



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**01.08.2018 Bulletin 2018/31**

(51) Int Cl.:  
**E05F 15/57 (2015.01)**

(21) Application number: **18153538.6**

(22) Date of filing: **25.01.2018**

(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**  
Designated Validation States:  
**MA MD TN**

(71) Applicant: **IVECO FRANCE S.A.S.**  
**69200 Vénissieux (FR)**

(72) Inventor: **MESTRE, Franck**  
**69008 LYON (FR)**

(74) Representative: **Bongiovanni, Simone et al**  
**Studio Torta S.p.A.**  
**Via Viotti, 9**  
**10121 Torino (IT)**

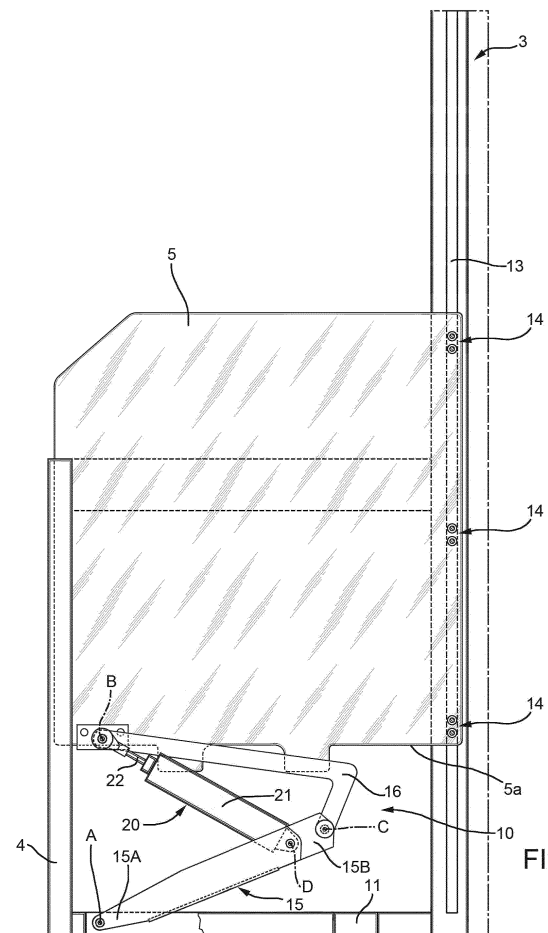
(30) Priority: **25.01.2017 IT 201700007807**

(54) **LIFTING SYSTEM FOR AN EMERGENCY GLASS OF A VEHICLE**

(57) A lifting system (10) for an object (5) in a linear guide (13), comprising:

- a first rigid element (15) articulated at a first end (15a) of the first element (15) in a first pivot point (A) placed underneath the object (5);
- a second rigid element (16) articulated at a second pivot point (B) placed at one end of the object (5) and at a third pivot point (C) placed at a second end (15b) of the first rigid element (15);
- a jack (20) comprising a main body (21) and a rod (22) configured to exit the main body (21), the end of the rod (22) is articulated at said second pivot point (B) and the opposing end of the main body (21) is articulated at a fourth pivot point (D) which is placed between said first and said third pivot point (A, C) on the first rigid element (15),

the second rigid element (16) connecting the second pivot point (B) and the third pivot point (C) in such a way that a vertical movement of the second pivot point (B) is equal to a vertical movement of the third pivot point (C).



**FIG. 3**

## Description

### PRIORITY CLAIM

**[0001]** This application claims priority from Italian Patent Application No. 102017000007807 filed on 25/01/2017, the disclosure of which is incorporated by reference.

**[0002]** The present invention relates to a lifting system, in particular a lifting system for an emergency glass of a public passenger transport vehicle.

**[0003]** Public passenger transport vehicles usually comprise a safety door positioned near to the driver of the vehicle.

**[0004]** The door beneficially comprises a movable glass pane designed to isolate the driver from the rest of the vehicle's interior.

**[0005]** Normally, the glass is movable vertically by means of a pneumatic jack configured to raise it. This jack is vertically positioned in the axis of the door and it pushes the glass entirely in the vertical direction.

**[0006]** In order to ensure the full travel of the glass for its closure, it is therefore not possible to use standard jacks; as a result, the jacks normally used for safety doors are very expensive.

