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(54) **Handle return device**

(57) A handle return device (1) for a door, main entrance, gate and the like, comprises an operating lever (2), having an insertion end (3), and a seating enclosure (5) wherein said insertion end (3) is arranged, said operating lever (2) being suitable for being operatively connected to opening/closing means suitable for allowing the opening and closing of aid door and said device (1)

further comprising an elastic element (10) connected to said insertion end (3) and arranged in said seating enclosure (5), for elastically returning said operating lever (2) and said elastic element (10) comprising a plurality of coils (11) axially packed, so as to reduce the overall dimensions of said device (1).

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## Description

**[0001]** The object of the present invention is a handle return device for a door, main entrance, gate and the like.

**[0002]** Several handle return devices exist; they usually comprise a handle which exhibits an operating end of standard size, that is, in accordance with the field, which cooperates with a washer enclosure and with return means for said handle, usually contained in the washer.

**[0003]** Recently, the need of a return to simple and sober shapes and design of handle return devices and of handles in general has been greatly felt.

**[0004]** However, the devices known in the field exhibit the disadvantage of having excessive overall dimensions, especially due to the handle return means, which are seated in the washer.

**[0005]** The object of the present invention is to provide a handle return device for a door, main entrance, gate and the like which should overcome the disadvantages mentioned with reference to the prior art.

**[0006]** Such object is achieved by a device according to the following claim 1. The dependent claims describe embodiment variations.

**[0007]** The features and advantages of the device according to the present invention will appear more clearly from the following description, made by way of an indicative and non-limiting example with reference to the annexed figures, wherein:

**[0008]** - figure 1 shows a perspective exploded view of a device according to the present invention;

**[0009]** - figure 2 shows a side partly section view of the device of figure 1; and

**[0010]** - figure 3 shows a front view of the device of figure 1.

**[0011]** In accordance with the annexed figures, reference numeral 1 globally indicates a handle device for a door and the like.

**[0012]** In accordance with the present invention, the handle return device 1 for a door, main entrance, gate and the like comprises an operating lever 2, to actuate said device and further allow opening and closing said door. In fact, the operating lever 2 is suitable for being operatively connected to opening/closing means, suitable for respectively opening and closing said door.

**[0013]** Favourably, the operating lever 2 is made in any desired shape, suitable for making an actuating device for door opening/closing means, such as a rectilinear cylindrical handle, a curvilinear handle, an "L" shaped handle, a "T" shaped handle, an ergonomic handle, a knob and further similar shapes, or more complex shapes or combinations of said shapes thereof.

**[0014]** The operating lever 2 exhibits an insertion end 3, for example cylindrical; the operating lever 2 in fact is suitable for being rotated about an axis X of rotation for influencing said opening/closing means by said insertion end 3.

**[0015]** In accordance with the present invention, de-

vice 1 is suitable for carrying out an automatic return of said operating lever 2 from angular open position, wherein said operating lever 2 influences said opening/closing means for allowing opening said door, to an angular closed position wherein said operating lever 2 influences said opening/closing means for preventing opening said door.

**[0016]** Favourably, the operating lever 2 is in horizontal position when it is in said angular closing position.

**[0017]** Moreover, according to the present invention device 1 comprises elastic means 10 connected to the insertion end 3 and suitable for elastically influencing the operating lever 2, for returning the operating lever 2 itself from said angular open position to said angular closed position, for example when said operating lever 2 is rotated.

**[0018]** In accordance with the present invention, the elastic means comprise an elastic element 10 comprising a plurality of coils 11 axially overlapped to one another, to obtain a desired elasticity of said elastic means; in other words, the overlapped coils 11 form a substantially cylindrical structure, whose height is preferably equal to about the sum of the thickness of each coil 11 (figure 1).

