

CONTROL VALVE

Description

The invention relates to a regulating valve, which is attachable in particular in a bore, executed with a female thread, of a hydraulic door closer, which valve has a body adjoined by a regulating area, and has a thread provided with an anti-rotation means, the thread, including the anti-rotation means, being screwed into the female thread of the bore.

DE 102 28 872 B4 discloses a regulating valve for a door closer, which consists of a body and of a regulating area. For the purpose of regulating the regulating valve, the body has a thread which can be screwed into a bore of the door closer. In this case, the regulating area is executed in a bush-shape and connected to the body via a ball-joint connection. In order to avoid any unwanted rotation of the regulating valve, in particular of the regulating area, an anti-rotation means is provided, which is disposed at the regulating area and is formed as an extension or as a projection. This extension is longitudinally guided in a groove within the housing of the door closer.

It is the object of the present invention to provide a regulating valve of the species described in the introduction, which has a simple design, any unwanted

adjustment of the regulating valve during operation being excluded.

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

According to the invention, it is provided that the anti-rotation means presents a plastic material layer at the thread flanks of the regulating valve, which layer cooperates with the female thread of the door closer. Thereby a clamping effect is achieved, which prevents the regulating valve from an unintentional releasing or rotation.

Another improvement is achieved in that the body has a thread with a plastic material layer being disposed in its thread flanks. Thereby, the thread shape, which is provided with the plastic material layer in a process, is predetermined at the body.

It has proven to be practical to dispose the thread at the shank of the body. Thereby, the production of the thread can be realized in a simple manner.

Another improvement is provided in that the regulating area consists of a shank prolongation with an end, wherein the shank prolongation is connected via a material guide to the plastic material layer in the thread flanks of the thread at the regulating valve. Thus, the regulating area can be produced in a single operation.

Another substantial advantage is that the body has a pocket hole bore, which is disposed along the longitudinal axis of the body, opposite the head area. Thereby, the regulating area can be produced as one piece, non-positively and positively connected as well as aligned to the body.

It is furthermore advantageous that the pocket hole bore has an angular or non-circular cross-section. This provides an additional protection against rotation when screwing the regulating valve into the bore of the door closer.

It is again advantageous that the extension is positively and in a rotation-resistant manner fastened in the pocket hole bore. The regulating area is thus connected to the body in a stabilized manner.

Furthermore, it has proven to be advantageous that the extension has at least one neck which projects into a bore of the body. Thereby the plastic material is guided towards the thread flanks and the extension is additionally secured against rotation.

It is an advantage that the plastic material layer is disposed at the thread positively and/or non-positively and/or adhesively by material. Thereby, the clamping effect can be very fine tuned, because it engages directly in the corresponding thread and, at this location, in the thread flanks of the door closer. This generates a high surface

pressure between the thread flanks of the female thread and of the regulating valve. It has been demonstrated that, due to such a disposition, the engaging thread parts do no longer rotate independently. Furthermore, a manual and/or intentional adjusting of the regulating valve is obviously still possible. In other words, this means that the regulating valve can be adjusted at any time according to the specific requirements of a defined closing behaviour, the anti-rotation means effectively preventing from any independent rotation, in particular one caused by occurring dynamic stresses.

The regulating area has an end facing away from the body and being formed tapered, preferably cone-shaped. This embodiment offers a more precise adjustment of the oil flow, which considerably influences the closing speed of the closing operation. Despite the forces, which are originated by the flowing fluid, acting upon the regulating valve, the plastic material layer at the thread flanks of the regulating valve ensures that the regulating valve does not re-adjust accidentally and independently in the thread.

It has proven to be advantageous that the regulating area is attached at the body by an injection moulding process. Thereby, the regulating area is produced in a simple mode of operation. Depending on the requirements with regard to the material to be processed, the injection moulding process can be modified. The body may be made from

metal, for example zinc, brass or steel, the regulating area being preferably made from plastic material. In order to achieve in particular a high strength, the said plastic material may be reinforced by fibres; in particular, the plastic material may have a certain percentage of glass fibres and/or carbon fibres and/or aramid fibres.

