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**Datasheet for the decision
of 19 February 2008**

Case Number: T 1665/06 - 3.2.01

Application Number: 97121140.4

Publication Number: 0852303

IPC: F16F 9/346

Language of the proceedings: EN

Title of invention:

Gas spring

Patentee:

SHOWA CORPORATION

Opponent:

Stabilus GmbH

Headword:

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Relevant legal provisions:

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Relevant legal provisions (EPC 1973):

EPC Art. 54(1),(2), 56

Keyword:

"Inventive step (no) - main request, first and second
auxiliary requests"

"Clarity (no) - sixth auxiliary request"

Decisions cited:

-

Catchword:

-



Case Number: T 1665/06 - 3.2.01

DECISION
of the Technical Board of Appeal 3.2.01
of 19 February 2008

Appellant: SHOWA CORPORATION
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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted
1 September 2006 concerning maintenance of
European patent No. 0852303 in amended form.

Composition of the Board:

Chairman: S. Crane
Members: J. Osborne
G. Weiss

Summary of Facts and Submissions

- I. The appeals by both the patent proprietor and the opponent are directed against the decision posted 1 September 2006 according to which it was found that, account being taken of the amendments made by the patent proprietor during the opposition proceedings, the patent and the invention to which it relates meet the requirements of the EPC.
- II. The following state of the art played a role during both the opposition and the appeal proceedings:
- D3: FR-A-2 305 645 (& D10: DE-C-25 13 302)
- D11: Publicity brochure "Stabilus macht Technik komfortabel, Die Gasfeder", index page, pages 3, 15-19, 2nd ed., 10 7/88.
- III. At oral proceedings held 19 February 2008 the patent proprietor requested that the decision under appeal be set aside and the patent maintained as granted (main request) or in the alternative that the patent be maintained in amended form on the basis of the claims according to first, second or sixth auxiliary requests filed with a letter of 15 January 2008. Third, fourth and fifth auxiliary requests filed with the letter of 15 January 2008 were withdrawn. The opponent requested that the decision under appeal be set aside and the patent revoked.

IV. Claim 1 as granted (main request) reads:

"A gas spring (40) having a piston (23) slidably disposed within a cylinder (21) sealed with a gas, with one end of said cylinder closed, a rod (22) fixed to said piston (23) and stretched from the open end of said cylinder, repulsive force means within said cylinder (21) for generating a repulsive force for biasing said rod (22) in the extension direction thereof, cylinder grooves (41) extending in the axial direction of said cylinder (21) formed on the inner periphery of said cylinder so that an extension side damping force is generated in an extension process in said cylinder grooves, said cylinder grooves (41) formed in both-side areas (X, Z) excluding at least one predetermined locking area (Y) in the stroke direction of said piston, one end of said cylinder and said rod being attached to a main body (sic) (2) and the other end fitted to an opening and closing member (4) pivotally provided in said main body, characterized in that said cylinder grooves (41) are formed with different cross sectional areas (41A, 41B) in said both-side areas (X, Z) of said predetermined locking area (Y) in said stroke direction of said piston."

Claim 1 according to the first auxiliary request differs by the addition of the following wording at the end of the claim:

"... and in that the piston is structured without passage".

Claim 1 according to the second auxiliary request differs from the first auxiliary request by the addition of the following wording at the end of the claim:

"... and wherein each of said cylinder grooves (41), consists of a straight section (41A) having a constant cross sectional area and a tapered section (41B) connected to the straight section, and the tapered section (41B) is formed in a tapered shape so that its cross sectional area is gradually reduced in the extension direction of the rod (22)".

Claim 1 according to the sixth auxiliary request differs from that of the main request (as granted) in as far as the characterising portion reads:

"characterized in that said cylinder grooves (41) are formed with different cross sectional areas (41A, 41B) in said both-side areas (X, Z) of said predetermined locking area (Y) in said stroke direction of said piston and in that the piston is structured without passage, wherein each of said cylinder grooves (41), consists of a straight section (41A) having a constant cross sectional area and a tapered section (41B) connected to the straight section, and the tapered section (41B) is formed in a tapered shape so that its cross sectional area is gradually reduced in the extension direction of the rod (22) and wherein the cross-sectional areas of the cylinder grooves in one side area (X) are larger than the cross sectional areas of the cylinder grooves in the other side area (Z) such that the moving speed of

the piston is faster at the start of the extension stroke."

