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(54) **COMBINED ELECTRICAL AND MECHANICAL DOOR OPENER**

(57) An inner door opener (1) for a vehicle, comprising a spring-loaded push button (2) with a front surface (3), where the push button (2) is adapted to close an electric circuit in a first pushed-in position (9), and where the push button (2) is adapted to release a door lock latch through a Bowden cable (15) in a second pushed-in position (10). The advantage of the invention is that a door opener comprising both an electrical release function and a mechanical release function in the same push button is provided.

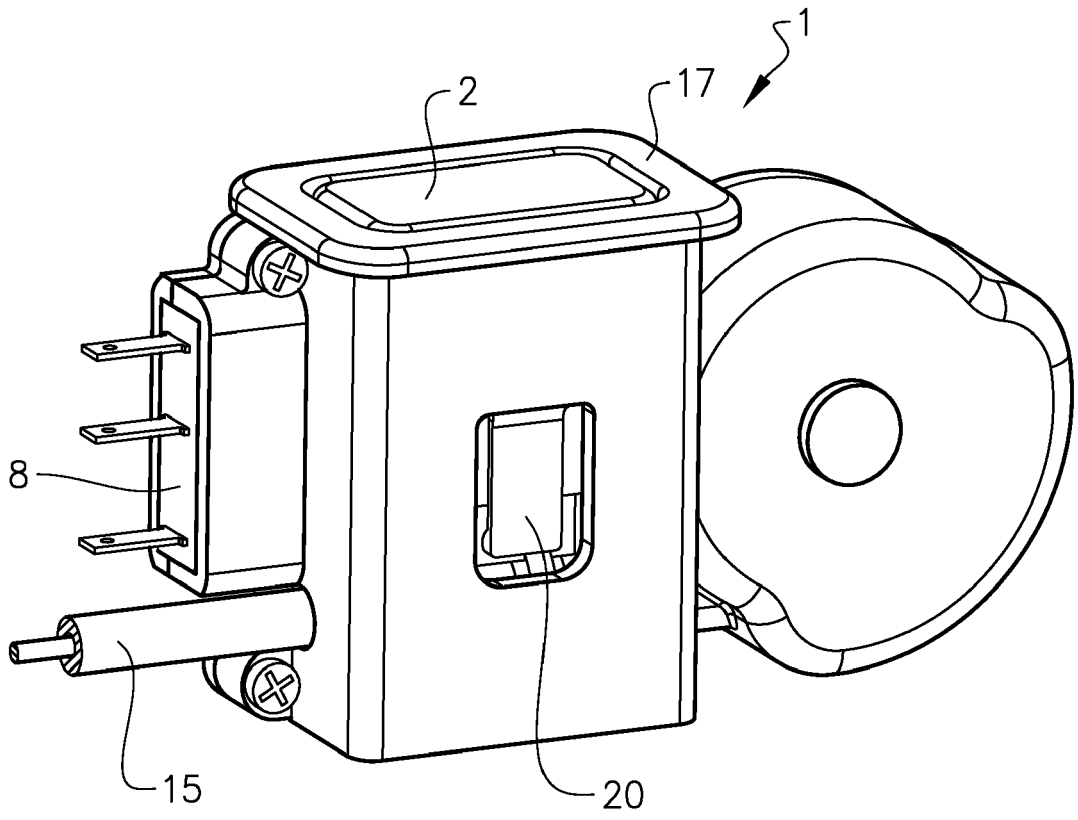

FIG. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a combined electrical and mechanical door opener adapted to be used as an inner door opener in a vehicle. By using a door opener comprising both an electrical switch and a mechanical actuating means, a simple and cost-effective door opener is provided, which is easy to install and which requires less space than a conventional door lever.

BACKGROUND AND SUMMARY OF THE INVENTION

[0002] Most modern cars are provided with a central lock function, in which every door lock is provided with an electrical actuator that operates the lock mechanism. The central lock is operated by the use of a remote control, which sends an open or close signal to the vehicle control unit. Some cars are also provided with a keyless entry system, in which a key comprising a transmitter is recognized by the vehicle control unit when it is in the close proximity of the vehicle.