**[0019]** According to a preferred embodiment, coils 11 are three.

**[0020]** According to a further preferred embodiment, coils 11 have a substantially equal diameter.

**[0021]** Favourably, in fact, the diameter of each coil 11 is standardised as compared to the diameter of the insertion end 3 of the operating lever 2; in fact, the radial dimensions of the insertion end 3 are predetermined in accordance with the technical regulations of the field.

**[0022]** The diameter of each coil 11 therefore is complementary to the diameter of the insertion end 3, that is, each coil 11 can be axially connected to the insertion end 3 by insertion.

**[0023]** In other words, the elastic element 10 has a diameter suitable for being connected to the standard insertion ends 3 and moreover, it exhibits elasticity variable as desired, and in any case made appropriate to the use by the possible selection of the number of coils 11 by the user.

**[0024]** According to a preferred embodiment, the elastic element 10 is arranged, or fitted, outside the insertion end 3 (figure 1).

**[0025]** According to an alternative embodiment, the elastic element 10 is inserted into said insertion end 3.

**[0026]** Favourably, coils 11 of the elastic element 10 comprise a first coil 111 which exhibits first hooking means 12 suitable for hooking on said insertion end 3. Preferably, the first hooking means 12 are shaped as a hooking tooth that extends towards the centre of the coil itself, for example obtained by a free end of the first coil 111, radially twisted inwards of the coil itself. Favourably, the first hooking means 12 rest on the bottom of the hooking slot 4 when they are coupled to the insertion end 3 (figure 1, 2).

**[0027]** Moreover, coils 11 also comprise a last coil 211

carrying first cooperation means 13 for obtaining said return of said operating lever 2.

**[0028]** In accordance with the present invention, device 1 comprises a seating enclosure 5 suitable for being associated to said door and connectable to a washer 25 for example through threading.

**[0029]** The seating enclosure 5 exhibits a first aperture 6 or window, preferably circular and with a diameter complementary to said insertion end 3; in fact, in the normal use of the present invention, the first aperture 6 is suitable for axially receiving, or it couples with, the insertion end 3.

**[0030]** The seating enclosure 5 is provided with a second aperture 7, arranged substantially opposite the first aperture 6 and with a substantially circular shape as well.

**[0031]** In fact, the second aperture 7 is suitable for allowing the operating connection between the insertion end 3 and the tightening means.

**[0032]** Favourably, the seating enclosure 5 also exhibits a first hooking seat 8 and a second hooking seat 9, separate from said first hooking seat 8; said hooking seats are intended for obtaining the connection and stop of the elastic means 10, as illustrated hereinafter.

**[0033]** In fact, the elastic element 10 is inserted in the seating enclosure 5, for example it is axially inserted through the second aperture 7 and fitted on the insertion end 3, inserted in advance in the seating enclosure 5 through the first aperture 6. When the operating lever 2 is in the angular open position, the elastic element 10 preferably is in rest position, that is, it is not deformed, whereas when the operating lever 2 is rotated, the elastic element 10 is elastically deformed, or it is in operating position, as described hereinafter.

**[0034]** The elastic element 10 is connected by an end portion thereof to a corresponding hooking portion of the insertion end 3.

**[0035]** In fact, the insertion end 3 exhibits a plurality of hooking slots 4 (figure 1).

**[0036]** Preferably, the hooking slots 4 are longitudinal hooking slots 4, substantially parallel to axis X of said insertion end 3.

**[0037]** According to a preferred embodiment, the first hooking means 12 are suitable for connecting to at least one of said hooking slots 4 of said insertion end 3.

**[0038]** The first cooperation means 13 are suitable for interfering with said first hooking seat 8 of said seating enclosure 5 for carrying out said return of said operating lever 2.

**[0039]** In fact, the first hooking seat 8 has a size substantially complementary to said first cooperation means 13, as it is preferably made with dimensional tolerances that allow a minimum clearance of said first cooperation means 13, when they are inserted in the first hooking seat 8. Preferably, in fact, the first cooperation means 13 are shaped as a hooking tooth that extends inwards of the coil itself, for example obtained by a free end of coil 211, radially twisted inwards of the coil itself (figure 1).

