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(54) **ELECTRONIC LOCK FOR CARGO VEHICLE DOORS**

(57) Electronic lock for cargo vehicle doors, with an electronic system (3) and a motor (7), a slider (5) with linear displacement, and locking means (6). The locking means (6) have an actuating lever (8) connected to the motor (7), an intermediate link (9) connected to the slider (5) and to the actuating lever (8), with a locking stop (10), and a complementary locking element (11). The elec-

tronic lock (1) has a locking position in which the locking stop (10) contacts against the complementary locking element (11) locking the slider (5), an unlocking position in which the locking stop (10) is separated from the complementary locking element (11), and an opening position in which the actuation of the slider (5) has caused the opening of the door.

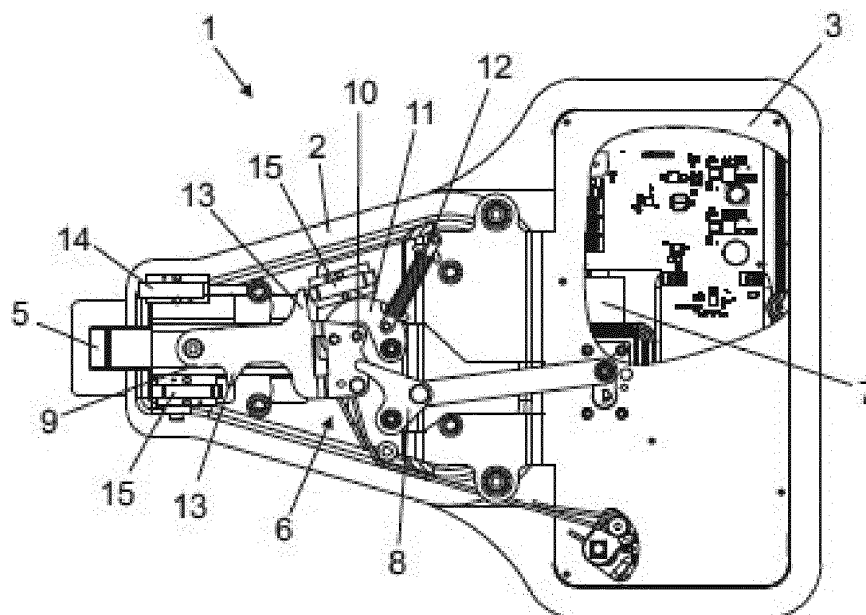


Fig. 3

Description

Field of the Invention

[0001] The present invention refers to the technical field of door closing systems, specifically to closing systems for truck and cargo vehicle doors, and more specifically to electronic lock systems that allow or block the opening of the door by means of a remotely actuated electronic system.

Background of the Invention

[0002] Currently in the field of trucks, cargo vehicles and delivery vehicles, certain closing mechanisms are known in which the movement of an opening handle is transmitted to a slider, whose linear displacement causes the opening and closing of the door.

[0003] To provide safety, the closing mechanisms usually incorporate locking and unlocking mechanisms of the slider to prevent or allow its linear movement when actuated by the lever, and thus prevent or allow the opening of the door. The most common locking and unlocking mechanisms consist of deadbolts connected to arms, levers, locks or hitches that lock or unlock the movement of the slider. However these mechanisms are uncomfortable and require the use of a key which must be inserted into the deadbolt for it to lock or open.

[0004] The applicant does not know if there are electromechanical mechanisms used for locking and unlocking locks on truck doors and cargo vehicles.

[0005] An electronic lock for cargo vehicle doors is therefore desirable that allows a safe, comfortable and efficient opening and closing, avoiding the drawbacks of the existing systems in the prior art.

Description of the Invention

[0006] The present invention relates to an electronic lock for cargo vehicle doors, having a base attachable to a cargo vehicle door such as a truck box door, an electronic system fixed to the base, remotely operable, with a motor, the electronic system being in charge of governing the closing and opening of the electronic lock. The electronic lock also has a handle on the base, a slider that engages the door to the frame thereof and that is actuated by means of the handle in a conventional way for opening the door by means of the linear displacement of said slider, and locking means arranged on the base connected to the electronic system and to the slider, to lock or allow the linear displacement of the slider, and thereby lock or allow the opening of the door by means of the actuation of the handle.

[0007] The locking means are in turn formed by an actuating lever connected to the motor of the electronic system and actuated by it, and by an intermediate link connected to the slider and to the actuating lever and actuated by said actuating lever by rotation, said intermediate

link having a locking stop. In addition, the locking means have a supplementary locking element that can rotate actuated by the intermediate link. By means of these elements the electronic lock is actuated between different positions.

[0008] In the locking position the locking stop of the intermediate link contacts against the complementary locking element, which prevents the movement of the intermediate link, thus blocking the linear movement of the slider, and thereby blocking the opening of the door even if the user actuates the handle. This is considered the default position of the electronic lock.

[0009] In the unlocking position, the locking stop of the intermediate link is separated from the complementary locking element, which allows the linear displacement of the slider, which will allow the door to be opened once the user actuates the handle.

