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(54) **Device for coupling and uncoupling an opening and closing mechanism for vehicle doors from a corresponding drive motor**

(57) The present invention relates to a device suitable for mechanisms comprising a speed reducer unit with a gear wheel geared with the motor, comprising a support plate for supporting the motor, which can rotate in both directions about a shaft integral with the speed reducer unit, and movement means for moving the support plate comprising an angular lever the resistance arm of which

comprises a first end portion, provided with a bar articulated thereto and to a point of the support plate, and a side appendage defining a second end portion, this end portion being subjected to the action of elastic means tending to move the lever towards a stable position of gearing between the gear wheel and the shaft of the motor.

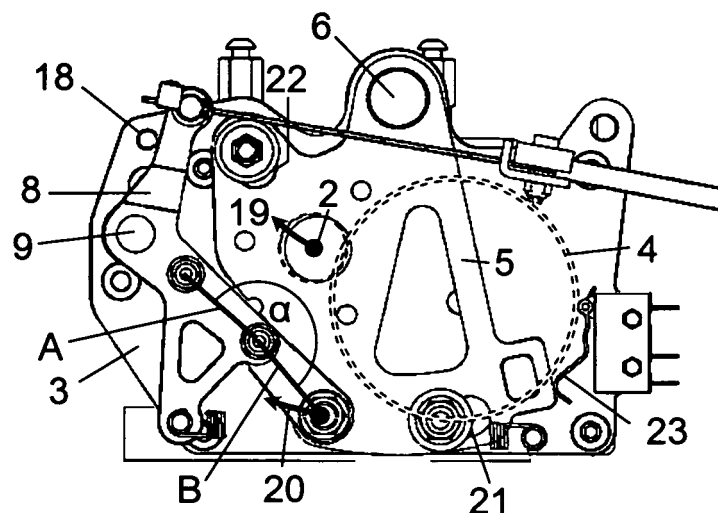


Fig. 4

Description

Technical Field of the Invention

[0001] The invention relates to a device for coupling/engaging and uncoupling/disengaging an opening and closing mechanism for vehicle doors, such as a public transport vehicle, from a corresponding drive motor, generally an electric motor.

Background of the Invention

[0002] From patent document ES 2162758, of the same applicant, an emergency mechanism for passenger vehicle doors is known, which is applicable to mechanisms comprising an electric motor, a speed reducer and a gearbox the output pinion of which is coupled to a gear wheel integral with a vertical bar on which the door is supported.

[0003] The mechanism comprises a mobile plate on which the electric motor and the speed reducer are fixed, the mobile plate being superimposed onto the gearbox and being able to rotate in both directions about a shaft by the action of actuating means, said rotation causing the radial movement of the output pinion of the speed reducer between two positions, a gearing position and an ungearing position in relation to the gearbox.

[0004] According to an embodiment, the actuating means comprise a first class lever in which the power arm is subjected to the action of a spring working permanently under traction, the fulcrum is arranged in the gearbox and the resistance arm is articulately coupled at its outer end to an end of a thrust arm the other end of which is articulately coupled to the mobile plate. The traction element of the lever is coupled at the same end of the resistance arm for its actuation.

[0005] With respect to the arrangement of the output pinion of the speed reducer and of the corresponding gear wheel of the reducer unit, the latter, which is larger in size, is arranged between the lever and the output pinion of the reducer unit.

[0006] A main objective of the present invention is to disclose an alternative solution to the variant described above, and specifically to disclose a variant which is more compact and in which the coupling between the traction element of the lever and the mentioned lever is more easily accessible.

Disclosure of the invention

[0007] The device according to the invention is of those comprising a speed reducer unit, suitable for being fixed to the chassis of the vehicle and provided with a driven gear wheel which in normal operating conditions is gear coupled with the shaft of the drive motor, the device comprising a support plate for supporting the drive motor, which can rotate in both directions about a shaft integral with the speed reducer unit, and movement means for

moving the support plate of the motor.

[0008] The device is essentially characterised in that said movement means for moving the support plate of the motor comprise a first class angular lever, actuatable from outside the device, the fulcrum of which is a rotation point fixed to the speed reducer unit and the resistance arm of which comprises a first end portion, provided with a bar articulated thereto and to a point of the support plate, and a side appendage defining a second end portion, and in that the mentioned second end portion is subjected to the action of elastic means tending to move the lever towards a stable position of coupling between the gear wheel and the shaft of the motor when it is actuated such that it causes the rotation of the support plate and consequently a side movement of the shaft of the motor, the latter being uncoupled from the gear wheel and therefore from the opening and closing mechanism.

