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(54) **CLOSURE DEVICE FOR DOORS**

(57) The invention relates to a closure device for doors, comprising: a bolt (2) made of ferromagnetic material provided with a spring (21) pushing it to a retracted position; and an electric door opener (1) comprising: a rotary latch (11) provided with a rear body (111) and with a front body (112) the height of which can be adjusted, fixed to a front face of the rear body (111), an electromechanical mechanism for the locking and unlocking of the latch in a closing position, and magnetic means which are located in a visible position on the front face of the front body (112) of the latch and are directly opposite the movable bolt (2), without any element interposed between same, in the closing position of the door, moving said bolt (2) into a front cavity (113) of the front body (112) of the latch (11).

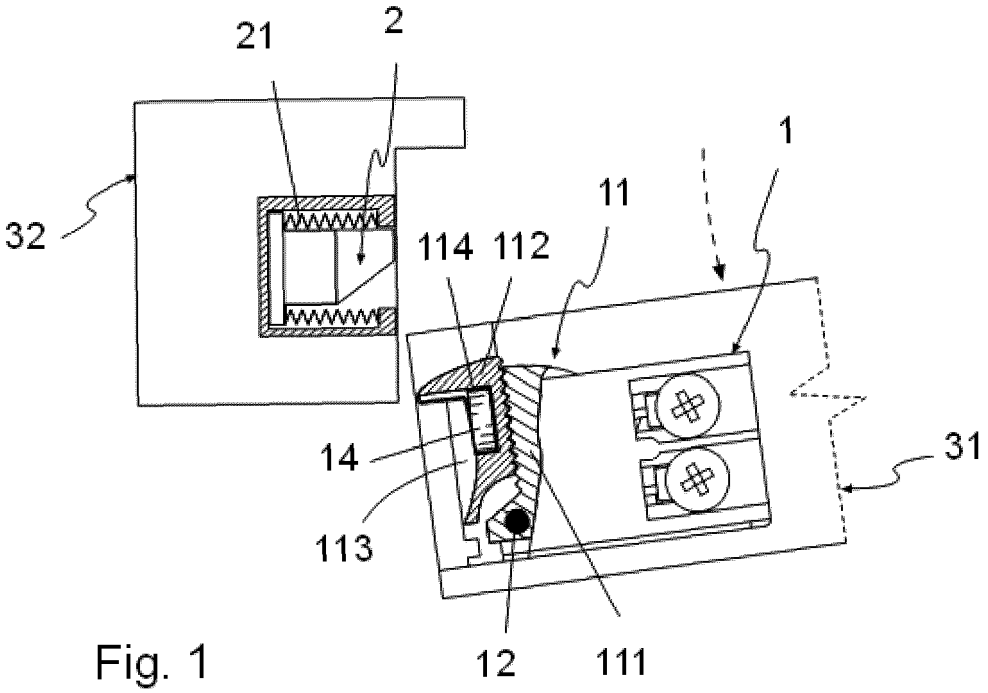

Fig. 1

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Description

Technical field

[0001] The present invention relates to a closure device for doors, applicable in the sector of the locks operated by electrical or magnetic means.

Prior art

[0002] Closure devices for doors comprising a movable bolt and an electric door opener, assembled in opposite positions in the frame and in the leaf of a door are currently known on the market.

[0003] In some known devices, the mentioned movable bolt is a spring-loaded bolt which is kept by the spring in a retracted position, out of the path of the door; the electric door opener comprising: a latch, an electromechanical mechanism locking the latch in a closing position and unlocking the latch when electrically operated, allowing it to rotate to an opening position.

[0004] The mentioned latch comprises a rear body assembled on a rotating shaft and a front body fixed to a front face of the rear body by means of screws, with the possibility of being released and the height adjusted with respect to said rear body.

[0005] The front body of the latch defines a front cavity for housing and holding the bolt in the closing position of the door.

[0006] As indicated, the bolt, made of a ferromagnetic material, has a spring that tends to keep it in a retracted position while the door leaf is kept open.

[0007] In turn, the door opener incorporates a magnet arranged between the front body and the rear body of the latch. In the closing position of the door, said magnet magnetically attracts the bolt, overcoming resistance of the spring that tends to keep it in the retracted position; said bolt being housed in the front cavity of the front body of the latch of the door opener.