[0010] At the opening position of the actuation of the slider by the handle has caused the opening of the door and the movement of the intermediate link, and with this the rotation of the supplementary locking element.

[0011] In this way, the simplest functioning of the electronic lock would consist of the following: starting from the locking position, in which the door is closed and the linear displacement of the slider is locked, if a user wishes to open the door, he will actuate the electronic system remotely, for example, by means of radio frequency (RF) or RFID, which will start the motor of the electronic system. This motor will actuate the actuating lever that is connected to the motor at one of its ends, and to the intermediate link at its other end. This movement of the actuating lever actuated by the motor will be transmitted by rotation of its second end to the intermediate link, which it will remove from its locking position by separating the locking stop from the complementary locking element, passing the electronic lock to the unlocking position.

[0012] In this unlocking position the user can already actuate the handle to open the door of the cargo vehicle. This actuation of the handle linearly moves the slider out of its hooking position in the frame allowing the door to be opened. In this movement the slider drags in its movement the intermediate link which in turn causes the rotation of the complementary locking element.

[0013] In order to carry out the closure of the door, it is made in reverse. Once the door of the cargo vehicle is closed, by actuating the electronic system remotely, the motor of the electronic system will be activated, which will actuate in the opposite direction to the actuating lever, which will transmit the movement in the opposite direction to the intermediate link which in turn will rotate the complementary locking element and in its final position the locking stop of the intermediate link will be in contact against the complementary locking element, thus leaving the electronic lock in its locking position again.

[0014] According to a preferred embodiment of the invention, the complementary locking element can have elastic means such as springs or platforms, configured

to rotate the complementary locking element and move from the opening position to the locking position of the electronic lock. In this way the locking element will rotate towards its position in the locking of the electronic lock aided by the elastic means during the closing of the electronic system.

[0015] According to different particular embodiments, the electronic lock has a door sensor arranged on the base, in proximity to the frame, for detecting whether the door is open or closed and sending said information to the electronic system. Thus, once the door of the cargo vehicle is closed, the electronic system will detect that it has been closed and can activate the lock directly without the user having to actuate said electronic system.

[0016] Likewise, the electronic lock preferably has locking/unlocking sensors to detect protrusions of the intermediate link duly positioned on it, and thus be able to determine if the electronic lock is in a locking position or in an unlocking position and send said information to the electronic system, which will end the movements once the determined position is reached.

[0017] The electronic lock of the present invention has the advantages of providing automatic locking of the doors of cargo vehicles, as well as unlocking by remote actuation means such as RF or RFID.

[0018] All this is achieved with an electronic board, motor and antenna integrated into the electronic system of the lock, avoiding or reducing to the maximum the necessary wiring, and also avoiding the need to install a switchboard in the cabin of the cargo vehicle.

[0019] According to a preferred embodiment, the electronic lock object of the present invention has emergency opening means connected to the locking means, to be able to actuate the electronic lock to the unlocking position manually in case of failure of the electronic system, and to be able to open the door of the cargo vehicle despite any failure of the electronic system or lack of power, battery, etc...

[0020] In particular, these emergency opening means are formed by a lock arranged on the door and a cable connected to said lock and to the intermediate link, to, by actuating the lock, with a key for example, move the intermediate link and thus separate its locking stop from the complementary locking element allowing the linear movement of the slider and consequently the opening of the door.

[0021] This embodiment provides the advantage of facilitating an emergency manual opening in the event of electronic system failures or power failures, battery problems, etc.

Summary of the Drawings

[0022] Then, to facilitate the understanding of the invention, by way of illustration but not limitation, an embodiment of the invention that refers to a series of figures will be described.

Fig. 1 is a front perspective view of the exterior of an embodiment of the electronic lock object of the present invention.

Fig. 2 a perspective view from another orientation of the electronic lock of Fig. 1, showing part of its internal structure.

Fig. 3 is a rear view of the electronic lock of Figs. 1 and 2 in which the cover has been removed to show its elements inside.

Figs. 4a-4d show rear views without a lid of an embodiment of the electronic lock, of the different positions of the sequential functioning of the closure. Figure 4a shows the unlocking position. Figure 4b shows the unlocking position. Figure 4c shows the opening position. Figure 4d shows again the unlocking position after the door is closed.

Fig. 5 is a perspective view of the exterior of the closure of Figs. 4a-4d showing the actuation of the lever in the passage from the unlocking position to the opening position.

Figures 6a-6b show the functioning of the embodiment of the electronic lock with emergency opening means. Fig. 6a shows the locking position and Fig. 6b shows the unlocking position by actuation of the emergency opening means.

[0023] These figures refer to a set of elements that are:

1. electronic lock
2. Base of the electronic lock
3. electronic system
4. handle
5. slider
6. locking means
7. engine of the electronic system
8. actuating lever
9. intermediate link
10. locking stop of the intermediate link
11. supplementary locking element
12. elastic means of the supplementary locking element
13. protrusions of the intermediate link
14. door sensor
15. locking/unlocking sensors
16. deadbolt of the emergency opening means
17. cable of the emergency opening means

Detailed Description of the Invention

[0024] The object of the present invention is an electronic lock 1 for doors of cargo vehicles, such as delivery vans, trucks, etc...

