

Title: Sealing plug

Description

5 The present invention relates to a sealing plug according to the generic part of claim 1.

10 The document DE 10 2007 032 838 A1 discloses an end cap which has attachment contours located on the inside, which engage in grooves in a clamping manner, wherein the grooves are disposed at an adapter of a door closer housing. The end cap is pushed onto the frontal side of the adapter, wherein the attachment contours extend in the grooves and retain the end cap at the housing of the door closer in a clamping manner.

15 The costs arising from affixing the grooves to the adapter of the door closer housing as well as the adjustment between the attachment contours of the end cap and the grooves of the adapter are disadvantageous in this embodiment.

20 Another disadvantage resides in the fact that a gap exists between the end cap and the cover of the door closer housing, which gap depending on the definition of the tolerances, represents an unacceptable appearance.

25 An additional disadvantage is found in that this embodiment indicates that the end cap can be removed effortless and without any hassle by a third party which could result in the door closer being vandalized.

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Therefore, it is the object of the present invention to provide an end cap, which overcomes the above disadvantages and has a simple design, and can be manufactured inexpensively.

- 5 This problem is solved according to the generic part of claim 1 in conjunction with the characterizing features. Advantageous further developments of the invention are indicated in the dependent claims.

10 The invention includes the technical teaching that a reception member is disposed in an opening of the door closer housing and a sealing plug has a web with a gate, wherein, when inserting the sealing plug into the opening, the reception member cooperates with the gate in such a way that the sealing plug rotates radially and the gate guides the sealing plug, wherein an axial immobilization of the
15 sealing plug is achieved in a longitudinal axis, and the radial immobilization of the sealing plug is realized by means of at least one spring arm which is disposed at the sealing plug.

20 The inventive embodiment has the advantage that the sealing plug is recessed in the opening and guided by the gate in such a way that the sealing plug reaches a position in which the sealing plug occupies a fixed disposition in the door closer housing, where a third party is not able to recognize whether or not the sealing plug can be removed, because there are no means for grasping the sealing plug,
25 whereby vandalism is prevented.

It is likewise an advantage, if the gate has a recess in which the reception member is immobilized in the direction of the longitudinal axis by means of at least one of the spring arms. The sealing plug is
30 retained at the door opener housing by the recess, whereby dynamic effects on the door closer housing are counteracted.

It is likewise advantageous, if the reception member is disposed in the border area of the opening. Thus an immediate cooperation is guaranteed between the reception member and the sealing plug.

- 5 It is furthermore advantageous, if the reception member is configured as a bolt or as a pin. Thereby a simple and yet inexpensive geometry can be utilized in order to affix the sealing plug to the door closer housing.
- 10 It is likewise advantageous, if the reception member is fastened to the door opener housing by means of screwing or riveting or pressing or bonding. These types of fastening ensure a simple disposition of the reception member at the door closer housing.
- 15 It is likewise an advantage, if the opening consists of a cylindrical bore. As the door closer has a sealing screw with a cylindrical shape for functioning thereof, from the manufacturing point of view, it is easy to execute the area, which is closed by the sealing plug likewise in a cylindrical shape.
- 20 It is furthermore advantageous, if the sealing plug has a cylindrical shape on the outside, wherein the dimensions of this cylindrical shape are smaller than the cylindrical bore of the opening. It is thus ensured that the sealing plug, at least partially, can be inserted into
- 25 the opening.
- It is likewise an advantage, if the sealing plug is at least partially received by the opening. The sealing plug is screwed into the opening in such a way that any projection of the sealing plug from the
- 30 surface of the door closer housing is avoided.

It is advantageous, if the gate is configured in a web, which is disposed at the sealing plug. A direct cooperation between the sealing plug and the reception member is thereby ensured.

- 5 It is likewise advantageous, if a shaft is disposed at the web. The shaft extends the abutment surface towards the reception member in order to achieve a stable immobilization of the sealing plug in the door closer housing.
- 10 It is likewise an advantage, if the spring arms form an exterior diameter in the area of the spring arms, which is larger than the cylindrical bore of the opening. As soon as the sealing plug is screwed into the opening, the spring arms, which are disposed at the sides of the sealing plug, tend to go back to their initial position,
- 15 whereby they lean against the cylinder surface of the opening with the result of centring the sealing plug in the opening.

