

Title: Door closer

Description

5 The invention relates to a door closer for opening and/or
closing a door with a closer shaft, which can be coupled to
the door, with at least one piston, which is in operating
connection with the closer shaft, and is disposed to be
movable within a housing, with at least one spring, which is
10 connected to a spring adjustment device, wherein the
spring adjustment device is in operative connection with a
gear, with at least one magnetic valve, which is disposed
on the spring side of the door closer, wherein the gear is
disposed adjacent to the spring compartment and is located
15 in the valve block of the magnetic valve.

A generic door closer is indicated in the document DE
10 2004 031 898 B4, in which a magnetic valve is disposed
on the side of the door closer housing facing away from the
20 spring compartment, whereby the distance of the centre of
rotation of the door up to the axis of rotation of the driven
closer shaft becomes relatively large, at which shaft an arm
assembly or a slide channel is disposed. The disadvantage
herein is that additional moments of force need to be
25 provided, in order to be able to close such a door. Another
disadvantage is that, with the door closer being mounted to
the door leaf, the magnetic valve can impact on a wall,

before the door has reached an opening angle of approximately 180°.

5 A door closer is described in the document G 93 08 568, which has a spring adjustment device. This spring adjustment device has the disadvantage that it is manipulated at the front end of the door closer without any option of being able to affix any further components as modules.

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A door operating device is described in the document DE 10 2006 012 757 A1, which is incorporated into a door and has a spring adjustment device. With the integral mounting of the door operating device, the spring
15 adjustment is performed from the top side of the door operating device, because otherwise, in the installed condition of the door operating device, it is impossible to access the spring adjustment device. This conception of the spring adjustment device has proven to be
20 disadvantageous in case the door operating device is affixed to a door leaf or to a frame of a door. As the axis of rotation of the tool reception extends parallel to the axis of rotation of the driven shaft, which can be coupled to the door, it is only possible to manipulate the spring adjustment
25 device from the top side or from the bottom side of the door operating device, which depends on whether the door operating device is disposed at a DIN left-handed door or at a DIN right-handed door.

GB 2 323 409 A discloses a door closer for opening and closing a door whereat the door closer offer a solenoid valve which is arranged on the spring side of the door closer. The door closer exhibit spring space, wherein a
5 valve block with a solenoid valve is arranged following the spring space, wherein the valve block has arrangements for receiving further components.

Door closers are in particular utilized with fire doors, which have to be manually opened. These fire doors are characterized in that, due to their type of construction, they
5 have a certain own weight, which is disadvantageous for manual operation, because a user needs to apply a lot of force in order to be able to open the fire door.

It is the object of the present invention to further develop a
10 door closer with a magnetic valve of the aforementioned species, which is suitable for equipping doors, such as fire doors, whereby a more compact overall disposition of the door closer is achieved, wherein, when mounting the door closer onto the door leaf, an opening angle of more than
15 180° is achieved and simultaneously the functionality of a spring adjustment device is reliably ensured, and wherein a modular arrangement is moreover provided for further components.

20 As the solution to this problem, a door closer having the features of claim 1 is proposed. Preferred further developments are set forth in the dependent claims.

For this purpose, it is intended that, according to the
25 invention, a valve block with a magnetic valve is disposed adjacent to the spring compartment, wherein a gear is provided in the valve block, which gear is in operative connection with the spring force adjustment device by

means of a flange and can be manipulated from the front, wherein the valve block includes provisions for receiving further components. On account of the possibility of manipulating the gear from the front, the door closer is applicable for both a DIN left-handed door and a DIN right-handed door. Furthermore, additional components, such as a smoke detector unit can be accommodated.

One measure enhancing the invention provides that the gear consists of a bevel gear, which comprises at least two bevel pinions. The transferred forces are redirected in a simple manner on account of the disposition of a bevel gear.

In an advantageous embodiment, the front side bevel pinion has a manipulation reception. This is advantageous in that, adjacent to the valve block, the door closer can be equipped with further components, such as a smoke detector unit for example, wherein the access to the spring force adjustment device is ensured.

Advantageously, the axis of rotation of the bevel pinion with the manipulation reception and the driving shaft are disposed at an angle of 90° to each other. It is thereby guaranteed that manipulating the spring force adjustment device can be carried out principally from the front of the door closer.

In a preferred embodiment, the valve block is screwed to the housing of the door closer. A simple installation of the valve block to the housing of the door closer is thereby guaranteed.