[0025] As can be seen in the figures, the electronic lock

1 has a base 2 attachable to a door of a cargo vehicle, an electronic system 3 fixed to the base 2, which is remotely operable and is in charge of governing the closing and opening of the electronic lock 1. The electronic system 3 has a motor 7. In addition, the electronic lock 1 has a handle 4 on the base 2, a slider 5 that engages the door to the frame thereof and that is actuated in a conventional way by means of the handle 4 for opening the door by means of the linear displacement of said slider 5, and locking means 6 arranged on the base 2 that are connected to the electronic system 3 and to the slider 5, to lock or allow the linear displacement of said slider 5, and thereby lock or allow the opening of the door with the actuation of the handle 5.

[0026] As the figures show, the locking means 6 are in turn formed by an actuating lever 8 that is connected to the motor 7 of the electronic system 3 and is actuated by it, and by an intermediate link 9 connected to the slider and to the actuating lever, which is actuated by said actuating lever 8 by rotating it. The intermediate link 9 has a locking stop 10 fundamental for the functioning of the electronic lock 1. Furthermore, the locking means 6 have a supplementary locking element 11 that can rotate actuated by the intermediate link 9 between different positions. By means of these elements the electronic lock 1 is actuated between different positions that are detailed below:

[0027] Figure 4a shows the unlocking position. In this locking position the locking stop 10 of the intermediate link 9 is in contact against the complementary locking element 11, which prevents the movement of the intermediate link 9, thus blocking the linear movement of the slider 5 in the opening direction, and thereby blocking the opening of the door even if the user actuates the handle 4. This is considered the default position of the electronic lock 1.

[0028] Figure 4b shows the unlocking position. In said unlocking position, the locking stop 10 of the intermediate link 9 is separated from the complementary locking element 11, which allows the linear displacement of the slider 5 in the opening direction, which will allow the door to be opened once the user actuates the handle 4.

[0029] Figure 4c shows the opening position. In the opening position, the functioning of the slider 5 by the handle 4 by means of the complete movement of the handle 4 has caused the opening of the door and the displacement of the intermediate link 9, and with this the rotation of the complementary locking element 11.

[0030] Thus, figures 4a-4d show the different positions of the sequential functioning of the lock, which is described in detail below:

Starting from the locking position shown in figure 4a, in which the door is closed and the linear displacement of the slider 5 is locked (the contact of the locking stop 10 against the complementary locking element 11 prevents the linear displacement of the slider 5, as seen in figure 4a), when a user wishes to open the door, he actuates the electronic system 3 remotely, for example, by means

of RF or RFID, which starts the motor 7 of the electronic system 3. The motor 7 actuates the actuating lever 8, which, as seen in the figures, is connected to the motor 7 at one of its ends, and to the intermediate link 9 at its other end. As can be seen in the figures, this second end of the actuating lever 8 can rotate, and has a "trigger", which in its rotation connects with the end of the intermediate link 9 dragging it in said rotation. This rotation of the end of the intermediate link 9 separates the locking stop 10 from the complementary locking element 11, passing the electronic lock 1 to the unlocking position.

[0031] In this unlocking position shown in figure 4b, the user can already actuate the handle 4 to open the door of the cargo vehicle in a conventional manner, moving to the opening position.

[0032] In the opening position, shown in figure 4c, this actuation of the handle 4 linearly moves the slider 5 out of its hooking position in the frame allowing the door to be opened. In this movement the slider 5 drags in its movement the intermediate link 9 which in turn causes the rotation of the complementary locking element 11, as seen in Figure 4c, favoured by the shape of the curved external profile of the complementary locking element 11.

[0033] In order to carry out the closure of the door, it is made in reverse. Once the door of the cargo vehicle is closed by the user, by actuating the electronic system 3 remotely, the motor 7 of said electronic system 3 will be activated, which will actuate in the opposite direction to the actuating lever 8, which will transmit the rotating movement in the opposite direction to the intermediate link 9, which in turn will rotate the complementary locking element 11 and in its final position the locking stop 10 of the intermediate link 9 will be in contact against the complementary locking element 11, thus leaving the electronic lock 1 in its locking position again.

[0034] According to a preferred embodiment of the invention shown in the figures, the complementary locking element 11 can have elastic means 12 such as springs or platforms, to rotate the complementary locking element 11 from the position it had in the opening position to that of the locking position, and thus move from the opening position to the locking position of the electronic lock 1. In this way the locking element will rotate towards its previous position in the locking of the electronic lock 1 aided by the elastic means 12 during the closing of the electronic system. This passage from the opening position to the locking position with the return to the original position of the complementary locking element by means of the elastic means is represented in Figures 4c and 4d.

[0035] According to different particular embodiments, which are shown in the figures, the electronic lock 1 has a door sensor 14 arranged on the base 2, in proximity to the frame, for detecting whether the door is open or closed and sending said information to the electronic system 3. Thus, once the door of the cargo vehicle is closed, the electronic system 3 will detect that it has been closed and can activate the lock directly without the user having to actuate said electronic system 3 by remote means

such as RF or RFID.

