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(54) Device for operating the lock of a vehicle.

(57) A device for operating the door lock of a vehicle; the device includes a first handle assembly (3) mountable externally on the door, a second handle assembly (4) mountable internally on the door, a key unit (5) operable from outside the door, a safety button (6) operable from inside the door and an operating plate (10) supported freely by a first pin (12), which is integral with one of said handle assemblies, and of a linkage connected at one end to a point integral with one of the handle assemblies and at the opposite end to said plate, the first pin (12) being engaged slidably in a rectilinear first aperture (13) of the plate, and a substantially L-shaped second aperture (21) of the plate being engaged by a second pin (16), integral to the first, said second aperture having a first substantially rectilinear branch parallel to the first aperature and having a length substantially identical to it.

The plate can be rotated around the first pin (12) by operating the handle assembly to operate, by means of a rod (11), the lock, when it is in a first position in which the first pin (12) is at the limit of travel against a first end of the first aperture (13) and the second pin (16) is at the limit of travel in the first branch of the second aperture (21), in correspondence with a second branch thereof, while it may not be rotated when it is in a second position with the first and second pins at the limit of travel against respective second ends of the first aperture (12) and of the first branch of the second aperture (21), opposite the preceding first ends.

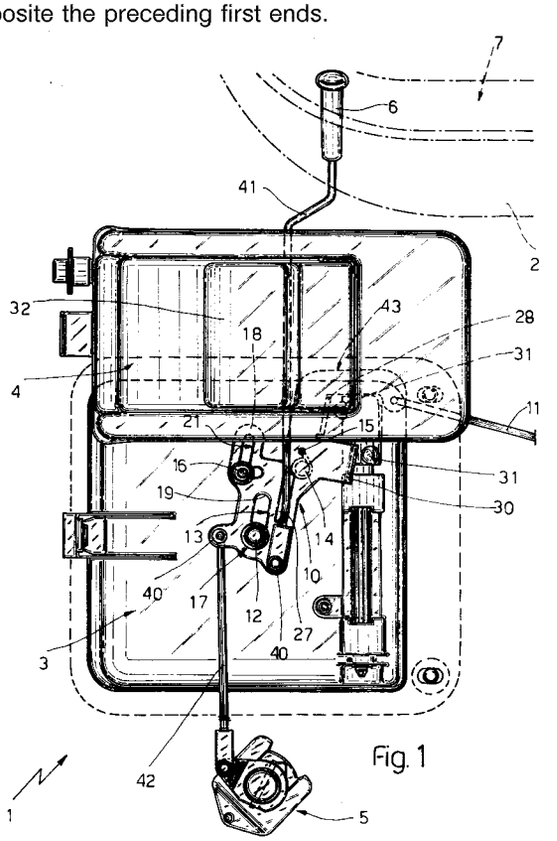

Fig. 1

EP 0 492 288 A1

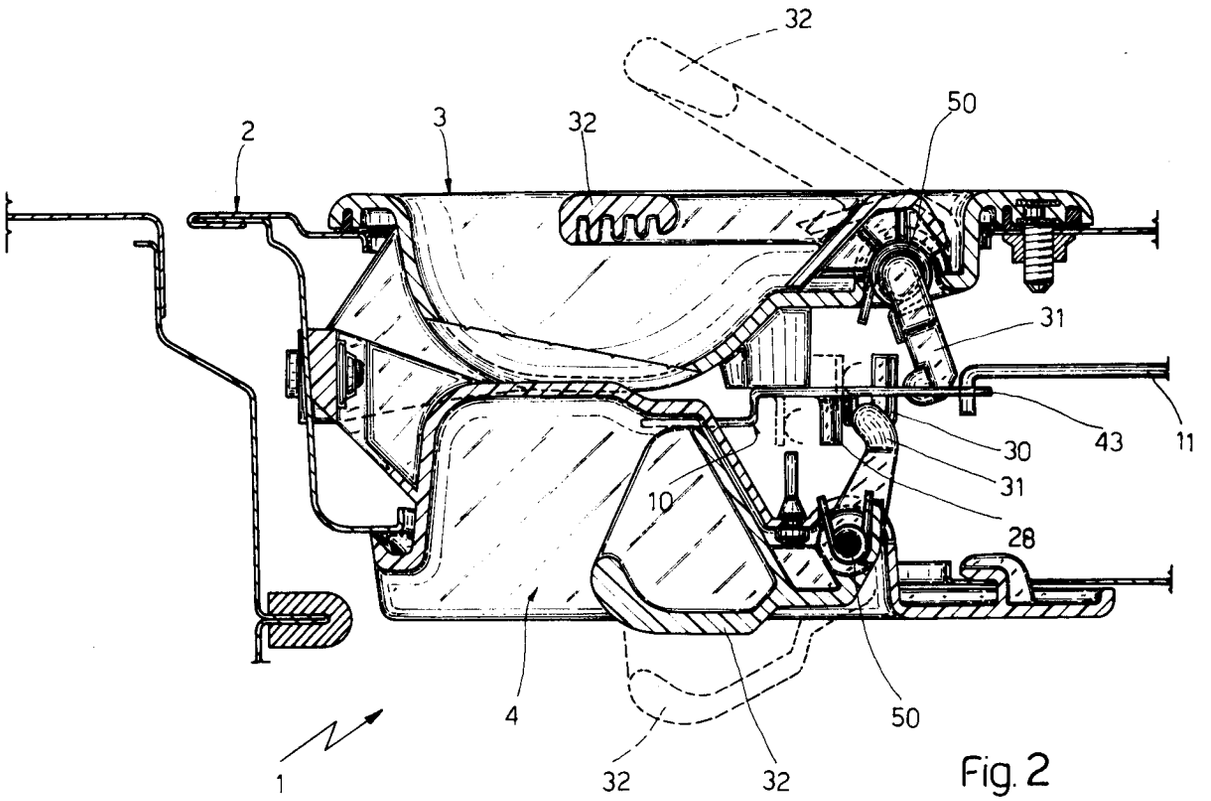

Fig. 2

The present invention refers to a device for operating the lock of a vehicle and in particular to a device for operating a rear lock of a sliding door of a van simply and economically by means of handles placed at the front part of the door.

It is known that on some types of vehicles, vans in particular, the handles and other devices by which the door lock of the vehicle is operated (in particular in the case of sliding doors) can be installed away from the position at which the door lock is mounted. In this case it is necessary to operate the lock by means of remote linkages, which must be equal in number to the operating functions in the lock. Since the operating devices in use today perform at least four different functions: opening the door by an external handle, opening by an internal handle, locking the lock by means of an external key, locking by an internal safety button, it is clear that at least four rods would be required to operate these functions directly at the lock (a fifth function, known as a child safety lock, which consists of locking the handle internally, can always be obtained locally in correspondence with said handle). This, however, would result in excessive complexity of the operating device in both construction and assembly.

At present this problem is solved by using two different locks, a first placed in front in correspondence with the controls and performing the above functions and a second placed at the rear of the door and required only to lock/unlock the door. The first lock acts on a single rod which directly controls the engagement of the second lock. This solution, however, is rather costly in economic terms. Another known solution, in which the lock is operated by a single rod controlled by several levers each performing one of the above functions, is also too costly in economic terms and in any event is very complex to construct and operate.

An aim of the invention is to produce a device for operating the door lock of a vehicle, capable also of operating the lock from a significant distance by performing all four of the above functions, and which is at the same time very simple to construct and operate and can be manufactured at low cost.