[0003] A door of the vehicle can then be opened without the need of using a remote control or by using a car key. When a driver and possible one or more passengers are seated in the car and the car engine is started, some manufacturers have implemented an automatic car lock function, which locks the doors after a few minutes. This is seen as a security function intended to avoid carjacking or preventing someone from opening a door from the outside, e.g. at a red light.

[0004] When a door is closed or locked, it is possible to open it from the inside. A door is provided with a door handle or door lever in the interior door panel, which comprises a mechanical connection to the door lock such that the lock mechanism can be unlatched from the inside when the lock is either closed or locked. The mechanical connection also allows a door to be opened from the inside even if the car would be without electricity, e.g. if the battery is empty or if the electrical actuator at the rear door is broken. Some cars may also be provided with an electrical switch in the handle that will open the door with just a touch of the switch, such that the handle must not be operated in normal conditions, i.e. when the vehicle has electric power. If the battery is empty, the handle must be pulled in order to activate a mechanical latch of the lock. Alternatively, a key may be rotated in order to open the door.

[0005] EP 1162332 B1 discloses a handle for a vehicle door, arranged on the outside of the vehicle door. An inner lateral surface facing the door is provided with a first push-button actuating device for electrically controlling a lock on the door, and a second mechanical push-button actuating device. The second mechanical actuating device is provided with a trigger-type actuating member, who extends through an opening formed in the inner surface, and is movable between an extracted rest position extending partly outwards of the inner surface, and a withdrawn control position inserted inside the handle. The second mechanical actuating device cooperates with a lever forming part of a mechanical actuating device for activating the door lock.

[0006] It is also possible to provide an inner door handle or door grip with an electrical switch in order to be able to open a door in an easy way, without having to pull the handle. In some cases, a handle or a grip may be relatively large and may be difficult to design into the interior door panel in an aesthetic satisfactory manner. Further, it may be difficult to provide a mechanical lever to operate the lock, especially if there are several different car models using the same lock arrangement.

[0007] There is thus room for an improved inner door opener for a door lock in a vehicle door.

DISCLOSURE OF INVENTION

[0008] An object of the invention is therefore to provide an improved inner door opener for a vehicle. A further object of the invention is to provide a vehicle comprising such an interior trim panel.

[0009] The solution to the problem according to the invention is described in the characterizing part of claim 1 regarding the inner door opener and in claim 14 regarding the vehicle. The other claims contain advantageous further developments of the inner door opener.

[0010] In an inner door opener for a vehicle, comprising a spring-loaded push button with a front surface, where the push button is adapted to close an electric circuit in a first pushed-in position, the object of the invention is achieved in that the push button is adapted to release a door lock latch through a Bowden cable in a second pushed-in position.

[0011] By this first embodiment of an inner door opener according to the invention, a spring-loaded push button adapted to be used in an interior trim panel of a car is provided. The push button is provided with a first pushed-in position in which an electrical circuit is closed, such that an electric actuator can release a latch in a door lock. The operating button is further provided with a second pushed-in position in which a wire in a Bowden cable is operated, such that the latch of the door lock can be released mechanically. In this way, a simple and convenient way of opening the door is provided. The door opener is further relatively small and can easily be designed into an interior panel of a vehicle. At the same time, an emergency opening of the door is provided, in which the push button can release the latch of the door lock when no electricity is available for the electrical actuator. The push button can release the latch when the door lock is closed and when it is locked.

[0012] The push button is spring-loaded and is pushed in a linear movement. The front surface of the push button may be flush with the bezel of the door opener, or may protrude some from the bezel when the push button is in an idle position. In one example, the front surface of the

push button protrudes from the bezel by 1 mm in the idle position and the stroke to the first pushed-in position is 2 mm, such that the front surface of the push button is 1 mm lower than the bezel when the push button is in the first pushed-in position. This will give a pleasant appearance of the push button in the bezel, and ensures that the front surface must be pushed pass the surface of the bezel in order to open the door. An elbow or the like will thus not be able to open the door accidentally.