[0036] According to this previous embodiment, the electronic system 3 can be programmed so that in case the electronic lock 1 is unlocked but the door is not opened, the system is automatically locked again after a few seconds. This is carried out if the door sensor 14 does not detect changes, which implies that the electronic lock 1 has been unlocked, but the door has not been opened.

[0037] Likewise, as can be seen in the figures, the electronic lock 1 preferably has locking/unlocking sensors 15 to detect protrusions 13 of the intermediate link 9 duly positioned on it, and thus be able to determine if the electronic lock 1 is in a locking position or in an unlocking position and send said information to the electronic system 3, which will end the movements once the determined position is reached. Obviously, these locking/unlocking sensors 15 are arranged on the base 2, in the vicinity of the intermediate link 9, and depending on the position of said intermediate link 9, the projections 13 will approach one sensor 15 or another, determining the position of the electronic lock 1.

[0038] According to a preferred embodiment, the electronic lock 1 of the present invention has emergency opening means connected to the locking means 6, to be able to actuate the electronic lock 1 to the unlocking position manually in case of failure of the electronic system 3, and to be able to open the door of the cargo vehicle despite any failure of the electronic system 3 or lack of power, battery, etc.

[0039] In particular, as can be seen in the figures, these emergency opening means are formed by a deadbolt 16 arranged on the door and a cable 17 connected to said deadbolt and to the intermediate link 9, to, by actuating the lock 16, with a key for example, be able to move the intermediate link 9 and thus separate the locking stop 10 from the complementary locking element 11 and allow the linear movement of the slider 5, and with it the opening of the door.

Claims

1. Electronic lock for cargo vehicle doors, comprising:

- a base (2) attachable to a door of a cargo vehicle,
- an electronic system (3) fixed to the base (2), remotely actionable, configured for the closing and opening of the electronic lock (1), comprising an engine (7),
- a handle (4) arranged in the base (2),
- a slider (5) actuated by the handle (4), configured to open the door by means of the linear movement of said slider (5), and
- locking means (6) arranged on the base (2) and connected to the electronic system (3) and to the slider (5), configured to lock and allow the

linear displacement of the slider (5),

characterized by the locking means (6) comprising in turn

- an actuating lever (8) connected to the engine (7) and actuated by the engine,
- an intermediate link (9) connected to the slider (5) and to the actuating lever (8) and actuated by said actuating lever (8) by turning, comprising that intermediate link (9) a locking stop (10), and
- a supplementary locking element (11) configured to rotate actuated by the intermediate link (9),

being the electronic lock (1) configured to be actuated between

- a locking position in which the locking stop (10) of the intermediate link (9) contacts the supplementary locking element (11) locking the linear movement of the slider (5),
- an unlocking position in which the locking stop (10) of the intermediate link (9) is separated from the supplementary locking element (11) allowing for the linear movement of the slider (5), and
- an opening position in which the actuation of the slider (5) by the handle (4) has caused the opening of the door and the movement of the intermediate link (9) and with this the rotation of the supplementary locking element (11).

2. The electronic lock for cargo vehicle doors according to claim 1, wherein the complementary locking element (11) comprises elastic means (12) configured to rotate the complementary locking element (11) and move from the opening position to the locking position of the electronic lock (1).

3. Electronic lock for doors of cargo vehicles, according to any one of the preceding claims, comprising a door sensor (14) configured to detect whether the door is open or closed and send said information to the electronic system (3).

4. Electronic lock for doors of cargo vehicles, according to any one of the preceding claims, comprising locking/unlocking sensors (15) configured to detect protrusions (13) of the intermediate link (9) and determine whether the electronic lock (1) is in the locked position or in the unlocking position and send said information to the electronic system (3).

5. Electronic lock for doors of cargo vehicles, according to any one of the preceding claims, comprising emergency opening means connected to the locking means (6) configured to actuate the electronic lock (1) to the unlocking position manually in case of fail-

ure of the electronic system (3).

6. The electronic lock for cargo vehicle doors according to claim 5, wherein the emergency opening means comprises

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- a lock (16) arranged on the door and
- a cable (17) connected to said lock (16) and to the intermediate link (9), configured to move said intermediate link (9) and separate its locking stop (10) from the complementary locking element (11) allowing the linear movement of the slider (5).

