

Title: Floor Spring

Description

The invention relates to a floor spring having a housing for accommodating a closing mechanism, the housing being covered by a housing cover and the housing cover, on the inside thereof oriented towards the housing, being provided with a receiving groove for a seal.

Such floor springs are known, for example, from DE 295 01 929.8 U1. They have a housing, in which the actual closing mechanism of the door closer is accommodated. A shaft, which is bearing a door or the like to be actuated, is extending from the housing to the outside. The housing can be closed by a housing cover, which can be connected to the housing preferably via screws and which is bearing the shaft.

Such housing cover is shown, for example, in Figure 1 to 3 in a view from above, from below and in a cross-section. A receiving groove having a constant depth t is machined into the housing cover 1, a seal being able to be inserted into said groove to allow for sealingly closing the housing with the housing cover. The screw holes for the passage of the screws are identified by a to g (compare Figure 2) and the distances of the individual screw holes a to g by y_1 to y_6 (compare Figure 3).

A general requirement for the conception of floor springs is the ability of mounting the housing as easily and as quickly as possible. In order to comply with this requirement, the number of screws, with which the housing cover is screwed to the housing, needs to be reduced if possible, for decreasing the amount of time needed for mounting and for future maintenance and repair work.

However, the number of screws cannot be reduced just like that. With traditional housing covers, a contact pressure on the seal inserted into the receiving groove is created when tightening the screws. However, if the number of screws is simply reduced, this contact pressure on the seal disappears and may result in leakages.

Therefore, it is an object of the present invention to create a floor spring, in which the housing cover can be fixed using less screws than in previous models, and which will nevertheless guarantee the impermeability between the housing and the housing cover.

This problem is solved for a floor spring of the type discussed in the opening paragraphs in that the depth of the receiving groove varies over the length thereof.

On account of this embodiment, when tightening the screws, in the regions of the receiving groove having a small depth, a contact pressure is created that is higher than the one in the

regions of the receiving groove having a deeper depth. This embodiment provides the option to increase the distance between the screws such that individual screws can be saved.

The dependent claims represent further embodiments of the inventive subject matter.

According to a preferred further development, the receiving groove presents regions having a deeper depth and regions having a smaller depth. As a result of this receiving groove, which is formed with regions of different depths, the contact pressure on the seal can vary depending on the distance of the screws and can be adapted to the respective conditions.

Preferably, the individual regions succeed each other continuously to avoid steps in depth of the receiving groove and thus avoid notch effects on the seal.

The increased distances between the individual screws, made possible on account of the inventive embodiment, generate a higher load on the housing cover, which in turn may lead to deformations at the housing cover. With the intention to counteract this effect, according to a preferred further development, it is intended that the housing cover presents a reinforcing shoulder at least on one peripheral area. On account of this embodiment, it is possible to impart a higher moment of resistance to downward deflection to the housing

cover, such as to be able to counteract a deformation caused through the increased contact pressure.

In particular, if, according to one preferred embodiment, a reinforcing shoulder is provided at the front side and another reinforcing shoulder at the transversal sides respectively, an embodiment of the housing cover with exceptional low-risk deformation is achieved.

The inventive subject matter will be explained in more detail on the basis of one illustrated exemplary embodiment, wherein

Figure 1: shows a housing cover seen from above according to the state of the art;

Figure 2: shows the housing cover from below according to Figure 1;

Figure 3: shows a cross-section through the housing cover along line I – II according to Figure 1;

Figure 4: shows an inventive housing cover from above;

Figure 5: shows a view of the inventive housing cover in the direction of arrow X of Figure 4;

Figure 6: shows the inventive housing cover from above, and

Figure 7: shows a cross-section through the housing cover along line I – II according to Figure 4.

In the Figures only the housing cover 1 being of interest herein is illustrated, but not the complete floor spring.

A view from below of the inventive housing cover 1a is shown in Figure 4. The same housing cover 1a is shown in a view from above in Figure 6 and in Figure 5 in a view from the direction of arrow X of Figure 4. Figure 7 shows a cross-section through the inventive housing cover 1a along line I – II of Figure 4.

On the underside of the housing cover 1a in the installed condition, a receiving groove 5 is provided in the housing cover 1a, into which groove a uniformly thick seal, not illustrated, can be inserted which is cut, e.g. from a tube seal.

As will be appreciated particularly from Figure 7, the depth t1 to t4 of the receiving groove 5 varies from region to region along the line I-II, resulting in regions of the receiving groove 5 having a deeper depth and having a smaller depth t1 to t4, which depths succeed each other, continuously ascending or continuously descending. The depth of the receiving groove 5 between the screw holes a' and b' decreases e.g. to a depth t2, and between the screw holes b' and c' decreases to a depth of t3, whereas the depth t1 between the screw holes c' and d' remains constant. Between the screw holes d' and e'

the receiving groove's 5 depth decreases again to t4. All in all the depth of the receiving groove 5 reaches a maximum in the region of the screw holes a' to e', whereas it reaches a minimum approximately in the central region between two adjoining screw holes a' to e'.

