

Title: Door closer

Description

The invention relates to a door closer according to the generic part of patent claim 1, which has an output shaft, which can be actuated in the closing direction by an assembly of springs, and has a damping piston, which is in operable connection with the shaft, as well as a pivotable actuating arm, which is coupled to the output shaft outside the housing, as well as a cam disc, which is connected to the output shaft inside the housing.

A door closer of the species mentioned at the beginning is revealed in DE 40 41 824 C1, in which a rotation of the damping piston and of the opening piston about their longitudinal axes in relation to the cam disc is eliminated. Securing means, which prevent the rotation, are provided for this purpose. The proper functioning of the door closer is not at all affected by the incorporation of the securing means. The first choice of securing means are two rods, which, on the one hand, are firmly anchored in the spring support member and, on the other hand, can plunge, without any friction on the opposite side, into pocket bores of the damping piston. In this case, the securing rods extend horizontally to the axis of the closer shaft. The securing rods are disposed on either side close to the closer shaft in the axial direction of the housing. It is thus possible that, in the event of a rotation of the damping

piston or of the spring support member, the securing rods either bear against the one or the other side of the closer shaft.

The object of the invention is to further develop the anti-rotation means of the state of the art in that a clearance-free contact is given at all times between the force transmission rollers and the damping piston or the opening piston. Furthermore, it is intended to improve the efficiency of the door closer.

10 This problem is solved with the features of patent claim 1. In this context, the dependent claims represent another embodiment of the inventive idea.

The state of the art is improved in that, for the purpose of increasing the efficiency, the cam disc and the force transmission rollers respectively have a circumferential recess or a groove, which is dimensionally adapted such that fixing bolts of the known type can be supported therein with minor play. Embedding the fixing bolts on the one hand allows for a smaller structure of the door closer and moreover for a reliable mounting of such a door closer. For this purpose, the fixing bolts, which respectively have their ends threaded, are firmly screwed into the opening piston with one of their ends. Obviously, other connecting types are possible. For mounting the damping piston, the free ends of the screwed-in fixing bolts can plunge into the damping piston and can be secured therein by appropriate

nuts, which are preferably provided in a stepped bore of the damping piston. In order to guarantee a precisely fixed position between the force transmission rollers and the cam disc, a spring element is placed between a bottom of the stepped bore and the nut. The spring element may be
5 either a disc spring or any other suitable spring element. By means of such a spring element, the elasticity of the overall construction is increased, in particular during the rotation of the output shaft. Likewise, respective tolerances of the cam
10 disc and of the force transmission rollers can be easily compensated for. However, a clearance-free contact is guaranteed at the same time between the force transmission rollers and the cam disc.

The circumferential groove in the rollers and the recess in
15 the cam disc are preferably disposed in the area of the longitudinal axis of the cylinder bore. Such a disposition is able to transmit tension and compression forces without entailing any deformation of the fixing bolts. Thus, there is no height offset and therefore no bending moment will
20 occur.

On the one hand, the clearance-free contact increases the operational safety and thus the efficiency and, on the other hand, such a door closer achieves a very good arresting function. Even in the event of reversals of the
25 output shaft, the contact between the force transmission rollers and the cam disc is maintained permanently. For this purpose, the force transmission rollers are rotatably

supported via bearing journals, which plunge into pocket bores provided within the opening piston and the damping piston. In order to prevent the bearing journals from sliding out of the pocket bores, they are protected from falling out
5 by means of appropriate securing pins.

On account of the clearance-free contact, an optimal arresting function can be achieved of such a door closer while increasing the efficiency at the same time.

Hereinafter, the invention will be explained based on one
10 possible exemplary embodiment diagrammatically illustrated in the drawings, wherein:

Figure 1: shows a partial view of a door closer in a longitudinal cut according to the axis of the housing;

15 Figure 2: shows the same as Figure 1, however in a cross-section according to the line A-A through the output shaft.

Figure 1 shows a door closer indicated at 1 in a partial view, in which the components, which are not relevant for the invention, have been omitted or are not identified by a
20 reference numeral. An output shaft 9 is supported in a bearing 8 within a housing 13 such that, at the exit side, the shaft 9 is connected to the housing 13 by means of a screwed cap with a bearing 14. The output shaft 9 has a

cam disc 2, which has a circumferential groove 7 (see in particular Figure 2).

A damping piston 19 and an opening piston 18 are displaceably supported within the closer housing 13 on the left and right sides of the cam disc 2. A spring 25, in the shape of a force accumulator, presses against the opening piston 18. Force transmission rollers 10 and 11 respectively are rotatably supported in both, the opening piston 18 and the damping piston 19 by means of bearing journals 3. In this case, the bearing journals 3 plunge into pocket bores 4. In order to prevent the bearing journals 3 from sliding out, they are secured by means of appropriate securing pins 5.