[0008] In this position, the door leaf is kept locked in the closing position until the door opener is electrically operated, causing the unlocking of the latch of the door opener, which allows said latch to be able to rotate to the rear area so as to be released from the bolt and to allow the opening of the door.

[0009] The arrangement of the magnet between the front body and the rear body of the latch poses numerous drawbacks, among which the following can be mentioned: the need to use a strong magnet to move the bolt taking into account that in addition to the resistance offered by the spring that tends to keep it in the retracted position, said magnet is arranged behind the front body of the latch, which reduces its attractive capacity and increases the distance existing between said magnet and the bolt in the retracted position.

[0010] Another drawback of this closure device is that the magnet is housed at least partially in a hole or recess defined in the rear body of the latch, which prevents said magnet from moving in height together with the front body and may cause misalignment of the magnet with the bolt when adjusting the height of the front body of the latch; a stronger magnet must be used to ensure the movement of the bolt to the locking position in the closing position of the door, and this involves a higher manufacturing cost for the closure device.

Disclosure of the invention

[0011] The closure device for doors object of this invention, which is of the type mentioned above and described in the preamble of the first claim, has technical features providing a series of advantages, among which the following can be included: it ensures effective operation of the closure device using less strong, and therefore lower cost magnetic means; and a perfect alignment of said magnetic means with the movable bolt, regardless of whether the front body of the latch is arranged at a greater or lesser height with respect to the rear body of said latch while the closure device is assembled and fitted.

[0012] This closure device for doors is of the type comprising a movable bolt made of ferromagnetic material and a door opener, both intended to be assembled in the frame and in the leaf of a door, such that they are opposite one another in the closing position of the door; arranging the bolt of a spring moving it to a retracted position, out of the path of the door leaf; and the electric door opener comprising: a rotary latch provided with a rear body assembled on a rotating shaft and with a front body provided with a front cavity and fixed to the rear body, with the possibility of the height being adjusted by means of screws; an electromechanical mechanism for the locking and unlocking of the latch in a closing position; and magnetic means which magnetically attract the bolt to a closing position, housing it in the front cavity of the latch, in the closing position of the door leaf.

[0013] According to the invention, in order to achieve the proposed objectives, this closure device for doors has the particularity that the magnetic means, which are in charge of moving the bolt into the front cavity of the latch, are located in a visible position on the front face of the front body of the latch in the closing position of the leaf and are directly opposite the movable bolt, without any element interposed between same, in the closing position of the door leaf.

[0014] This arrangement of the magnetic means on the front face of the front body of the latch provides various advantages, among which the following should be mentioned: the reduction of the distance existing between the magnetic means and the movable bolt when the door is in the closing position; the possibility of using less strong, and accordingly lower cost magnetic means for moving the bolt into the latch, which involves a lower manufacturing cost for the closure device and the magnetic means being moved together with the front body of the latch when the height thereof is adjusted with respect

to the rear body of the latch of the door opener, therefore being kept aligned with the bolt once the height of the position of the front body of the latch is adjusted.

[0015] Another advantage of the invention is the possibility of replacing the front body of the latch carrying the magnetic means and the application thereof in other already existing door openers.

[0016] According to the invention, the front body of the latch has at least one recess at the bottom of the front cavity for housing at least one magnet making up the aforementioned magnetic means. Said recess of the front body has a depth equal to or greater than the thickness of the magnet or magnets housed therein, such that each magnet is flush or slightly penetrating with respect to the bottom of the front cavity of the front body of the latch.

[0017] According to the invention, each magnet is fixed inside the corresponding recess of the front body of the latch by means of an adhesive product or by means of press fitting.

[0018] In one embodiment of the invention, the door opener comprises at least two magnets arranged at the same height in the front body of the latch and aligned in a direction parallel to the rotating shaft of said latch, increasing the surface of the bolt subjected to the magnetic fields of said magnets.

Brief description of the content of the drawings

[0019] To complete the description that is being given and for the purpose of facilitating comprehension of the features of the invention, a set of drawings is attached to the present specification in which the following has been depicted in an illustrative and non-limiting manner:

- Figure 1 shows a schematic top plan view of the closure device for doors of the invention, partially sectioned, with the bolt and the door opener assembled in opposite positions in the frame and in the leaf of a door, said door having been depicted in the open position.