As will result in particular from a comparison of Figure 3 and 7, with the housing cover 1 of the state of the art, the distances y1 to y6 between the screw holes a to g are smaller than the distances x1 to x4 between the screw holes a' to e' with the inventive housing cover 1a. As a consequence, there are seven screw holes a to g provided along the line I-II with the housing cover 1 according to the state of the art, whereas there are only five screw holes a' to e' provided along the line I-II with the housing cover 1a according to the inventive embodiment. Therefore, on account of the inventive embodiment, two screw holes can be saved over the same longitudinal portion.

This is also revealed in a comparison of Figure 2 and 4, where, on account of the inventive embodiment of the inventive housing cover 1a according to Figure 4, the screw hole f, located on the far right hand side of the housing cover 1 according to the state of the art of Figure 2, can be omitted.

With the intention to prevent unintended deformations in the housing cover 1a on account of the larger distances between

the screw holes a' to e', reinforcing shoulders 2, 3 are provided, which protrude from the underside of the housing cover 1a.

One of the reinforcing shoulders 2, 3, namely the reinforcing shoulder 2, is formed to be flush with the front side of the housing cover 1a and extends centrally in relation to a longitudinal centre axis L of the housing cover 1a. It presents a linear shape and extends substantially right-angled in relation to the longitudinal centre axis L.

The two other reinforcing shoulders 3 are provided at the transversal sides of the housing cover 1a, respectively. They are intersected by a transversal centre axis Q of the housing cover 1a and do not extend linearly as does the reinforcing shoulder 2, but they are provided with a bend.

Instead of the illustrated bend, the reinforcing shoulders 3 may likewise be formed curved, for example.

The reinforcing shoulders 3 provided at the transversal sides of the housing cover 1a are formed on projections 4, which extend to the outside, in the plane of the housing cover 1a in the direction of the transversal centre axis Q. In this case again, the reinforcing shoulders 3 extend flush with the exterior edge of the projections.

References

1	housing cover according to the state of the art
1a	housing cover according to the invention
2	reinforcing shoulder
3	reinforcing shoulder
4	projection
5	receiving groove
L	longitudinal centre axis
Q	transversal centre axis
a to g	screw holes according to the state of the art
a' to e'	screw holes according to the invention
t	depth of the receiving groove according to the state of the art
t1 to t4	depth of the receiving groove according to the invention
y1 to y6	centre-to-centre distances of the individual screw holes according to the state of the art
x1 to x4	centre-to-centre distances of the individual screw holes according to the invention

Patent Claims

1. A floor spring having a housing for accommodating a closing mechanism, the housing being covered by a housing cover and the housing cover, on the inside thereof being oriented towards the housing, is provided with a receiving groove for a seal, characterized in that the depth (t1 to t4) of the receiving groove (5) varies, seen over the length thereof.
2. A floor spring according to claim 1, characterized in that the receiving groove (5) presents regions having a deeper depth and regions having smaller depths (t1 to t4).
3. A floor spring according to the preceding claims, characterized in that the individual regions succeed each other continuously.
4. A floor spring according to the preceding claims, characterized in that the depth of the receiving groove (5) reaches a maximum in the region of the screw holes (a' to e') and reaches a minimum in the centre region between two adjoining screw holes (a' to e').

5. A floor spring according to the preceding claims, whereby the housing cover is bearing a shaft of the closing mechanism, which shaft is supporting a door or the like, characterized in that the housing cover (1a) presents a reinforcing shoulder (2, 3) at least in one peripheral area.
6. A floor spring according to the preceding claims, characterized in that the reinforcing shoulder (2) is provided at a front side of the housing cover (1a) and ends flush with the latter.
7. A floor spring according to the preceding claims, characterized in that the reinforcing shoulder (2), provided at the front side, is centrally arranged in relation to a longitudinal centre axis (L) of the housing cover (1a).
8. A floor spring according to the preceding claims, characterized in that two other reinforcing shoulders (3) are provided at two opposite transversal sides.
9. A floor spring according to the preceding claims, characterized in that a transversal centre axis (Q) of the housing cover (1a) passes through the reinforcing shoulder (3) provided at the transversal sides.

10. A floor spring according to the preceding claims, characterized in that the reinforcing shoulders (3) provided at the transversal sides are provided at projections (4) which laterally extend beyond the housing cover (1a).
11. A floor spring according to the preceding claims, characterized in that the length of the projections (4) and the length of the reinforcing shoulders (3) is equal.
12. A floor spring according to the preceding claims, characterized in that the reinforcing shoulder (2) provided at the front side presents a linear shape.
13. A floor spring according to one or more of the preceding claims, characterized in that the reinforcing shoulders (3) provided at the transversal sides present a non-linear shape and, in particular, are provided with a bend or are curved.
14. A floor spring according to one or more of the preceding claims, characterized in that all reinforcing shoulders (2, 3) project into the housing in the mounted condition of the housing cover (1a).