**[0007]** Yet, the current systems cannot be moved into other door positions without increasing their size.

**[0008]** It is thus necessary to improve lifting systems for emergency glass in safety doors of public passenger transport vehicles, while ensuring that the systems not be bulky, and that they are also versatile, cost-effective, and simple to manufacture.

**[0009]** The invention aims to resolve the abovementioned problems.

**[0010]** The abovementioned objects are achieved by a system according to claim 1.

**[0011]** Other characteristics and advantages of the invention will become apparent from the following non-limiting description, provided for illustrative purposes, with reference to the attached drawings, in which:

- Figure 1 is a perspective view of the interior of a vehicle comprising a lifting system according to the present invention;
- Figure 2 is a front view of the lifting system according to the present invention in a compressed configuration;
- Figure 3 is a front view of the system of Figure 2 in an operating configuration;
- Figures 4a to 4c are front views of the system of Figure 2 in various operating configurations.

**[0012]** Figure 1 shows the interior of a vehicle 1, in particular the space near to the driver's cab 2. The cab 2 can be closed by a door 3 hinged on a frame which is fixed with respect to the vehicle 1.

**[0013]** The door 3 preferably comprises a lower panel 4 configured to accept into its interior an emergency glass

5 configured to be vertically movable with respect to the panel 4 and a lifting system 10 for the glass 5.

**[0014]** The lifting system 10 (Figures 2 and 3) is preferably positioned under the glass 5 and even more preferably on a lower edge 11 of the panel 4. The glass 5 can slide vertically thanks to a slide rail 13, formed in the panel 4 and in which the rollers 14, fixed to the glass 5, can roll.

**[0015]** The lifting system 10 beneficially comprises:

- a first rigid element 15, which is articulated at a first end 15a of the first element at a first pivot point A positioned under the glass 5.
- a second rigid element 16, which is articulated at a second pivot point B positioned at an end 5a of the glass 5 and which is articulated at a third pivot point C positioned at a second end 15b of the first element 15.
- a jack 20 comprising a main body 21 and a rod 22 configured to exit from the body 21; the end of the rod 22 is articulated at the second pivot point B and the opposite end of the body 22 is articulated at a fourth pivot point C which is positioned between the first and second pivot points A, C on the first rigid element 15.

**[0016]** The second element 16 connects the second pivot point B and the third pivot point C so that a vertical movement of the second pivot point B is equal to a vertical movement of the pivot point C.

**[0017]** The second element 16 is preferably a substantially "L"-shaped bar which defines a triangle with the pivot points B, C. Beneficially, the short side of the "L" is articulated at the third pivot point C.

**[0018]** The first element 15 preferably has a substantially "U"-shaped section and is of dimensions such as to house inside it, at least partially, the body 21 of the jack 20 when the system 10 is in a compressed operating position.

**[0019]** During its operation, the jack 20 is preferably inclined with respect to the vertical. The jack 20 is a standard jack whose rod 22 is sized so as to have a stroke preferably between 20 and 150 mm so as to ensure a minimum travel of the glass of between 5 and 900 mm.

**[0020]** The first, third and fourth pivot points A, C, D are preferably positioned along a shared line which connects them together. This conjunction line is preferably a line of symmetry of the first element 15.

**[0021]** In a known way, the travel of the jack is controlled by a control device, not shown.

**[0022]** The operation of the lifting system for an emergency glass of a public passenger transport vehicle is the following.

**[0023]** In a first operating step, the emergency glass 5 is entirely inside the panel 4 and the system 10 is in a compressed position (Figure 2).

**[0024]** When the driver wants to raise the emergency glass 5, the extension of the rod 22 of the jack 20 is

activated.

**[0025]** As the rod progressively exits from the body 21 of the jack 20, the first element 15 is raised, being articulated at the first pivot point A (Figures 4a-4c).

**[0026]** Raising of the first element 15 is possible thanks to the rigid connection between the second and third pivot points B, C.

**[0027]** The jack 20 can be extended due to the fact that the end of the body 21 is articulated at the fourth pivot point D; the jack 20 can thus be extended and, at the same time, the first element 15 can be raised by being articulated at the first pivot point A.

**[0028]** From the foregoing, the benefits of a lifting system for an emergency glass of a public passenger transport vehicle according to the present invention are apparent.

**[0029]** Thanks to the system 10, the jack 20 used to raise the glass 5 is a standard jack of minimum size. But still, the use of a standard jack makes it possible to reduce the costs.

**[0030]** Again, the system 10 can be positioned anywhere inside the panel 4, by changing the shape of the first and second rigid elements 15, 16.