The said aim is achieved by the invention, which relates to a device for operating the lock of a vehicle, of the type comprising a first handle assembly mountable externally on the door, a second handle assembly mountable internally on the door, a key unit operable from outside the door, and a safety button operable from inside the door, characterized by the fact that it further comprises an operating plate on which said handle assemblies, key unit and safety button act and which is attached by a first rod to said lock; means for rotatively supporting said plate comprising a first pin integral with said handle assembly and slidably engaged in a substantially rectilinear first aperture of the plate, and a linkage connected at one end to a point integral with one of the handle assemblies and at the opposite end to the said plate; and a second pin integral with the first, which is engaged in a substantially L-shaped second aperture of the plate comprising a substantially rectilinear first branch parallel to the first aperture and of length substantially identical to it, and a second branch positioned substiantially orthogonal to the first in correspondence with a first end thereof disposed towards said first aperture, said plate being capable, when in a first position in which the first pin is at the limit of travel against a first end of the first aperture and the second pin is in correspondence with said second branch of the second aperture, at the limit of travel against the first end thereof, of being rotated around the first pin by operation of the handle assemblies to operate the lock through the first rod, and being linked with said key unit and safety button respectively by a second and a third rod in such a manner as to be capable of being moved, by operation thereof, to a second position in which the first and second pins are at the limit of travel against respective ends of the first aperture and of the first branch of the second aperture, opposite said first end thereof, in such a mannner as to prevent rotation of the plate.

For a better understanding of the invention, a non-limitative description is now given of one embodiment thereof, with reference to the appended drawings, in which:

figure 1 illustrates in elevation the operating device according to the invention applied to a vehicle door;

figure 2 illustrates in section the device of figure 1 viewed in plan from above; and

figures 3,4,5, illustrate three different positions of operation of the device of figure 1.

With reference to figures 1 to 5, there is indicated as a whole with 1 a device for operating a known lock, not illustrated for simplicity, of a vehicle door 2 (also not illustrated for simplicity), in particular a sliding door of a van, of which only an upper front portion housing the device 1 is illustrated in figures 1 and 2. It comprises essentially a known first handle assembly 3, mountable externally on the door 2, a second handle assembly 4, also known, mountable internally on the door 2, a known key unit 5, operable from outside the door and mounted integrally on the outside of door 2 in a known manner, not illustrated for simplicity, and a safety button 6 operable from inside the door, for example placed in correspondence with a window 7 thereof. According to the invention, the device 1 further comprises an operating plate 10 bent appropriately, on which act simultaneously either handle

assemblies 3,4 or key unit 5 and button 6 and which in turn acts in a known manner, not illustrated for simplicity, on the said lock not illustrated, for example by controlling the engagement of the lock directly by means of rod 11 so as to produce, when rod 11 is put under traction, the release of the said lock to be operated, thus causing the said lock to open.