- It is likewise an advantage, if, on account of the cylinder surface, the spring arms immobilize the sealing plug in the opening axially with
- 20 regard to the longitudinal axis. The configuration of the spring arms results in the spring arms being supported at the cylinder surface, whereby an equal gap is achieved between the door closer housing and the cylinder surface of the sealing plug located on the outside.

- 25 It is furthermore an advantage, if the sealing plug has a contour, which is adapted to a frontal end contour of the door closer housing. Thus, it is possible to respond to different design variants of the door closer housing in order to be able to continue the design of the door closer housing at the sealing plug.

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It is advantageous, if the sealing plug consists of plastic material or of metal. A multitude of variants is thus ensured, whereby design

suggestions can be considered. The plastic material execution of the sealing plug utilizes an efficient manufacturing process.

5 It is likewise an advantage, if, when manufacturing the sealing plug, it is possible to select the colour design. Thus a multitude of variants is ensured.

10 Another preferred embodiment consists in the sealing plug being completely received in the opening. The configuration of the sealing plug does not reveal to uninformed persons that the sealing plug can be removed from the door closer housing.

The invention of a preferred embodiment will be illustrated in more detail based on the following description and Figures, in which:

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Figure 1: shows a door closer with a sealing plug which is completely recessed into the door closer housing in a perspective view,

20 Figure 2: shows a door closer in a perspective view in which the sealing plug has been removed from the door closer housing,

Figure 3: shows a detail W of Figure 2,

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Figure 4: shows the sealing plug in a perspective view,

Figure 5: shows the sealing plug in another perspective view,

30 Figure 6: shows a sectional view of a perspective view, in which the sealing plug is screwed into the housing of the door closer housing.

Figure 1 shows a door closer with a door closer housing 20, wherein a sealing plug 10 closes an opening of the door closer housing 20. Figure 1 shows the axes X, Y and Z of the door closer housing 20, wherein the Z-axis is the longitudinal axis 85 of the door closer housing 20 via which the sealing plug 10 is installed into the door closer housing 20 and un-installed therefrom.

Figure 2 shows the door closer of Figure 1, wherein the sealing plug 10 is illustrated as being removed from the door closer housing 20, and, as a result, an opening 80 of the door closer housing 20 can be seen. The arrow 90 indicates that the sealing plug 10 is inserted into the opening of the door closer housing 20 in the direction of the longitudinal axis 85. Figure 2 includes furthermore an indication of the detailed view W, and a sectional plane A-A.

Figure 3 shows the detailed view W of Figure 2. The opening 80 of the door closer housing 20 is visible and has a cylindrical shape, thus forming a cylinder surface 25. A reception member 30, which cooperates with the sealing plug 10, is disposed in the area of the opening 80, in the border area. The sealing plug 10 has a cylinder surface 15, which has a smaller diameter than the cylindrical opening 80 of the door closer housing 20, which circumstance guarantees that the sealing plug 10 can be introduced into the opening 80. The contour 70 of the sealing plug 10 matches the frontal end contour 75 of the door closer housing 20, thus resulting in a homogenous surface design. The door closer housing 20 has bores, which by means of additional attachment means serve to fasten the door closer to a door casing, a door leaf, a wall or the like. The Figure 3 shows a bore 65 of said attachment bores.

Figure 4 shows the sealing plug 10. The cylinder surface 15 forms the cylindrical area of the sealing plug 10, whereby the cylindrical

area of the sealing plug 10 is delimited on one side by the contour 70. The contour 70 is the visible side of the sealing plug 10, in other words the side which remains visible once the door closer housing 20 is assembled. The cylindrical area is delimited at the other second
5 side by means of spring arms 50, 55, which are formed by means of cut-out areas in the partial areas of the cylinder surface 15. The cylinder surface 15 is interrupted by a web 45, wherein the web 45 extends in the shape of an inside oriented connection for the inner cylindrically surfaces. The web 45 has a gate 35 which has a recess
10 in one portion.