[0009] Unlike the device known up until now, the lever is not straight but rather it is angular, it is bent, which allows an optimal location of its ends and of the corresponding components linked to the mentioned ends. Furthermore, the portion on which the elastic means and the articulated bar for the connection with the support plate act is located on the resistance arm of the angular lever, i.e., on one and the same side of the fulcrum of the angular lever.

[0010] According to another feature of the invention, in the operational position of coupling between the gear wheel of the speed reducer unit and the shaft of the drive motor, the connection line between the fulcrum of the angular lever and the articulated connection thereof with the bar and the connection line between the two articulated connections of said bar with the angular lever and with the support plate, respectively, form an angle α greater than 180° , seen from the position of the drive motor.

[0011] According to another feature of the invention, the elastic means are made up of a traction spring, connected at one of its ends to the second end portion of the resistance arm of the angular lever and at its other end to a fixed point of the speed reducer unit.

[0012] According to a variant of the invention, the device comprises actuation means for actuating the angular lever and such means comprise a traction element connected to the power arm of the lever.

[0013] In a preferred embodiment, the angular lever is bent at an angle, the fulcrum of the angular lever being arranged at the vertex of the mentioned angle, and the drive motor is fixed to the support plate such that its rotation shaft is arranged closer to the fulcrum of the angular lever than the rotation shaft about which the gear wheel rotates.

Brief Description of the Drawings

[0014] The attached drawings show, by way of a non-limiting example, an embodiment of the device according to the invention. Specifically:

Figures 1 to 3 show a sequence of the movement of the support plate when the angular lever is actuated and is rotated in a clockwise direction, the uncoupling between the motor and the gear wheel of the reducer unit occurring; and

Figure 4 is a depiction of the device in the position of coupling depicted in Figure 1, on which the positions of the gear wheel and of the rotation shaft of the motor, as well as the movement directions of the shaft of the motor and of the support plate when the angular lever is actuated have been indicated.

Detailed Description of the Drawings

[0015] A device 1 for coupling and uncoupling an opening and closing mechanism for vehicle doors from a corresponding drive motor, not shown, has been depicted in Figures 1 to 3.

[0016] The device 1 comprises a support plate 5 for supporting the drive motor, superimposed onto the reducer unit and which can rotate in both directions about a shaft 6 integral with the mentioned speed reducer unit. The device 1 further comprises movement means 7 for moving the support plate 5 of the motor, made up of a first class angular lever 8, actuatable from outside the device, the fulcrum 9 of which is a rotation point fixed to the speed reducer unit and the resistance arm 10 of which comprises a first end portion 11, provided with a bar 12 articulated thereto and to a point 12b of the support plate, and a side appendage defining a second end portion 14.

[0017] It is seen in Figures 1 to 3 that the second end portion 14 of the angular lever 8 is subjected to the action of elastic means 13 which are formed, in the example of Figures 1 to 4, by a traction spring, connected at one of its ends 13a to the mentioned second end portion 14 of the resistance arm 10 of the angular lever 8 and at its other end 13b to a fixed point of the speed reducer unit 3. These elastic means tend to move the angular lever 8 towards the stable position depicted in Figure 1 of coupling between the gear wheel of the reducer unit and the shaft of the motor when it is moved from the position depicted in said Figure 1.

[0018] The device 1 also comprises actuation means 15 for actuating the angular lever 8 comprising a traction element 17 connected to the power arm 16 of the lever, i.e., to the other side of the fulcrum in which there are located the first end portion 11 and the second end portion 14 of the angular lever connecting it with the support plate 5 and with the elastic means 13, respectively.

[0019] It is seen in Figures 1 to 4 that the angular lever is bent at an angle, the fulcrum 9 of the angular lever being arranged at the vertex of the mentioned angle, and in Figure 4 that the drive motor 2 is fixed to the support plate 5 such that its rotation shaft is arranged closer to the fulcrum 9 of the angular lever 8 than the rotation shaft about which the gear wheel 4 rotates.

[0020] When the angular lever is actuated by the traction means 17 causing its rotation in a clockwise direction,

the rotation of the support plate 5 and consequently a side movement of the shaft of the motor occurs, the motor being uncoupled from the gear wheel and therefore from the opening and closing mechanism.

5 [0021] In Figures 2 and 3 the support plate 5 of the device adopts two different positions, considerably rotated in a clockwise direction about its rotation shaft 6, when a user pulls the traction means 17 in the direction indicated by arrow 24. In this situation, as shown in Figure 10 4, the connection point between the articulated bar 12 and the support body 5 moves in the direction indicated by arrow 20 and consequently the drive motor 2 moves in the direction indicated by arrow 19 of the same Figure 4, i.e., moving away from the gear wheel 4.