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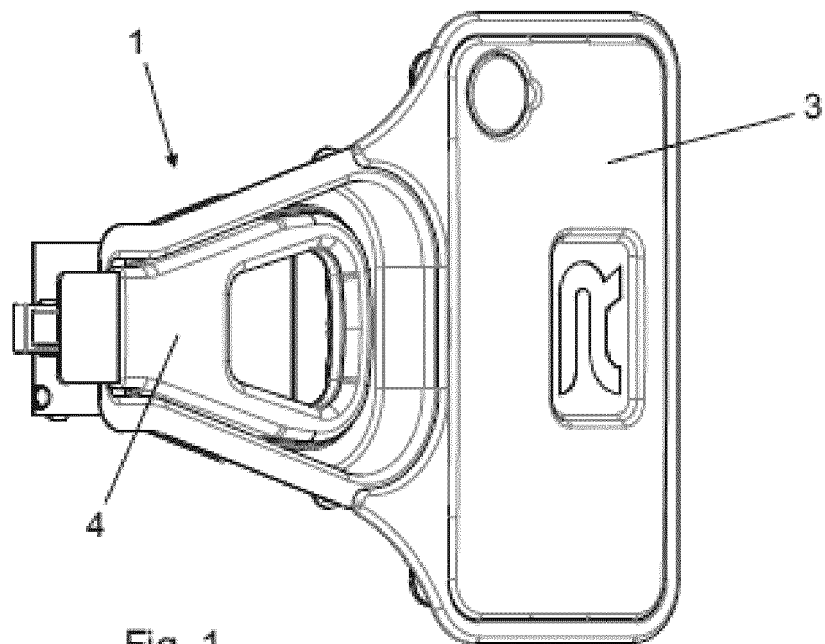