Another possibility is that the body and/or the regulating area consist of plastic material, in particular the body consisting of a fibre-reinforced plastic material. Thereby, the whole regulating valve can be manufactured in a single operation.

Another advantage turns out to be a coloured execution of the body. Thereby, different types of regulating valves can be visually distinguished.

It is advantageous that the door closer has a supply channel, a drainage channel and a cone-shaped valve seat, a fluid being able to be conducted through the supply channel along the valve seat and to the drainage channel. The free end of the regulating area is substantially adapted to the valve seat of the door closer. As a rule, there is a certain distance between the valve seat and the preferably cone-shaped end of the regulating area, such that the fluid from the supply channel can flow between the valve seat and the preferably cone-shaped end of the regulating area into the direction of the drainage channel.

The drawings show:

Figure 1: an inventive regulating valve in a plane view,

Figure 2: the inventive regulating valve of Figure 1 in a full section along the sectional plane X-X,

Figure 3: shows the inventive regulating valve of Figure 1 in a perspective view,

Figure 4: the body of the inventive regulating valve of Figure 3,

Figure 5: a door closer, the regulating valve being screwed-in.

Figure 1 shows a regulating valve 1, which is provided for a hydraulic door closer. In this case, various door closers may be considered, which for example can be operated by an eccentric cam disc according to DE 103 61 085 A1 or by a toothed rack according to DE 199 01 234 C1. The regulating valve 1 has a reception 7 for a sealing element. This sealing element may consist for example of an O-ring. The shank 2a of the regulating valve 1 has a thread 2, a plastic material layer being provided in the thread flanks. The material exit opening 6 as well as the material guide 5 is mounted at the regulating valve 1. Furthermore, Figure 1 presents a sectional plane X-X.

Figure 2 shows a full section through the regulating valve 1 along the sectional plane X-X of Figure 1. The regulating

valve 1 consists of the body 3, as well as of a regulating area 4. The regulating area 4 essentially consists of a shank prolongation 4c and of an extension 4a. Furthermore, necks 4b are illustrated, which, through the material guide 5, form the plastic material layer at the thread 2.

Figure 3 shows a regulating valve 1 of Figure 1 in a perspective view. A head area 8, which the mechanic uses to operate the regulating valve 1 with an appropriate tool, is fitted to the body 3. In Figure 3, the thread 2 is diagrammatically illustrated for the sake of simplicity. The free end 11 of the regulating area 4 is executed cone-shaped and tapering.

Figure 4 shows the body 3 in a perspective view. In this case, the thread 2 is diagrammatically illustrated for the sake of simplicity. On the side of the body 3 opposite the head area 8, the body 3 has a pocket hole bore 9. The pocket hole bore 9 may have, for example a rectangular, square or triangular cross-section. Furthermore, material exit openings 6 and 6a are illustrated which continuously extend as far as into the positive pocket hole bore 9.

Figure 5 shows a door closer 20 into which a regulating valve 1 is screwed. In this case, the thread 2 with the plastic material layer corresponds to the female thread 25 of the door closer 20. The regulating valve 1 has a sealing element 21. The free end 11 of the regulating area 4 and

thus of the regulating valve 1 is located in a cone-shaped valve seat 24 of the door closer 20. A supply channel 22, through which oil is conducted, is located in the region of the cone-shaped free end 11 of the regulating area 4. As a rule, the cone-shaped free end 11 of the regulating area 4 does not directly bear against the valve seat 24, such that the oil can flow through the small channel, formed between the valve seat 24 and the cone-shaped free end 11 of the regulating area 4, into the direction of a drainage channel 23. The flow cross-section for the oil can be adjusted at the regulating valve 1, whereby in particular the closing behaviour of the door closer 20 is controllable. On account of the above described anti-rotation means, the forces, produced by the flowing oil and acting upon the regulating valve 1, are unable to cause any unwanted rotation of the regulating valve 1, not even in the tolerance range.

