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(71) Applicant: VALEO JAPAN CO., LTD. [JP/JP]; 39, Aza Higashihara, Sendai, Kumagaya-shi Saitama, 3600193 (JP).

(72) Inventors: BELLET, Augustin; 1 Chemin d'Aunay, LA CHAPELLE- D'AUNAINVILLE, 28700 (FR). GUITARI, Imed; 1 rue Danton, ELANCOURT, 78990 (FR).

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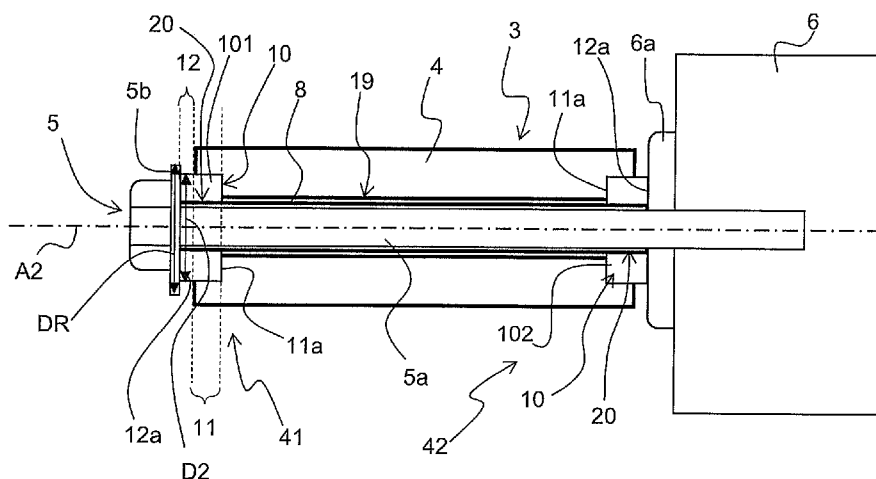
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(54) Title: AIR CONDITIONING INSTALLATION COMPRESSOR EQUIPPED WITH VIBRATION DAMPING MEMBERS



(57) Abstract: The invention concerns a compressor for a vehicle air conditioning installation comprising: - a casing including at least one mounting block (3), - at least one of the mounting blocks (3) including: - a reception element (4) intended to cooperate at least with a fixing system (7) of the compressor (1), - two vibration damping members (10, 101, 102) located in part in the reception element (4), each damping member (10, 101, 102) comprising a hole (20) intended to have pass through it at least one part of the fixing system (7), at least one of the damping members (10, 101, 102), termed the first damping member (10), comprising: - a first portion (11) located entirely inside the reception element (4), and - a second portion (12) located entirely outside the reception element (4), comprising an end face (12a) configured to bear against at least part of the fixing system (7), characterized in that a section of the second portion (12) of the first damping member (10) has an outside perimeter less than or substantially equal to an outside perimeter of a section of the first portion (11) of said first damping member (10).



Description

Title of Invention: AIR CONDITIONING INSTALLATION COMPRESSOR EQUIPPED WITH VIBRATION DAMPING MEMBERS

Technical Field

[0001] The field of the present invention is that of compressors equipping air conditioning installations for vehicles, notably motor vehicles. The invention relates more specifically to the absorption of vibrations that are generated during operation of the compressor.

Background Art

[0002] Air conditioning installations for motor vehicles comprise a closed air conditioning circuit in which a refrigerant fluid flows. Successively in the direction of flow of the refrigerant fluid through it, the air conditioning circuit essentially comprises a compressor, a condenser, a pressure regulator and an evaporator.

[0003] The compressor comprises an axially extending casing of cylindrical general shape. The casing includes an inlet through which the fluid is admitted at low pressure into the casing. The fluid then flows through the casing from the inlet to a refrigerant fluid compression mechanism. An outlet communicates with the compression mechanism to evacuate the fluid at high pressure from the casing following its compression. The compressor is routinely driven from the propulsion engine of the vehicle. There have more recently been proposed compressors with their motor and control electronics are mounted inside the casing.

[0004] Moreover, the casing of the compressor conventionally includes a plurality of mounting blocks enabling the compressor to be fixed to a support present on the vehicle. Such mounting blocks generally comprise a reception element through which pass bolts, the bolts being intended to be screwed into the support.

[0005] A problem is the vibrations generated by the compressor when it is operating. In fact, such vibrations propagate into the support and generate unwelcome noise perceptible to the passengers in the passenger compartment of the vehicle.

[0006] To limit the transmission of vibrations between the compressor and the support it is known to use damping members able to absorb them, as is clear for example from the document JP2000130330 (DENSO CORP.). The damping procured by the device described in that document nevertheless is deserving of improvement. In fact, the presence of a shoulder on the damping members extending beyond the reception element, i.e. with the shoulder wider than the part of the damping member situated inside the reception element, tends to concentrate the vibrations in a corner of the

shoulder, thus able to cause the damping member to break through shear. The latter member can then no longer perform its function adequately.

