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(54) **Lock with latching device**

(57) The invention relates to a lock (4), e.g. for a vehicle door (1), comprising a lock (4) which is preferably protected by a metal enclosure (7) and is connected mechanically, e.g. via pull-rods (5, 6), to an exterior opening handle provided with a lock cylinder (8), and via for example a wire (13) to an interior opening handle with blocking control. The invention is achieved by a latching means (18) being adapted to moving into engagement with a locking arm (16) which is situated in the lock (4) and by which the locking function of the lock (4) is latched or unlocked.

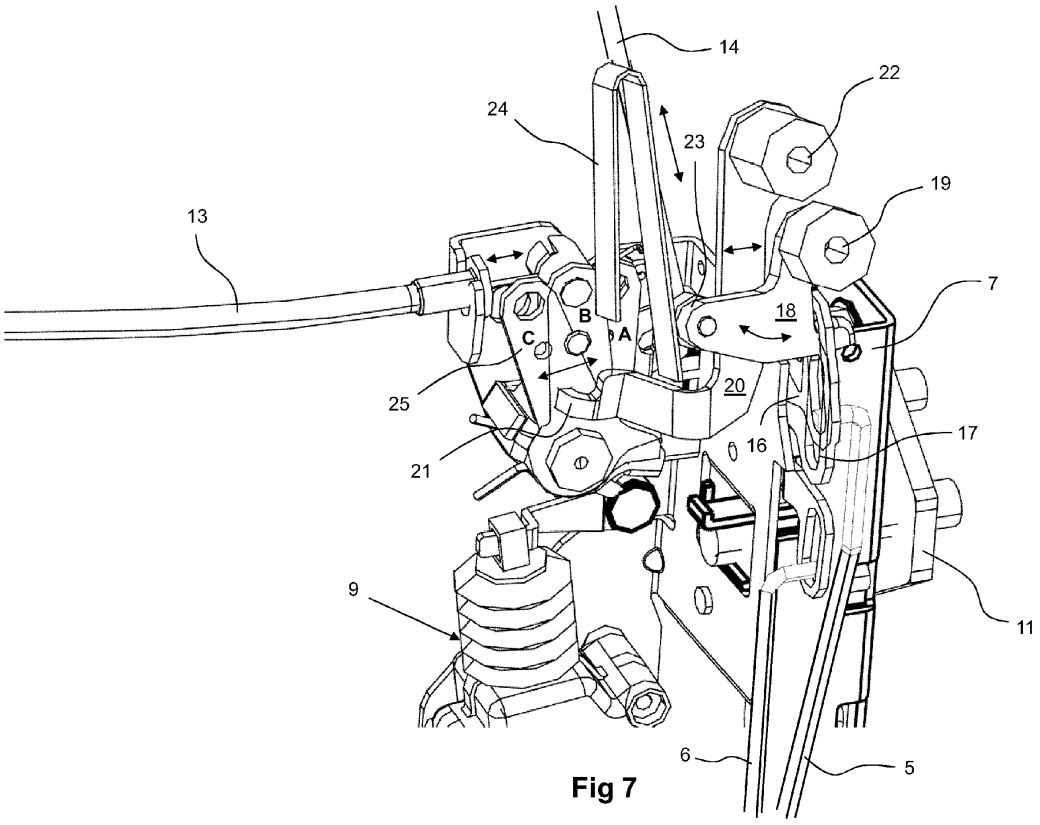

Fig 7

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Description

TECHNICAL FIELD

[0001] The present invention relates to a lock for a vehicle door to prevent or make it difficult for anyone to break into and attack persons in the vehicle. The lock has to be difficult to break open from the outside of the vehicle and is particularly intended to latch/block a conventional locking mechanism so that it cannot be opened from the outside without help from a person inside the vehicle. The invention is primarily intended for heavy/commercial vehicles such as trucks or the like but may of course also be employed in other vehicles with lockable doors, e.g. cars, contractor machines etc. The invention relates also to a vehicle provided with a door lock according to the invention.

STATE OF THE ART

[0002] Most vehicles available on the market are provided with lockable doors to prevent break-ins and theft, but many door locks are relatively easy for the initiated, without much effort, to manipulate so that they can be opened from outside without a key. This is a significant problem leading increasingly to vehicles being broken into and not least to sleeping drivers being caught by surprise and robbed. The risk of attack and robbery, and also of hijacking of vehicles, needs to be minimised.