15 [0022] As shown in Figure 4, it is emphasised that, in the operational position of coupling between the gear wheel 4 of the speed reducer unit 3 and the shaft of the drive motor 2, the connection line A between the fulcrum 9 of the angular lever 8 and the articulated connection 20 12a thereof with the bar 12 and the connection line B between the two articulated connections 12a and 12b of said bar 12 with the angular lever 8 and with the support plate 5, respectively, form an angle α greater than 180° , seen from the position of the drive motor 2. This relative 25 position between the articulated parts of the angular lever 8 ensures that the drive motor 2 and the gear wheel 4 remain coupled during the operation of the motor due to the interlocking effect caused by the fixed points corresponding to the fulcrum 9 of the angular lever 8 and the 30 end of the runners 21 and 22, made in the support plate 5, when it abuts against corresponding pins integral with the reducer unit.

35 Claims

1. A device (1) for coupling and uncoupling an opening and closing mechanism for vehicle doors from a corresponding drive motor (2), the mechanism being of those comprising a speed reducer unit (3), suitable for being fixed to the chassis of the vehicle and provided with a driven gear wheel (4) which in normal operating conditions is gear coupled with the shaft of the drive motor, the device comprising a support plate (5) for supporting the drive motor, which can rotate in both directions about a shaft (6) integral with the speed reducer unit, and movement means (7) for moving the support plate of the motor, **characterised in that** said movement means for moving the support plate of the motor comprise a first class angular lever (8), actuatable from outside the device, the fulcrum (9) of which is a rotation point fixed to the speed reducer unit and the resistance arm (10) of which comprises a first end portion (11) provided with a bar (12) articulated thereto and to a point (12b) of the support plate, and a side appendage defining a second end portion (14), and **in that** the mentioned second end portion is subjected to the action of elas-

tic means (13) tending to move the lever towards a stable position of coupling between the gear wheel and the shaft of the motor when it is actuated such that it causes the rotation of the support plate and consequently a side movement of the shaft of the motor, the latter being uncoupled from the gear wheel and therefore from the opening and closing mechanism.

2. The device (1) according to claim 1, **characterised in that** the operational position of coupling between the gear wheel (4) of the speed reducer unit (3) and the shaft of the drive motor (2), the connection line (A) between the fulcrum (9) of the angular lever (8) and the articulated connection (12a) thereof with the bar (12) and the connection line (B) between the two articulated connections (12a and 12b) of said bar with the angular lever and with the support plate (5), respectively, form an angle α greater than 180° , seen from the position of the drive motor.
3. The device (1) according to claim 2, **characterised in that** the mentioned elastic means (13) are made up of a traction spring, connected at one of its ends (13a) to the second end portion (14) of the resistance arm (10) of the angular lever (8) and at its other end (13b) to a fixed point of the speed reducer unit (3).
4. The device (1) according to claim 1, **characterised in that** it comprises actuation means (15) for actuating the angular lever (8) and **in that** such means comprise a traction element (17) connected to the power arm (16) of the lever.
5. The device (1) according to the previous claims, **characterised in that** the angular lever (8) is bent at an angle, the fulcrum (9) of the angular lever being arranged at the vertex of the mentioned angle, and **in that** the drive motor (2) is fixed to the support plate (5) such that its rotation shaft is arranged closer to the fulcrum of the angular lever than the rotation shaft about which the gear wheel (4) rotates.

