the opposite direction for latching or locking is facilitated by means of

a torsion spring 17 that biases the multi lever arm 12, which is described in detail below.

Figure 3 shows a base plate 8 made of plastic that forms a pit-shaped base plate actuator housing part 11 with an opening at the bottom area.

Preferably, the powered actuator drive is placed into that base plate actuator housing part 11 and covered by the actuator housing part 10 like a cap. Basically, an electrical connector 28 of the powered actuator is passing through said opening.

Preferably, the output member 21 is passing through the output member housing gate 22 that is formed by the base plate actuator housing part 11 and the actuator housing part 10 together.

Preferably, the output member 21 is joined by means of a pin connection 24 to a second rod and powered actuation lever arm 13 of the multi arm lever 12.

Basically, a second rod fitting 16b at the second rod and powered actuation lever arm 13 of the multi arm lever 12 provide firm connection to the second rod 7b.

Preferably, the multi arm lever 12 further comprises a first rod lever arm 14 with a first rod fitting 16a for firm connection to the first rod 7a.

Preferably, the multi arm lever 12 can rotate about a pivot having a pivot bearing 20 with Support three triangular shaped support ribs.

A torsion spring 17 is mounted on the multi arm lever 12 through a spring hole 19 within a pit and on the base plate 8 by means of a L-shaped spring bracket 18 in order to bias the rotation of the multi arm lever 12 in counterclockwise direction. The base plate 8 is connected to the tailgate 2 or liftgate 26 by means of screw connection 25.

Preferably, a manual actuation arm 15 of the multi arm lever 12 is operably connected to the handle 4 in a way that operation the handle 4 will lead to shifting a not shown rod downwardly causing manual release of the multi arm lever 12 to rotate in a clockwise direction (Fig. 3). Thereby, manual release of the first and second latch mechanism 6a, 6b is enabled. This ensures, that the tailgate 2 or liftgate 27 can be released and opened when the electric supply is down or the powered actuator is damaged.

The basic mechanism of the powered latch systems works as following: The actuating mechanism 5 provides for release of the first and second latching mechanism 6a, 6b the powered actuator 9 is remotely actuated by use of a key fob a switch inside a driver's cabin or other such remote device as well as if the handle 4 is actuated manually by a user. The first and second latching mechanism 6a, 6b each comprise a latch that is connected to the elongated first respectively second rod 7a, 7b. The powered actuator 9 acts on the multi arm lever 12 having an upper second rod and powered actuation lever arm 13 and a lower first rod lever arm 14. Upper second rod and powered actuation lever arm 13 is connected to the second rod 7b, and lower first rod lever arm 14 is connected to first rod 7a. Actuation of the powered actuator 9 causes the multi arm lever 12 to rotate in a clockwise direction about a pin or pivot, pulling the first and second rod 7a, 7b inwardly towards the centered actuating mechanism 5. Such inward movement of the first and second rod 7a, 7b rotates the latches of the first and second latching mechanism 6a, 6b to release the tailgate 2 or liftgate 27.

The powered actuator 9 includes an output member 21 that shifts linearly in the direction of the upper second rod and powered actuation lever arm 13. An electrical connector 28 connects the powered actuator 9 to an electrical power supply and/or a controller. As noted above, torsion spring 17 biases the multi arm lever 12 in a counterclockwise direction. The powered actuator 9 can be configured such way to just provide powered motion only when retracting the output member 21 to thereby overcome the torsional force generated by torsion spring 17. Rotation in the counterclockwise direction of multi arm lever 12 may be facilitated by deactivating the powered actuator 9, such that the torsion spring 17 causes the multi arm lever 12 to rotate

in a counterclockwise direction. During operation, the powered actuator 9 can control rotation of the multi arm lever 12 to thereby remotely pull on the first and second rod 7a, 7b to thereby release the latches of the first and second latching mechanism 6a, 6b.