**[0031]** Finally, it is apparent that the lifting system for an emergency glass of a public passenger transport vehicle according to the present invention may be subject to modifications and variations without thereby departing from the protective scope of the claims.

**[0032]** For example, the shape or the section of the first and second elements 15, 16 can be changed based on the positioning of the system 10 with respect to the glass 5 inside the panel 4.

## Claims

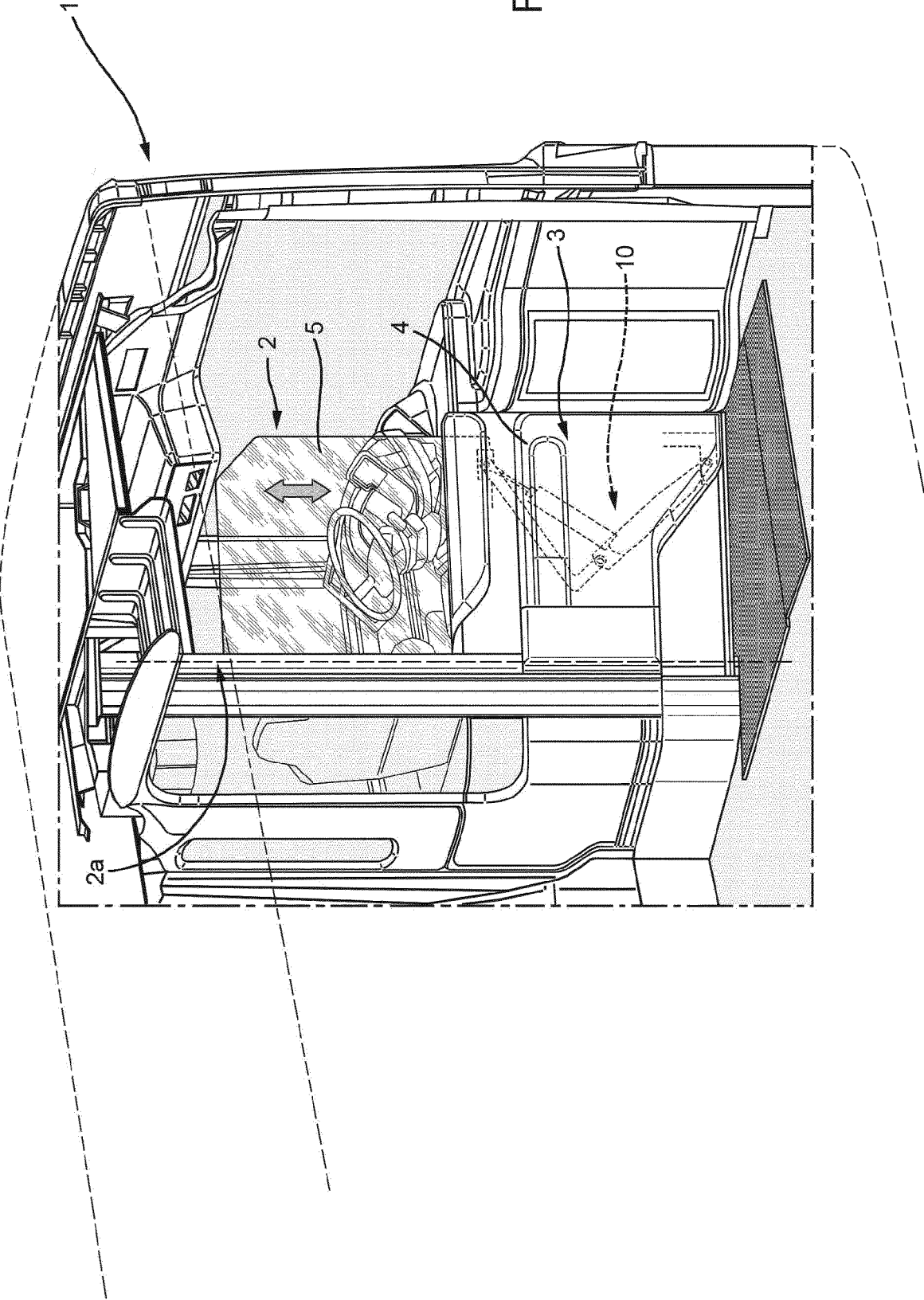
1. A lifting system (10) for an object (5) in a linear guide (13), **characterised in that** it comprises:

