

Title: Pinion**Description**

- The invention relates to a pinion, which corresponds to a toothed piston of a door closer or of a door operator, has at least one toothing and, at each end of the pinion, a square shaft end, at which at least one cone is provided, and a cylindrically shaped area is disposed between each square shaft end and the toothing, the position of the toothing being aligned with the two square shaft ends.
- 10 In the door closers as well as the door operators, which are currently available on the market and provided with pinions and toothed pistons, pinions are used which are manufactured in several operational steps at high production expenses and cost as well as high investments
- 15 in machine equipment. The blank is a turned component, which subsequently is provided with a toothing. As a result, the thus manufactured pinions require that, after each operational step, the item in question be transported and stored temporarily if required, which entails a logistic
- 20 challenge and logistic expenses. The cooperation of the pinion with a toothed piston is illustrated in the document DE 195 38 482 C2, as well as in DE 102 28 870 A1.
- It is the object of the present invention to provide a pinion of the species described in the introduction, in which the
- 25 toothing is mounted position-oriented.

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

5 In the inventive pinion, it is intended that the toothing be mounted position-oriented with regard to the two square shaft ends located at the respective end of the pinion. Thereby, when installing the door closer or the door operator, a pretension can be applied to the piston and thus to the spring (force accumulator) of the door closer or of the
10 door operator.

It is of advantage that the pinion be manufactured as a cold extruded component. This allows for manufacturing the pinion in a single operational step.

15 Another practical embodiment is to have the toothing extend continuously. Door closers or door operators, in which the axle mounting is located in the area of the piston, can be equipped with this embodiment. This would be the case of a door closer having a small constructional height.

It is advantageous that the toothing has a collar at one end.
20 The collar stabilizes the toothing. Door closers or door operators, in which the axle mounting is located outside the piston, can be equipped with this embodiment.

The drawings show:

Figure 1: an inventive pinion in a plane view,

Figure 2: the inventive pinion of Figure 1 in a perspective view,

Figure 3: an inventive pinion of Figure 1 with a collar at one end of the toothing,

5 Figure 4: the inventive pinion of Figure 3 in a perspective view,

Figure 5: an inventive pinion of Figure 1 in a lateral view,

Figure 6: an inventive pinion of Figure 1 in an installed situation with a lever arm of a door closer or of
10 a door operator.

Figure 1 shows a pinion 1, which is intended for door closers as well as for door operators. In this case, it is about diverse door closers and door operators, which have a pinion as well as a toothed piston, as illustrated
15 according to the documents DE 195 38 482 C2 and DE 102 28 870 A1. At each end, the pinion 1 has a square shaft end 4a and 4b. Threaded bores 5a and 5b are provided at the frontal sides 11a and 11b, which bores are not manufactured in one operational step during the
20 production of the pinion 1. The threaded bores 5a and 5b as well as appropriate threads are manufactured in another operational step. A toothing 2 is provided at the circumference of the pinion 1 in the middle area of the pinion 1 in the direction of the central axis 10. At the two
25 ends, this toothing 2 is limited by respectively one shaft 3a

and 3b, which have a smaller diameter than the inner partial circle of the toothing 2. The pinion 1 has a central axis 10, which serves to determine the position of the toothing 2, of the shaft 3a and 3b, of the square shaft end 4a and 4b, as well as of the threaded bores 5a and 5b. At one end, the toothing 2 has a leading slope 2a, whereas, at the other end of the toothing 2, a continuous toothing 2b is provided. The pinion 1 with a continuous toothing 2b is used with door closers or door operators, in which the axle mounting is installed centrally with regard to the piston of the door closer or of the door operator.

Figure 2 shows the pinion 1 of Figure 1 in a perspective view. A cone 12a and 12b is mounted on two opposite sides of the square shaft end 4a and 4b at the respective end of the pinion 1.

Figure 3 shows the pinion 1 of Figure 1, where a collar 6 is provided at one end of the toothing 2, what represents a not continuous toothing. In case of stress on the pinion 1, the collar 6 serves to stabilize the toothing 2. The pinion 1 with a collar 6 is used with door closers or door operators, which have an axle mounting outside or centrally of the piston of a door closer or of a door operator.

Figure 4 shows the pinion 1 of Figure 3 in a perspective view. The collar 6 is mounted to one end of the toothing 2. The cones 12a and 12b are mounted at two opposite sides

of the square shaft end 4a and 4b located at the respective end of the pinion 1.

Figure 5 shows the pinion 1 of Figure 1 in a lateral view. This view shows that the toothing 2 is aligned position-oriented with regard to the square shaft end 4a. The
5 position-orientation of the toothing 2 may be embodied in a way that a plain tooth of the toothing 2 is positioned on one of the frontal-sided central lines 10a. In another possible embodiment, the toothing 2 may be aligned such that the
10 recess of a tooth of the toothing 2 is located on one of the frontal-sided central lines 10a. This applies to toothings which have both an even number and an uneven number of teeth at the toothing 2 of the pinion 1.

Figure 6 shows the pinion 1 of the Figure 1 in a mounted
15 situation with a lever 7 of a door closer or of a door operator. The lever 7 is positively and non-positively connected to the pinion 1 with an attachment screw 8 and a washer 9 by means of the threaded bore 5b (see Figure 1), which bore is manufactured in addition to the
20 corresponding thread in another operational step.

The pinion 1, made from a blank, which is a turned component, is manufactured as a cold extruded component in one operational step, which is executed in several press steps without having to rechuck the blank (turned
25 component). In this step, the square shaft end 4a, 4b, the cone 12a, 12b, the shaft 3a, 3b and the toothing 2 with the

leading slope 2a as well as the collar 6 are manufactured. In this case, the position of the tothing 2 is aligned at the same time with regard to the square shaft end 4a and 4b. Based on the required embodiments of the tothing 2 at the
5 pinion 1 – tothing with continuous tothing 2b or tothing with collar 6 – the pinion 1 is thus manufactured as a cold extruded component. In the embodiment with a continuous tothing 2b additional press steps are realized.

The threaded bores 5a and 5b and the respectively
10 associated threads are realized in another operational step, in order to be able to non-positively attach the pinion 1 at the lever 7 by means of the attachment screw 8 and the washer 9, whereby the lever 7 is positively connected by means of the cones 12a and 12b at the square shaft end
15 4a and 4b of the pinion 1.

List of References

	1	pinion
	2	toothing
	2a	leading slope
5	2b	continuous toothing
	3a	shaft
	3b	shaft
	4a	square shaft end
	4b	square shaft end
10	5a	threaded bore
	5b	threaded bore
	6	collar
	7	lever arm
	8	attachment screw
15	9	washer
	10	central axis
	10a	frontal-sided central lines
	11a	front side
	11b	front side
20	12a	cone
	12b	cone

Patent claims

1. A pinion (1), which corresponds to a toothed piston of a door closer or of a door operator, which has at least one toothing (2) and, at each end of the pinion (1), a square shaft end (4a, 4b), at which at least one cone (12a, 12b) is provided, and a cylindrically shaft (3a, 3b) is disposed between each square shaft end (4a, 4b) and the toothing (2), characterized in that the toothing (2) is mounted position-oriented with regard to the two square shaft ends (4a, 4b) located at the end of the pinion (1).
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2. A pinion (1) according to claim 1, characterized in that the pinion (1) is manufactured as a cold extruded component.
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3. A pinion (1) according to claim 1, characterized in that the toothing (2) represents a continuous toothing (2b).
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4. A pinion (1) according to claim 1, characterized in that the toothing (2) has a collar (6) at one end.
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