Summary of the invention

[0007] In this context, the invention consists in a compressor for a vehicle air conditioning installation comprising:

- a casing including at least one mounting block,
- at least one of the mounting blocks including:
 - a reception element intended to cooperate at least with a fixing system of the compressor,
 - two vibration damping members located in part in the reception element, each damping member comprising a hole intended to have pass through it at least one part of the fixing system, at least one of the damping members, termed the first damping member, comprising:
 - a first portion located entirely inside the reception element, and
 - a second portion located entirely outside the reception element, comprising an end face configured to bear against at least part of the fixing system,

[0008] characterized in that a section of the second portion of the first damping member has an outside perimeter less than or substantially equal to an outside perimeter of a section of the first portion of said first damping member.

[0009] Accordingly, with shorter or substantially equal perimeters, this means that the damping member has no external shoulder that can be the seat of vibrations and/or shear caused by the operation of the compressor. This damping member therefore has no area sensitive to this shear effect.

[0010] To be more precise, the sections of the first and second portions are cross sections perpendicular to a fixing axis along which the reception element extends.

[0011] Because of its shape, a damping member of this kind is easier to manufacture, notably by an overmoulding process, as well as producing more effective vibration decoupling than damping members comprising shoulders.

[0012] When it is stated that the compressor comprises two damping members, it is understood that those members are separate from each other and preferably spaced from each other. It is then clear that the damping members straddle a longitudinal end of the reception element.

[0013] The expression “substantially equal” means that the manufacturing tolerances are included to verify this equality.

[0014] According to various features of the invention, separately or in combination:

- the end face of the second portion has an area equal to an area of a section of the first portion. The section of the first portion is understood as being a cross section perpendicular to the fixing axis of the reception element.

- a tube extends into the hole of at least one of the damping members. The tube preferably extends into the hole in the first damping member.
- the reception element includes a recess for housing the first damping member.
- the reception element comprises a through-orifice allowing the passage of a fixing member along a fixing axis.
- the recess is delimited at least in part by an inner shoulder serving as a bearing surface for the first damping member. The presence of the recess delimited by the inner shoulder then forms a spot facing inside the reception element for receiving the first damping member.
- the recess is delimited by walls having an inside diameter less than or equal to an outside diameter of a washer or a nut or a screwhead of the fixing system intended to bear against the end face of the second portion of the first damping member.
- the end face of the second portion of the first damping member has an outside diameter less than or equal to an outside diameter of a washer or a nut or a screwhead of the fixing system intended to bear against the end face of the second portion of the first damping member. This therefore makes it possible to prevent shear causing the damping member to break. In fact, at the time of an abnormal impact to the vehicle, such as a collision with the vehicle, the movement of the compressor transmitted along the mounting block is then limited and stopped.
- the second portion projecting from the reception element has a length between 5% and 50% inclusive of a total length of the first damping member, the lengths being measured along a fixing axis along which the reception element extends.
- the first portion of the first damping member has an outer surface in direct contact with an inner surface of the recess of the reception element.
- the first damping member has a constant cross section along a fixing axis along which the reception element extends. Alternatively, the first damping member has a diameter varying from its first longitudinal end face to its second longitudinal end face.
- the first damping member has a first diameter of a first end space delimiting the first portion, a second diameter of the end face, termed the second end face, delimiting the second portion, and a third diameter between the first end face and the second end face, the third diameter being greater than either the first diameter or the second diameter.
- the first damping member has a diameter that evolves continuously between the first diameter and the third diameter and between the third diameter and the second diameter along a fixing axis along which the reception element extends.
- the first damping member comprises a ring located on the first portion.
- the ring projects and extends radially relative to an outer surface of the first portion.
- the projecting ring is situated nearer the first face and the second face.

- at least one of the faces of the reception element comprises a chamfer. A chamfer of this kind makes it possible to assist the insertion of the first damping member into the reception element. This chamfer is particularly useful in the case of a damping member of varying diameter.
- the reception element comprises a groove receiving the ring.
- the first damping member is made of elastomer. The elastomer is for example based on natural rubber, silicone or any other material enabling damping of the vibrations, notably a synthetic material.
- the reception element comprises the first damping member and a second damping member, each of the damping members being situated at a longitudinal end of the reception element and having respective second portions projecting from the reception element.
- the mounting block comprises a second damping member of identical conformation to the first damping member.
- the compressor comprises three mounting blocks distributed over an outer periphery of the casing.

[0015] The invention also consists in a combination comprising::

- a compressor as defined above, and
- a fixing system comprising at least: a fixing member extending in part in the reception element and intended to be fixed into a support of the compressor.

[0016] According to one embodiment, the fixing system also comprises a support for the compressor, said support being configured to be fastened to the vehicle.