[0013] A micro switch is preferably used as the switch element that closes the electric circuit. It is also possible to use e.g. an optical fork coupler or another type of electrical contact. A micro switch is however reliable and weather proof.

[0014] The second pushed-in position is reached when the push button is pushed further into the door opener. The stroke to reach the second pushed-in position is preferably in the range between 13 - 20 mm from the idle position. When the first pushed-in position is reached and the push button is pushed further, the push button will pull an inner wire of a Bowden cable which is mechanically attached to the release latch of the door lock. When the second pushed-in position is reached, the latch will be released and the door will be opened. By using a Bowden cable, the installation of the door opener is simplified and it is possible to use the same door opener in different car models without exchanging any parts.

[0015] The inner wire of the Bowden cable may be attached directly to the push button, but it may be difficult to obtain a pulling action of the Bowden cable in an easy way by a direct attachment of the Bowden cable. It is thus preferred to use a transmission between the push button and the wire of the Bowden cable. In on example, the transmission comprises a toothed wheel which interacts with teeth of the push button. It is also possible to let the transmission be a lever that is pushed by the push button, where the lever is pivotally arranged and which pulls the wire of the Bowden cable on the other side of the pivot axle. A suitable travel distance for the wire of the Bowden cable to release the latch is between 10 - 20 mm. This is also a suitable stroke distance for the push button, in order to release a latch mechanically in an emergency situation. The ratio of the transmission may thus preferably be in the region of 1:1, even if it is also possible to use other ratios.

BRIEF DESCRIPTION OF DRAWINGS

[0016] The invention will be described in greater detail in the following, with reference to the attached drawings, in which

Fig. 1 shows an example of a door opener according to the invention in an idle position,

Fig. 2 shows a split view of a door opener according to the invention in an idle position,

Fig. 3 shows a split view a door opener according to the invention in a first pushed-in position, and

Fig. 4 shows a split view of a door opener according to the invention in a second pushed-in position.

MODES FOR CARRYING OUT THE INVENTION

[0017] The embodiments of the invention with further developments described in the following are to be regarded only as examples and are in no way to limit the scope of the protection provided by the patent claims.

[0018] Fig. 1 and Fig. 2 shows a first example of a door opener according to the invention in the idle position, Fig. 3 shows the door opener in the first pushed-in position, and Fig. 4 shows the door opener in the second pushed-in position. The door opener 1 comprises a push button 2 having a front surface 3 and side walls 4. The front surface 3 is adapted to be operated by a user and is thus preferably designed in a shape that is pleasant to touch and that is smooth. The front surface may be flat or slightly curved, and may comprise a symbol showing the function of the push button, i.e. that it is a door opener button. The symbol may be moulded in a two component moulding procedure and may be back lit with a light source. The shape is preferably rectangular, but other shapes are also plausible. The shape of the push button may be rectangular with the long side being at least 25 mm and the short side being at least 15 mm, such that the push button can easily be operated by a finger of a user. The shape of the push button may also be circular with a diameter of 20 mm or more. Other shapes are also possible. It is important that the user can push the push button to the second pushed-in position with a finger. However, the fit to a finger may be relatively tight since the second pushed-in position will not be used very often.

[0019] The body 6 of the door opener preferably encloses the components of the door opener such that the door opener can be handled as a stand-alone component without damaging any of the included components. The body may thus be formed in e.g. a box-shape comprising attachment means such that the door opener can be mounted to a trim panel in an easy way and such that it easily can be removed if it needs to be replaced. The body is in the shown example provided with a position member 20 which is somewhat resilient and which is provided with an inward protrusion. A lower edge of the push button will interact with the position member when the push button is pushed past the first pushed-in position. In this way, a user will detect when the first pushed-in position is reached and when the move to the second pushed-in position starts.

