(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 138 854 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
04.10.2001 Bulletin 2001/40

(51) Int Cl.[7]: **E05B 65/20**, E05B 65/32

(21) Application number: **01104262.9**

(22) Date of filing: **22.02.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **29.02.2000 JP 2000052981**

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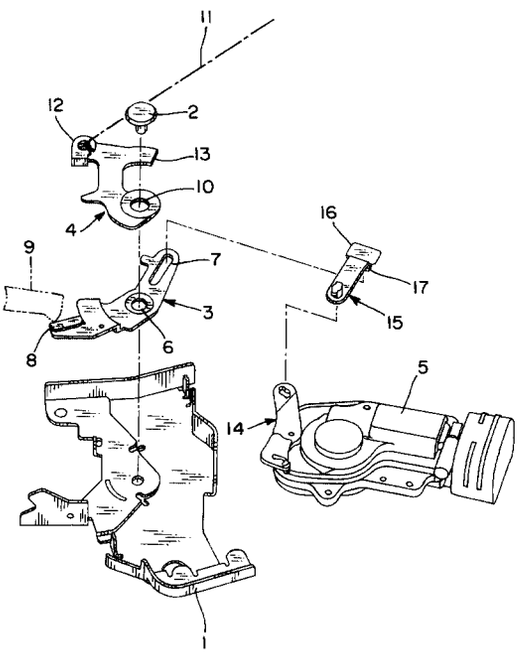
(54) Door lock apparatus for vehicles

(57) A door locking and unlocking apparatus for a vehicle comprising: a latch unit (103) having a latch (19) engaged with a sriker of a vehicle body for maintaining a vehicle door (101) in a closed state relative to the vehicle body (102); a handle unit (106,107) for operating the latch unit (103) to bring the vehicle door into an opened state relative to the vehicle body; a remote control unit (104) for making operation of the handle unit (106,107) transmittable or non-transmittable to the latch unit (109); a main lever (3) provided at the latch unit (103) for operating a pawl (18) for restricting rotation of the latch; and a sublever (4) provided to the latch unit (103), in communication with the operation of the handle unit (106,107) via the remote control unit (104) and engageable to and disengageable from the main lever (3), so that the door cannot be unlocked even when a cable connected to the latch unit is unlawfully operated.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a door lock apparatus for vehicles, particularly to a door lock apparatus for locking and unlocking a slide door to a body of an automobile.

[0002] Conventionally, there is known a door lock apparatus for vehicles of this kind as disclosed in Japanese Patent Laid-Open Publication No.24737/1998. As shown in Fig. 8, the conventional door locking and unlocking apparatus includes a pair of front and rear latch units 103 having latches engaged with strikers of a vehicle body for maintaining a vehicular door in a closed state relative to the vehicle body, handle units 106 and 107 on an inner side and an outer side of the vehicular door for operating the latch units 103 to bring the door into an opened state or a closed state relative to the vehicle body, and a remote control unit 104 for making operation of the handle units 106 and 107 transmittable or nontransmittable to the latch units 103.

[0003] The latch units 103 each is constituted by a structure having a rotatable latch engaging to and disengaging from the striker of the vehicle body, a rotatable pawl engaged with the latch for restricting rotation of the latch and a main lever for operating the pawl.

[0004] The remote control unit 104 is constituted by a structure having an open lever connected and engaged with the handle units 106 and 107, a lift lever connected and engaged with the latch units 103 and capable of engaging to and disengaging from the open lever and a locking lever engaging to and disengaging from the open lever and the lift lever.

[0005] Further, unlatch operation of the latch units 103 is carried out by operating main levers of the latch units 103 via the open lever and the lift lever of the remote control unit 104 by operating the handle unit 106 and 107. Further, lock operation of the latch units 103 is carried out by releasing engagement of the open lever and the lift lever of the remote control unit 104 by operating the locking lever of the remote control unit 104 by operating a sill knob provided on the compartment inner side of the vehicular door or a key cylinder provided on the compartment outer side.

[0006] The lift lever of the remote control unit 104 and the main levers of the latch units 103 are coupled by cables and rods arranged in the vehicular door, and thereby the remote control unit 104 and the latch units 103 are connected and engaged with each other.

[0007] According to the above-described constitution, operations of lock and unlock of the door as well as latch and unlatch of the latch units 103 are carried out by the remote control unit 104. However, since the remote control unit 104 and the latch units 103 are coupled by cables and rods, when the cables and the rods are unlawfully operated from outside of the vehicle, there is a danger of opening the door by operating the latch units to unlatch regardless of operating the latch units to lock by operating the remote control unit.

[0008] Further, when the sill knob is unlawfully operated from outside of the vehicle, the latch units are operated to unlock by operating the remote control unit, as a result, the unlatch operation of the latch units can be carried out by operating the handle units and there is the danger of opening the door.

SUMMARY OF THE INVENTION

[0009] Hence, it is an object of the invention to resolve the drawback of the conventional technology, mentioned above.

[0010] According to the invention, in order to resolve the above-described problem, basically, a technical conception for arranging a sublever engageable to and disengageable from a main lever at a latch unit is employed.

[0011] Specifically, according to an aspect of invention, there is provided a door lock apparatus for vehicles having a latch unit having a latch engaged with a striker of a vehicle body for maintaining a vehicular door in a closed state relative to the vehicle body, a handle unit for operating the latch unit to bring the vehicular door into an opened state relative to the vehicle body and a remote control unit for making operation of the handle unit transmittable or nontransmittable to the latch unit, the vehicular door locking and unlocking apparatus comprising a main lever provided at the latch unit for operating a pawl for restricting rotation of the latch, and a sublever provided to the latch unit, transmitting the operation of the handle unit via the remote control unit and engageable to and disengageable from the main lever.

[0012] According to the present apparatus, by releasing engagement between the main lever and the sublever, in addition to lock operation of the latch unit by operating the remote control unit, the lock operation of the latch unit per se is carried out. Therefore, even when cables or rods for connecting and engaging the remote control unit and the latch unit are unlawfully operated or even when the latch unit is unlawfully operated to unlock by unlawful operation of the remote control unit, by lock operation of the latch unit per se, the latch unit can be prevented from being operated to unlatch and robbery preventive performance can be promoted.