The above described regulating valve 1 is produced as follows. Initially the body 3 is produced in the shape according to Figure 4 with a thread 2 at its shank. The body 3 is inserted into operating means, preferably an injection moulding tool. In an injection operation, in which plastic material is processed, the regulating area 4 is formed by the injection moulding tool. In this case, the plastic material layer is formed at the thread 2 through the material exit openings 6 and 6a, as well as the material guide 5. During the injection operation, a plastic material is used, which is a polyacetal (POM) in the present embodiment, distinguished

among others things by its excellent sliding characteristics, good resistance to chemicals and high abrasion resistance.

For clarity's sake, the illustration of the operating means has been omitted.

On account of this process, the regulating area 4 is non-positively and/or positively connected to the body 3, and thus the regulating valve 1 according to Figure 1 is obtained.

A clamping effect between the thread 2 of the regulating valve 1 and the female thread 25 of the door closer 20 is achieved on account of the plastic material layer at the thread flanks, because the space between the threads is filled. Thereby a high surface pressure of the engaging thread parts is obtained. At the same time, the regulating valve 1 can be manually rotated at any time and/or it can be unscrewed from the bore of the door closer 20.

List of References

1	regulating valve
2	thread
2a	shank
3	body
4	regulating area
4a	extension
4b	neck
4c	shank prolongation
5	material guide
6	material exit opening
6a	material exit opening
7	reception
8	head area
9	pocket hole bore
11	end
20	door closer
21	sealing element
22	supply channel
23	drainage channel
24	valve seat
25	female thread
X-X	sectional plane

Patent claims

1. A regulating valve (1), which is attachable, in particular in a bore, executed with a female thread (25), of a hydraulic door closer (20), which valve has a body (3) adjoined by a regulating area (4), and a thread (2) provided with an anti-rotation means, the thread (2) including the anti-rotation means being screwed into the female thread (25), characterized in that the anti-rotation means presenting a plastic material layer and being disposed at the thread flanks, and in that the body has a pocket hole bore (9), the pocket hole bore (9) having an angular or non-circular cross-section.
2. A regulating valve (1) according to claim 1, characterized in that the thread (2) is disposed at a shank (2a) of the body (3).
3. A regulating valve (1) according to claim 1, characterized in that the regulating area (4) consists of a shank prolongation (4c) with an end (11), the shank prolongation (4c) being connected to the plastic material layer at the thread flanks of the thread (2) via a material guide (5).
4. A regulating valve (1) according to claim 1, characterized in that the body (3) presents a pocket hole bore (9) which is

disposed along a longitudinal axis of the body (3) opposite of a head area (8).

5. A regulating valve (1) according to claim 3 to 4, characterized in that an extension (4a) of the regulating area (4) is positively and rotation-resistantly connected in the pocket bore hole (9).
6. A regulating valve (1) according to claim 5, characterized in that the extension (4a) has at least one neck (4b), which protrudes into a material exit opening (6) of the body (3).
7. A regulating valve (1) according to claim 1, characterized in that the plastic material layer is disposed at the thread (2) positively and/or non-positively and/or adhesively by material.
8. A regulating valve (1) according to claim 3, characterized in that the regulating area (4) has an end (11) which is facing away from the body (3) and is formed tapered, preferably cone-shaped.
9. A regulating valve (1) according to one of the preceding claims, characterized in that the regulating area (4) is

attached to the body (3) by means of an injection moulding process.

10. A regulating valve (1) according to one of the preceding claims, characterized in that the body (3) and/or the regulating area (4) consist of plastic material, in particular the body (3) consists of a fibre-reinforced plastic material.
11. A regulating valve (1) according to one of the preceding claims, characterized in that the execution of the body (3) is coloured.
12. A regulating valve (1) according to one of the preceding claims, characterized in that the door closer (20) presents a supply channel (22), a drainage channel (23) and a cone-shaped valve seat (24), wherein a fluid can be conducted through the supply channel (22) along the valve seat (24) to the drainage channel (23).