- Figure 2 shows a view similar to the preceding figure, with the door in the closed position.

- Figure 3 shows a perspective view of the door opener of the closure device of the preceding figures.

- Figure 4 shows a perspective view of the door opener of the preceding figure, with the front body of the latch, the set screws thereof and the magnetic means detached from the rest of the door opener.

- Figure 5 shows a front elevational view of the door opener.

Detailed disclosure of embodiments of the invention

[0020] In Figures 1 and 2, the closure device for doors comprises a door opener (1) assembled in this case in the leaf (31) of a door and a bolt (2) assembled in the door frame (32), such that the door opener (1) and the bolt (2) are arranged opposite one another in the closing position of the door as shown in Figure 2.

[0021] The bolt (2) has a spring (21) moving it to a retracted position, out of the path of rotation of the leaf, when the door is open as shown in Figure 1.

[0022] The door opener (1) has a rotary latch (11) comprising a rear body (111) assembled on a rotating shaft (12) and a front body (112), the height of which can be adjusted, fixed to a front face of the rear body (111) by means of screws (13).

[0023] Said door opener (1) internally comprises a (non-depicted) electromechanical mechanism for the locking and unlocking of the latch (11) in a closing position.

[0024] The front body (112) of the latch defines a front cavity (113) for receiving the bolt (2) in the closing position of the door depicted in Figure 2, and two recesses (114) at the bottom of said front cavity (113) in which there are housed and fixed respective magnets (14) making up the magnetic means which are in charge of moving the bolt (2) into the front cavity (113) of the latch, overcoming resistance of the spring (21), when the door reaches the closing position shown in Figure 2.

[0025] In said position, the door leaf (31) is locked by the bolt and rotation disabled, and when the door opener (1) is electrically operated, the latch (11) is unlocked, allowing it to rotate to the rear area so as to be released from the bolt (2), allowing the opening of the door.

[0026] In the time the opening of the door takes place, the bolt (2) returns to the retracted position, shown in Figure 1, by the action of the spring (21).

[0027] Said magnets (14) are aligned in a direction parallel to the rotating shaft (12) of the latch (11) and are kept in a visible position on the front face of the front body (112) of the latch, as shown in Figure 5, directly opposite the bolt (2), without the interposition of any element, when the door reaches the closing position.

[0028] In the example shown, the recesses (114) have a height approximately equal to the thickness of the magnets (14) such that the latter are virtually flush with the bottom of the front cavity (113) of the front body (112) and do not constitute any impediment for operation of the door opener (1).

[0029] In the example shown, the magnets (14) are fixed inside the recesses (114) by means of an adhesive product, although use of other suitable fixing means, for example the press fitting thereof in said recesses (114), is not ruled.

[0030] Having sufficiently described the nature of the invention as well as a preferred embodiment thereof, it is hereby stated for all relevant purposes that the materials, shape, size and arrangement of the described elements may be modified provided that it does not represent an alteration of the essential features invention which are claimed below.

Claims

1. A closure device for doors; comprising:

    - a movable bolt (2) made of ferromagnetic material, assembled in the door frame (32), and provided with a spring (21) pushing it to a retracted position and,
    - an electric door opener (1) assembled in the door leaf (31), opposite the bolt (2) and comprising:

        - a rotary latch (11) provided with a rear body (111) assembled on a rotating shaft (12), and with a front body (112), fixed to a front face of the rear body (111), the height of which can be adjusted by means of screws (13), and defining a front cavity (113);
        - an electromechanical mechanism for the locking and unlocking of the latch in a closing position; and
        - magnetic means which magnetically attract the bolt (2) to a locking position inside the front cavity (113) of the latch (11) of the door opener (1) in the closing position of the door;

    characterised in that the magnetic means, which are in charge of moving the bolt (2) into the front cavity (113) of the latch (11), are located in a visible position on the front face of the front body (112) of the latch in the closing position of the door and are directly opposite the movable bolt (2), without any element interposed between same, in the closing position of the door.

2. The closure device according to claim 1, **characterised in that** the front body (112) of the latch (11) has at least one recess (114) at the bottom of the front cavity (113) in which there is fixed at least one magnet (14) making up the magnetic means.