[0003] Drivers are therefore keen to be able to lock the door from inside the vehicle in such a way that it is impossible or at least difficult to manipulate from outside. At the same time, it is important that the lock be easy for the driver to handle, e.g. in a crisis or accident situation. A problem which may arise if a separate lock is provided alongside the vehicle's ordinary lock and is not operated by means of an ordinary opening handle is that it may make it difficult to evacuate the vehicle, e.g. in a panic situation where visibility in the cab may for some reason be limited, as in darkness or when a fire occurs. In such panic situations where it is usual for the driver to try to open the door in the usual habitual way the haste involved may cause him/her to forget that a separate safety lock has been activated/closed. To eliminate the risk of such possibly fatal mistakes, it is desirable that it should always be possible for the vehicle to be opened by means of the usual ordinary opening handle.

[0004] Many attempts have been made to solve this break-in problem. Doors have for example been strengthened by fitting protective plates to cover the components of the lock, but it has still been found difficult to make a safe lock installation which can be opened in the usual way by means of the door's ordinary opening handle.

[0005] The disadvantages of known solutions thus comprise locks not being sufficiently safe and effective. Prior art does not refer to any lock designs which anticipate the invention and which in an effective, functional and cost-effective way help to ensure a locking function which provides vehicle drivers with desired safety.

SUMMARY OF THE INVENTION

[0006] The object of the invention is to solve the above problem and propose a lock structure whose mechanism prevents or significantly hinders undesired ingress into the vehicle by its door lock being manipulated and opened from outside the vehicle without the cooperation of a person inside.

[0007] A further object of the invention is that the mechanism of the lock should cooperate with the door's interior opening handle to simplify locking and unlocking so that no further operating handle need be used to open the door.

[0008] A further object of the invention is that the lock structure should be lockable and unlockable by only operating the door's usual opening handle, so that unlocking can be effected quickly and safely.

[0009] A further object of the invention is that the mechanism which prevents or hinders manipulation of the lock from outside should cooperate with movable parts of the lock.

[0010] A further object of the invention is that it be possible for existing locks to be supplemented so that a lock structure according to the invention is achieved.

[0011] A further object of the invention is that the lock structure be of simple and functional design, comprise as few parts as possible and be easy to build into today's products/vehicles without substantial modifications of cab structure or panel parts.

[0012] A further object of the invention is that the lock structure be easy to fit so that manufacture can be quick and cost-effective.

[0013] These and further objects and advantages are achieved according to the invention by a device defined by the features indicated in the characterising part of the independent claim 1.

[0014] As previously mentioned, the invention is primarily intended for heavy commercial vehicles such as trucks and the like but may of course also be employed on other kinds of vehicles where there is risk of break-in or attack because the door lock can be manipulated from outside the vehicle.

[0015] The invention is achieved partly by providing an enclosure or metal cover on the outside of the lock, i.e. an extra metal plate appropriate in shape to the door and situated between the lock and the door's outer panel or outer plastic parts, and partly by a mechanism which actively latches/fixes the lock in its closed state.

[0016] The enclosure is so configured as to cover/shield the lock's essential and movable parts as seen from outside the door, e.g. if someone tries to reach the lock by drilling or in some other way making their way through the door's steel outer panel. The enclosure takes with advantage the form of a steel plate of such thickness or of such a grade as to be difficult to break open with a normal drilling machine.

[0017] The latching comprises a latching means which is movable, e.g. pivotable or flexible, such as a hook which can engage with a movable part, a locking arm, in a conventional lock in cases where the door is locked in the normal way, i.e. where the user activates the door's locking element from the inside.
The latching means is acted upon via a pull-rod with a locking spigot situated in the door, e.g. at the top in the vicinity of the side window and near to the door's rear pillar. When the locking spigot is in its upward-protruding extreme upper position the latching of the lock is not activated, and when the locking spigot is pushed down to its extreme lower position the latching is activated.

[0018] The solution according to the invention involves the lock being operated from inside the vehicle by operating a locking spigot adjacent to the side window. The opening handle on the inside of the door is therefore operated in the normal way and pulled inwards by the driver when the door is to be opened.
As a first stage, the latching means is released, i.e. the hook is turned away from its latching position and releases the locking arm. As a second stage, the locking arm is operated. The locking spigot adjacent to the side window moves upwards at the same time as the hook is released from the locking arm.

[0019] Having a separate latching device in the lock thus prevents the locking mechanism of the ordinary lock from being interfered with from outside, the risk of undesired ingress into the vehicle is reduced/prevented and greater safety is achieved.

[0020] The solution according to the invention entails no modifications to the existing lock structure, which means that the novel solution is relatively easy, and therefore cost-effective, to implement in the production sequence of making new vehicles. For the same reason, the invention makes it easy to update locks on vehicles already manufactured.

[0021] Further features and advantages of the invention are indicated by its more detailed description set out below and the attached drawings and other claims.

BRIEF LIST OF DRAWINGS

[0022] The invention is described below in more detail in some preferred embodiment examples with reference to the attached drawings.

Figure 1 is a side view of a commonly occurring vehicle door on a truck, with an opening handle on the outside of the door.