V. The patent proprietor's submissions may be summarised as follows:

The wording "different cross sectional areas (41A, 41B) in said both-side areas (X, Z) of said predetermined locking area (Y) in said stroke direction of said piston" in the characterising portion of claim 1 according to all requests is to be interpreted as meaning that the cross-sectional areas of grooves on each side of the locking area are different with respect to each other.

As regards the main request in both claim 1 and the description there is a distinction made between "extension direction" and "stroke direction". As a result, the subject-matter of the claim is a spring in which the locking is effective in both directions of movement, implicitly because there is no communication passage in the piston. Similarly, damping is controllable by means of the grooves in both directions of movement. The subject-matter of the claim differs from the disclosure in D3, which forms the closest state of the art, by not only the features of the characterising portion but also the feature of locking in both directions. In accordance with D3 the speed of movement is controlled only during extension and in all embodiments a piston with a communication passage prevents locking during contraction. D3 therefore teaches away from the subject-matter of present claim 1.

Claim 1 according to the first auxiliary request explicitly includes the feature that there is no communication passage in the piston. That feature is not disclosed in D3. The present patent solves two problems, namely to provide locking in both directions and to provide a gas spring requiring fewer assembly steps and at lower cost. The teaching of D3 involves higher cost by providing a communication passage and valve in the piston and so is contrary to the aims of the present patent. The skilled person would not delete the communication passage and valve from D3 since the valve serves to provide different damping in each direction.

In accordance with the second auxiliary request claim 1 also includes the feature of the grooves having a tapered end portion. This provides for a reduction in speed at the end of travel and is not disclosed in D3. D11 is accepted as being state of the art but would not be used by the skilled person because the teaching of its figure 14 relates to a problem which already has been solved in D3. Moreover, the teaching according to D11 figure 14 includes a piston having a passage providing damping in both directions.

The square cross-section in the tapered end portion specified in claim 1 according to the sixth auxiliary request provides a more linear change in damping than is achievable with a triangular cross-section and is not disclosed in D3. In response to a question from the board, whether the expression "square tapered" is clear and whether there was an original disclosure of a particular sectional form of tapered portion in combination with a straight portion of unspecified form,

the appellant replied that the expression would be clear when read in the light of the description and that only the cross-section of the tapered portion is important to the technical effect achievable thereby.

VI. The opponent essentially submitted the following:

Claim 1 according to the main request only specifies characteristics in respect of the extension direction and it leaves open whether the piston is equipped with a by-pass channel. Even if that were not so, although in the embodiments shown in D3 the respective pistons are equipped with a by-pass channel and valve this feature first appears in claim 3. Claim 1 of D3 therefore is a disclosure of a piston having no by-pass channel. Moreover, even in the embodiments in D3 the piston when positioned in the locking area will remain stationary irrespective of its direction of movement into the locking area. D3 furthermore teaches that the extent of damping may be varied by altering the number and/or cross-section of the grooves. If in the intended use a different rate of damping at either side of the locking area would be desirable the skilled person would learn from D3 how that could be achieved. As a result, the subject-matter of claim 1 according to this request does not involve an inventive step.

The additional feature in claim 1 according to the first auxiliary request does not establish an inventive step because it is already known from claim 1 of D3.

The additional feature of claim 1 according to the second auxiliary request is known from the teaching in respect of figure 14 of D11.

As regards the sixth auxiliary request, the effect suggested by the patent proprietor is achievable by using a rectangular cross-section of the tapered portion, not a square cross-section. Nevertheless, the form of the end portion is merely the result of calculation.

Reasons for the Decision

1. The patent relates to a gas spring as is commonly used to support large, pivoting bodywork parts on vehicles such as the tailgate of a hatchback car. The gas spring essentially comprises a piston mounted on the end of a rod, positioned within a cylinder charged with pressurised gas. Damped extension and contraction of the rod is permitted by gas passing between chambers on opposing sides of the piston through grooves in the cylinder wall. By providing a section of plain cylinder wall between longitudinally spaced grooves an intermediate, locking section is created. The locking effect may be overcome by applying force to compress the gas and move the piston beyond the locking section whereby the gas can once again pass through the grooves. The patent specification discloses both that the grooves on each side of the locking section may be of a different cross-sectional area and that an end of each groove may taper to reduce the cross-section.