3. The closure device according to claim 2, **characterised in that** each recess (114) of the front body (112) of the latch (11) has a depth equal to or greater than the thickness of the magnet (14) housed therein, said magnet (14) being flush or penetrating with respect to the bottom of the front cavity (113) of said front body (112).

4. The closure device according to claim 2, **characterised in that** each magnet (14) is fixed inside the corresponding recess (114) of the front body (112) of the latch by means of an adhesive product, or by means of press fitting.

5. The closure device according to one of claims 2 or 3, **characterised in that** the door opener comprises at least two magnets (14) arranged at the same height in the front body (112) of the latch (11) and aligned in a direction parallel to the rotating shaft (12) of the latch (11).

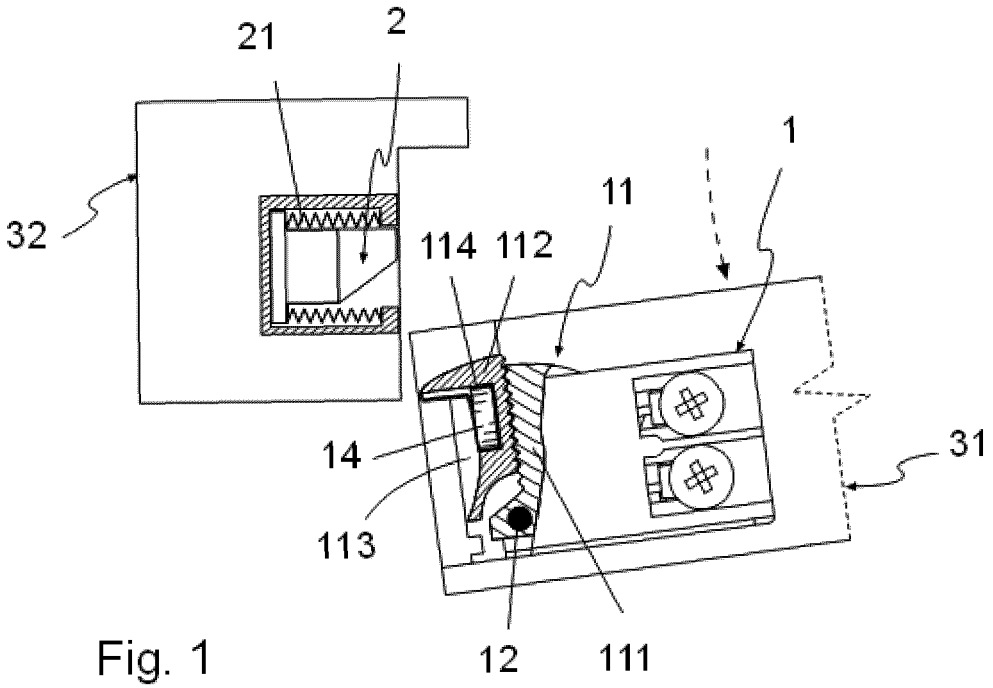