Fig. 1

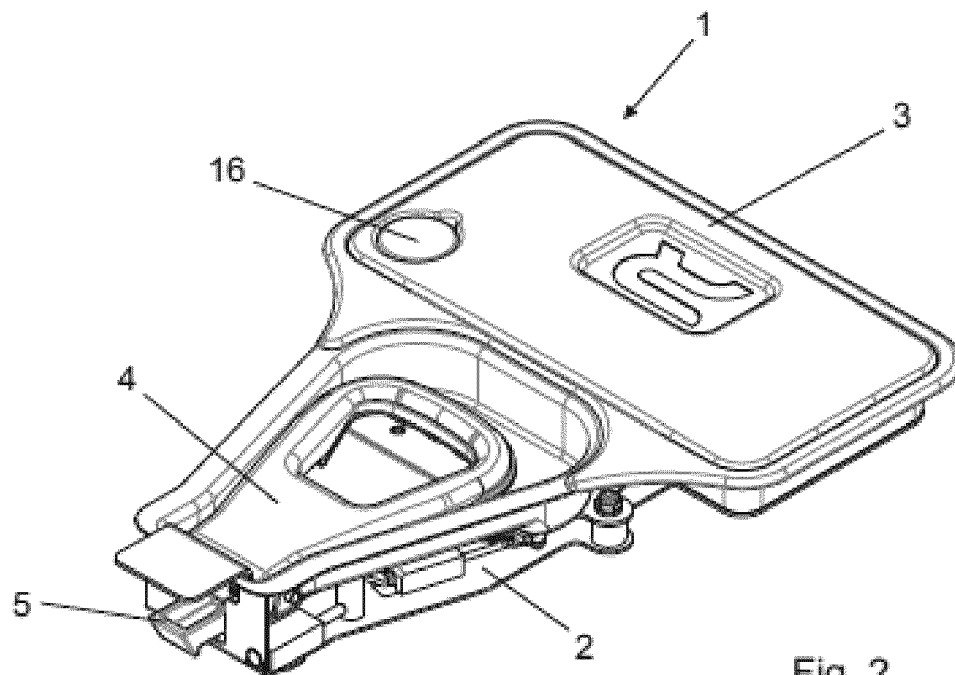


Fig. 2

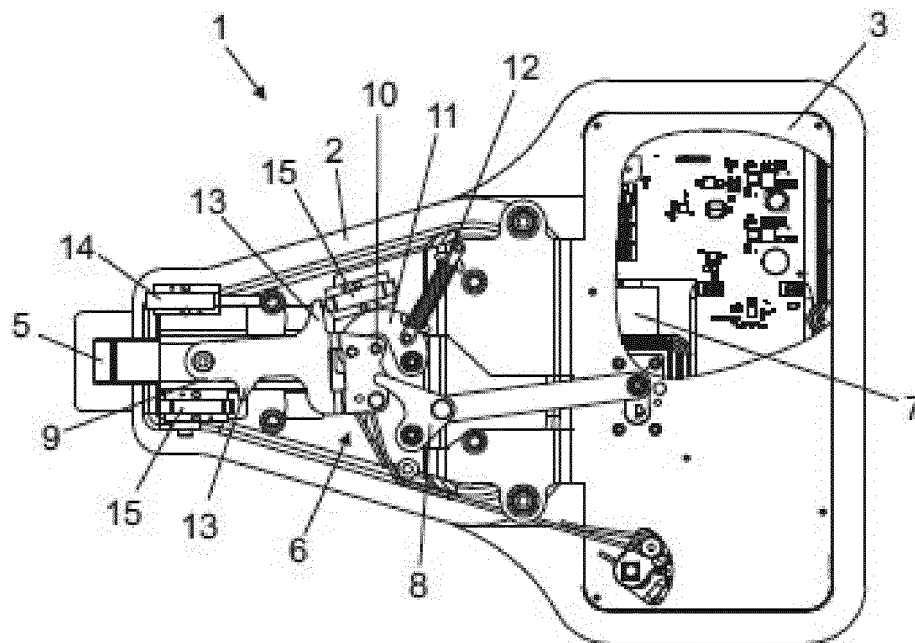


Fig. 3

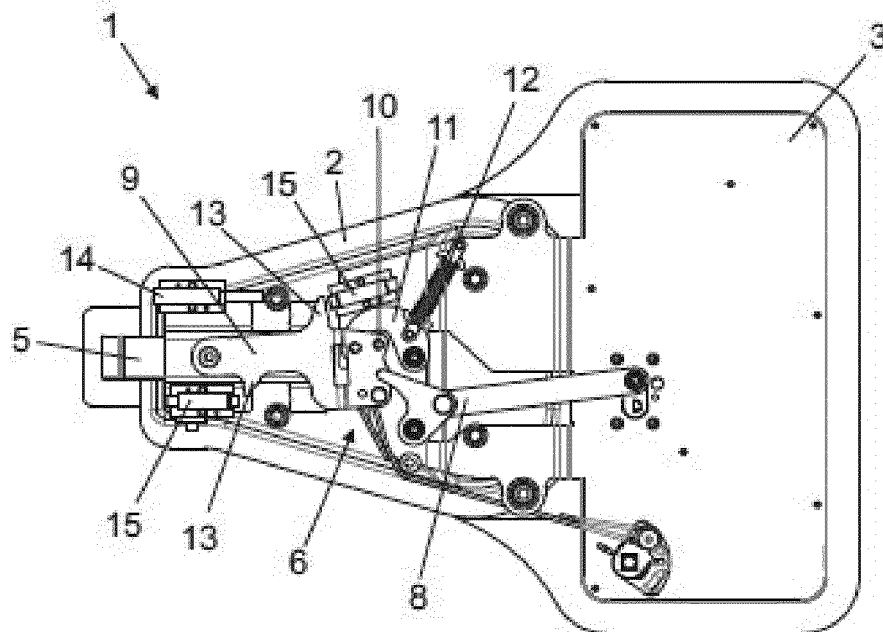


Fig. 4a

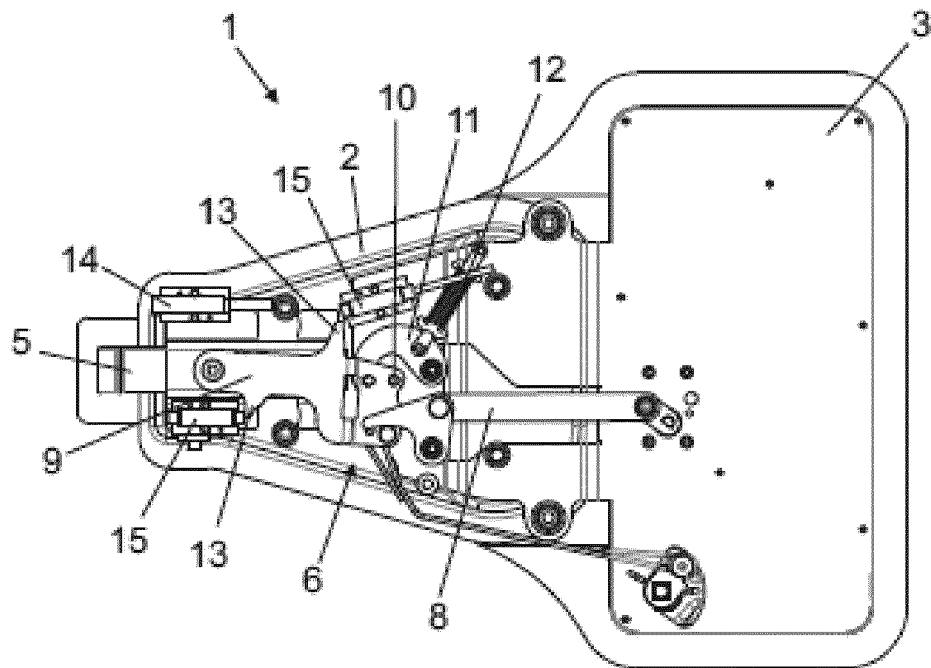