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Another advantageous embodiment can be achieved, if further components are disposed at the valve block as modules. The option is thereby provided to be able to equip the door closer with different functions, without having to
10 determine this in advance. Mounting in the factory remains flexible on account of the modular mounting option.

Further advantages, features and details of the invention will result from the following description, in which several
15 embodiments of the invention are described in detail, reference being made to the drawings. In this context, the features, mentioned in the claims and in the description, may be individually or in random combination essential to the invention.

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In the drawings:

Figure 1: shows a door closer with a slide channel, wherein the door closer is mounted to the
25 door leaf and the slide channel is mounted to the frame of a door,

Figure 2: shows the door closer with valve block and magnetic valve in a frontal view,

Figure 3: shows a detailed view of Figure 2,

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Figure 4: shows a partial section in the viewing direction Y of Figure 3,

Figure 5: shows a perspective view of the door closer of Figure 2,

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Figure 6: shows a detailed view of Figure 5,

Figure 7: shows a perspective rear view of the door closer of Figure 5,

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Figure 8: shows an exploded view of the valve block adjoining the door closer.

20 A door closer 3, which is connected to a slide channel 4, is illustrated in Figure 1. The door closer is mounted to the door leaf of the door 2, wherein the slide channel 4 is disposed on the frame 1. The axis of rotation 13 and the axis of rotation 14 of the drive have a distance X to each other.

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Figure 2 shows a door closer 3 with the valve block 5 and a magnetic valve 6 in a frontal view.

A detailed view of Figure 2 is shown in Figure 3, in which the frontal surface 10 of the door closer 3 is indicated. Furthermore, the bevel pinions 8 and 9 are represented in the valve block 5, wherein the bevel pinion 8 has a manipulation reception 7. The magnetic valve 6 is located adjacent to the valve block 5. The viewing direction Y is additionally indicated in Figure 3.

Figure 4 shows a partial section in the viewing direction Y of Figure 3. In this case, the bevel pinions 8 and 9, as well as the manipulation reception 7, the flange 15 and the spring compartment 17 can be seen, the magnetic valve 6 being likewise illustrated.

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Figure 5 is a perspective view of the door closer 3, in which the frontal surface 10 as well as the manipulation reception 7 and the drive 12 are illustrated.

Figure 6 shows a detailed view of Figure 5. The door closer 3 includes the valve block 5 and the magnetic valve 6, wherein the bevel pinions 8 and 9 are provided in the valve block 5. The bevel pinion 8 includes the manipulation reception 7.

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Figure 7 shows the door closer 3 in a perspective view, wherein the mounting side 11 can be seen. The valve block

5 and the magnetic valve 6 are disposed at the door closer 3.

Figure 8 shows an exploded drawing. In this case, the individual parts are illustrated which are to be installed in the valve block 5. For the sake of clarity, only the bevel pinions 8 and 9, as well as the flange 15, the magnetic valve 6 and the frontal surface 10 of the door closer 3 and the screws 16 are indicated.

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When mounting the door closer 3 to a door leaf, it is necessary to keep a distance X , because the opening moments as well as the closing moments depend on this distance X . The distance X is related to the centre of rotation of the door 2 and to the axis of rotation 14 of the drive 12, where the slide channel 4 or a scissor arm assembly are coupled. The larger the selected distance X of the centre of rotation of the door 2, the higher are the opening moments and the closing moments. If the selected distance X of the centre of rotation of the door 2 is smaller than the distance X , the result will be a lower opening moment and closing moment.

Fire doors have application fields which require the door closer 3 to cover different moments, which circumstance results in the door closer 3 having a spring force accumulator, which can be manipulated by a spring force adjustment device. The respectively required force is

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adjusted for the spring force accumulator by means of the spring force adjustment device, in order to be able to reliably ensure the closing function of the relevant fire door in case of need.

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The door closer 3 has a magnetic valve 6 which ensures that the spring force accumulator is held at the position, up to which the fire door, when actuated, was opened the first time after the power supply was interrupted. If the fire door
10 is opened manually up to an angle of 65° for example, the spring force accumulator is simultaneously loaded, wherein the magnetic valve 6, by means of a fluid provided in the housing of the door closer 3, keeps the spring force accumulator loaded at exactly this loaded position,
15 whereby free-swinging of the fire door is guaranteed in the range of 0° to 65° in this case. If, in this case, the fire door is opened beyond 65° during further operation, for example up to an opening angle of 120° , the spring force accumulator is further loaded and kept loaded by the
20 magnetic valve 6 at this newly loaded position, whereby a free-swinging of the fire door is guaranteed in the range of 0° to 120° .