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Fig. 1

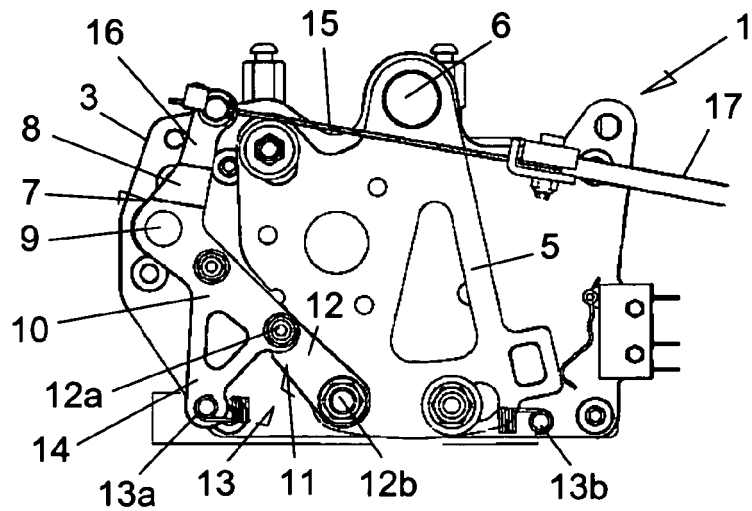


Fig. 2

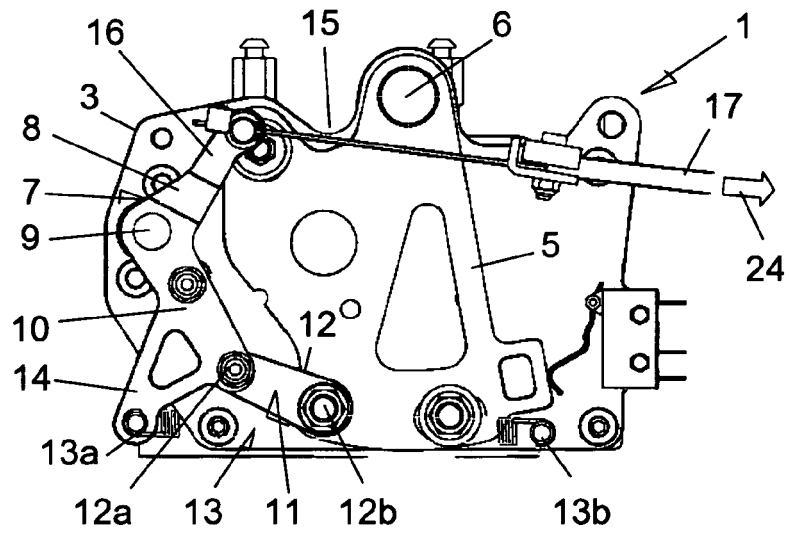
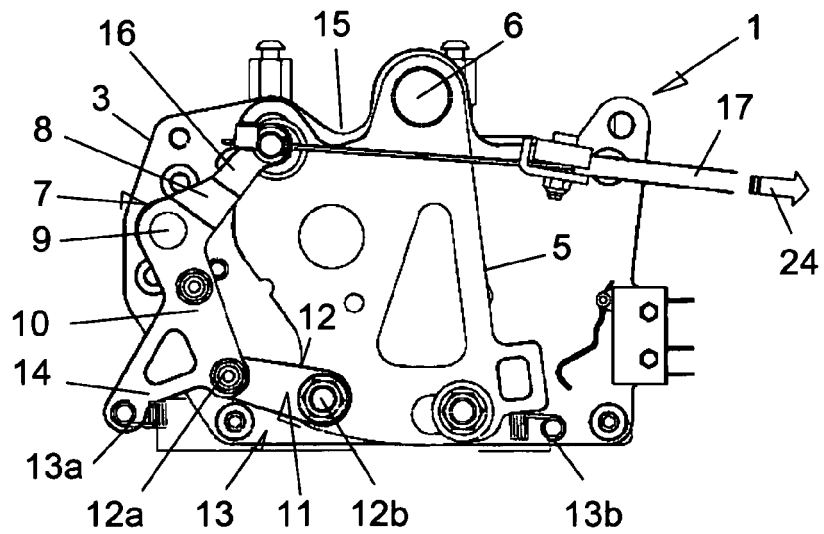


Fig. 3



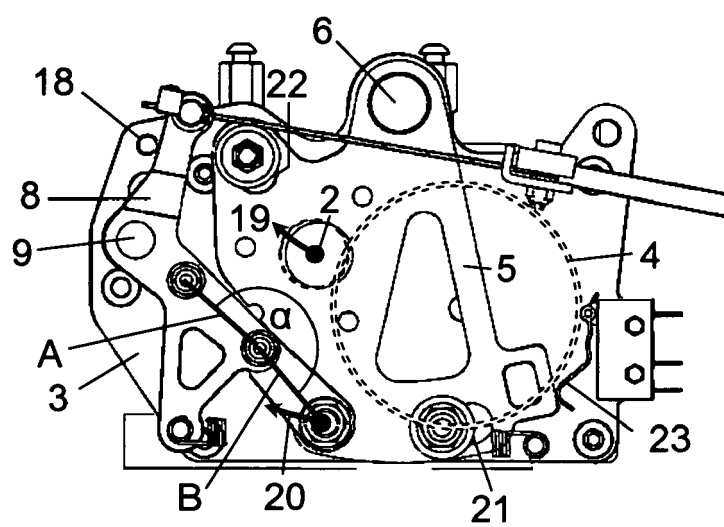


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- ES 2162758 [0002]