[0013] More preferably, according to another aspect of invention, there is provided the door lock apparatus, further comprising an actuator provided to the latch unit, a first link provided to the latch unit and pivoted by operation of the actuator, and a second link which is provided to the latch unit, one end of which is axially supported by the first link and other end of which is capable of being brought into contact with a portion of the sublever, wherein the actuator releases contact between the sublever and the second link and releases engagement between the main lever and the sublever.

[0014] More preferably, according to further another

aspect of the invention, there is provided the door lock apparatus, further comprising a long hole formed in the main lever and a projected pin formed at the second link and inserted into the long hole of the main lever and capable of being brought into contact with a portion of the sublever, wherein by operating the actuator, the projected pin of the second link is moved along the long hole by the first link and the contact relationship between the second link and the sublever is released.

[0015] More preferably, according to another aspect of the invention, there is provided the door lock apparatus, further comprising a bracket for coaxially and pivotably supporting the sublever and the main lever and holding the actuator, wherein the main lever, the sublever, the first and the second links and a portion of the actuator are surrounded by the bracket.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016]

Fig. 1 is a disassembled perspective view of a latch unit of a door lock apparatus according to the invention;

Fig. 2 is a front view of the latch unit of the door lock apparatus according to the invention;

Fig. 3 is a front view showing a double lock operation of the latch unit of the door lock apparatus according to the invention;

Fig. 4 is a front view of a vehicular door mounted with the door lock apparatus according to the invention;

Fig. 5 is a sectional view showing a remote control unit of the door lock apparatus according to the invention;

Fig. 6 is a sectional view showing the remote control unit of the door lock apparatus according to the invention;

Fig. 7 is a perspective view of each parts for the remote control unit according to the invention; and

Fig. 8 is a front view of a vehicular door mounted with a conventional door locking and unlocking apparatus.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] As shown by Fig. 4, a slide door 101 of a vehicle is arranged with the pair of front and rear latch units 103 for maintaining a slide door 101 in a closed state relative to a vehicle body 102 and a remote control unit 104 for operating the latch units 103.

[0018] The remote control unit 104 and the pair of front and rear latch units 103 are connected and engaged with each other by cables and rods arranged to the slide door 101, further, the remote control unit 104 is connected and engaged with a outside handle unit 107 arranged on a panel of the compartment outer side of the slide door 101 and the inside handle unit 106 arranged on a panel of the compartment inner side of the slide door 101.

[0019] As shown by Fig. 5 - 7 the remote control unit 104 is mainly constituted by a lift lever 41, an inside open lever 42 and an outside open lever 43.

[0020] The lift lever 41 is pivotably supported by a coaxial shaft 93 at a central portion in the longitudinal direction thereof and coupled to sublevers 4 of the latch units 103, mentioned later, by cables 11 at both ends thereof. A slide bush 47 is slidably supported by the lift lever 41.

[0021] The inside open lever 42 is pivotably supported by the coaxial shaft 93 provided at a base bracket 91 and is connected to an inside handle of the inside handle unit 106 via a rod 61a at one end thereof. At other end of the inside open lever 42, a slide bush 48 is slidably supported.

[0022] The outside open lever 43 is pivotably supported by the coaxial shaft 93 at one end thereof and is connected to an outside handle of the outside handle unit 107 via a cable 43e at other end thereof. The outside open lever 43 is engageably and disengageably arranged with engaging and disengaging pin portions 47a and 48a of the slide bushes 47 and 48.

[0023] The slide bush 47 is made to slide by a locking lever 44. The locking lever 44 is pivotably supported by the base bracket 91 by snap engagement and is inserted with a connecting pin portion 47b of the slide bush 47. The locking lever 44 is connected to an output lever 51 of a locking actuator 50 attached to the base bracket 91. Further, the output lever 51 is connected to a sill knob of the inside handle unit 106 via a rod 62a.

[0024] The slide bush 48 is made to slide by a connecting lever 49. The connecting lever 49 is pivotably supported by the base bracket 91 by snap engagement and is inserted with the engaging and disengaging pin portion 48a of the slide bush 48. The connecting lever 49 is connected to a child lever of the inside handle unit 106.

[0025] In a state shown by Fig. 6, when the inside handle unit 106 or the outside handle unit 107 is operated, the lift lever 41 is pivoted via the inside open lever 42, the outside open lever 43 and the slide bushes 47 and 48. Thereby, operation of the handle unit 106 or 107 is transmitted from the lift lever 41 of the remote control unit 104 to the sublevers 4 of the latch units 103 via the cables 11 (unlatch operation of latch unit 103).

[0026] In the state shown by Fig. 6, when the locking lever 44 is operated by the sill knob or the locking actuator 50, the slide bush 47 is made to slide and engagement between the outside open lever 43 and the lift lever 41 via the slide bush 47 is released. Under the state, ever when the inside handle unit 106 or the outside handle unit 107 is operated, the lift lever 41 is not pivoted, thereby, operation of the handle unit 106 or 107 is not transmitted from the lift lever 41 of the remote control unit 104 to the sublevers 4 of the latch units 103 via the

cables 11 (lock operation of latch unit 103).

[0027] As shown by Fig. 1 and Fig. 2, the latch unit 103 is mainly constituted by a main lever 3 and the sublever 4.

[0028] The main lever 3 is provided at its center portion with a hole 6 for inserting a pin 2 and at its one end with a long hole 7 extending longitudinally. An end portion 8 of the main lever 3 on a side opposed to the end portion having the long hole 7 is capable of being brought into contact with an operating lever 9 connected to a pawl 18 of the latch unit 103.

[0029] The sublever 4 supported by the pin 2 is formed substantially in a T-like shape and is provided with a hole 10 for passing the pin 2, a piece 12 for fixing one end of the cable 11 and a contact piece 13 capable of being brought into contact with a second link 15, mentioned later.

[0030] One end of a first link 14 which is made pivotable by an output shaft of an actuator 5, is axially supported by one end of the second link 15. The other end of the second link 15 is provided with a contact portion 16 capable of being brought into contact with the contact piece 13 of the sublever 4 and a projected portion 17 (or pin) inserted into the long hole 7.