Plate 10 is supported rotatively on door 2 by means of a cylindrical pin 12 engaged slidably in a substantially rectilinear aperature 13 through plate 10 and, in the example, obtained integrally as part of handle assembly 3, and by a spring 14, of the so-called "bistable" type, which is attached rotatively hinged, in parallel with the plane of plate 10, at one end to a point integral with the door 2, in the example to handle assembly 3 to which pin 12 is also integral and at the opposite end to plate 10, in the example engaged in a hole 15 of the same excentric device with respect to aperture 13. In this way the spring 14 is capable of operating as a linkage which can selectively trip plate 10 into two different positions, the first illustrated in figures 1,3,4 and the second in figure 5, in which pin 12 is positioned at the limit of travel in aperture 13 in correspondence respectively with a lower end 17 (in the first position) and an upper end 19 (in the second position) of the said aperture 13. Both ends 17,19 are rounded and shaped as a half-circle having the same diameter as pin 12.

According to the invention, device 1 further comprises a second pin 16 obtained integral to 12 in a lateral offset position with respect to it, for example always obtained as part of the handle assembly 3, pin 16 being engaged in a second aperture 21 through plate 10, obtained to one side and in an advanced position, through a lug portion 18 of the said plate 10. Aperture 21 is substantially L-shaped, and comprises a substantially rectilinear first branch 23 positioned parallel to aperture 13 and having a length substantially identical to the latter, and a second branch 22 positioned substantially orthogonal to branch 23 and obtained in correspondence with an end 24 of the latter, disposed towards aperture 13. Branch 22 of aperture 21 is curved and, in the example, has a curvilinear profile having the centre of curviture in correspondence with end 17 of aperture 13. In this way, when plate 10 is in the said first position of figures 3,4, pins 12,16 are both at the limit of travel against respective lower ends 17,24 of apertures 13,21 respectively, and pin 16 is aligned with curved branch 22. In this position it is evident that plate 10 is free to rotate around pin 12 in the direction of the arrow (figure 3) by moving from the angular configuration of figure 3 to that of figure 4, since during rotation pin 18 is free to slide in curved branch 22 of L-shaped aperture 21 following a trajectory which has its centre exactly at end 17 occupied by pin 12.

Device 1 finally comprises a compression spring 26 capable of preventing the abovementioned rotation of plate 10. The spring 26, of the helical type, is fitted directly on pin 12 and is connected integrally to it engaged at one end for example through a radial hole therein and, at the opposite end, is engaged slidably in a further rectilinear aperature 27 through plate 10 obtained parallel with aperture 13, on the part opposite to 21 and in a position less advanced than that of 13, and having the same length as aperture 13. Plate 10 is further provided with respective contact lugs 28,30 positioned at right angles away from the plane of the said plate and capable of cooperating with respective known thrust levers 31 controlled in a known manner, against the action of respective compression springs 50, by respective known pivoted handles 32 of handle assemblies 3,4. The position of pins 12,18 and the length of apertures 13,27 and of branch 23 of aperture 21 are designed in such a manner that in the first position that can be adopted by plate 10 (figures 1,3,4) the lugs 28,30 are positioned on a level with rods 31 (figure 3), whereby, following rotation of one or both of the handles 32 from the position illustrated by the continuous line to that illustrated by a dashed line (figure 2), the lugs 28,30 are intercepted (figure 4) by respective levers 31 receiving from them a thrust in the direction of the arrows capable of rotating plate 10 around pin 12 in the direction of the arrow (figure 4).

When plate 10 is, vice versa, in the said second position of figure 5 the lugs 28,30 are no longer positioned at the level of levers 31, but beneath them. Therefore, when handles 32 are operated with consequent rotation of levers 31, these are moved from the position illustrated by a continuous line to that illustrated by the dashed line (figure 5), but cannot intercept lugs 28,30 and therefore do not rotate plate 10. The plate 10 is selectively moved between the said two different positions by action on respective attachment lugs 40 by means of respective rods 41,42 attached respectively to button 6 and key unit 5. The lugs 40 are obtained on opposite parts with respect to aperture 13, in a position substantially equidistant therefrom. Rod 11 which controls the engagement of the lock to be operated is vice versa fixed to an L-shaped lever 43 obtained as part of plate 10 in a position diagonally opposite to aperture 13 with respect to bistable spring 14. Lever 43 is further positioned parallel and excentric to apertures 21,13,27.