[0020] The side walls 4 of the push button are preferably parallel. The side walls may be provided with guiding means, such as one or more ridges, which are adapted to interact with corresponding grooves 5 in the body 6 of the door opener. The guiding means ensures that the push button will travel in a predictable manner and that

the push button will spring back when it is released by a user. A side wall of the push button is further provided with an interaction section 7 adapted to interact with the actuator of a switch element 8, e.g. a micro switch, when the push button is in the first pushed-in position 9. It is also possible to use other types of position detecting means, such as other types of electrical contacts or optical position detection means, such as an optical fork coupler. A micro switch is however suitable since it is reliable, has a snap action contact element and is weather sealed, which is of advantage when the switch is positioned behind the interior panel, towards the outside of the door. It is also possible to drive an electric actuator, e.g. a solenoid, directly through a micro switch in order to open the door latch.

[0021] The shown push button is further provided with teeth 11 on one side wall 4. The teeth are adapted to interact with a toothed wheel 12 which constitutes a transmission 13. The purpose of the transmission is to transfer the pushing action of the push button to a pulling action that will be able to pull the inner wire 14 of the Bowden cable 15. In the shown example, the pushing action of the push button will be transferred to a perpendicular pulling action, but other pulling directions are of course also possible, depending on the positions of the door opener and the door lock of the door. The wire 14 is attached to the toothed wheel 12 and the Bowden cable is attached to a mounting socket 16 of the door opener body 6.

[0022] In Fig. 2, the push button is in an idle position 18. The front surface 3 of the push button is in this example flush with the bezel of the door opener. In another example, the front surface 3 protrudes by e.g. 1 mm from the surface of the bezel 17. In Fig. 3, the door opener is shown in the first pushed-in position 9. In this position, the interaction section 7 of the push button body 4 interacts with the actuator of the micro switch 8, and pushes it inwards. The micro switch will in this position give a signal to an electric actuator, e.g. a solenoid or an electric motor, such that the door latch can be released. The signal may be directly connected to the electric actuator or may be routed through an electronic control unit. By sending a release signal to an electronic control unit, it is possible to apply further rules in order to control the release of the door latch, i.e. to control the opening of the door. One such rule may be the speed of the vehicle. It may e.g. be possible to prevent the release of the door latch if the vehicle is moving faster than 5 km/h, or if the vehicle is reversing. This will further ensure that the door is not opened erroneously.

[0023] Fig. 4 shows the push button in the second pushed-in position 10. In this position, the push button is pushed to its lowermost position. The teeth 11 has caused the toothed wheel 12 to rotate counter-clockwise such that the wire 14 of the Bowden cable is pulled to its release position, in which the door latch is released. Preferably, this second pushed-in position overrides other lock functions of the door lock, such that the door latch is always released when the push button is in the second pushed-in position 10. It is also possible to prevent the release of the latch in the second pushed-in position if there is power available in the vehicle, e.g. if the vehicle is travelling with a certain speed.

[0024] The invention is not to be regarded as being limited to the embodiments described above, a number of additional variants and modifications being possible within the scope of the subsequent patent claims.

REFERENCE SIGNS

[0025]

1:	Door opener
2:	Push button
3:	Front surface
4:	Side wall
5:	Groove
6:	Door opener body
7:	Interaction section
8:	Micro switch
9:	First pushed-in position
10:	Second pushed-in position
11:	Teeth
12:	Toothed wheel
13:	Transmission
14:	Wire
15:	Bowden cable
16:	Mounting socket
17:	Bezel
18:	Idle position
19:	Coil spring
20:	Position member

Claims

1. Inner door opener (1) for a vehicle, comprising a spring-loaded push button (2) with a front surface (3), where the push button (2) is adapted to close an electric circuit in a first pushed-in position (9), **characterized in that** the push button (2) is adapted to release a door lock latch through a Bowden cable (15) in a second pushed-in position (10).

2. Door opener according to claim 1, **characterized in that** the door opener (1) comprises a micro switch (8) for the closing of the electric circuit.

3. Door opener according to claim 1 or 2, **characterized in that** the stroke from an idle position (18) to the first pushed-in position (9) is in the range of 1 - 4 mm.