[0031] Although in the illustrated example, a lower half portion of a bracket 1 is shown, the bracket 1 is constituted by a box shape surrounding the main lever 3, the sublever 4, the first and the second links 14 and 15 and a portion of the actuator 5 to thereby prohibit unlawful approach to these parts from outside.

[0032] Fig. 2 shows a state for normal latch and unlatch operations. The contact piece 13 of the sublever 4 is opposed to the contact portion 16 of the second link 15, the projected portion 17 is disposed at one end of the long hole 7 and the end portion 8 of the main lever 3 is opposed to the operating lever 9.

[0033] The operating lever 9 is coupled to the pawl 18 of the latch unit 103. The pawl 18 is engaged with and disengaged from a ratchet 19 for receiving a striker on the vehicle body side and specifies positions of the ratchet 19 (latch and unlatch positions).

[0034] In the state shown by Fig. 2, when the cable 11 is pulled in an arrow mark A direction by pivoting the lift lever 41 of the remote control unit 104 by operating the outside handle unit 107 or the inside handle unit 106, the sublever 4 is pivoted in the clockwise direction centering on the pin 2, the contact piece 13 of the second link 15 pushes the contact portion 16, the projected portion 17 pivots the main lever 3 in the clockwise direction and the end portion 8 pushes the operating lever 9. As a result, the pawl 18 is separated from the ratchet 19 and the slide door 101 is released.

[0035] In a lock state of the latch unit 103 by operating the locking lever 44 of the remote control unit 104, by an electric signal from an ignition key having an operating button for operating door lock apparatus of respective doors of the vehicle in wireless, an electric signal in cooperation with double lock operation of a door lock apparatus of a door on the driver's seat side or the like, the actuator 5 is operated and pivots the first link 14 in the counterclockwise direction of Fig. 2. By pivoting the first link 14 in the counterclockwise direction of Fig. 2, as shown by Fig. 3, the projected portion 17 of the second link 15 is moved along the long hole 7 of the main lever 3 and the contact portion 16 is moved to a position separated from the contact piece 13 of the sublever 4 (double lock operation of latch unit 103) .

[0036] According to the double lock state shown in Fig. 3, even when the cable 11 is unlawfully moved and the sublever 4 is pivoted in the clockwise direction, the contact piece 13 is pivoted idly relative to the contact portion 16 of the second link 15 and there is no movement transmission to the main lever 3. As a result, the slide door 101 is not opened. Further, even when the locking lever 44 of the remote control unit 104 is unlawfully operated and the latch unit 103 is operated to unlock, since there is no movement transmission from the sublever 4 of the latch unit 103 to the main lever 3, the slide door 101 is not opened by operating the handle unit 106 or 107.

[0037] In order to release a double lock state of Fig. 3, the actuator 5 is operated and the first link 14 is pivoted in the counterclockwise direction of Fig. 3. By moving the first link 14, the second link 15 is moved along the long hole 7 and the normal state shown by Fig. 2 can be provided.

[0038] A spring may be arranged pertinently to maintain the state of Fig. 2.

[0039] In this way, by arranging the sublever 4, the actuator 5 and the first and the second links 14 and 15 to the latch unit 103 to thereby enable to carry out double lock operation of the latch unit and accordingly, by only interchanging the latch unit 103, a specification which does not need a double lock operation can easily be changed to a specification which needs the double lock operation, common formation of parts is achieved and the apparatus is made inexpensive in view of the cost.

[0040] The sublever 4, the actuator 5, the first and the second links 14 and 15, mentioned above, may be arranged to both or one of the pair of front and rear latch units 103.

[0041] As many apparently widely different embodiments of the present invention can be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

[0042] To construct a constitution in which a door is not unlocked even when a cable connected to a latch unit is unlawfully operated, a contact portion (16) of a second link (15) opposed to a contact piece (13) of a sublever (4) is moved to other position by operating an actuator (5) to thereby release the opposed relationship.

Claims

1. A door lock apparatus for a vehicle, which is adapted to be used to a structure having a latch unit having a latch engaged with a striker of a vehicle body for maintaining a vehicular door in a closed state relative to the vehicle body, a handle unit for operating the latch unit to bring the vehicular door into an opened state relative to the vehicle body and a remote control unit for making operation of the handle unit transmittable or nontransmittable to the latch unit, said door lock comprising:

   a main lever adapted to be provided at the latch unit for operating a pawl for restricting rotation angle of the latch; and
   a sublever adapted to be provided to the latch unit, in communication with the operation of the handle unit via the remote control unit and engageable to and disengageable from the main lever.

2. The door lock apparatus according to Claim 1, further comprising:

   an actuator adapted to be provided to the latch unit;
   a first link adapted to be provided to the latch unit and pivoted by operation of the actuator; and
   a second link adapted to be provided to the latch unit, one end of which is axially supported by the first link and the other end of which is capable of being brought into contact with a portion of the sublever;
   wherein the actuator releases contact between the sublever and the second link and releases engagement between the main lever and the sublever.

3. The door lock apparatus according to Claim 3, further comprising:

   a projected pin formed at the second link, inserted into a long hole formed on the main lever and capable of being brought into contact with a portion of the sublever;
   wherein by operating the actuator, the projected pin of the second link is moved along the long hole by the first link and the contact between the second link and the sublever is released.

4. The door lock apparatus according to Claim 2, further comprising:

   a bracket for coaxially and pivotably supporting the sublever and the main lever and holding the actuator;
   wherein the main lever, the sublever, the first and the second links of and a portion of the actuator are surrounded by the bracket.

5. The door lock apparatus according to Claim 1, further comprising a pair of latch units wherein one is located at a front portion of the vehicular door and the other is located at a rear portion thereof, at least one of the latch units having the main lever and the sublever.

6. A door locking and unlocking apparatus for a vehicle comprising:

   a latch unit having a latch engaged with a striker of a vehicle body for maintaining a vehicular door in a closed state relative to the vehicle body;
   a handle unit for operating the latch unit to bring the vehicular door into an opened state relative to the vehicle body;
   a remote control unit for making operation of the handle unit transmittable or nontransmittable to the latch unit;
   a main lever provided at the latch unit for operating a pawl for restricting rotation of the latch; and
   a sublever provided to the latch unit, in communication with the operation of the handle unit via the remote control unit and engageable to and disengageable from the main lever.