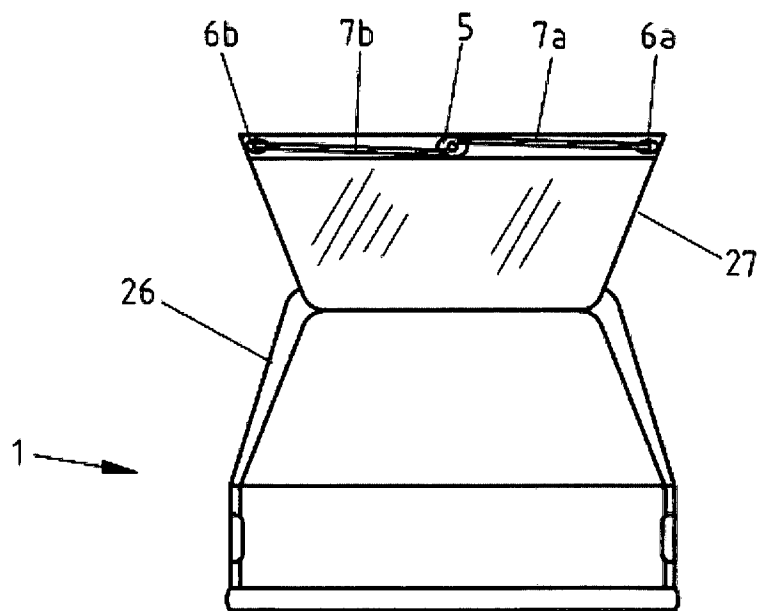
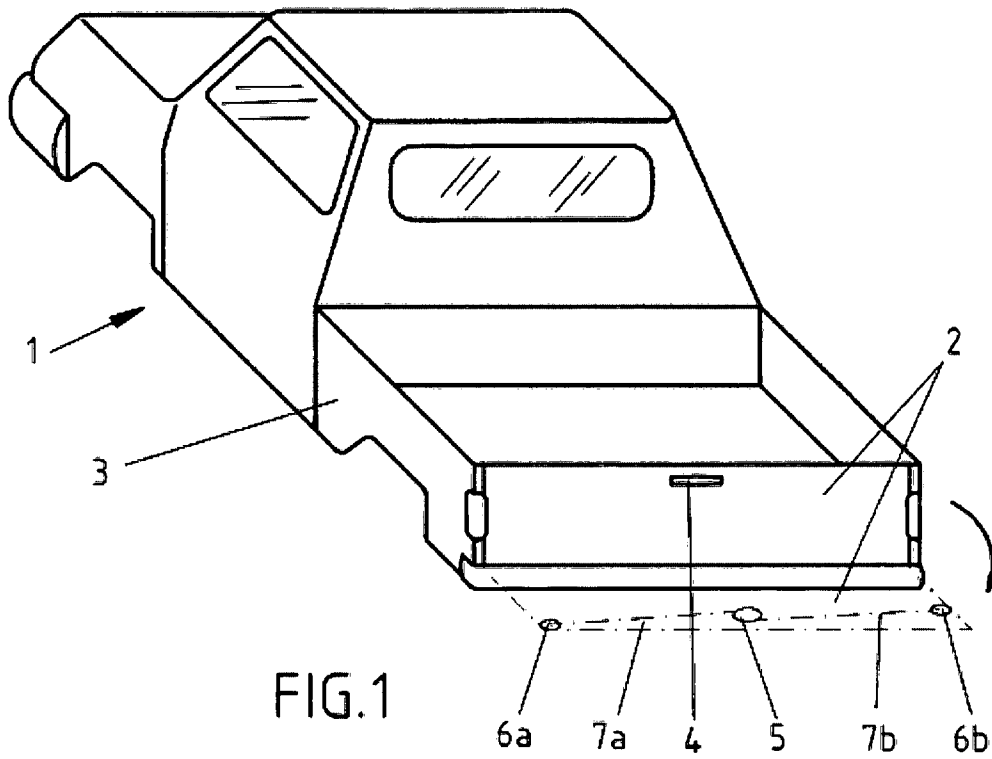
5 Another aspect of the invention concerns a tailgate 2 or liftgate 27 for a pickup truck 1 with a powered latch system with one or more features of the powered latch system and the embodiments of the powered latch system as described above.