Figure 2 is a cutaway view of part of the door, with the outer door panel omitted, more specifically in the region of the opening handle and the location of the lock indicated by broken lines in Figure 1.

Figure 3 depicts an example of an embodiment of an enclosing or protective plate according to the invention.

Figure 4 depicts a side view, from outside the vehicle, of the whole lock structure with opening handle, conventional lock, protective plate, electric motor and necessary pull-rods for operating the lock from inside and outside the door.

Figure 5 depicts a side view of the lock structure according to the invention depicted in Figure 4 but unconcealed and as seen from inside the vehicle.

Figure 6 depicts an unconcealed view, from the door's rear edge, of the constituent parts of the lock structure.

Figure 7 depicts in yet more detail the lock's various lever arms and how the latching mechanism locks/fixes them.

DESCRIPTION OF PREFERRED EMBODIMENTS

[0023] **Figure 1** depicts a side view of a commonly occurring vehicle door 1 on a truck (not depicted) with an exterior opening handle 2 on its outside. The door is here viewed from the vehicle's left side. The opening handle 2, whose covering 3 may for design reasons often consist partly of plastic, is situated relatively low in the door to be readily accessible for a user/driver standing on the ground outside the vehicle.

[0024] **Figure 2** depicts part of the door 1 as seen from outside the vehicle but with the outer door panel omitted for the sake of clarity. Part of the opening handle 2 and the location of the door lock 4 are shown more clearly here. The lock is situated above the opening handle and in the rear edge of the door and is operated by the opening handle by means of two pull-rods 5, 6.

[0025] An essential part of the lock 4, the lock case, is covered by an enclosure 7 or protective plate bent into a suitable shape to fit in between the lock and the door's other components and outer panel. The pull-rods 5, 6 are situated between the opening handle 2 and the lock 4 and transmit mechanical motion both from the opening handle and from a lock cylinder 8 situated therein (see Figure 4) and operated by a key.

[0026] **Figure 3** depicts in detail an embodiment example of an enclosure 7 or protective plate according to the invention without other lock parts. The enclosure is cut and bent to make it easy to fit between the lock/lock case (not depicted) and the door's other parts without occupying more space than necessary. The enclosure hinders penetration and makes it difficult/impossible for anyone to use for example a drilling machine to reach and manipulate the lock's internal parts.

[0027] **Figure 4** depicts a side view of the whole lock structure with opening handle, lock/lock case 4, enclosure 7, electric motor 9 and the pull-rods 5, 6 which are necessary for operating the lock from outside the door.

A vertical broken line 10 marks the dividing line between the door and the door pillar (not depicted) which is firmly installed in the vehicle and in which a locking spigot 11 is provided. A first pull-rod 5 is connected to the opening handle's lock cylinder 8 and moves in the axial direction when a key is turned in the lock cylinder. A second pull-rod 6 is connected to the opening handle's manually operated portion 12 and moves in the axial direction when the manually operated portion is pulled outwards with the object of opening the door. A wire 13 is fitted between the lock and an interior opening handle (not depicted) which opens the door and the lock when it is operated. The lock may be locked from inside the vehicle by means of a blocking control (not depicted). A third pull-rod 14 is provided between the lock 4 and a locking spigot 15 situated for example adjacent to the door's side window.

[0028] **Figure 5** depicts a side view of the lock structure according to the invention depicted in Figure 4 but unconcealed and as seen from inside the vehicle. The lock 4 is fitted in the enclosure 7, and the electric motor 9 which operates the lock by means of electronics in a central locking unit (not depicted) is fitted below the lock. Pull-rods 5, 6, 14 and wires 13 are depicted in more detail.

[0029] **Figure 6** depicts for the sake of clarity a view of the lock structure as seen from the door's rear edge, and the lock structure's constituent parts and the locking arm 16 which is important for the invention and is provided with a locking lug 17, but here unconcealed by the door's other components. The locking arm 16 is adapted to moving in a vertical direction and the lock 4 is in a closed state when the locking arm is in its extreme upper position (as in the diagram). When the locking arm is in an extreme lower position the lock is open.