Interpretation of claim 1

2. The following features relating to the grooves in the cylinder wall are present in claim 1 as granted and common to all of the patent proprietor's requests:

(a) the grooves are formed in "both-side areas (X, Z) excluding at least one predetermined locking area (Y) in the stroke direction of said piston"; and

(b) they are formed with "different cross sectional areas (41A, 41B) in said both-side areas (X, Z) of said predetermined locking area (Y) in said stroke direction of said piston".

Feature (a) specifies that the grooves are provided on each side of the locking area. Feature (b) has been variously understood during the appeal procedure to mean either that the cross-sectional area of the grooves on each side of the locking area changes in the stroke direction of the piston, as in the tapered end sections, or that the grooves on each side of the locking area are of a different cross-section. The board considers that the latter is the correct interpretation and the patent proprietor during the oral proceedings agreed with this.

Main request

3. During opposition the opponent argued that the subject-matter of claim 1 as granted was not new with respect to *inter alia* D3. The opposition division found that not to be the case and during appeal the opponent did

not contradict that finding. The board also is satisfied that the subject-matter of claim 1 is new.

4. Claim 1 uses the expression "in the stroke direction" when specifying the locking areas. The patent proprietor contends that this when seen in the light of the use in the patent specification of the expressions "extension direction" (also in claim 1) and "compression direction" indicates that the locking action is effective in both directions and that the piston therefore implicitly has no by-pass passage.

- 4.1 There is no dispute that the embodiments in the patent specification employ pistons having no by-pass passage. This is explicitly stated to be so in respect of figure 1 and locking in both extension and contraction directions is disclosed in respect of both embodiments. However, the statement of object in paragraph [0006] of the description merely speaks of "adjustment of the extent of opening of the opening and closing member in a plurality of stages" (emphasis added). Moreover, claim 1 only requires that there be a damping force in the extension direction. Both of these leave open the possibility that a by-pass passage equipped with a one-way valve be provided to overcome any locking and damping effects in the contraction direction. Finally, the locking area *per se* has no directional quality and the wording "in the stroke direction" in claim 1 merely defines the position of the locking area. It follows that that wording cannot form the foundation of any conclusions as regards the specification of directions in claim 1.

- 4.2 The board therefore cannot agree with the patent proprietor's interpretation of claim 1 in this respect and concludes that the claim does not inherently include the feature of a piston having no by-pass passage.
5. The board agrees with both parties that D3 forms the closest state of the art for consideration of inventive step. D3 acknowledges previously known gas springs which were lockable in any position by means of a manually controllable valve selectively permitting communication between the two chambers. The aim of D3 is to provide a gas spring of simple construction which locks at predetermined positions of opening (page 1, final paragraph). In one embodiment this is achieved by providing longitudinally spaced grooves in the cylinder wall. The piston according to that embodiment is constructed in such a way that during extension of the spring the exchange of gas between the chambers takes place only through the grooves but during contraction an additional passage through the piston opens. As a result, if the piston rod is driven into the cylinder the movement is not locked during the passage of the piston through the locking portion but is only subject to an increase in resistance. One further embodiment employing a profiled central control rod in place of the grooves has similar operating characteristics whilst a third requires no increased force to pass the locking area during contraction.
- 5.1 The subject-matter of present claim 1 differs from the disclosure of the first embodiment of D3 by the features included in the characterising portion, namely that the grooves on one side of the locking area have a

different cross-sectional area to those on the other side (see point 2 above). These features have the effect that the resistance to extension is greater on one side of the locking area than on the other.

5.2 It would be within the normal activity of the skilled person when preparing detailed designs to manufacture the gas spring of D3 to configure it according to the desired duty. D3 discloses that the speed of extension is a function of the quantity and cross-section of the grooves (page 5, lines 8, 9). It follows that if the desired duty of the spring would require a greater resistance to extension at one end, the skilled person when following the teaching of D3 would arrive at the subject-matter of the present claim without exercising inventive effort.

5.3 On the basis of the foregoing the board concludes that the subject-matter of present claim 1 does not involve an inventive step. The request therefore fails.