Claims

1. Powered latch system for remote release of a tailgate movably
5 mounted to the rear end of a pickup truck for pivoting between
an upright closed position and a generally horizontal open
position to provide access to a rear bed storage area with
upstanding sidewalls extending along opposite sides, wherein the
powered latch system comprising
10 a base plate for mounting actuating mechanism members to the
tailgate and
a powered actuator for remotely actuating an actuating
mechanism of the powered latch system,
wherein a housing of the powered actuator for housing an
15 powered actuator drive is formed partly by the base plate.
2. Powered latch system of claim 1, wherein the housing comprises a
separate actuator housing part, wherein the actuator housing
part is attachable to a base plate actuator housing part, which is
20 formed by the base plate.
3. Powered latch system of claim 2, wherein the base plate, the
base plate actuator housing part of the base plate and/or the
actuator housing part are made of polymeric material or plastic.
- 25 4. Powered latch system of claim 3, wherein the base plate actuator
housing part has a U-shape.
5. Powered latch system of claim 3, wherein a pit of the base plate
actuator housing part is big enough to house an electric motor of
30 the powered actuator.
6. Powered latch system of claim 3, wherein the base plate actuator
housing part comprises an opening and the actuator housing part
partly pass through said opening.
- 35 7. Powered latch system of claim 3, wherein the actuator housing
part is mounted to the base plate and/or the base plate actuator
housing part by means of a form-fit connection.

8. Powered latch system of claim 3, wherein the actuator housing part is mounted to the base plate and/or the base plate actuator housing part by means of a clip.
- 5 9. Powered latch system of claim 3, wherein the actuator housing part is mounted to the base plate and/or the base plate actuator housing part by means of injection molding of the actuator housing part into the base plate and/or the base plate actuator housing part.
- 10 10. Powered latch system of claim 3, wherein an output member housing gate for allowing an output member to transmit motion and/or forces from the powered actuator drive inside the housing to a latching mechanism outside the housing is mostly formed by
15 the base plate actuator housing part.
11. Powered latch system of claim 3, wherein a multi lever arm, which is rotatable mounted on the base plate to transmit motion and/or forces from the powered actuator to a first latching mechanism
20 engageable to one of the sidewalls and/or a second latching mechanism engageable to the opposite sidewall, is made of a polymeric material or plastic.
12. Powered latch system of claim 11, wherein the multi lever arm
25 comprises a manual actuation arm for transmitting motion and/or forces generated by manual actuation of a handle for manual release of the first and second latching mechanism, wherein the manual actuation arm is dimensioned bulky and/or having at least double thickness compared to the plane extension thickness
30 of the multi lever arm.
13. Powered latch system of claim 11, wherein the multi arm lever
35 comprise a pivot bearing for allowing rotation about a pivot or pin, wherein the pivot bearing having a ring-shaped support structure reinforced by means of support ribs and/or having at least doubled thickness compared to the plane extension thickness of the multi lever arm.

14. Powered latch system of claim 11, wherein the multi arm lever is pivotable mounted on a top side of a plane extension of the multi arm lever and biased to rotate with a second rod and powered actuation lever arm towards the powered actuator by means of a spring.
- 5
15. Powered latch system of claim 14, wherein the second rod and powered actuation lever arm is connected to an output member of the powered actuator for transmitting a one-way motion and/or push force from the powered actuator to the multi arm lever for a rotation in clockwise direction.
- 10
16. Powered latch system of claim 14, wherein the second rod and powered actuation lever arm is connected to a second rod for transmitting motion and/or forces from the multi arm lever to a second latching mechanism for latch and release of a latch of the second latching mechanism.
- 15
17. Tailgate or liftgate for a pickup truck with the powered latch system of claim 1.
- 20