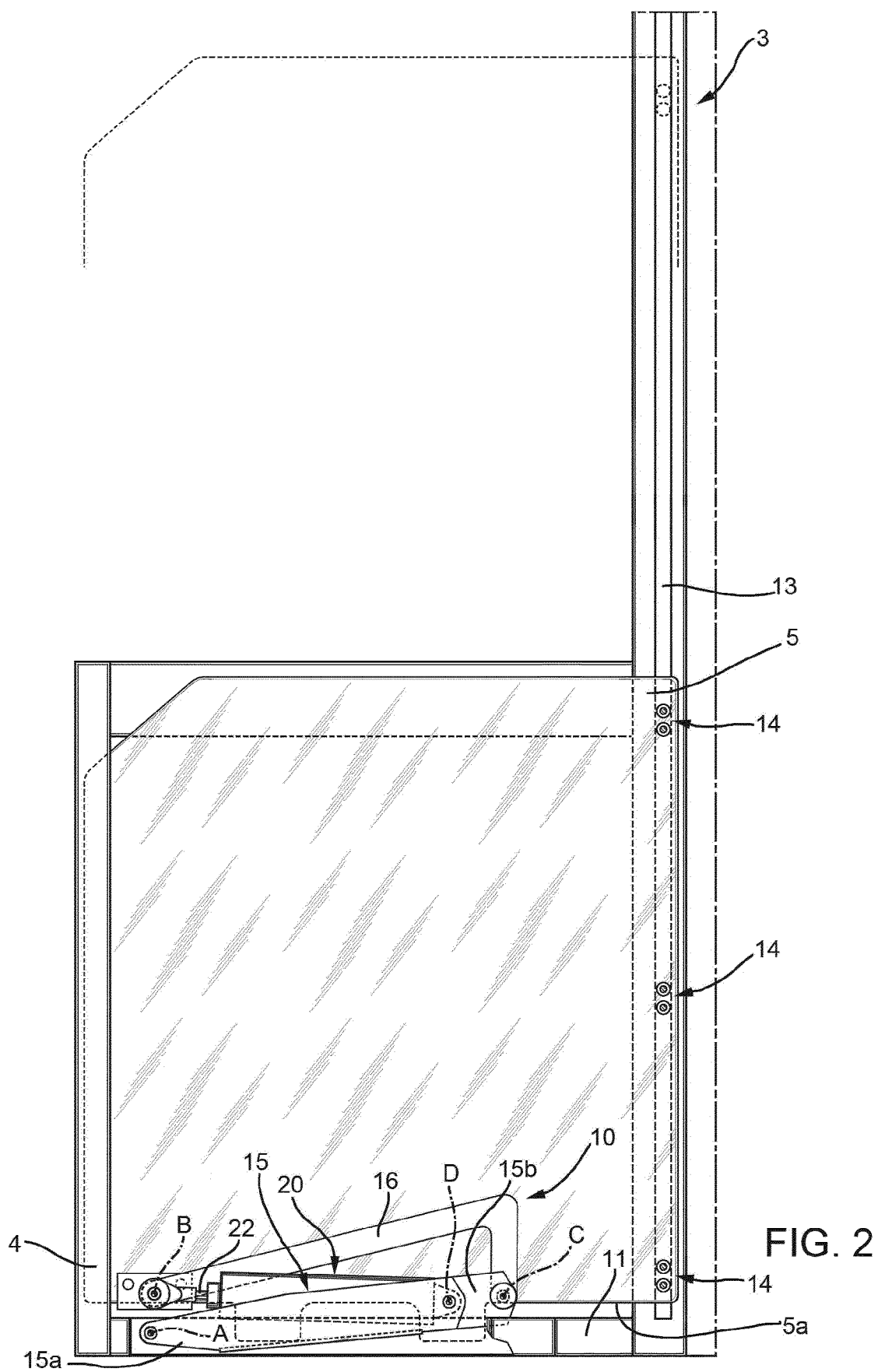
- a first rigid element (15) articulated at a first end (15a) of said first element (15) at a first pivot point (A) placed underneath said object (5);
- a second rigid element (16) articulated at a second pivot point (B) connected at a second end of said object (5) and at a third pivot point (C) placed at a second end (15b) of said first rigid element (15);
- a jack (20) comprising a main body (21) and a rod (22) configured to exit the main body (21), the end of the rod (22) is articulated at said second pivot point (B) and the opposing end of the main body (21) is articulated at a fourth pivot point (D) which is placed between said first pivot point and said third pivot point (A, C) on said first rigid element (15), said second rigid element (16) connecting the second pivot point (B) and the third pivot point (C) in such a way that a vertical movement of the second pivot point (B) is

equal to a vertical movement of the third pivot point (C).