In use, device 1 normally operates with plate 10 in the position and angular configuration of figure 3. Spring 14 holds plate 10 with pins 12 and

16 positioned at the limit of travel in apertures 13,21, in correspondence with ends 17,24. In this configuration, rod 11 is not stressed and the lock is therefore controlled in the closed position. To open the door 2 it is sufficient to act on any of the handles 32. These rotate one of the levers 31 which intercepts one of the lugs 28,30, applying to plate 10 a moment with respect to pin 12. Thus plate 10 rotates around pin 12, against the action of spring 26 which goes into tension, to reach the angular position at the limit of travel shown in figure 4, which is stabilised by the abutment of pin 16 against the end of curved branch 22 of aperture 21 opposite to end 24 of branch 23 thereof. During this rotation, rod 11 is put under tension in the direction of the arrow and controls the release of the lock, with consequent opening thereof. When the handle 32 which was operated is released, the spring 26 resets plate 10 in the position of figure 4, whereby the lock can be locked again following closure of the door.

The functions of locking and safety, with door 2 shut, are always performed by plate 10 when it is placed in the position of figure 5. This is obtained by acting either on key unit 5 (locking) or on button 6 (safety), so as to move in the direction of the arrow either rod 41 (which in this case acts as a remote control) or rod 42. This action applies to plate 10 a downward thrust in the direction of the arrow (figure 5) consequently stressing spring 14 which rotates in the direction of the arrow and triggers the movement of the plate 10 from the position of figure 3 to that of figure 5, bringing pins 12,16 to the limit of travel against the ends 19,18 of apertures 13 and 21. In this position, operation of the lock by rod 11 is impossible: in fact, on one hand operation of handle 32 cannot produce any moment on plate 10, as the lugs 28,30 thereof are in a position where they cannot be intercepted by levers 31; on the other hand, rotation of plate 10 around pin 12 is impossible as it is prevented by pin 16, which, being engaged in end 18 and incapable of lateral movement relative to plate 10, operates as an angular locking device.

The functions of child safety if required can be performed in a traditional manner by acting directly on handle assembly 4, by means of a known mechanism, not illustrated for simplicity, which prevents the rotation of the respective lever 31.

From what has been described the advantages connected with the invention are evident. All four principal functions of the lock can be performed in correspondence with handles simply by means of a low cost plate that can be easily produced, mounted and replaced if it breaks. The lock is then operated by the plate by means of a single rod or remote control, providing an operating device of maximum simplicity, limited weight and dimensions and low cost; the lock to be operated can finally be put in the rear part of the door, at a significant distance from the controls, which can be positioned vice versa in the front part.

Claims

1. A device for operating the lock of a vehicle, of the type comprising a first handle assembly mountable externally on the door, a second handle assembly mountable internally on the door, a key unit operable from outside the door, and a safety button operable from inside the door, characterised by the fact that it further comprises an operating plate on which act said handle assemblies, key unit and safety button and which is attached by means of a first rod to said lock; means for rotatively supporting said plate comprising a first pin integral with said handle assembly and engaged slidably in a substantially rectilinear first aperture of the plate, and a linkage connected at one end to a point integral with one of said handle assemblies and at the opposite end to said plate; and a second pin, integral with the first, which is engaged in a substantially L-shaped second aperture of the plate comprising a first substantially rectilinear branch positioned parallel to the first aperture and of length substantially identical to that of the latter, and a second branch positioned substantially orthogonal in correspondence with the first end of the latter disposed towards the said first aperture; said plate being capable, when in a first position in which the first pin is at the limit of travel against the first end of the first aperture and the second pin is in correspondence with said second branch of the second aperture, at the limit of travel against the first end thereof, of being rotated around the first pin by operation of the handle assemblies to operate the lock by means of the first rod, and being connected with said key unit and safety button respectively by a second and third rod in such a manner as to be capable of being moved by the operation thereof into a second position, in which the first and second pin are at the limit of travel against respective second ends of the first aperture and of the first branch of the second aperture, opposite the said first end thereof, in such a manner as to prevent the rotation of the plate.

2. An operating device according to claim 1, characterised by the fact that said linkage is defined by a bistable spring attached at one end to one of said handle assemblies in such a manner as to be capable of rotating with re-

spect to it on a plane parallel to that of said plate and, at the opposite end, to a hole in said plate.

3. An operating device according to claim 1 or 2, characterised by the fact that said second branch of the second aperture has a curvilinear profile having its centre of curviture in correspondence with the first end of said first aperture.

4. An operating device according to any of the foregoing claims, characterised by the fact that it further comprises a compression spring for rotating the said plate, the said spring being placed over the said first pin, engaged at one end thereof and, at the opposite end, engaged slidably in a third aperture of the plate obtained parallel to said first aperture, at the opposite end of said second aperture.

5. An operating device according to any of the foregoing claims, characterised by the fact that said plate comprises respective contact lugs bent at a right angle away from the plane of the plate and capable of cooperating with respective thrust levers of respective handles of said handle assembly; in said first position of the plate said lugs being intercepted by said thrust levers receiving from them, following operation of the said handle, a thrust capable of pushing the bracket in rotation around the said first pin; and in said second position of the plate, said lugs being in a position in which they cannot be intercepted by the thrust levers of the handle.

6. An operating device according to any of the foregoing claims, characterised by the fact that said plate comprises respective attachment lugs for said second and third rods, which are obtained on opposite parts with respect to the first aperture, substantially equidistant therefrom.