**[0040]** Since coils 11 are axially packed on top of each other, the first coil 111 is arranged in position axially op-

posite the last coil 211 (figure 1, 2).

**[0041]** Preferably, therefore, the first coil 111 which cooperates with the insertion end 3 and the last coil 211, which cooperates with the first hooking seat 8, have equal radial dimensions and are arranged axially on top of one another, advantageously comprising further coils 11 between them; since the dimensions of the insertion end 3 are predetermined by the technical regulations of the field, also coils 11, the first coil 111, and the last coil 211 of the elastic element 10 substantially have dimensions similar to the insertion end 3, while maintaining the desired elastic features to have optimum arrangement of the operating lever 2, that is, for an effective return of the operating lever 2 into position, thanks to the plurality of coils 11 themselves.

**[0042]** Favourably, therefore, said seating enclosure 5 exhibits the first hooking seat 8, suitable for interfering with the first cooperation means 13 for carrying out the return of the operating lever 2.

**[0043]** In fact, by the hooking slots 4, the twisting torque provided by the user to the operating lever 2 for moving the lever itself in angular open position, is transmitted from the insertion end 3 to the first coil 111 of the elastic element 10, which elastically deforms, that is, is in operating position; the elastic deformation, and thus the elastic energy provided by the twisting of first coil 111, is transmitted to the intermediate coils 11 up to the last coil 211, which interferes with the first hooking seat 8, which in turn acts as a resisting element: in fact, when the operating lever 2 is not stressed in rotation anymore, the elastic element 10 recovers the elastic deformation and the elastic energy is transmitted again from the elastic element 10 to the operating lever 2, thus causing a further twisting torque, opposite the previous one, which returns the operating lever 2 to the angular closed position.

**[0044]** To obtain this it is therefore important that the first coil 111 and the last coil 211 are respectively constrained to two separate elements, for example the insertion end 3 and the seating enclosure 5 as described hereinbefore, so that the twist can effectively propagate along the elastic element 10 and the elastic energy required to return the operating lever 2 accumulates in the elastic element 10 itself as elastic twisting deformation of the coils. As said, once the elastic element is not stressed in twisting anymore, the elastic energy is "returned" by the elastic element 10 itself to the operating lever 2; the elastic element 10 is at rest again, that is, in non-deformed configuration.

**[0045]** In accordance with a preferred aspect of the present invention, the seating enclosure 5 comprises a seat 14 of substantially cylindrical shape and of dimensions complementary to said elastic element 10 and which seats said elastic element 10 for preventing a twisting movement of said elastic element 10 relative to its axis X, when said operating lever 2 is made to rotate (figure 1, 2).

**[0046]** Favourably, seat 14 extend inside the seating enclosure 5, along axis X of rotation of the operating lever

2.

**[0047]** In fact, when the elastic element 10 is elastically deformed, it tends to twist, that is, to bend exiting from the twisting plane, that is, to move from its central axis X when it is twisted. Seat 14, by the inner surface thereof, acts as a guide for the elastic element, preventing undesired movements thereof during the rotation.

**[0048]** Preferably, the elastic element 10 comprises a torsion spring 10 which develops longitudinally along axis X of rotation of said operating lever 2.

**[0049]** Favourably, axis X of rotation of said operating lever 2 is the axis about which said insertion end 3 develops.

**[0050]** Device 1 preferably comprises stopping means 15 or spring holders, for example of substantially annular shape and suitable for cooperating with the seating enclosure 5 and with the insertion end 3, for delimiting the angular stroke of the operating lever 2 (figure 1).

**[0051]** Preferably, the stopping means 15 are arranged coaxially on said insertion end 3, blocking the elastic means and thus the elastic element 10 into the seating enclosure 5 (figure 3).

**[0052]** In accordance with an embodiment of the invention, the stopping means 15 rest on the elastic element 10 for axially blocking the elastic element 10 in said seating enclosure 5 (figure 3).