2. The system according to claim 1, **characterised in that** said jack (20) is continuously inclined vertically for the entire stroke of said object (5) in said linear guide (13).
3. The system according to claim 1 or 2, **characterised in that** said first rigid element (15) is configured to receive, at least partially, said jack (20) in a compressed position of said system (10).
4. The system according to any one of the previous claims **characterised in that** said jack (20) is pneumatic and has a stroke of between 20 and 150 mm.
5. The system according to any one of the previous claims **characterised in that** said first rigid element (15) has a profile with a "U"-shaped section.
6. The system according to any one of the previous claims **characterised in that** said second rigid element (16) is a substantially "U"-shaped bar.
7. The system according to claim 6, **characterised in that** the shortest side of the "L" is articulated at the third pivot point (C).
8. The system according to any one of the previous claims **characterised in that** said first, said third and said fourth pivot points (A, C, D,) are positioned on a shared line.
9. The system according to claim 8, **characterised in that** said shared line is a line of symmetry of said first rigid object (15).
10. A road vehicle comprising a lifting system (10), according to any one of the previous claims, for the emergency glass of a safety door of said vehicle.

FIG. 1





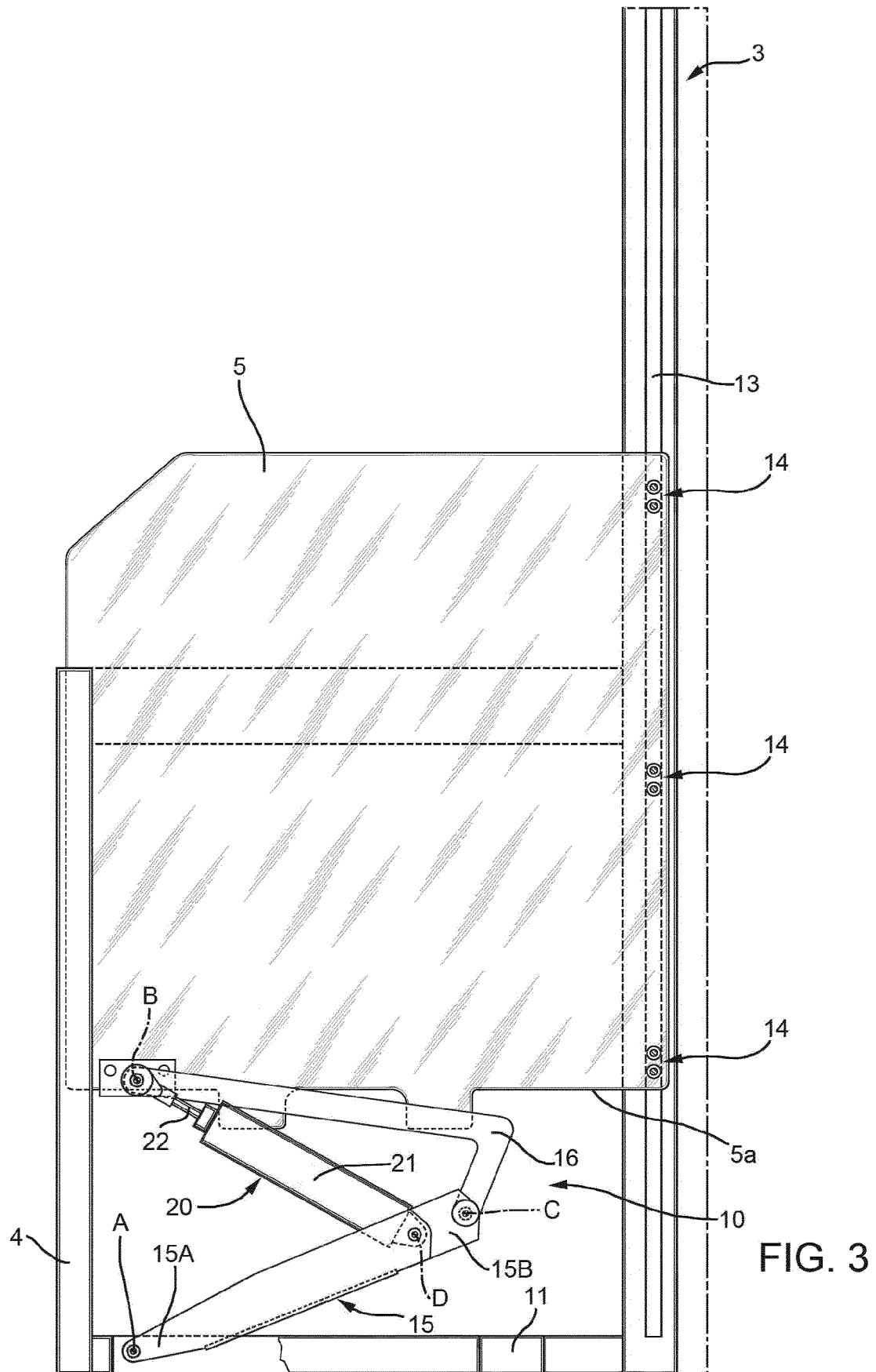
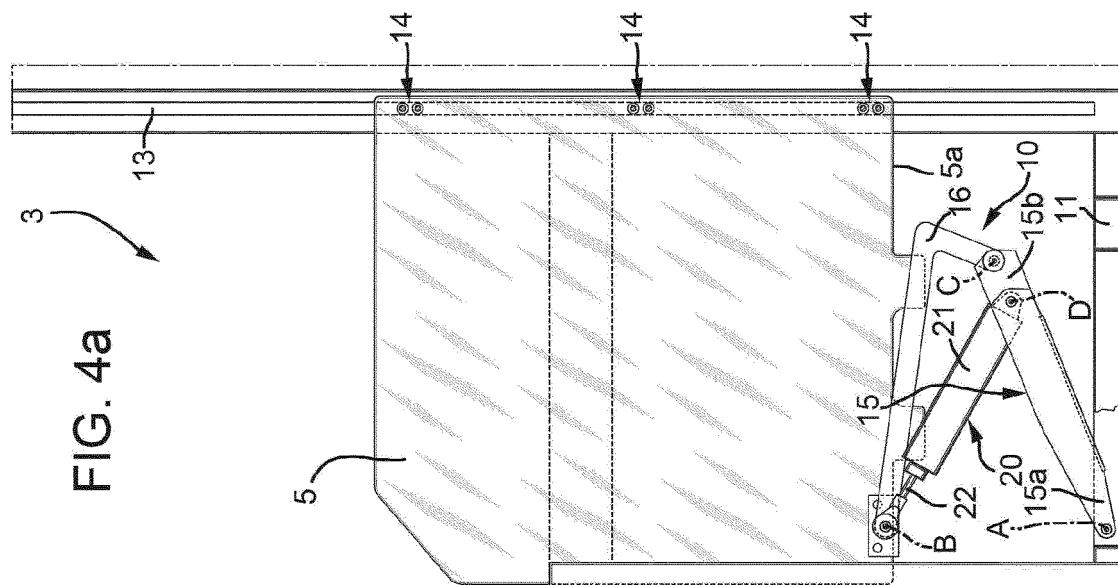
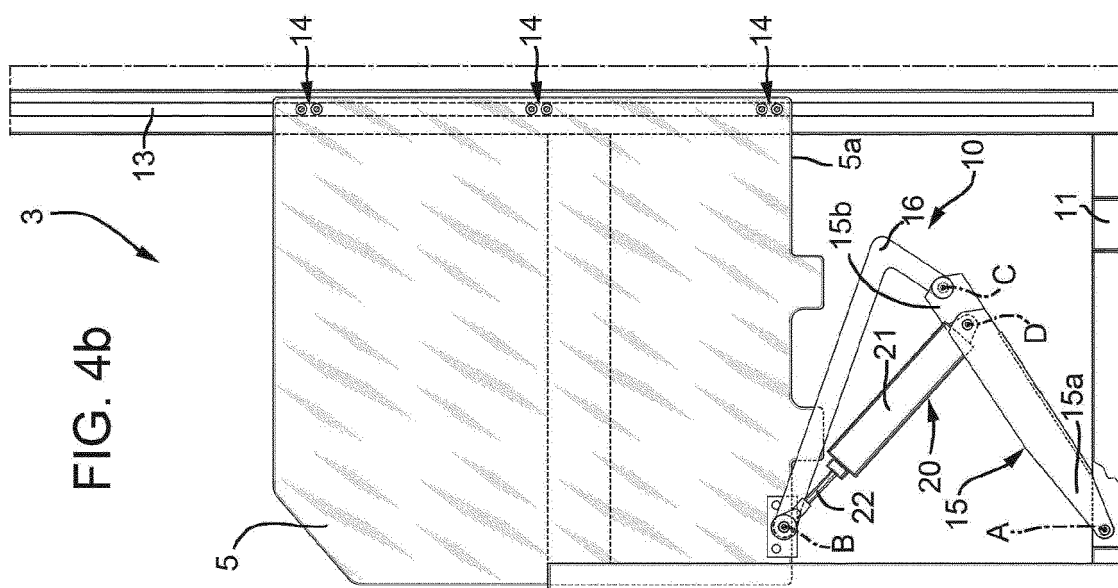
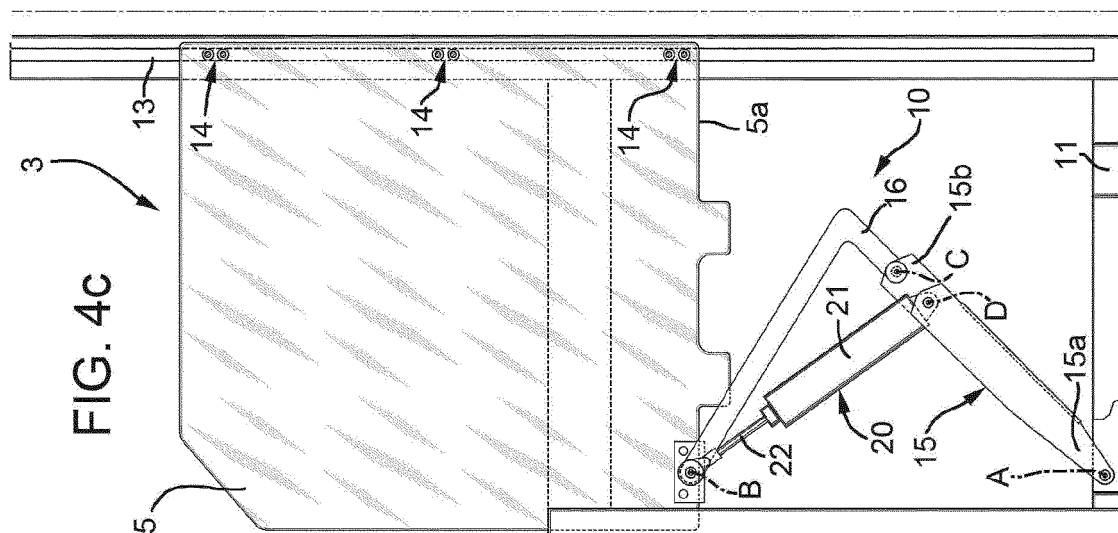