[0030] Finally, **Figure 7** illustrates the lock 4 and its constituent parts in more detail and shows how the additional latching mechanism according to the invention engages with the conventional locking arm 16, and more specifically how a hook element 18 can be turned to engage with the locking arm's locking lug 17. The invention thus comprises a hook element 18 articulated about a first spindle 19. The hook element is adapted to engaging with the locking lug 17 situated in the portion of the lock 4 which latches/unlatches its locking function, e.g. by means of a key. The wire 13 is adapted to acting upon the locking mechanism via a lever arm 25 which is movable between three different positions. The lever arm closes the lock when it moves to an extreme inner position A, i.e. axially as far as possible to the right in Figure 7. In an intermediate position B, which is a default position, the lever arm returns automatically when the wire 13 is not acted upon, and finally in an extreme outer position C the lever arm causes the lock's opening function to open while at the same time an unlocking arm 20 is turned about its spindle 22 via a protrusion 21. The unlocking arm causes the hook element 18, via a roller 23, to turn clockwise about the spindle 19, thus moving the hook 18 out of engagement with the locking lug 17. At the same time, the pull-rod 14 is pushed upwards because of being articulated in the roller 23 and in the hook element 18. Thus the locking arm 16 can be moved to its extreme lower position and the lock be opened in the normal way both from inside the door and with a key from outside the door.

[0031] Latching the lock 4 involves the pull-rod 14 being pushed manually down against the action of a bent flat spring 24, and the hook element 18 being turned to engage with the locking arm's locking lug 17. This is only possible when the lock is already in a closed state, i.e. when the locking arm is in its extreme upper position. There are two ways in which this may be achieved. One is by the lock being locked by a key from outside and the other by the blocking handle on the inside of the door (not depicted), i.e. adjacent to the door's interior opening handle, being operated so that the lever arm 25 is moved by the wire 13 to its extreme inner position A, i.e. to the right in the diagram.

[0032] The structure according to the invention makes it impossible for the locking arm 16 or the pull-rod 5 to be manipulated from outside.

[0033] The above description is primarily intended to facilitate understanding of the invention and is of course not confined to the embodiments indicated, since other variants of the invention are also possible and conceivable within the scope of the inventive concept and the protective scope of the claims set out below.

Claims

1. A lock device intended for example for a vehicle door, comprising a lock (4) which is preferably protected by a metal enclosure (7) and is connected mechanically, e.g. via pull-rods (5, 6), to an exterior opening handle provided with a lock cylinder (8), and via for example a wire (13) to an interior opening handle,
   characterised
   in that a latching means (18) is adapted to moving into engagement with a locking arm (16) which is situated in the lock (4) and by which the locking function of the lock (4) is latched or unlocked, and a pull-rod (14), when activated, preferably by being pushed down, is adapted to rotating the latching means (18) to engage with the locking arm (16).

2. A lock device according to claim 1,
   characterised
   in that the latching means (18) takes the form of a hook element.

3. A lock device according to any one of the foregoing claims,
   characterised
   in that the hook element (18) is limitatedly pivotable or rotatable about a spindle (19).

4. A lock device according to any one of the foregoing

claims,
characterised
in that the locking arm (16) is provided with a recess in the form of a locking lug (17).

5. A lock device according to any one of the foregoing claims,
characterised
in that the hook element (18) is adapted, for latching, to being moved into the locking lug (17) provided in the locking arm (16) and to thereby fixing/blocking the locking arm (16) in its extreme upper position in which the lock (4) remains latched.

6. A lock device according to any one of the foregoing claims,
characterised
in that a spring (24) is adapted to keeping the hook element (18) in engagement with the locking arm (16).

7. A lock device according to any one of the foregoing claims,
characterised
in that an unlocking arm (20) is provided with a protrusion (21) which is caused by a lever arm (25), when moved to its unlocking position (C) by the wire (13), to move a hook element (18) out of engagement with the locking arm (16) against the action of the spring (24).