This free-swinging is maintained until the magnetic valve 6
25 is de-energized. In this case, the spring force accumulator is released and closes the fire door.

One application case is for example intended for hospitals. Every day in the morning, the fire door is initially opened up to an opening angle of 180° for example, which means the fire door remains for the day in the free-swinging condition.

5 At night time, the magnetic valve 6 of the door closer 3 is no longer energized, thus releasing the spring force accumulator in order to reliably close the fire door. In case a fire breaks out during the free-swinging of the fire door, the power supply to the magnetic valve 6 is automatically
10 interrupted, resulting in the spring force accumulator being released in order to safely close the fire door.

In the present invention, while considering optimum opening moments and closing moments, as well as utilizing
15 a spring force adjustment device and a magnetic valve 6, the distance X has been selected such that a valve block 5 is disposed adjacent to the spring compartment 17, which block includes a gear for manipulating the spring force adjustment device, as well as the magnetic valve 6, which
20 is in operative connection with the spring force adjustment device. In this case, the gear includes a bevel gear which has two bevel pinions 8, 9. The bevel pinion 8 has a manipulation reception 7 for a tool, in order to be able to rotate the bevel pinion 8 about its axis of rotation, whereby
25 the bevel pinion 9 is likewise actuated, because the bevel pinion 8 is in operative connection with the bevel pinion 9, whereby the spring force adjustment device is actuated by the flange 15, which is in operative connection with the

bevel pinion 9. The manipulation reception 7 is disposed at the front at the free-swing door closer 3, in order to be able to principally operate the spring force adjustment device from the front, independently from the door closer being
5 disposed at a DIN right-handed door or at a DIN left-handed door. The axis of rotation of the toothed wheel 8 and the axis of rotation 14 of the drive are disposed at an angle of 90° to each other.

10 The front of the door closer 3 includes the frontal surface 10, which represents the opposite side of the mounting side 11, wherein the mounting side 11 includes the side which bears against the door 2 or against the frame 1. The mounting side 11 and the axis of rotation 14 of the drive
15 are parallel to each other.

The valve block 5 is screwed to the housing of the door closer 3 by means of screws 16. In order to be able to incorporate further components such as a smoke detector
20 unit for example, such a component is modularly disposed at the valve block 5.

It is thus guaranteed that, while considering the moments in opening direction and in closing direction as well, an
25 optimum distance X can be respected, wherein the door closer 3, including a magnetic valve 6, has a spring force adjustment device which is accessible at any time.

List of reference numerals

	1	door frame
	2	door
5	3	door closer
	4	slide channel
	5	valve block
	6	magnetic valve
	7	manipulation reception
10	8	bevel pinion
	9	bevel pinion
	10	frontal surface
	11	mounting side
	12	drive
15	13	axis of rotation
	14	axis of rotation of the drive
	15	flange
	16	screws
	17	spring compartment
20	X	distance

Patent claims

1. A door closer (3) with at least one magnetic valve (6) for opening and/or closing a door (2), a fluid
5 provided in the housing of the door closer (3), wherein the magnetic valve (6) is disposed on the spring side of the door closer (3),
with a closer shaft, which can be coupled to the door (2), with at least one piston, which is in
10 operative connection with the closer shaft and is movable within a housing,
with at least one spring, which is disposed in a spring compartment (17) and a spring adjustment device, which is in operative connection with the
15 spring,
characterized in that, adjacent to the spring compartment (17), a valve block (5) with the magnetic valve (6) is disposed, wherein a gear is provided in the valve block, which gear is in
20 operative connection with the spring force adjustment device by means of a flange (15) and can be manipulated from the front, wherein the valve block (5) includes provisions for receiving further components.
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2. A door closer (3) according to claim 1,
characterized in that the gear consists of a bevel gear.

3. A door closer (3) according to claim 2,
characterized in that the bevel gear consists of
at least two bevel pinions (8, 9).
- 5 4. A door closer (3) according to claim 3,
characterized in that a manipulation reception
(7) is provided at the front of the bevel pinion (8).
- 10 5. A door closer (3) according to claim 4,
characterized in that the axis of rotation of the
bevel pinion (8) and the axis of rotation (14) of the
drive include an angle of 90° between each other.
- 15 6. A door closer (3) according to claim 1,
characterized in that the valve block (5) is
screwed to the housing of the door closer (3).
- 20 7. A door closer (3) according to claim 6,
characterized in that further components are to
be modularly disposed at the valve block (5).