FIG. 3





## EUROPEAN SEARCH REPORT

Application Number  
EP 18 15 3538

5

10

15

20

25

30

35

40

45

50

55

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                     |                                                  |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                       | Relevant to claim                                | CLASSIFICATION OF THE APPLICATION (IPC) |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DE 42 07 924 A1 (BAYERISCHE MOTOREN WERKE AG [DE]) 16 September 1993 (1993-09-16)<br>* column 2, line 6 - line 45 *<br>* figure 1 * | 1-10                                             | INV.<br>E05F15/57                       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2 335 696 A (ANTON RAPPL ET AL)<br>30 November 1943 (1943-11-30)<br>* column 1, line 38 - line 52 *<br>* figure 1 *              | 1-10                                             |                                         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                     |                                                  | TECHNICAL FIELDS SEARCHED (IPC)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                     |                                                  | E05F                                    |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                     |                                                  |                                         |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                     | Date of completion of the search<br>11 June 2018 | Examiner<br>Prieto, Daniel              |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                     |                                                  |                                         |

EPO FORM 1503 03/82 (P04C01)



**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 15 3538

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

11-06-2018

10

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| DE 4207924                                | A1                  | 16-09-1993                 | NONE                |
| -----                                     |                     |                            |                     |
| US 2335696                                | A                   | 30-11-1943                 | NONE                |
| -----                                     |                     |                            |                     |

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**REFERENCES CITED IN THE DESCRIPTION**

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

**Patent documents cited in the description**

- IT 102017000007807 [0001]