4. Door opener according to any of the preceding claims, **characterized in that** the stroke from an idle position (18) to the second pushed-in position (10)

is in the range of 13 - 20 mm.

5. Door opener according to any of the preceding claims, **characterized in that** the push button (2) will return to the idle position (18) by the use of a coil spring (19).

6. Door opener according to any of the preceding claims, **characterized in that** the push button (2) is attached directly to the wire (14) of the Bowden cable (15).

7. Door opener according to any of claims 1 to 5, **characterized in that** the push button (2) is attached to the wire (14) of the Bowden cable (15) through a transmission element (13).

8. Door opener according claim 7, **characterized in that** the transmission element (13) is a toothed wheel (12).

9. Door opener according claim 7, **characterized in that** the transmission element (13) is a lever.

10. Door opener according to any of claims 7 to 9, **characterized in that** the ratio of the transmission element (13) is 1:1.

11. Door opener according to any of the preceding claims, **characterized in that** the front surface (3) of the push button (2) is flush with the bezel (17) of the door opener when the push button (2) is in the idle position (18).

12. Door opener according to any of claims 1 to 10, **characterized in that** the front surface (3) of the push button (2) protrudes from the bezel (17) of the door opener when the push button (2) is in the idle position (18).

13. Door opener according to any of the preceding claims, **characterized in that** the front surface (3) of the push button (2) extends inwards from the bezel (17) of the door opener when the push button (2) is in the first pushed-in position (9).