First auxiliary request

6. Claim 1 according to this request explicitly specifies that the piston has no by-pass passage. As set out above, in all embodiments according to D3 such a passage is provided, equipped with a one-way valve. Claim 1 according to D3, on the other hand, does not include this feature which first appears in claim 5. The opponent takes the view that as a result claim 1 of D3 implicitly discloses the absence of a by-pass passage. The board disagrees. The purpose of patent claims is to define the subject-matter to be protected and the absence of the feature from claim 1 of D3 is

not a technical teaching to this effect but merely the consequence of the feature not being essential to achieving the object of D3.

6.1 However, as is derivable from D3 page 3, lines 6 to 18 the provision of a by-pass passage equipped with a one-way valve was considered advantageous in order to avoid the need to apply excessively high loads during contraction. Presumably that advantage was considered to outweigh the resultant additional complexity. Be that as it may, it is evident from the overall disclosure of D3 that the feature of a by-pass passage equipped with a one-way valve has no functional relationship with the remainder of the gas spring. If the intended duty were such that the application of relatively high loads during contraction were not problematic it would be an obvious measure in accordance with the aims of the present patent for the skilled person to simply delete this feature in order to simplify the gas spring and reduce costs. Contrary to the argument of the patent proprietor this measure would not be inconsistent with the teaching of D3 since that also aims to provide a simple construction.

6.2 The board concludes that the subject-matter of claim 1 according to this request does not involve an inventive step. The request therefore fails.

Second auxiliary request

7. Claim 1 according to this request contains the additional feature that the grooves have tapered end portions and the subject-matter is essentially the same as that found by the opposition division to involve an

inventive step. The additional feature has the effect of increasing the damping where the piston arrives at the end of a groove.

- 7.1 D11 is a brochure publicising the technological background to gas springs produced by the opponent. In section 4 it lists functions which may be provided in addition to those of a basic gas spring, including damping in one or both directions and damping at the end of travel. Figure 14 discloses that damping at the end of travel may be achieved using a groove in the cylinder wall which tapers towards the end in order to increase the resistance to gas transfer between chambers. The skilled person would be aware of this teaching and it would be an obvious measure for him to apply it to the gas spring of D3.
- 7.2 The patent proprietor's view is that the problem solved by the disclosure in respect of D11 figure 14, namely to provide damping at the end of travel, has already been solved in the teaching of D3 and that the skilled person therefore would have no reason to add the feature from D11. D3 does disclose in page 5, lines 17 to 22 that by suitably locating the ends of the grooves gas pressure acts to bring the piston to a halt more gently than would a mechanical stop at the end of the cylinder. However, it is evident that the teaching of D11 is wholly compatible with and would serve as an additional refinement of that according to D3 by providing greater control. The apparent presence in the piston according to D11 figure 14 of a by-pass passage operative during extension is not relevant to this matter since the effects achievable by the groove and by-pass passage are purely additive.

7.3 The opposition division's positive finding in respect of inventive step was based on the reasoning that the objective problem solved by the subject-matter of the claim is not addressed in D3 and that even if D3 and D11 would be combined there would be no disclosure in D11 of a locking area. The opposition division defined the objective problem as being to decrease the speed of the piston when approaching a locking area with a view to reducing vibrations and went on to reason that D11 was not relevant because vibrations were not an issue. However, whether vibrations occur in the member attached to the gas spring would depend on factors outside of the scope of this claim. Moreover, the tapered sections in the gas spring according to present claim 1 are provided not only adjacent the locking area but also adjacent the extension end of the cylinder and the problem relates more generally to decreasing speed at the ends of the grooves. This problem is explicitly addressed in D11 for the ends of the grooves adjacent the extension end of the cylinder. Having received encouragement from D11 to adopt that solution it would be obvious for the skilled person to employ it also adjacent a locking area since the relationship between the piston and grooves is the same irrespective of the position in the cylinder.

7.4 On the basis of the foregoing the board concludes that the subject-matter of present claim 1 does not involve an inventive step. The request therefore fails.

Sixth auxiliary request

8. In claim 1 according to this request the form of the ends of the grooves has been defined as "square tapered". This expression is fundamentally unclear because a taper is by definition not square. In the description the term 'square' is used in respect of the cross-section of the tapered area but with reference to figure 7 which shows a cross-section which apparently is not square but rectangular. Moreover, the arguments which the patent proprietor presented in support of inventive step of this feature were based on effects achievable with a tapered area of rectangular cross-section. Since claim 1 is unclear in defining the subject-matter to be protected the request fails.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

A. Vottner

S. Crane