8. A vehicle equipped with a door lock according to any one of claims 1-7.

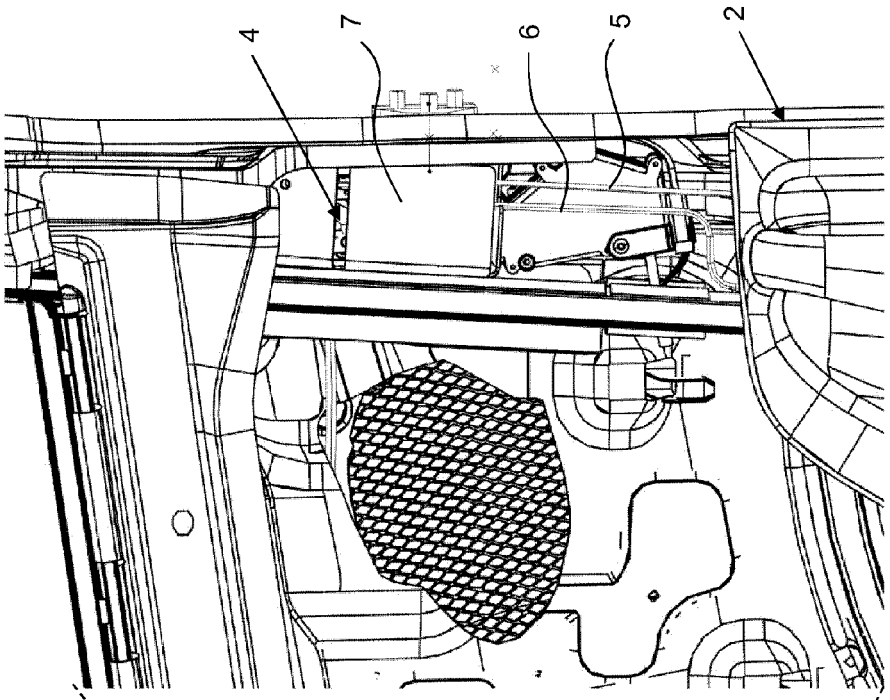

Fig 2

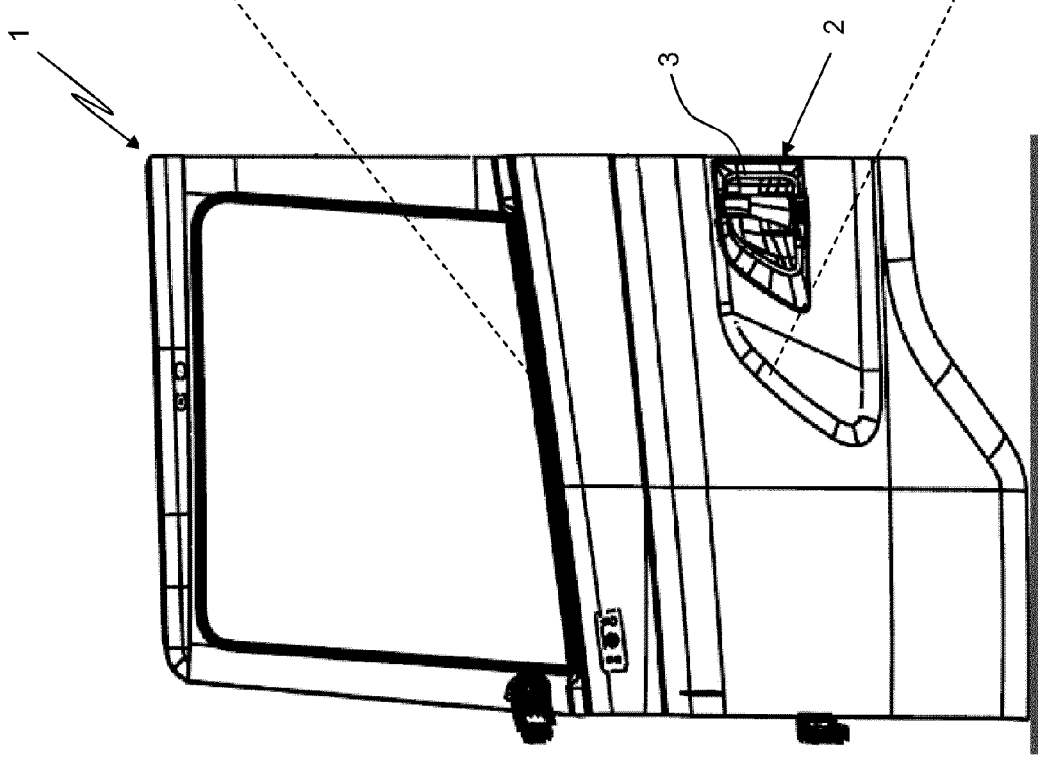

Fig 1