Within the force transmission rollers 10, 11 a circumferential groove 12 is respectively provided, like in the cam disc 2; it is also possible to execute the force transmission rollers 10, 11 and the cam disc in two pieces.

Referring to the opening piston 18, Figure 1 represents a fixing bolt 15, which has threads 6 and 20 respectively at its ends. In this case, the thread 6 is screwed into a threaded bore in the opening piston 18. The dimensions of the fixing bolts 15 are adapted such as to be embedded with very little clearance within the groove of the force transmission rollers 10, 11 and within the groove 7 of the cam disc 2 as well.

The other end of the fixing bolts 15 with the thread 20 passes respectively through a bore 16 within the damping piston 19 and ends in a stepped bore 23 within the damping piston 19. A nut 17, which pulls the fixing bolt 15 on account of the thread 20 against a bottom of the stepped bore, is located in the stepped bore 23. In order to achieve a higher operational safety and tolerance compensation with regard to the force transmission rollers 10, 11 and the cam disc 9, a spring element 22, preferably in the shape of a disc spring, is introduced between the bottom of the stepped bore 23 and the nut 17. This achieves a permanent contact of the force transmission rollers 10, 11 and the cam disc 2.

In order to seal off this connection in the damping piston 19, the stepped bore 23 is closed by a seal washer 24.

Figure 2 reveals that, on account of the stable position of the output shaft 9 through the internal bearings 8 and 14 and of the fixing bolts 15 embedded within the groove 7 of the cam disc 2, a rotation of the opening piston 18, displaceable within a reception compartment 21, and of the damping piston 19 about their own axes is not possible.

List of References

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| | 1 | door closer |
| | 2 | cam disc |
| | 3 | bearing journal |
| 5 | 4 | pocket bore |
| | 5 | securing pin |
| | 6 | thread |
| | 7 | groove |
| | 8 | bearing |
| 10 | 9 | output shaft |
| | 10 | force transmission roller |
| | 11 | force transmission roller |
| | 2 | groove |
| | 13 | housing |
| 15 | 14 | bearing |
| | 15 | fixing bolts |
| | 16 | bore |
| | 17 | nut |
| | 18 | opening piston |
| 20 | 19 | damping piston |
| | 20 | thread |
| | 21 | reception compartment |
| | 22 | spring member |
| | 23 | stepped bore |
| 25 | 24 | seal washer |
| | 25 | spring |

Patent claims

1. A door closer having an output shaft, that can be actuated in the closing direction by means of an assembly of springs, and a damping piston in
5 operational connection with the shaft, as well as a pivotable actuating arm coupled to the output shaft outside the housing, as well as a cam disc connected to the output shaft inside the housing, the cam path of said disc associated to the
10 opening direction being charged by an opening piston via at least one force transmission roller and the cam path associated to the closing direction by the damping piston via another force transmission roller, the damping piston and the
15 opening piston being disposed protected against rotation with regard to the cam disc, and in that the anti-rotation means is formed by at least two fixing bolts extending in axial direction of the housing and transversely to the direction of the
20 closer shaft, at least one of the fixing bolts extending on each side of the output shaft, characterized in that the cam disc (2) and the force transmission rollers (10, 11) have a circumferential recess in the shape of a groove (7, 12) respectively or in that the force transmission
25 rollers (10, 11) and the cam disc (2) are

respectively executed in two pieces, wherein the fixing bolts (15) are embedded.

2. A door closer according to claim 1, characterized in that the fixing bolts (15) extend in the central axis of the reception compartment (21) for the opening piston (18) and for the damping piston (19).
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3. A door closer according to claim 1, characterized in that the ends of the fixing bolts (15) have a thread (6, 20) respectively.
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4. A door closer according to one of the preceding claims, characterized in that the fixing bolts (15) with their threads (6) are screwed into threaded bores of the opening piston (18).
- 15 5. A door closer according to one of the preceding claims, characterized in that a nut (17) is respectively screwed on the thread (20) of the fixing bolts (15) and in that therefore, on the one hand, the opening piston together with the force transmission roller (10) is pulled against the cam disc (2) and, on the other hand, the damping piston (19) together with the force transmission roller (11) is pulled against the cam disc (2).
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6. A door closer according to one of the preceding claims, characterized in that the nut (17) is embedded in a stepped bore (23).
- 5 7. A door closer according to one of the preceding claims, characterized in that at least one spring (22) is disposed between the nut (17) and a bottom of the stepped bore (23).
8. A door closer according to one of the preceding claims, characterized in that the spring (22) is a
10 disc spring.
9. A door closer according to one of the preceding claims, characterized in that the force transmission rollers (10, 11) are supported by means of bearing journals (3), the bearing
15 journals (3) being secured through securing pins (5).