7. The door locking and unlocking apparatus according to Claim 6, further comprising:

   an actuator provided to the latch unit;
   a first link provided to the latch unit and pivoted by operation of the actuator; and
   a second link which is provided to the latch unit, one end of which is axially supported by the first link and the other end of which is capable of being brought into contact with a portion of the sublever;
   wherein the actuator releases contact between the sublever and the second link and released engagement between the main lever and the sublever.

8. The door locking and unlocking apparatus according to Claim 7, further comprising:

   a projected pin formed at the second link, inserted into the long hole formed on the main lever and capable of being brought into contact with a portion of the sublever;
   wherein by operating the actuator, the projected pin of the second link is moved along the

long hole by the first link and the contact between the second link and the sublever is released.

9. The door locking and unlocking apparatus according to Claim 6, wherein the remoto control unit includes a rotatable lift lever connected to the sublever of the latch unit via a cable, an open lever unit connected to the handle unit, a locking lever for establishing engagement and disengagement of the lift lever and the open lever unit, and a power source for operating the locking lever.

10. The door locking and unlocking apparatus according to Claim 6, further comprising a pair of latch units wherein one is located at a front portion of the vehicular door and the other is located at a rear portion thereof, at least one of the latch units having the main lever and the sublever.

FIG. 1

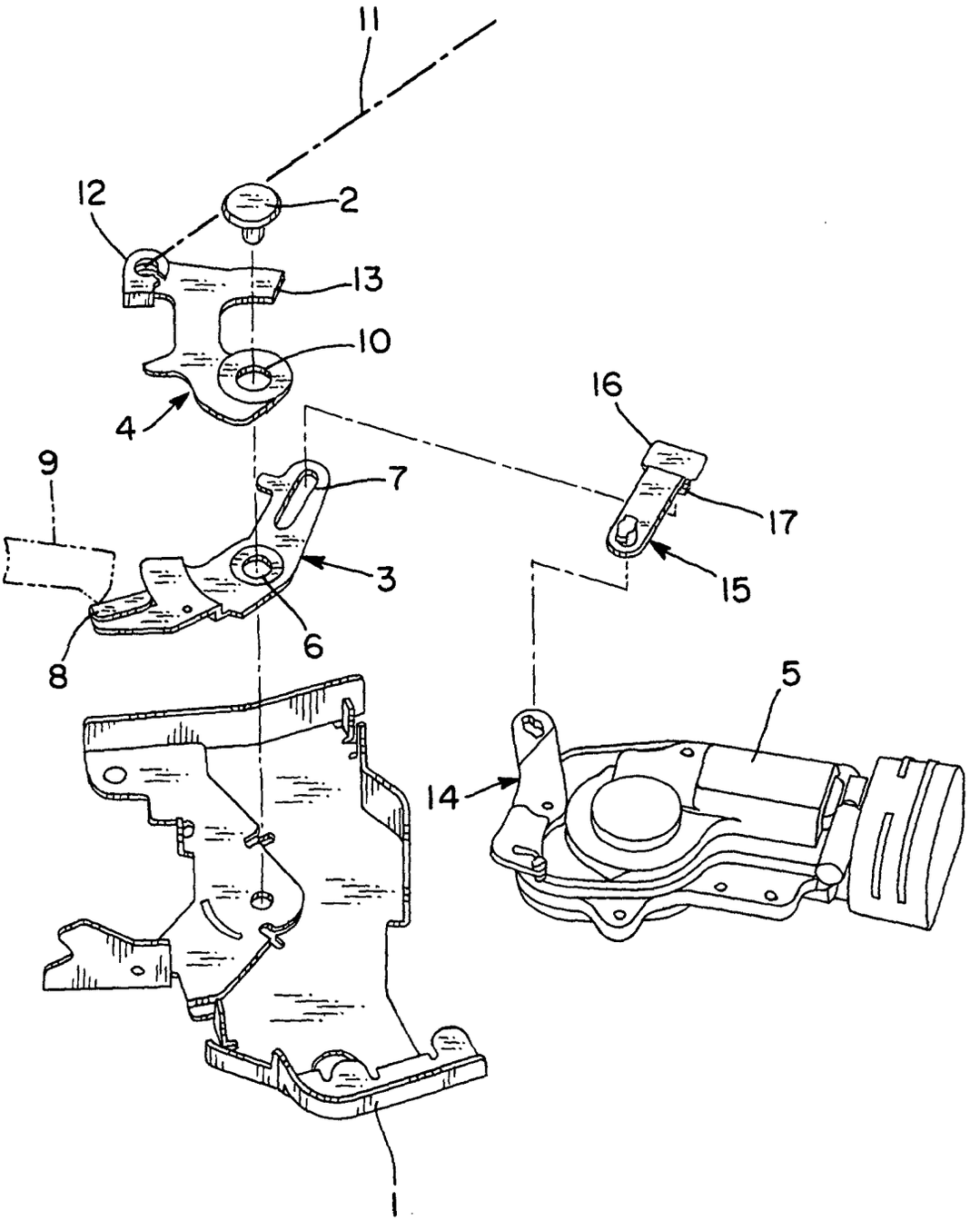


FIG. 2

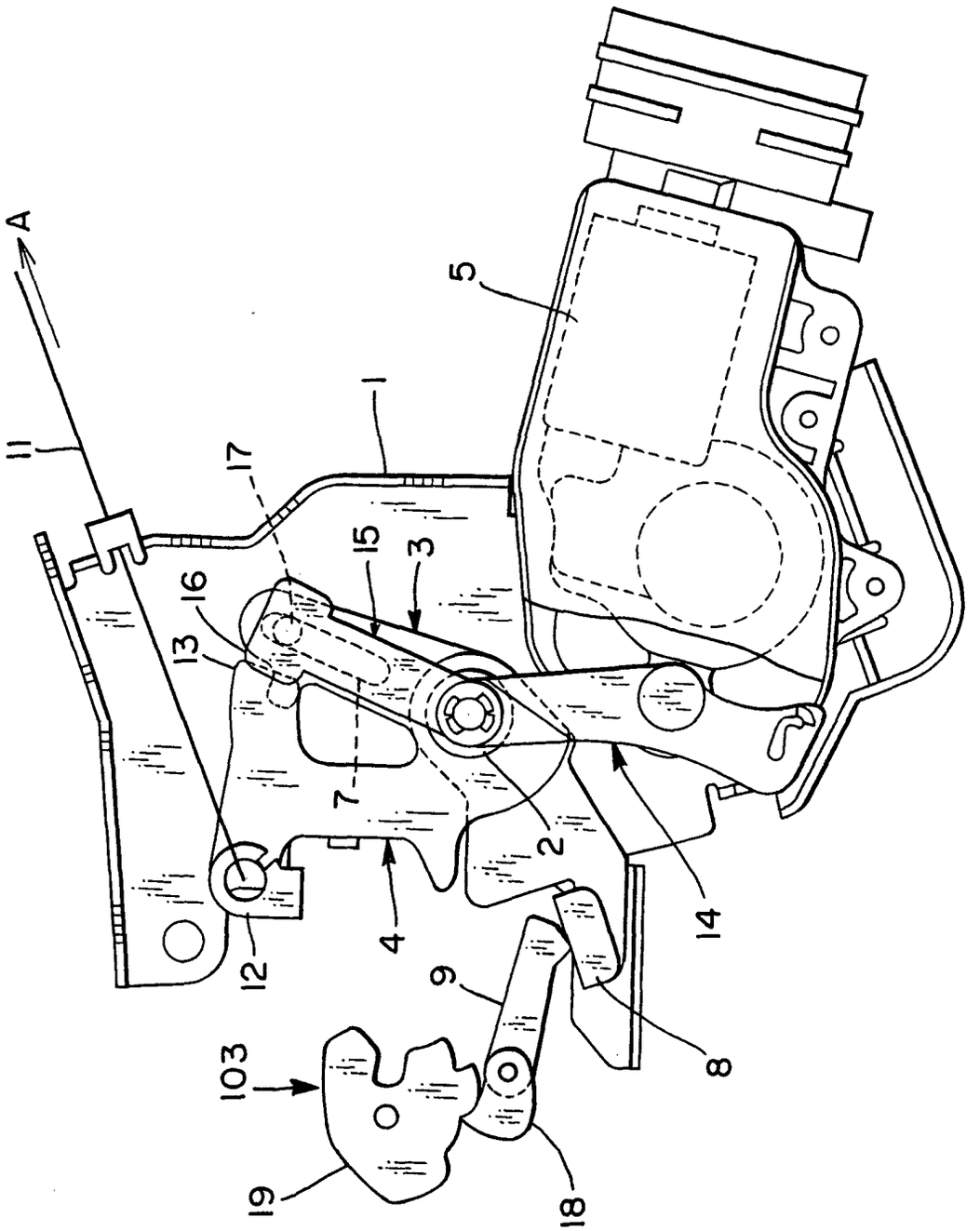


FIG. 3

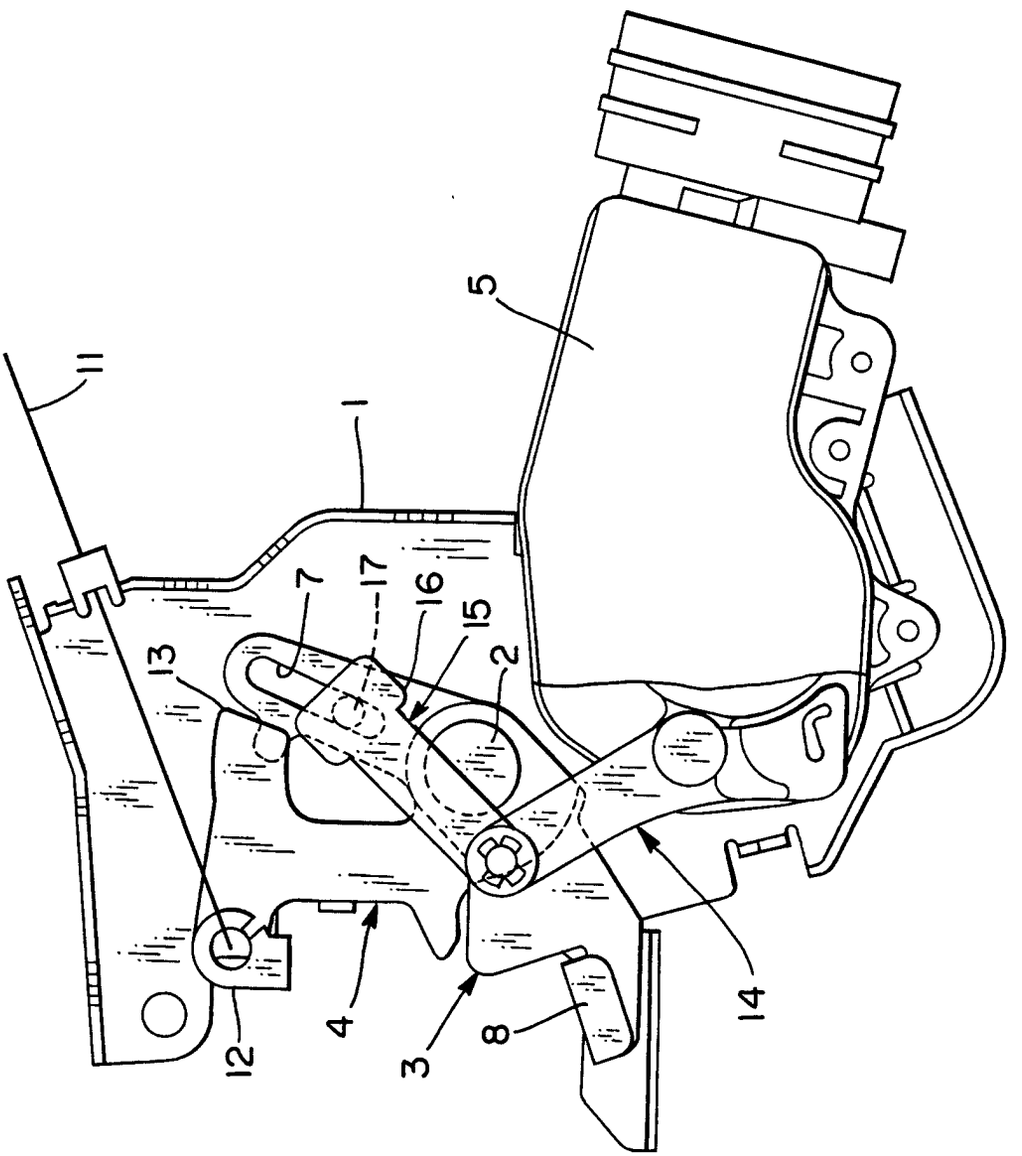


FIG. 4

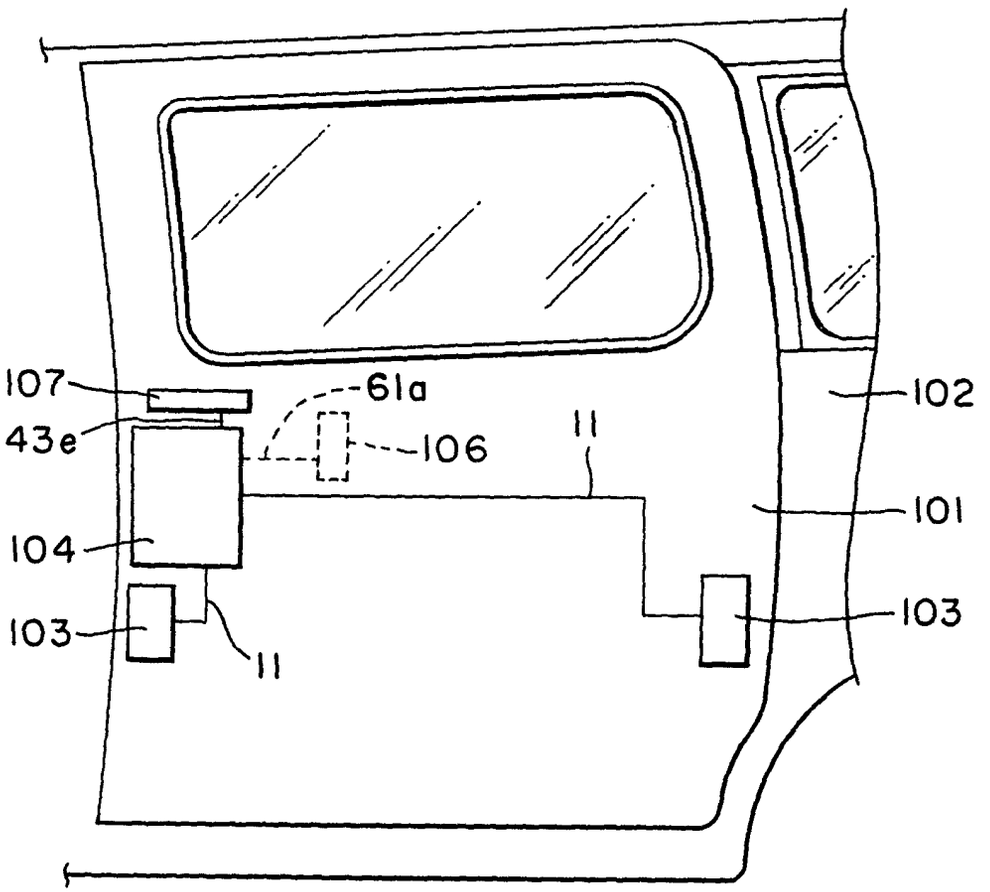


FIG. 5

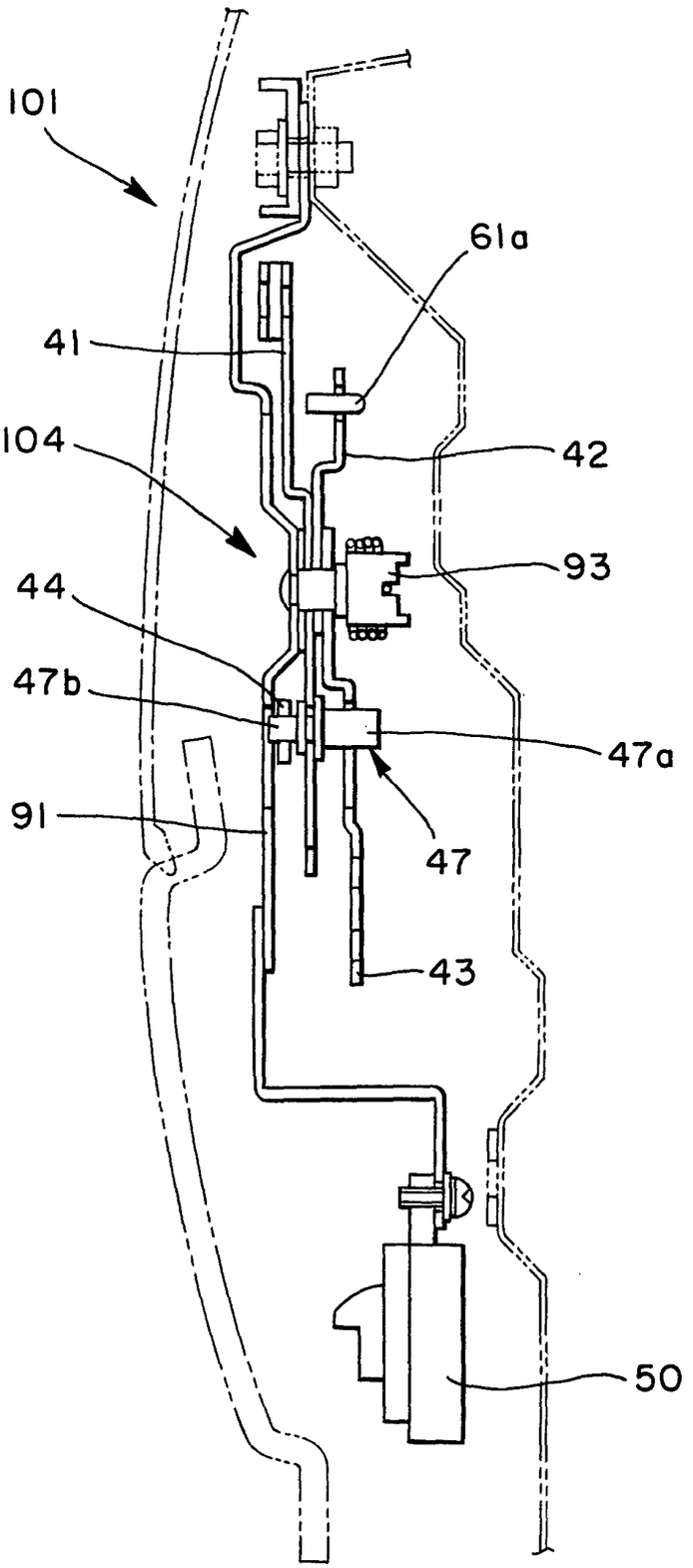


FIG. 6

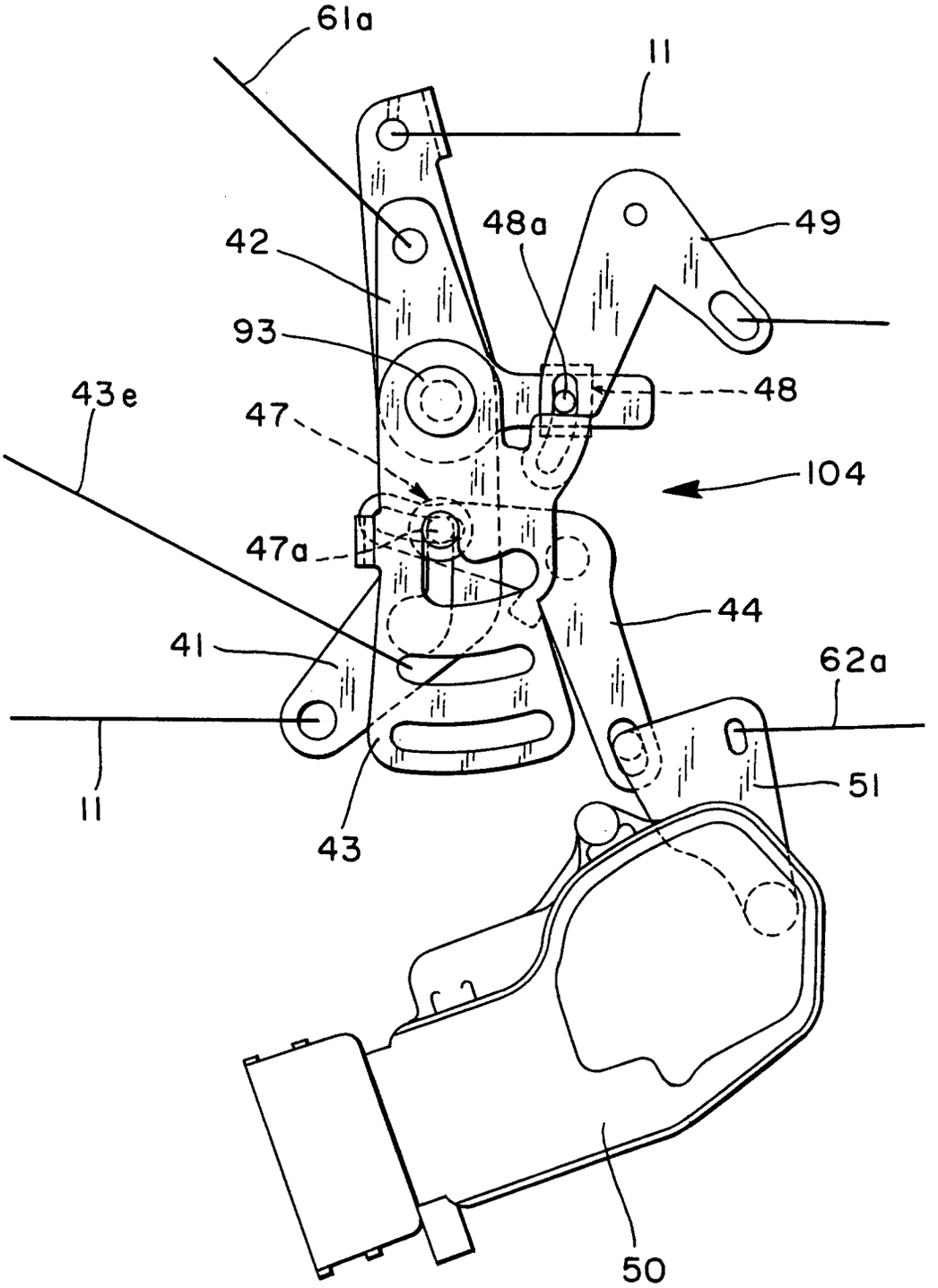


FIG. 7

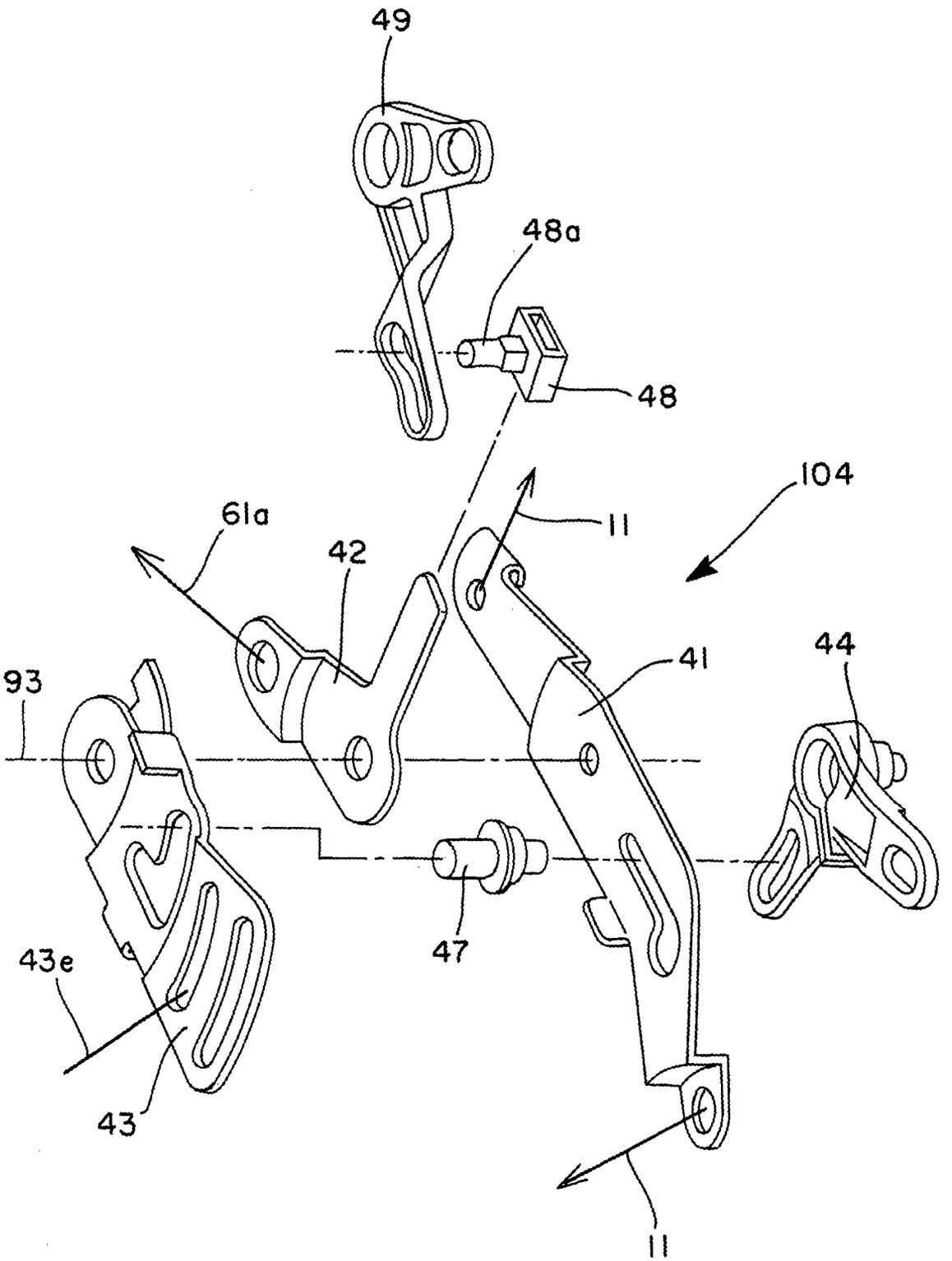
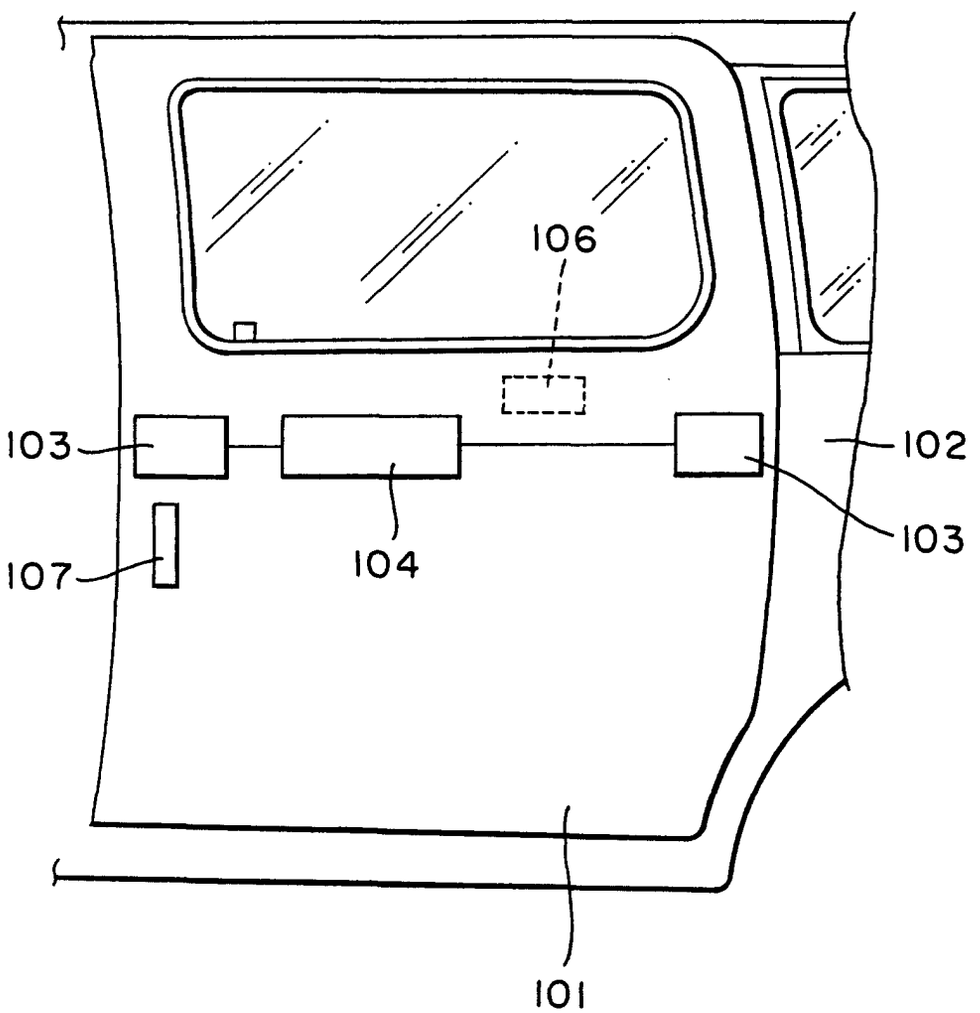


FIG. 8



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 10 4262

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	US 5 979 951 A (SHIMURA) 9 November 1999 (1999-11-09) * column 5, line 45 - column 7, line 51; figures *	1,6	E05B65/20 E05B65/32
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A	US 5 893 593 A (DOWLING) 13 April 1999 (1999-04-13) * column 2, line 47 - column 5, line 24; figures *	1,6	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	29 June 2001	Vacca, R

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 10 4262

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
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