Figure 5 shows the sealing plug 10 in another perspective view. A shaft 60, which includes a portion of the gate 35, is disposed at the web 45, wherein the recess 40 is likewise configured in the area of
15 the shaft 60. The shaft 60 accommodates the reception member 30 and, in the area of the recess 40, stabilizes the positioning of the sealing plug 10 at the reception member 30. The spring arms 50, 55 are configured by means of cut-out areas in the area of the cylinder surface 15.

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Figure 6 shows a sectional view based on the sectional plane A-A of Figure 2. The sealing plug 10 is screwed into the door closer housing 20 whereby the gate 35, on account of the reception member 30, has guided the sealing plug 10 and the spring arms 50, 55 immobilize the
25 sealing plug 10 in such a way that the reception member 30 latches in the recess 40. The reception member 30 retains the sealing plug 10 on account of the gate 35, the recess 40 and the web 45 as well as of the spring arms 50, 55 in the opening 80 of the door closer housing 20 in such a way that a homogenous surface is the result at
30 the frontal end surface of the door closer housing 20, whereby protruding or recessed sealing plugs 10 are avoided. It is visible that the sealing plug 10 covers the bores 60.

At the frontal end, the door closer housing 20 has a contour 75, which is interrupted by cylindrical openings 80. The openings 80 ensure access to the bores 65, in order to be able to affix the door closer for example to a door via the bores 65 and additional screws.

5 The bores 65 can be manufactured in an additional machining step or directly during the casting process. The openings 80 may have different forms and shapes, such as an oval shape, whereby the appropriate contour correspondingly continues at the sealing plug 10. In order to be able to prevent vandalism at the door closer, a sealing
10 plug 10 is utilized to close off the opening 80 of the door closer housing 20, whereby the bores 65 and the screws, as well as other required structural components of a door closer are concealed. The configuration of the sealing plug 10 is selected in such a way that the frontal end contour 75 of the door closer housing 20 is transferred to
15 the sealing plug 10, whereby the sealing plug 10 obtains a contour 70, which corresponds to the frontal end contour 75 of the door closer housing 20, in order to achieve a homogenous appearance of the door closer housing 20 and thus of the complete door closer. This configuration of the sealing plug 10 should be selected in particular in
20 order to not reveal any hint to unauthorized individuals that the sealing plug 10 can be uninstalled from the door closer housing 20.

A reception member 30, which is configured as a bolt or as a pin, is disposed in the opening 80 of the door closer housing 20, wherein
25 the reception member 30 is screwed, riveted, pressed or bonded into the door closer housing 20, in order to guarantee a firm connection to the door closer housing 20.

The sealing plug 10 has a web 45, which includes a gate 35 with a
30 recess 40. If the sealing plug 10 is fitted into the opening 80 in the direction of the arrow 90 on the longitudinal axis 85 of the door closer housing 20, the reception member 30 and the gate 35 cooperate,

wherein the sealing plug 10 is guided by the reception member, sliding in the gate 35.

5 The sealing plug 10 rotates in this case about the reception member 30 and moves radially in the direction of the terminal position. The terminal position of the sealing plug 10 is reached in that at least one of the spring arms 50, 55, which are disposed at the sealing plug 10, presses the recess 40 of the gate 35 against the reception member 30, whereby the sealing plug 10 latches with the reception member 10 30. As an alternative or in addition, said latching condition may be made possible on account of separate spring elements, such as a compression spring.

15 The spring arms 50, 55 are configured at the sealing plug 10 in such a way that they have a greater exterior diameter than the cylindrical opening 80. The spring arms 50, 55 thus bear against the cylinder surface 25 of the opening 80, with the result that the sealing plug 10 is screwed into the opening 80 and is radially guided on the longitudinal axis 85 of the door closer housing 20 and is finally 20 immobilized in the recess 40. The sealing plug 10 is furthermore axially immobilized by means of the spring arms 50, 55, as the configuration of the spring arms 50, 55 is designed in that a support of the spring arms 50, 55 at the cylinder surface 25 is likewise guaranteed in axial direction, wherein the axial direction illustrated in 25 this case, consists of the Y-axis of the door closer housing 20.