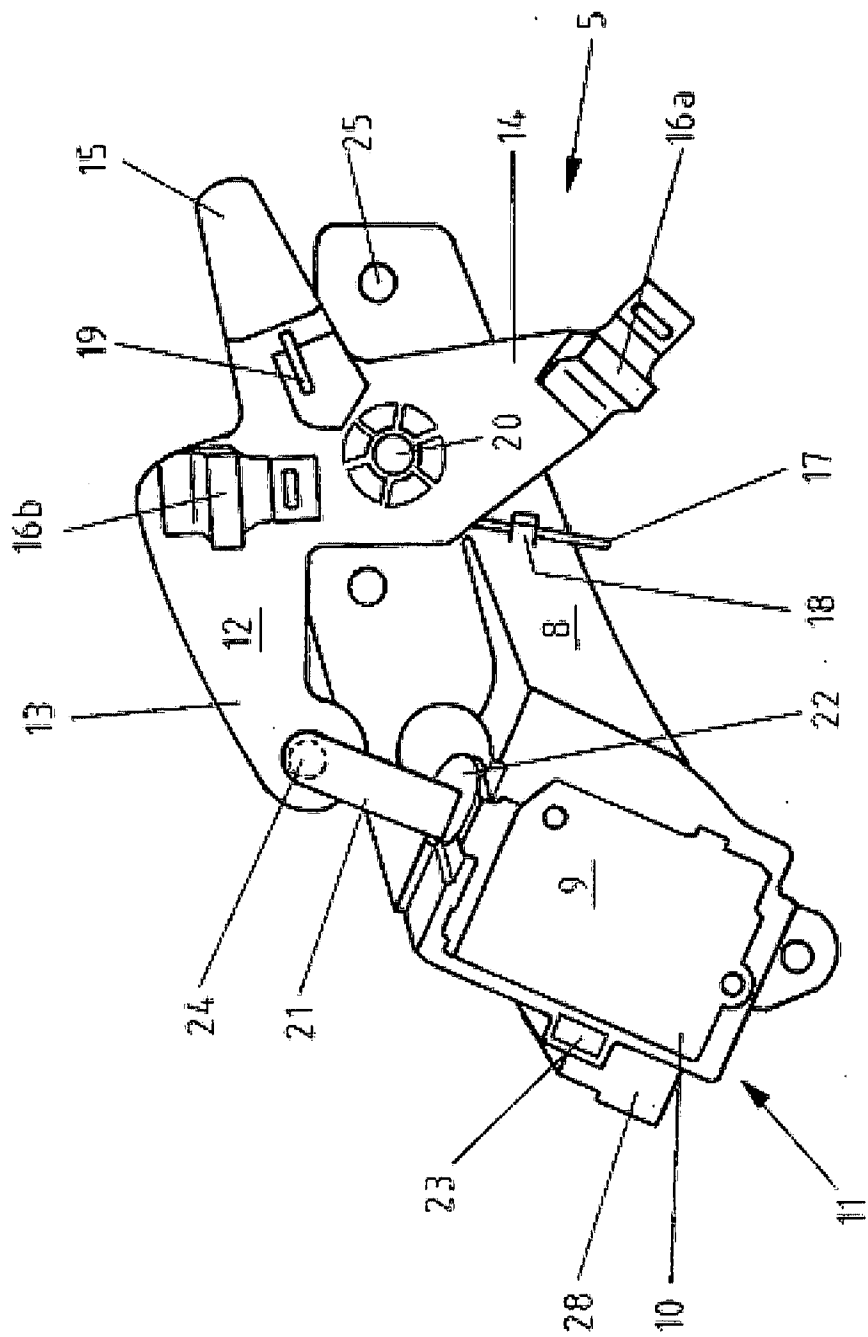


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No

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A. CLASSIFICATION OF SUBJECT MATTER

INV.	E05B81/76	E05B83/16	E05B81/90	E05B85/02	E05B81/24
	E05B79/12	B62D33/037			
ADD.	E05B81/06	E05B15/16	E05B81/14		

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E05B B62D E05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	----- US 6 371 537 B1 (VIGE SYLVIE [FR] ET AL) 16 April 2002 (2002-04-16) column 2, line 46 - column 5, line 20; figures 1-7	1-8,17
X	----- TR 2012 09445 U (ARIKAN KRIKO VE MAKINA SANAYI TICARET ANONIM SIRKETI [TR]) 22 October 2012 (2012-10-22) figures 1-9	1,2,17
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☒ Further documents are listed in the continuation of Box C.

X See patent family annex.

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Pérez Méndez, José F

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2016/000935

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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