**[0053]** Favourably, the seating enclosure 5 exhibits the second hooking seat 9, separate from the first hooking seat 8 and suitable for interfering with the stopping means 15, for delimiting the angular stroke of said operating lever 2.

**[0054]** In fact, the stopping means 15 comprise first hooking teeth 16 arranged on the inner perimeter of said stopping means 15, for example two hooking teeth radially projecting towards the centre of the stopping means 15.

**[0055]** The first hooking teeth 16 are suitable for being hooked to the hooking slots 4 of said operating lever 2, for rotating the stopping means 15 along with the operating lever 2 (figure 3).

**[0056]** In fact, the hooking teeth 16 are preferably arranged complementary to the hooking slots 4: for example, if the hooking slots 4 are obtained in a respectively diametrically opposite position on said insertion end 3, also the hooking teeth 16 will be provided in respectively diametrically opposite position on said stopping means 15, for example they will be two hooking teeth 12 inserted into two hooking slots 4 (figure 3).

**[0057]** Preferably, moreover, the stopping means 15 comprise at least a second hooking tooth 17 arranged on the outer perimeter of the stopping means 15, for example projecting outwards in radial direction.

**[0058]** The second hooking tooth 17 is suitable for being inserted in the second hooking seat 9 of said seating enclosure 5 for sliding in the hooking seat 9 itself when said operating lever 2 is made to rotate, so that the angular stroke of the operating lever 2 is delimited by the angular stroke of said second hooking tooth 17 into said

second hooking seat 9 (figure 3).

**[0059]** Favourably, the second hooking seat 9 exhibits a first abutment surface 19 and a second abutment surface 20 substantially opposed in said hooking seat 9 and suitable for delimiting the angular stroke of said second hooking tooth 17 inside said hooking seat 9 (figure 3).

**[0060]** In fact, the second hooking tooth 17 abuts on the first abutment surface 19 when said operating lever 2 is in angular closed position, so that the elastic element 10 is constantly preloaded in said angular closed position.

**[0061]** Moreover, the second hooking tooth 17 abuts on the second abutment surface 20 when the operating lever 2 is in said angular open position.

**[0062]** Moreover, device 1 comprises locking means 18, such as a stopping ring, a snap ring and the like, suitable for axially locking said stopping means 15 in said seating enclosure 5; for example, the snap ring is fitted on the insertion end 3 and keeps the stopping means 15 locked inside the seating enclosure 5 (figure 1, 3).

**[0063]** Favourably, moreover, the seating enclosure 5 comprises a rest surface 21, for associating the seating enclosure 5 itself to the door; favourably, seat 14 projects from the rest surface 21.

**[0064]** Preferably, the rest surface 21 exhibits hooking holes suitable for cooperating with screw means, for fixing device 1 to the door and the like (figure 1).

**[0065]** Favourably, the rest surface 21 is obtained in any desired shape, for example circular, rhomboid, square, rectangular, elongated rectangular and the like.

**[0066]** Innovatively, the device allows obtaining a seating enclosure which has very reduced overall volumetric dimensions, that is, suitable for seating the insertion end and the elastic element associated thereto; in fact, since the elastic element exhibits coils of radial dimensions substantially complementary and similar to those of the insertion end, the overall dimensions of the enclosure are advantageously minimised for said radial dimensions.

**[0067]** According to a further advantageous aspect thereof, the device allows reducing the overall dimensions of the enclosure, without impairing the elasticity of the elastic return means of the operating lever; in fact, the elastic element comprised in the elastic means exhibits a plurality of coils arranged axially adjacent; in this way, the desired elasticity is predetermined and in any case it is easily obtained thanks to a predetermined number of coils connected to each other in the elastic element and axially overlapped and at the same time, the radial overall dimensions of the coils are considerably reduced, as they are equal to the radius of the coils themselves, irrespective of the number of coils themselves. In this way, for example it is possible to considerably reduce the thickness of the washer or of the seating enclosure.