14. Vehicle, comprising a door opener according to any of claims 1 to 13.

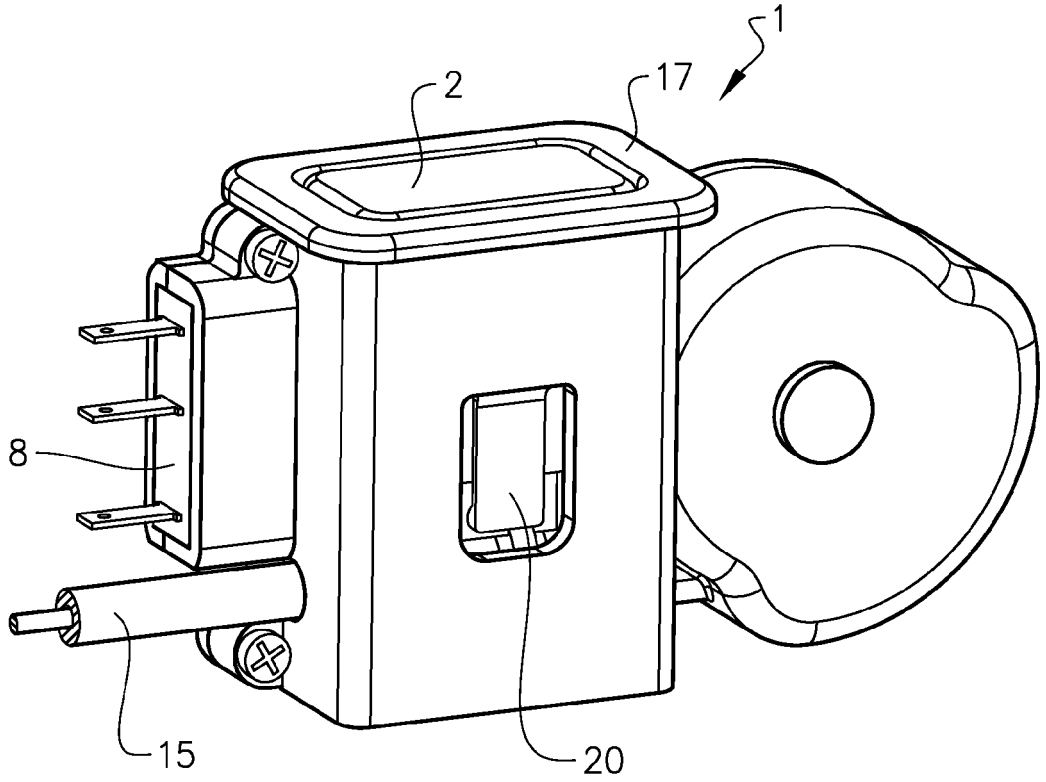

FIG. 1

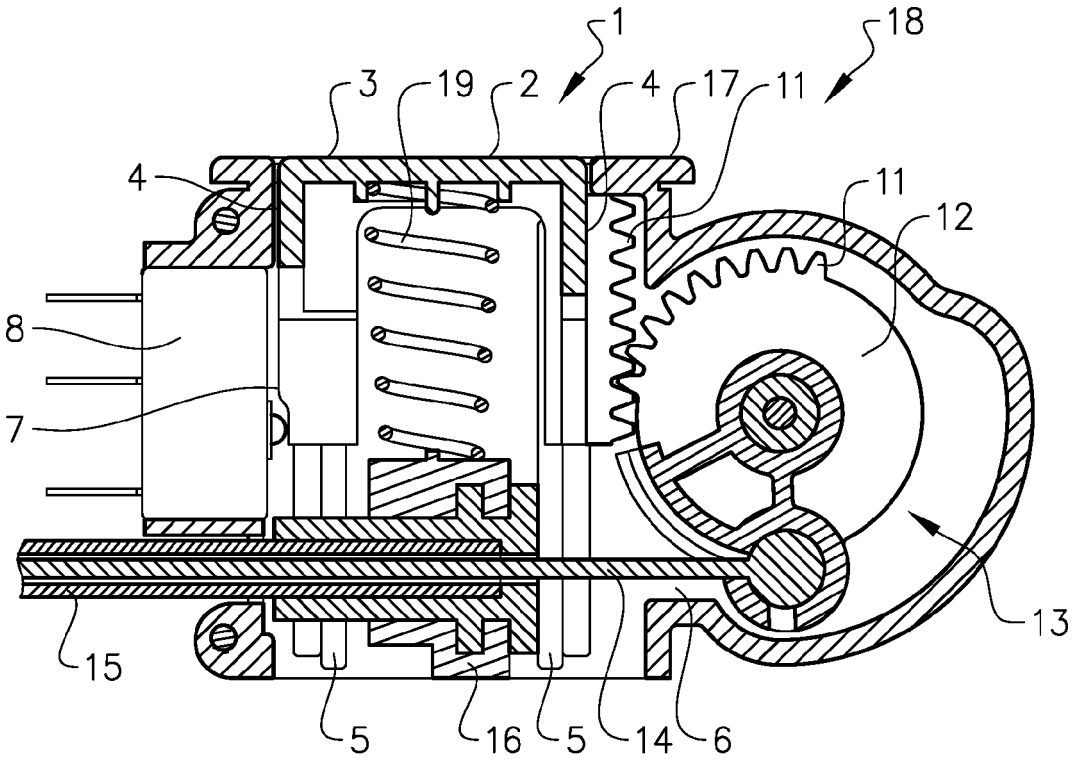

FIG. 2

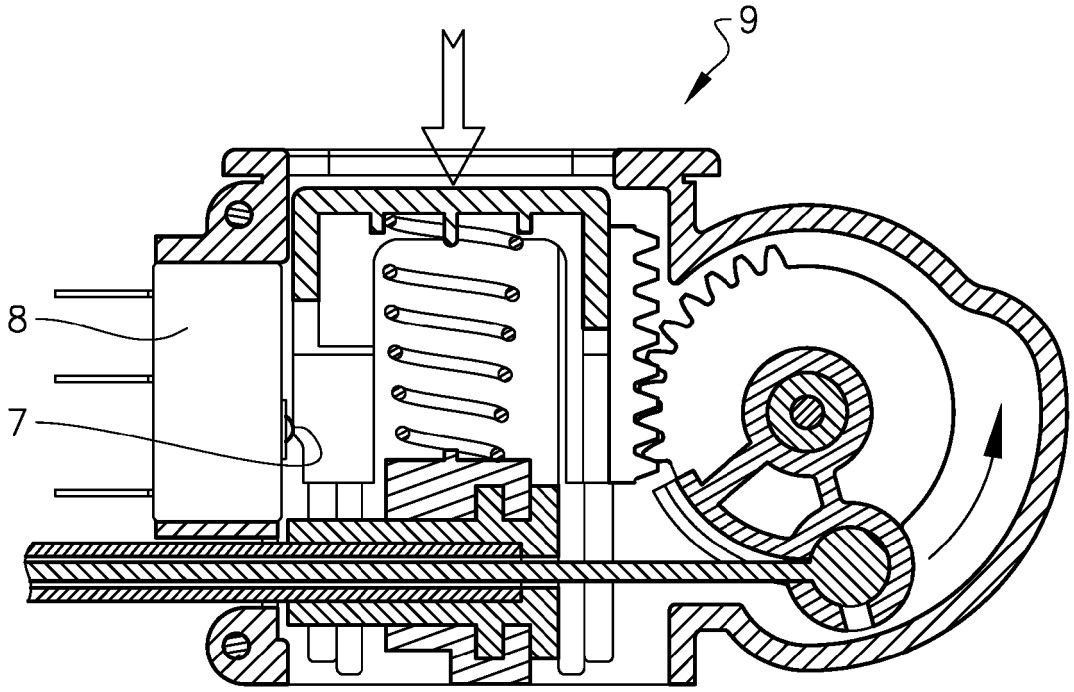

FIG. 3

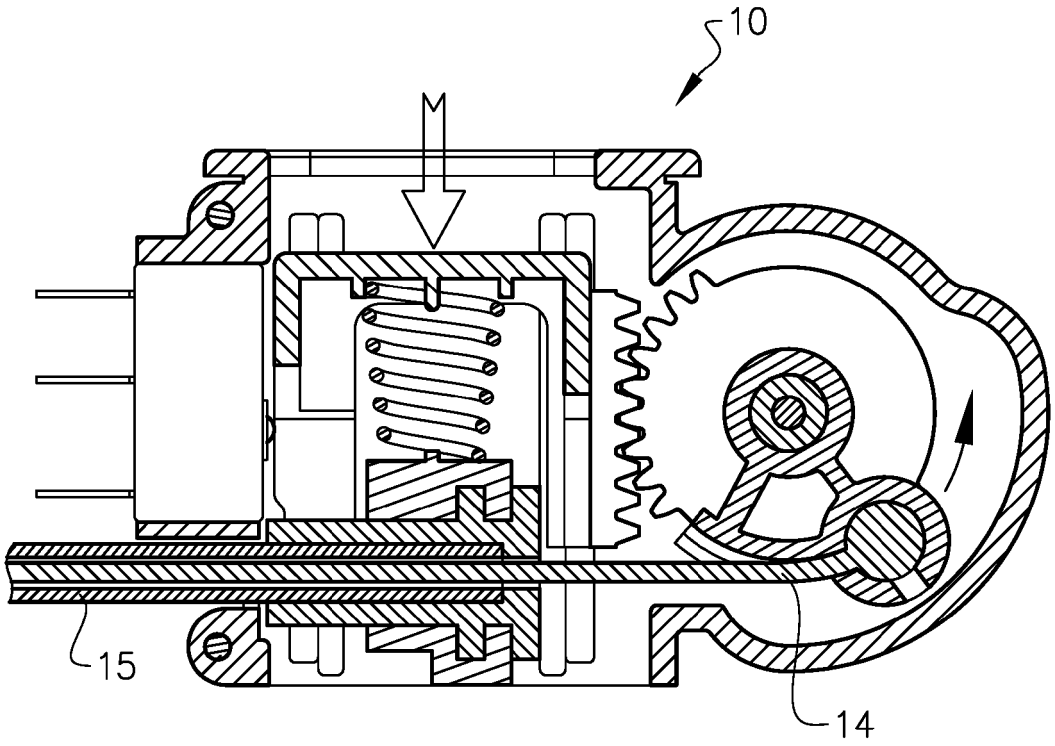

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 16 16 9830

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 October 2016	Pérez Méndez, José F

CATEGORY OF CITED DOCUMENTS

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