7. An operating device according to any of the foregoing claims, characterised by the fact that said first rod is fixed to an L-shaped lever obtained as part of said plate in a position diagonally opposite to said first aperture with respect to said linkage, said L-shaped lever being further positioned parallel and excentric to the said apertures.

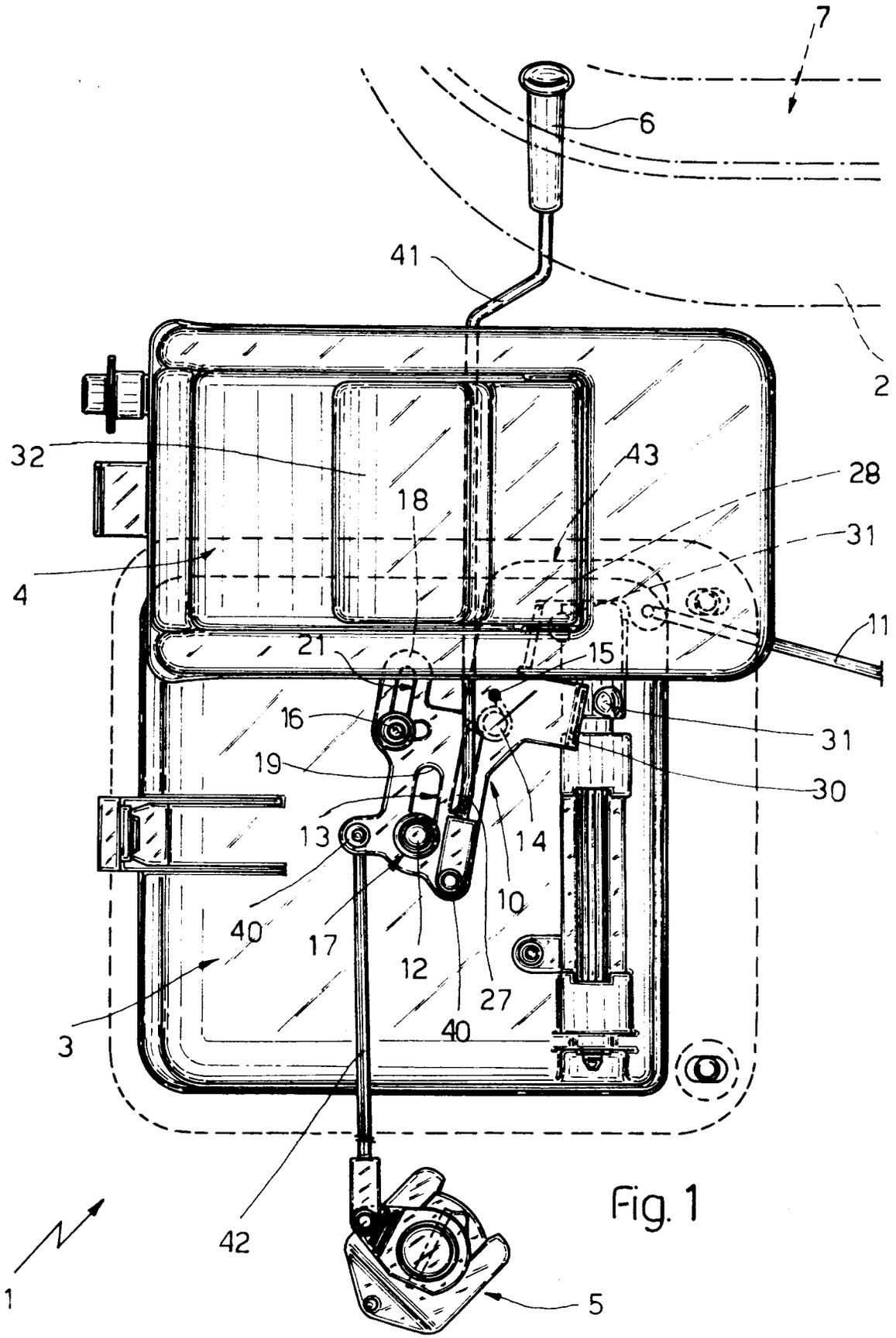
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Fig. 1