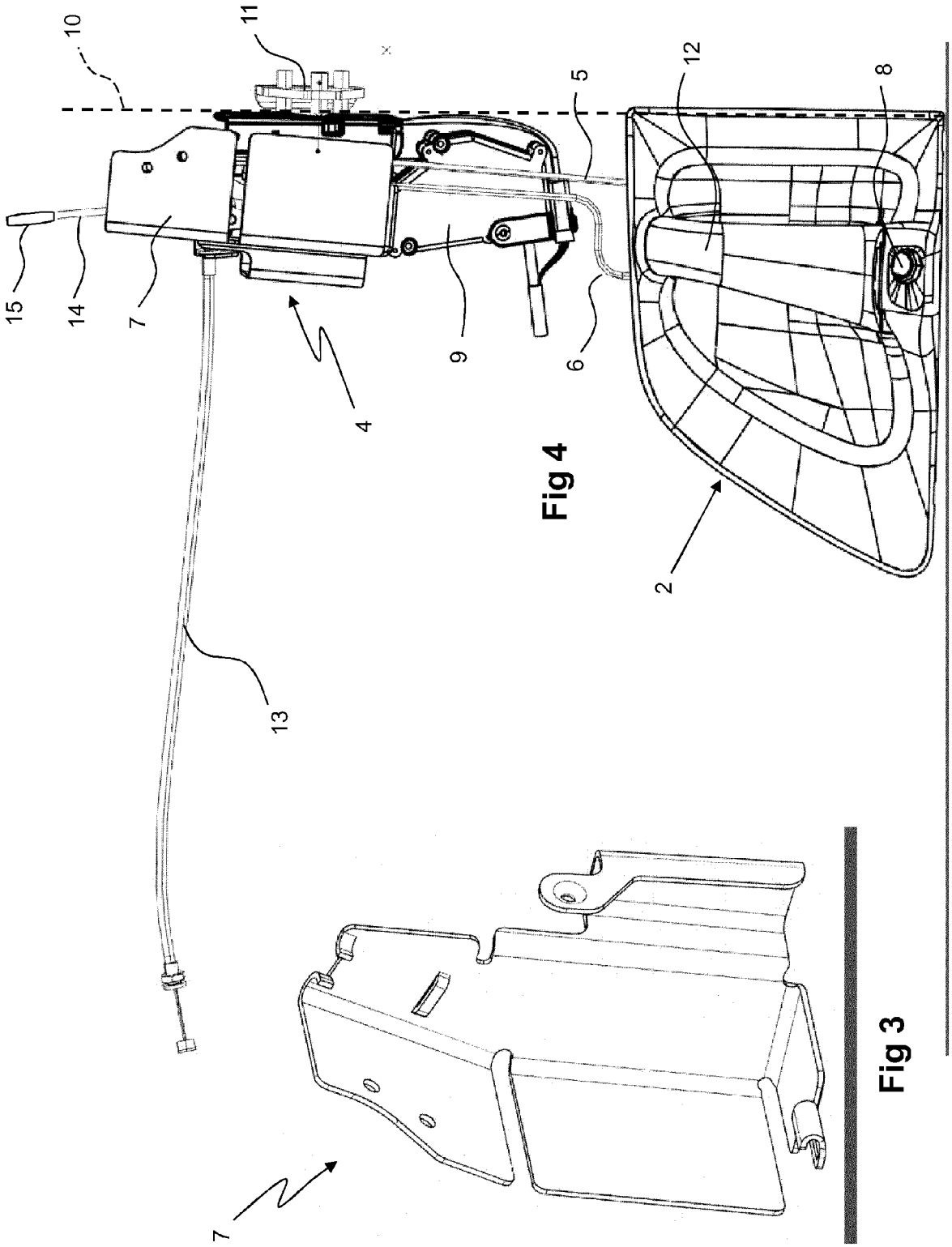

Fig 4

Fig 3

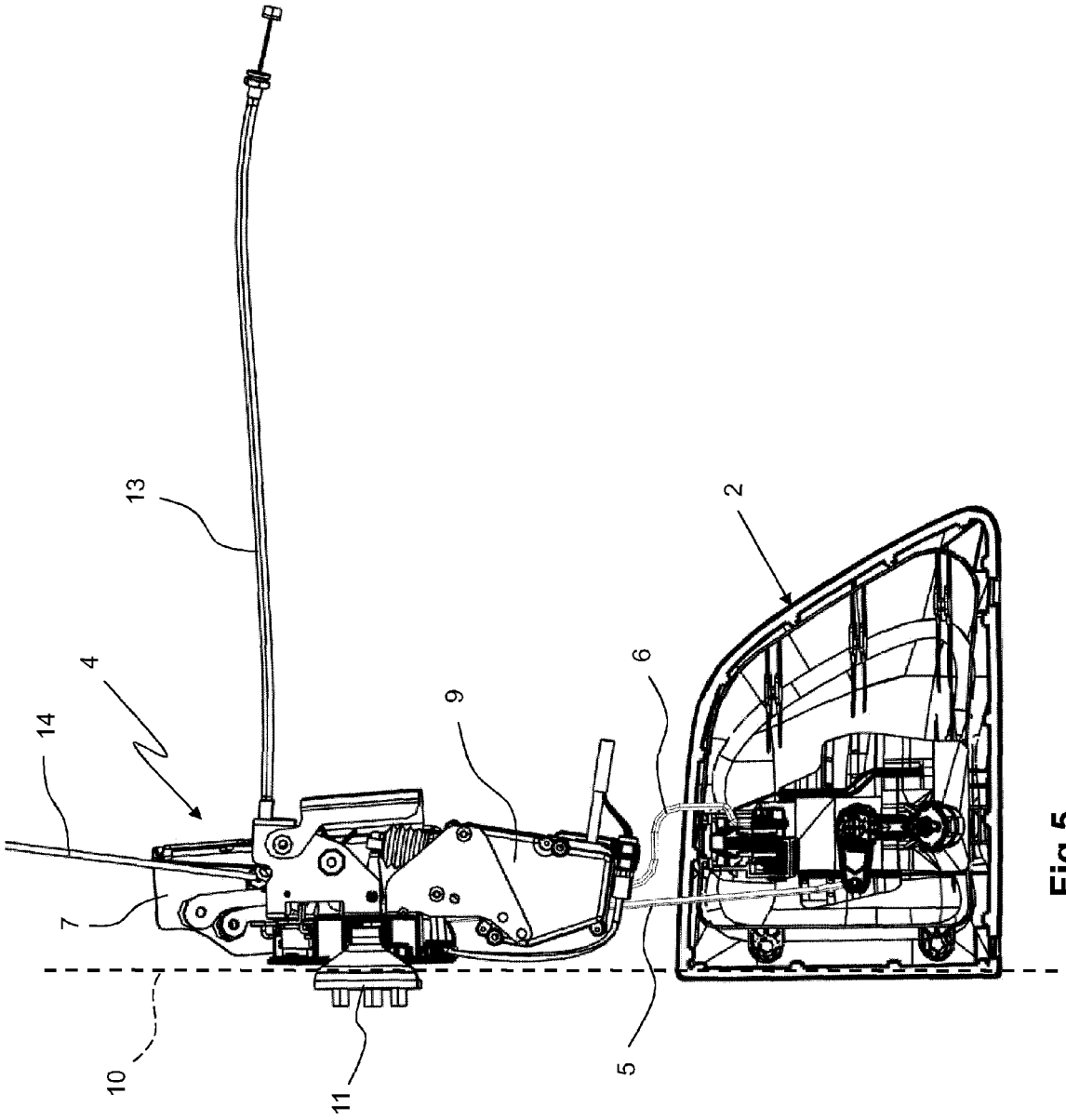

Fig 5