Fig. 4b

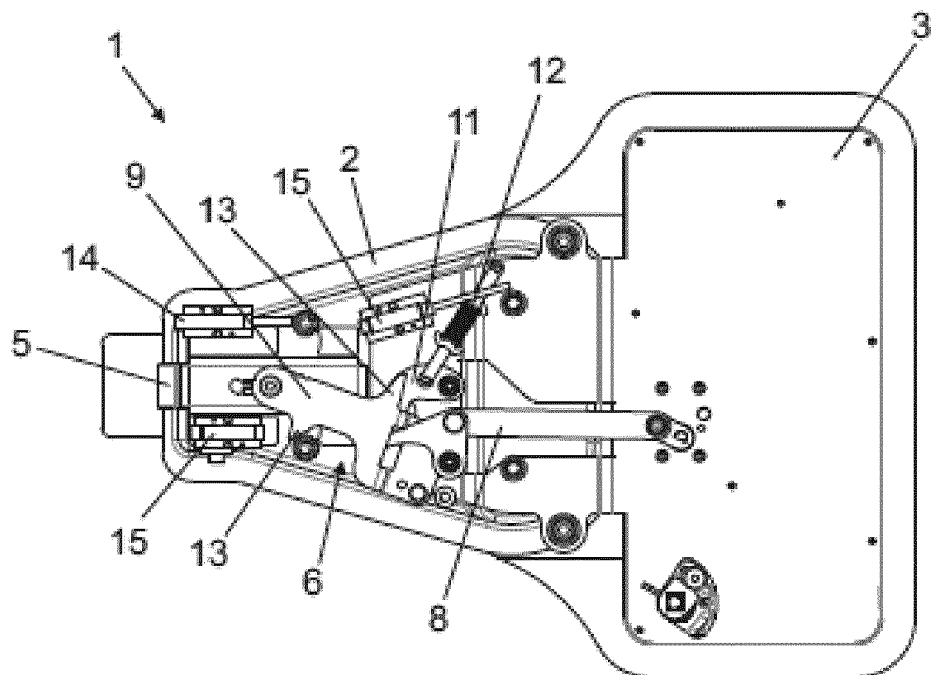


Fig. 4c

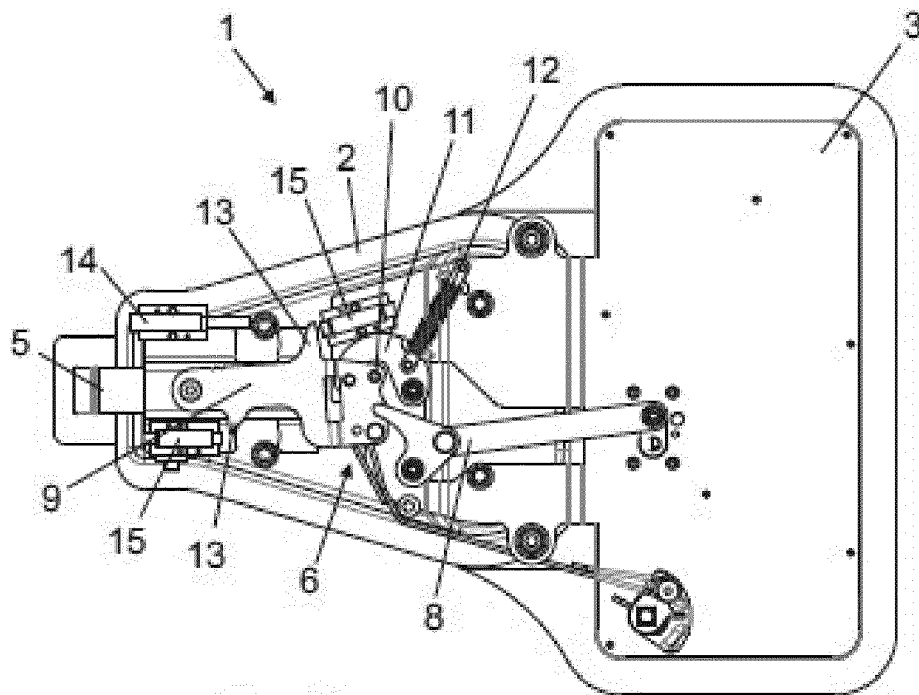


Fig. 4d

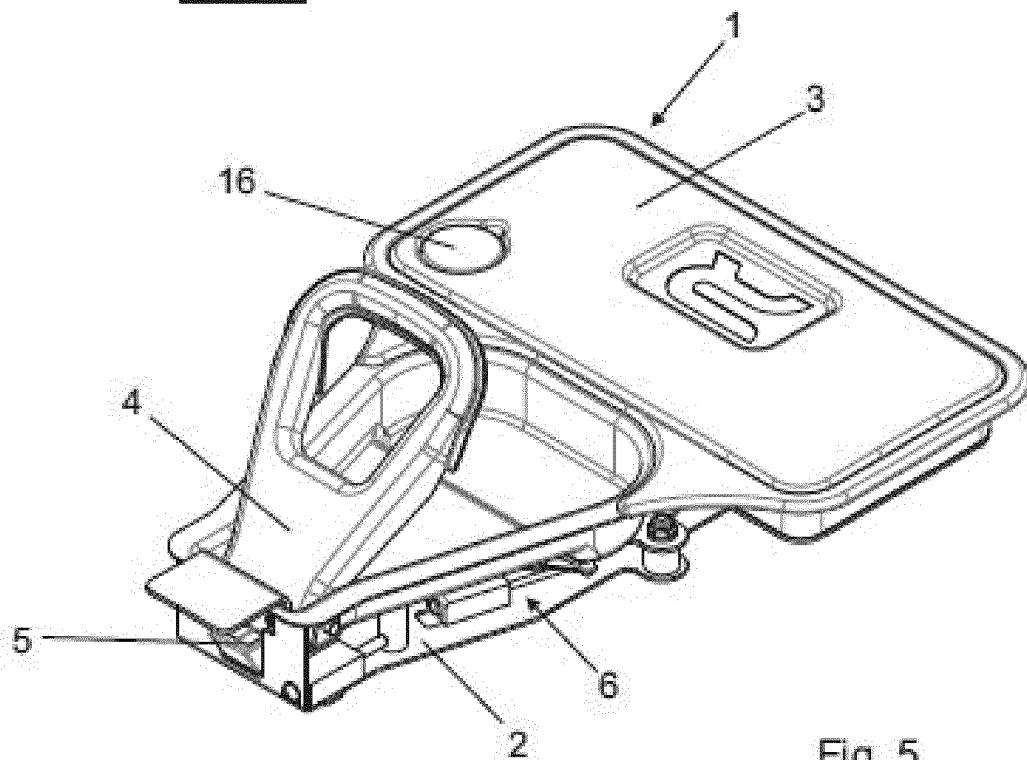


Fig. 5

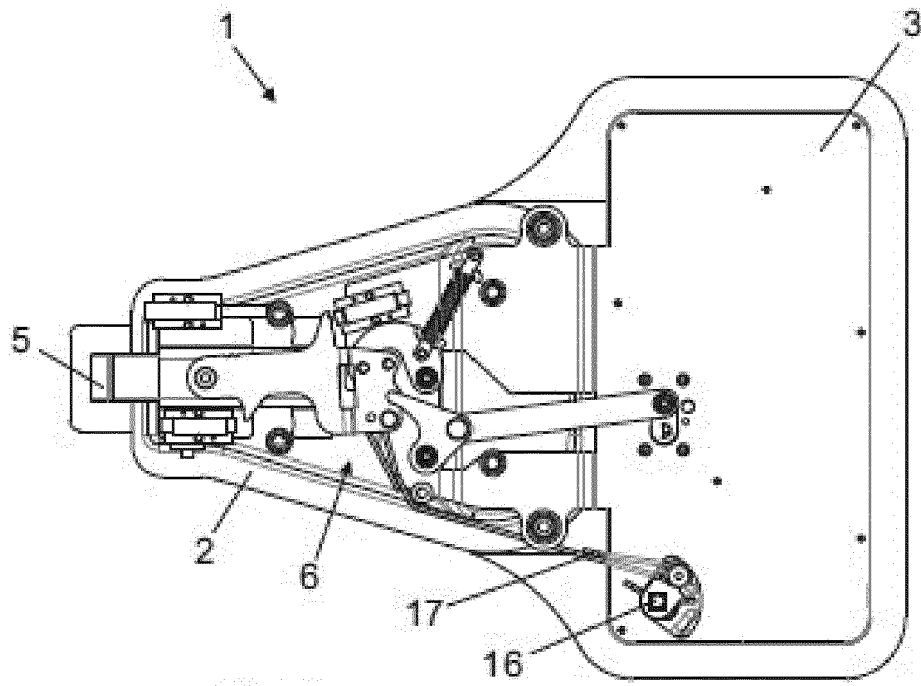