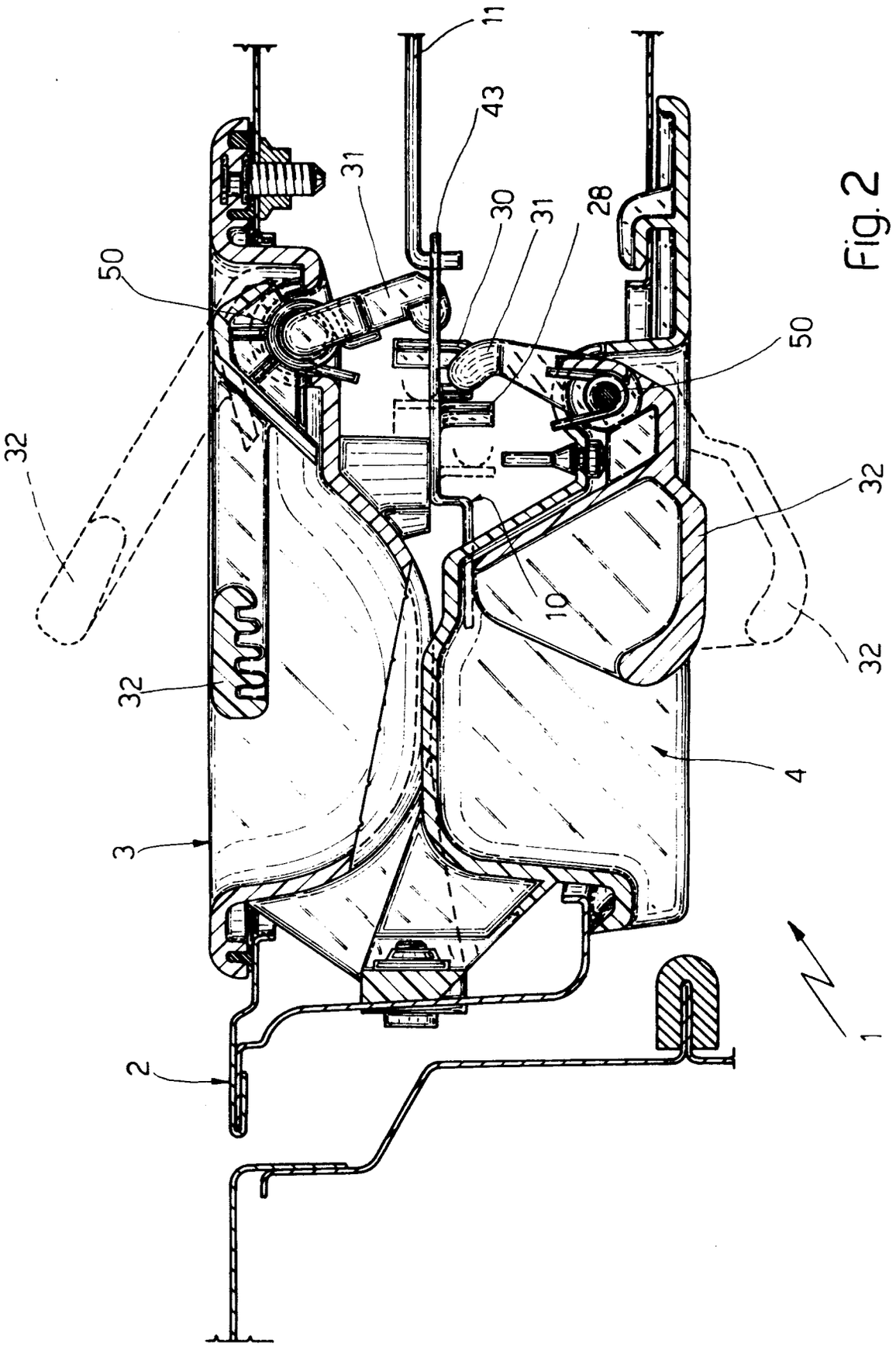

Fig.2

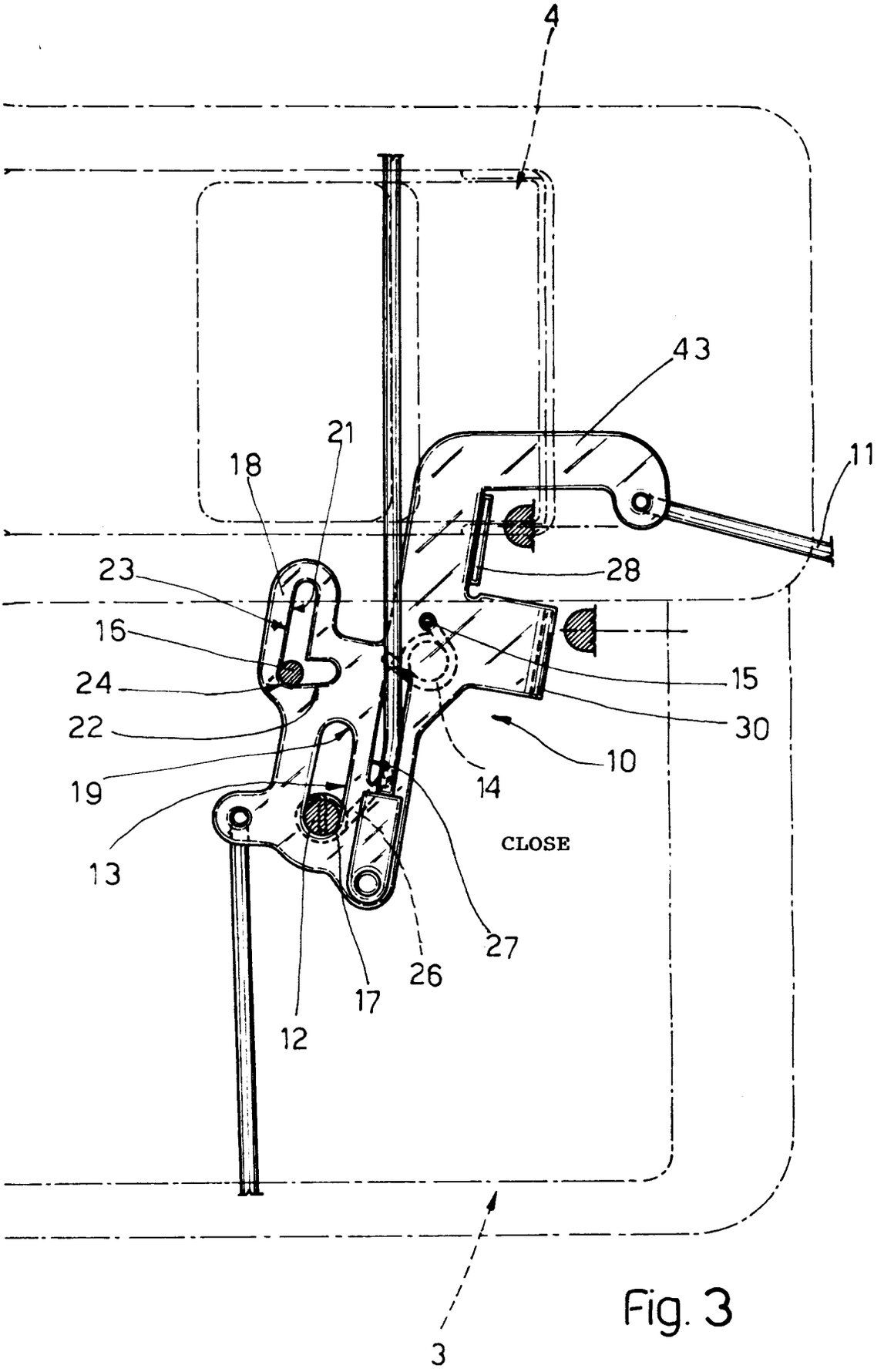

Fig. 3

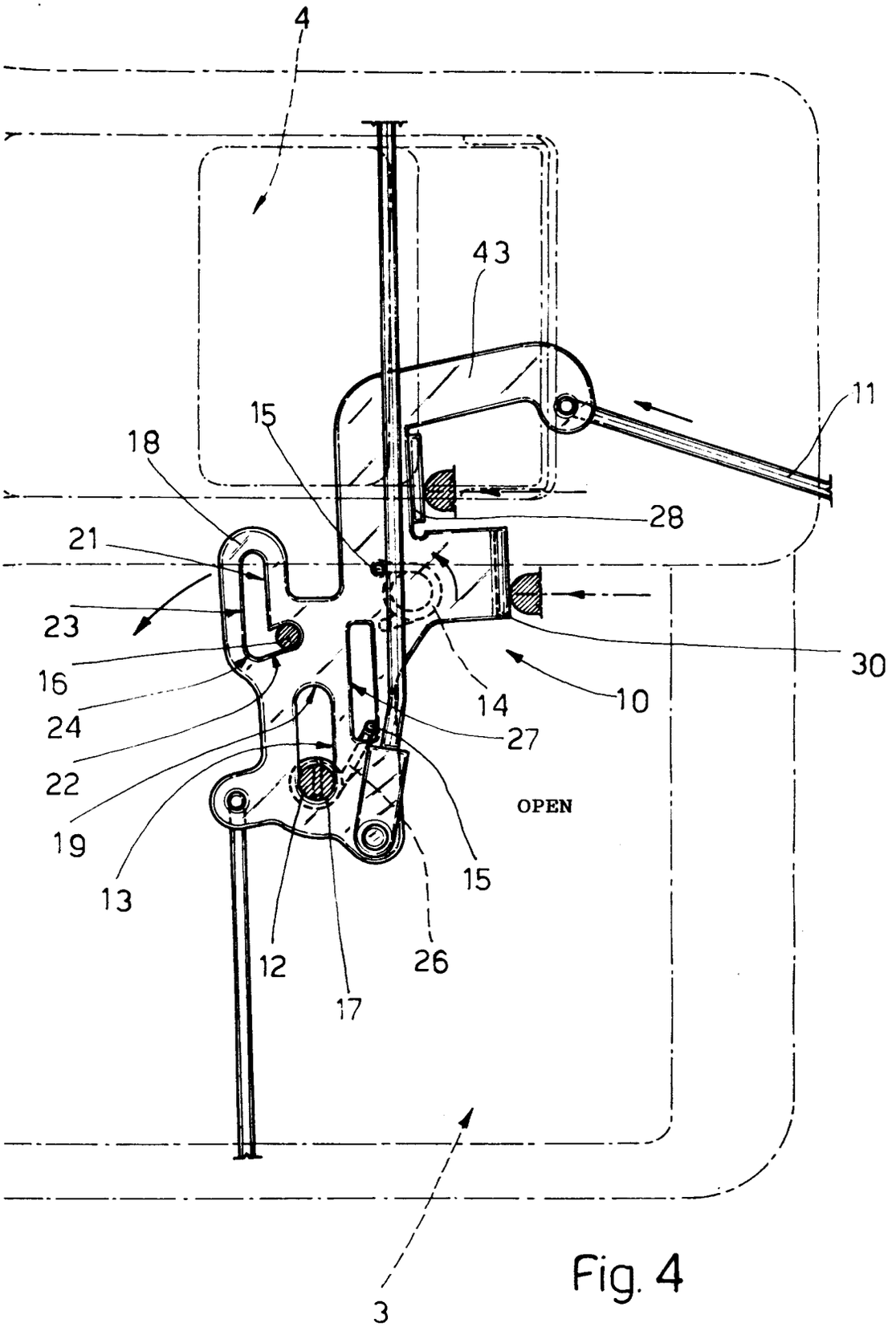

Fig. 4

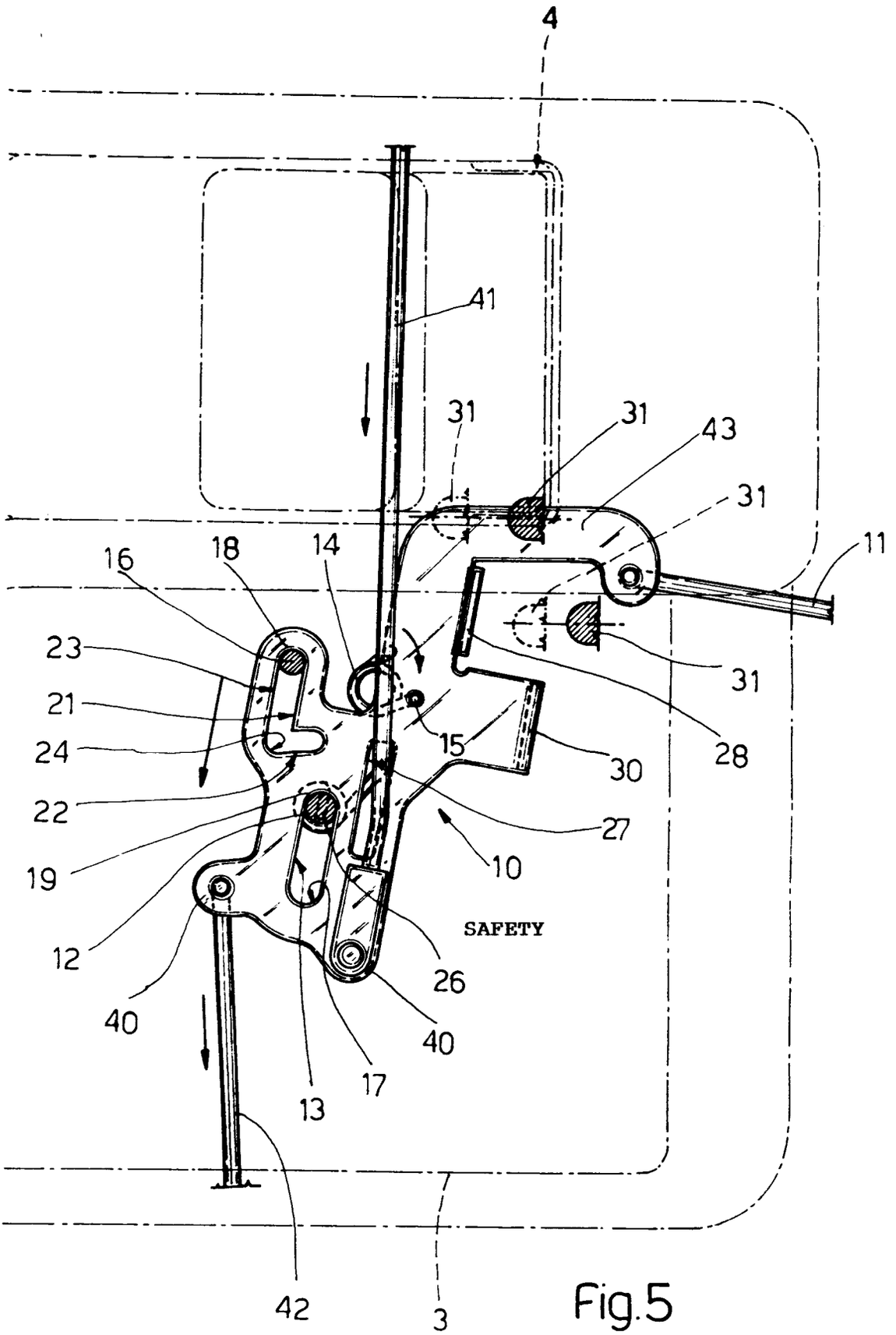
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Fig.5

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EUROPEAN SEARCH REPORT

Application Number

EP 91 12 1280

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.5)
A	FR-A-2 355 147 (REGIE NATIONALE DES USINES RENAULT) * Whole document *	1,5,6	E 05 B 65/20 E 05 B 65/08
A	US-A-4 662 109 (NISSAN SHATAI CO., LTD) * Whole document *	1,4-7	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 05 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20-03-1992	VESTIN K.B.

CATEGORY OF CITED DOCUMENTS

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