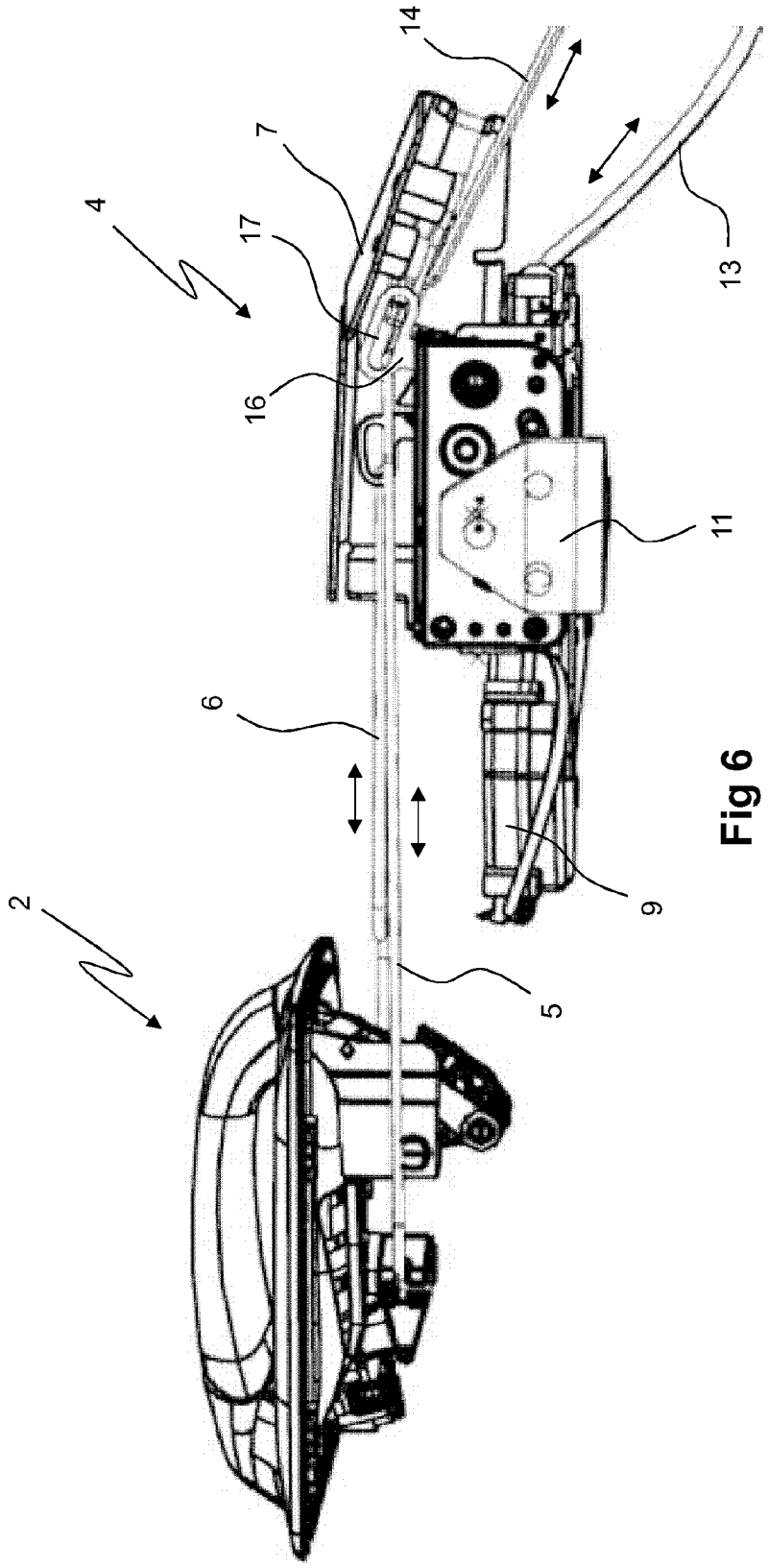

Fig 6

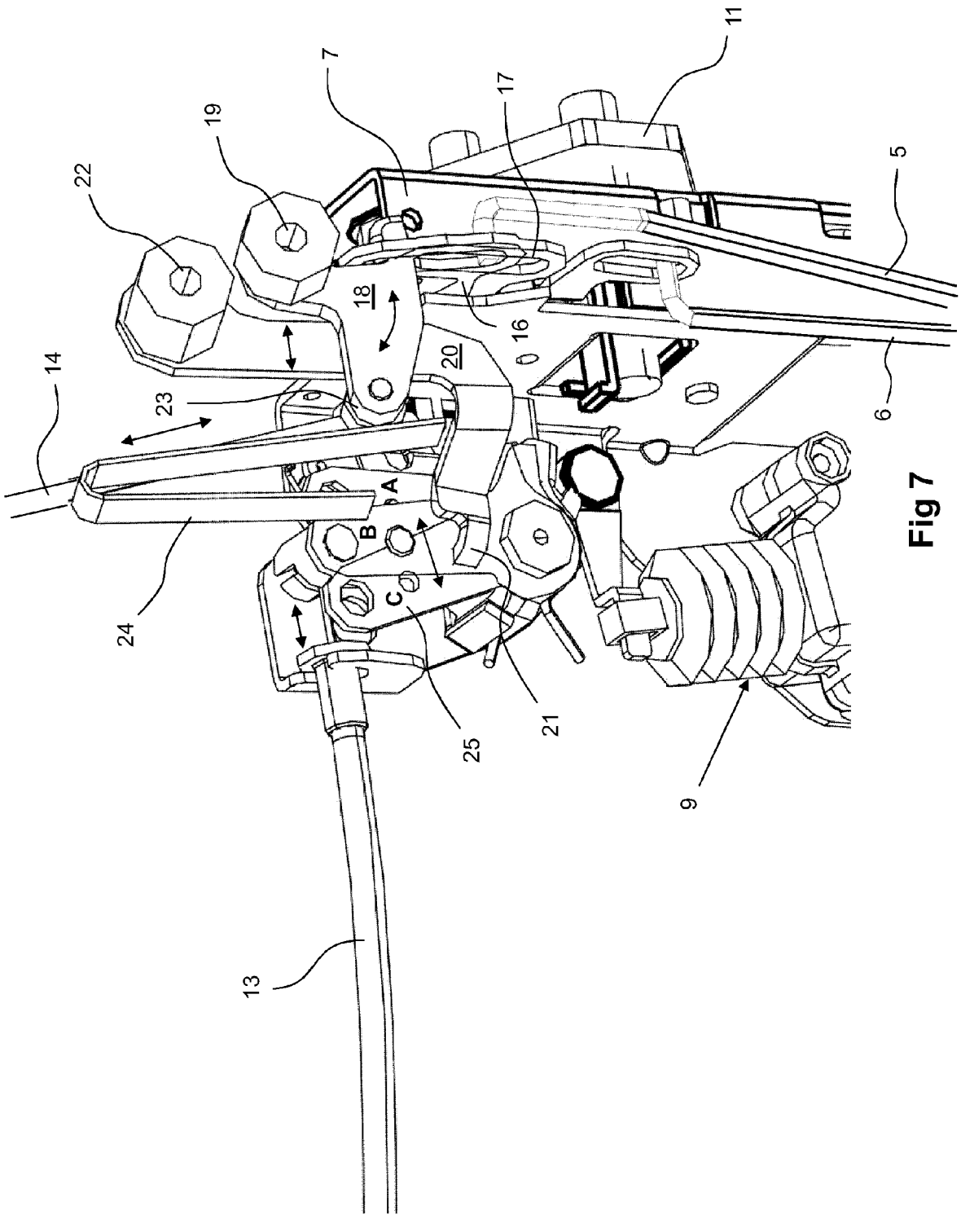

Fig 7