Fig. 1

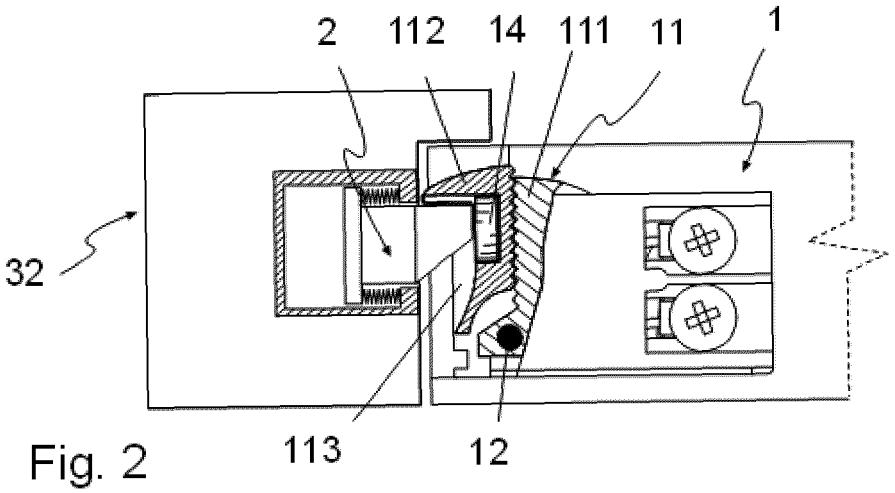

Fig. 2

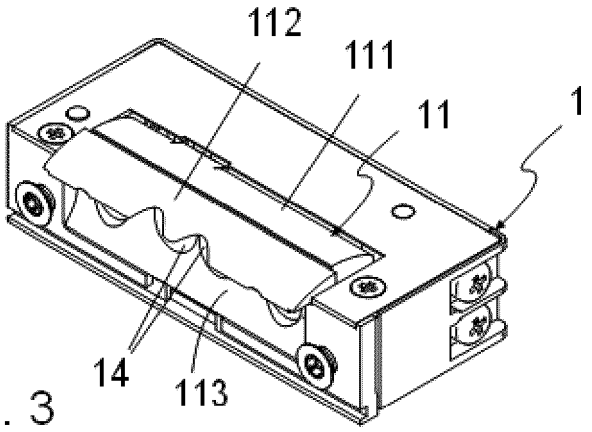

Fig. 3

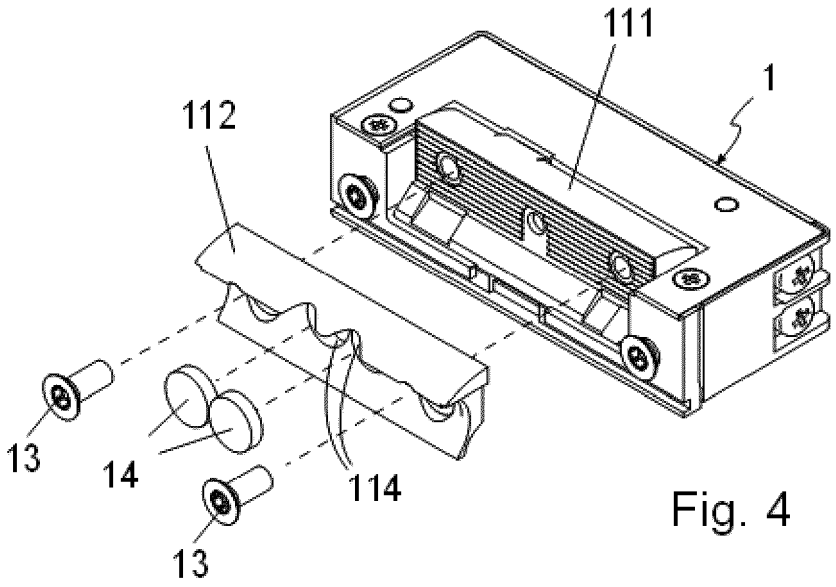

Fig. 4

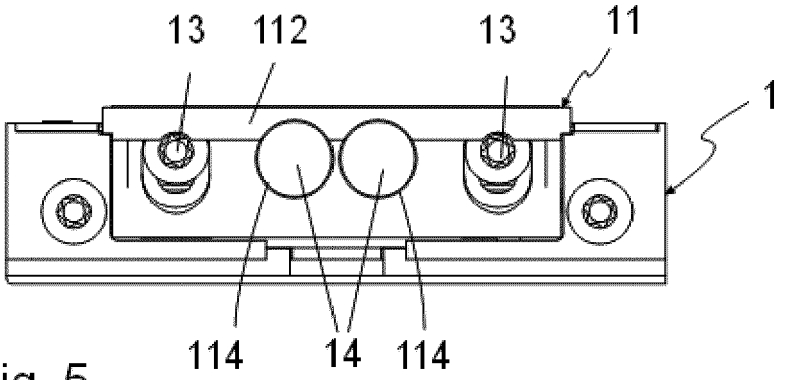

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 22 38 2177

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 2 543 797 A2 (ASSA ABLOY SICHERHEITSTECHNIK) 9 January 2013 (2013-01-09) * the whole document *	1-5	INV. E05B47/00 E05C19/16
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A	CN 110 847 715 A (LIUZHOU VOCATIONAL & TECHNICAL COLLEGE) 28 February 2020 (2020-02-28) * figures 8,9 *	1	

TECHNICAL FIELDS SEARCHED (IPC)

E05B
E05C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 August 2022	Van Beurden, Jason

CATEGORY OF CITED DOCUMENTS

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12-08-2022

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