**[0068]** In fact, advantageously, the first coil that hooks to the insertion end has the same diameter as the last coil that interferes with the seating enclosure and sub-

stantially similar to the diameter of the insertion end; in this way, the required elasticity of the elastic element is advantageously ensured and obtained, with a considerable reduction of the overall dimensions of the elastic element itself.

[0069] Advantageously, as said, the reduced overall dimensions of the elastic element allow considerably reducing also the overall dimensions of the enclosure.

[0070] Advantageously, therefore, a device of reduced dimensions is obtained, which meets aesthetic requirements and with a refined and minimalist design and which exhibits sober, flat and simple shapes, even for handles of reduced sizes or knobs. In fact, surprisingly, the device has the elastic element 10 of the same dimensions as the inner coil of the elastic elements of the devices known in the art, while exhibiting reduced overall volumetric dimensions and at the same time an effective return elasticity for the operating lever.

[0071] In fact, the elastic element effectively "supports" the operating lever in the angular closed position thereof, thanks to the fact that multiple axially packed coils are provided.

[0072] Advantageously, the provision of the seating enclosure allows an effective control and restriction of the undesired movements and of the twisting deformations the elastic element is subject to, when it is stressed by the twisting torque provided by the insertion element; in fact, the seat effectively acts as axial guide for the elastic element, preventing the twisting thereof, that is, the arrangement of the coils in asymmetrical position relative to the central axis of the elastic element: in fact, the coils and therefore the elastic element are constantly kept in abutment against the inner surface of the seat itself.

[0073] Advantageously, also the stopping means allow effectively keeping the elastic element in position, for example when it is rotated by the operating lever.

[0074] According to a further advantageous aspect, also the stopping means are effectively guided in rotation into the second hooking seat, abutting on the surfaces of the hooking seat itself.

[0075] It is clear that a man skilled in the art may make several variations and changes to the handled return device according to the present invention in order to meet specific and incidental needs, all falling within the scope of protection defined in the following claims.

## Claims

1. A handle return device (1) for a door, main entrance, gate and the like, comprising:

- an operating lever (2) having an insertion end (3), said operating lever (2) being suitable for being operatively connected to opening/closing means suitable for allowing the opening and closing of said door, said operating lever (2) being suitable for being rotated about an axis (X)

of rotation, for influencing said opening/closing means by said insertion end (3); said device (1) being suitable for carrying out an automatic return of said operating lever (2) from angular open position, wherein said operating lever (2) influences said tightening means for allowing opening said door, to an angular closed position wherein said operating lever (2) influences said tightening means for preventing opening, said device (1) further comprising:

- elastic means (10) connected to said insertion end (3) and suitable for elastically influencing said operating lever (2), for returning said operating lever (2) from said angular open position to said angular closed position;

said device (1) being **characterised in that** said elastic means comprise an elastic element (10) comprising a plurality of coils (11) axially overlapped to one another, for obtaining a desired elasticity of said elastic means.

2. A device (1) according to claim 1, wherein said coils (11) have a diameter substantially equal to one another.

3. A device (1) according to any one of the previous claims, wherein said elastic element (10) is arranged outside said insertion end (3).

4. A device (1) according to any one of claims 1 to 3, wherein said elastic element (10) is inserted into said insertion end (3).

5. A device (1) according to any one of the previous claims, comprising:

- a seating enclosure (5) suitable for being associated to said door and having a first aperture (6) suitable for receiving said insertion end (3) of said operating lever (2) and a second aperture (7) suitable for allowing said connection between said insertion end (3) and said tightening means.

6. A device (1) according to claim 5, wherein said elastic means are inserted in said seating enclosure (5).

7. A device (1) according to any one of the previous claims, wherein said coils (11) comprise a first coil (111) which exhibits first hooking means (12) suitable for connecting to said insertion end (3) and a last coil (211) carrying first cooperation means (13) with said device (1) suitable for carrying out said return of said operating lever (2).