The web 45 has a shaft 60, which supports the immobilization of the sealing plug 10, because the recess 40 extends into the shaft 60, whereby the recess 40 is enlarged by an additional surface. The 30 sealing plug 10 is thus retained at the frontal end of the door closer housing 20.

Authorized individuals may uninstall the sealing plug 10 from the door closer housing 20 in that they press on one side of the sealing plug 10, which is located next to the Y-axis of the door closer housing 20. The sealing plug 10 is thereby released from the fixed condition
5 in the recess 40, and, by rotating, the sealing plug 10 can be removed from the opening 80 on account of the gate 35.

List of reference numerals

	10	sealing plug
	15	cylinder surface
5	20	door closer housing
	25	cylinder surface
	30	reception member
	35	gate
	40	recess
10	45	web
	50	spring arm
	55	spring arm
	60	shaft
	65	bore
15	70	contour
	75	contour
	80	opening
	85	longitudinal axis
	90	arrow

Patent claims

1. A sealing plug (10) for closing the frontal end of an opening (80) of a door closer housing (20), **characterized**
5 **in that** a reception member (30) is disposed in the opening (80) of the door closer housing (20) and the sealing plug (10) has a web (45) with a gate (35), wherein, when inserting the sealing plug (10) into the opening (80), the reception member (30) cooperates with the gate (35)
10 in such a way that the sealing plug (10) radially rotates and the gate (35) guides the sealing plug (10), wherein an axial immobilization of the sealing plug (10) is achieved in a longitudinal axis (85) and the radial immobilization of the sealing plug (10) is realized by means of at least one
15 spring arm (50, 55), which is disposed at the sealing plug (10).
2. The sealing plug (10) according to claim 1, **characterized**
20 **in that** the gate (35) has a recess (40), in which the reception member (30) is immobilized on account of at least one of the spring arms (50, 55) in the direction of the longitudinal axis (85).
3. The sealing plug (10) according to claim 1, **characterized**
25 **in that** the reception member (30) is disposed in the border area of the opening (80).
4. The sealing plug (10) according to claim 1, **characterized**
30 **in that** the reception member (30) is configured as a bolt or as a pin.

5. The sealing plug (10) according to the claims 1 to 3, **characterized in that** the reception member (30) is fastened to the door closer housing (20) by means of screwing or riveting or pressing or bonding.
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6. The sealing plug (10) according to claim 1, **characterized in that** the opening (80) consists of a cylindrical bore.
7. The sealing plug (10) according to the claims 1 and 5, **characterized in that** the sealing plug (10) has a cylindrical shape on the outside, wherein the dimensions of this cylindrical shape are smaller than of the cylindrical bore of the opening (80).
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8. The sealing plug (10) according to claim 6, **characterized in that** the sealing plug (10) is received, at least partially, by the opening (80).
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9. The sealing plug (10) according to claim 8, **characterized in that** a shaft (60) is disposed at the web (45).
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10. The sealing plug (10) according to claim 1, **characterized in that**, in the portion of the spring arms (50, 55), the spring arms (50) form an exterior diameter which is larger than the cylindrical bore of the opening (80).
- 25
11. The sealing plug (10) according to claim 10, **characterized in that** the spring arms (50, 55) immobilize the sealing plug (10) in the opening (80) on account of the cylindrical surface (25) axially with regard to the longitudinal axis (85).
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12. The sealing plug (10) according to claim 1, **characterized in that** the sealing plug (10) has a contour (70) which is adapted to a frontal end contour (75) of the door closer housing (20).
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13. The sealing plug (10) according to claim 1, **characterized in that** the sealing plug (10) is made from plastic material or from metal.
- 10 14. The sealing plug (10) according to the claims 12 and 13, **characterized in that** the colour design can be selected when manufacturing the sealing plug (10).
- 15 15. The sealing plug (10) according to the claims 5 to 7 and 11, **characterized in that** the sealing plug (10) is received completely in the opening (80).