Fig. 6a

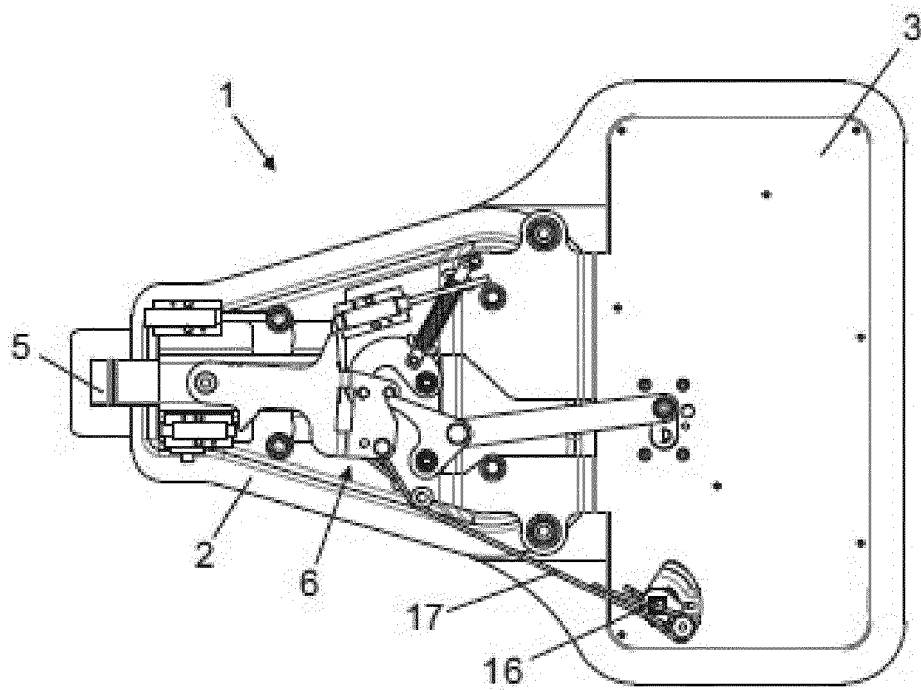


Fig. 6b



EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 January 2024	Examiner Goddar, Claudia
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