8. A device (1) according to claim 7, wherein said insertion end (3) exhibits a plurality of hooking slots

- (4) suitable for connecting to said hooking means (12).
9. A device (1) according to claim 8, wherein said hooking slots (4) are longitudinal hooking slots (4), substantially parallel to the axis of said insertion end (3). 5
10. A device (1) according to any one of claims 5 to 9, wherein said seating enclosure (5) exhibits a first hooking seat (8) suitable for interfering with said first cooperation means (13) for carrying out said return of said operating lever (2). 10
11. A device (1) according to any one of claims 5 to 10, wherein said seating enclosure (5) comprises a seat (14) with substantially cylindrical shape and of dimensions complementary to said elastic element (10) and which seats said elastic element (10) for preventing a twisting movement of said elastic movement (10) relative to its axis, when said operating lever (2) is made to rotate. 15 20
12. A device (1) according to any one of the previous claims, wherein said elastic element (10) comprises a torsion spring (10) which develops longitudinally along said axis (X) of rotation of said operating lever (2). 25
13. A device (1) according to any one of the previous claims, wherein said axis (X) of rotation of said operating lever (2) is the axis about which said insertion end (3) develops. 30
14. A device (1) according to any one of claims 5 to 13, comprising stopping means (15) of substantially annular shape, suitable for cooperating with said seating enclosure (5) and said insertion end (3), for delimiting the angular stroke of said operating lever (2). 35
15. A device (1) according to claim 14, wherein said stopping means (15) are arranged coaxially on said insertion end (3), blocking the elastic means into the seating enclosure (5). 40
16. A device (1) according to claim 14 or 15, wherein said stopping means (15) rest on said elastic element (10) for axially blocking said elastic element (10) in said seating enclosure (5). 45
17. A device (1) according to any one of claims 14 to 16, wherein said seating enclosure (5) exhibits a second hooking seat (9), separate from said first hooking seat (8), suitable for interfering with said stopping means (15) for delimiting the angular stroke of said operating lever (2). 50 55
18. A device (1) according to any one of claims 14 to 17, wherein said stopping means (15) comprise:
- first hooking teeth (16) arranged on the inner perimeter of said stopping means (15) and suitable for being hooked to said hooking slots (4) of said operating lever (2) for rotating said stopping means (15) along with said operating lever (2).
19. A device (1) according to any one of claims 14 to 18, wherein said stopping means (15) comprise:
- at least a second hooking tooth (17) arranged on the outer perimeter of said stopping means (15) and suitable for being inserted in said second hooking seat (9) of said seating enclosure (5) for sliding in said hooking seat (9) when said operating lever (2) is made to rotate, so that the angular stroke of said operating lever (2) is delimited by the angular stroke of said second hooking tooth (17) into said second hooking seat (9).
20. A device (1) according to claim 19, wherein said second hooking seat (9) exhibits a first abutment surface (19) and a second abutment surface (20) substantially opposed in said hooking seat (9) and suitable for delimiting the angular stroke of said second hooking tooth (17) inside said hooking seat (9).
21. A device (1) according to claim 20, wherein said second hooking tooth (17) abuts on said first abutment surface (19) when said operating lever (2) is in angular closed position, so that said elastic element (10) is constantly preloaded in said angular closed position.
22. A device (1) according to claim 20 or 21, wherein said second hooking tooth (17) abuts on said second abutment surface (20) when said operating lever (2) is in angular open position.
23. A device (1) according to any one of claims 14 to 22, comprising locking means (18), such as a stopping ring, a snap ring and the like, suitable for axially locking said stopping means (15) in said seating enclosure (5).
24. A device (1) according to any one of claims 11 to 23, wherein said seating enclosure (5) comprises a rest surface (21) for associating said seating enclosure (5) to said door and the like, from which said seat (14) projects.
25. A door, main entrance, gate and the like comprising a device (1) according to any one of the previous claims.