[0017] Other features and advantages of the present invention will become more clearly apparent in the light of the following description and the drawings, in which:

Brief Description of Drawings

[0018] [Fig. 1] figure 1 is a partial perspective view of a compressor according to the invention, showing mounting blocks of the compressor cooperating with a support of the vehicle;

[Fig. 2] figure 2 is a representation in axial section of a mounting block of the compressor according to the invention on said support;

[Fig. 3] figure 3 is a diagrammatic perspective view of a first embodiment of a damping member of the mounting block according to the invention;

[Fig. 4] figure 4 is a representation in axial section of part of one of the longitudinal ends of the reception element of the mounting block according to the invention shown in figure 2;

[Fig. 5A] figure 5A is a diagrammatic perspective view of a second embodiment of a damping member of the mounting block according to the invention;

[Fig. 5B] figure 5B is a representation in axial section of a first end of a mounting block of the type shown in figure 2, showing the integration of the second embodiment of the damping member according to the invention;

[Fig. 6A] figure 6A is a diagrammatic perspective view of a third embodiment of a damping member of the mounting block according to the invention;

[Fig. 6B] figure 6B is a representation in axial section of the first end of a mounting block showing the integration of the third embodiment of the damping member according to the invention.

Detailed Description

- [0019] It should first be noted that although the figures show the invention in detail for the purposes of its execution, they can of course serve to define it better if necessary. It is also to be noted that in all the figures similar elements are indicated by the same reference.
- [0020] Figure 1 shows a compressor 1 intended to equip an air conditioning installation equipping a motor vehicle. The compressor 1 comprises a casing 2 having an elongate conformation, such as a cylindrical general conformation. As a general rule the casing 2 of a compressor 1 extends primarily along a longitudinal axis A1. The casing 2 houses an electric motor driving a spiral vane compression mechanism.
- [0021] The casing 2 includes an inlet 2a for admitting a refrigerant fluid and an outlet 2b for evacuating the refrigerant fluid from the casing 2. In the example shown, the inlet 2a and the outlet 2b are at a distance from one another on the same side of the casing 2. The refrigerant fluid is fed from the inlet 2a to the outlet 2b by a hydraulic circuit inside the casing 2.
- [0022] The casing 2 is equipped with at least one mounting block 3 for fixing the compressor 1 to the vehicle. The casing 2 preferably comprises a plurality of mounting blocks 3, here three in number. For example, a first mounting block 3a is placed near the inlet 2a, a second mounting block 3b is placed near the outlet 2b intersecting the longitudinal axis A1 on the side of the spiral vane compression mechanism, and a third mounting block 3c is placed diametrically opposite the first fixing block 3a.
- [0023] In the example shown each mounting block 3 comprises a reception element 4 fastened to the casing 2. The reception elements 4 are advantageously integrally moulded into the casing 2 during its manufacture. A reception element 4 takes the form of a generally cylindrical conduit with axis A2. This axis A2 is perpendicular to the longitudinal axis A1 of the compressor 1 and illustrates an axis for fixing the compressor 1 to its support 6.
- [0024] Each reception element 4 cooperates with a fixing system 7 enabling the fixing of the compressor 1 to the vehicle. To be more precise, this fixing system 7 comprises at least one fixing member 5 such as a screw or a bolt for example. The fixing system 7 can

also comprise a support 6 fastened to a vehicle. Each reception element 4 features an orifice 19 that receives a fixing member 5. The fixing system 7 can also comprise a nut or one or more washers cooperating with the screw or the bolt.

- [0025] As shown in figure 2, here the fixing member 5 is a bolt 5a that cooperates on the one hand with a washer 5b and on the other hand with the support 6. The fixing member 5 generally has an elongate shape having a greater length than the reception element 4, enabling it to be able to cooperate with the support 6. In fact, the fixing members 5 pass through the reception elements 4 and are fixed to the support 6, notably by screwing them in, along the fixing axis A2.
- [0026] This fixing axis A2 is oriented perpendicularly to a plane in which the support 6 lies and the axis A1 along which the compressor 1 extends, as mentioned above. The fixing axes A2 of the various mounting blocks 3 are oriented parallel to one another in the example shown. Instead of this or in addition to this, depending on the configuration of the support 6, the fixing axes A2 of two reception elements 4 can also be oriented along intersecting fixing axes. The fixing system 7 can also comprise a steel ring 6a pressed against the support 6 and this ring 6a can be in one piece with the support 6 or attached to the support 6.
- [0027] Damping members 10 are used to prevent propagation of vibrations from the compressor 1 to the support 6. To this end the damping members 10 can be made of elastomer. The elastomer is for example based on natural rubber, silicone or any other material making it possible to damp vibrations, notably a synthetic material.
- [0028] Here each mounting block 3 is equipped with two damping members 10 adapted to reduce the vibrations generated when the compressor 1 is operating. These two damping members 10 are separate from each other and preferably spaced from each other.
- [0029] The damping member 10 is located in part in the reception element 4 and comprises a hole 20 adapted to have the fixing member 5 pass through it along the fixing axis A2. This hole 20 can have a diameter that is constant or varies along the damping member 10, along the fixing axis A2. The damping member 10 comprises a first portion 11 located entirely inside the reception element 4 and a second portion 12 located entirely outside the reception element 4. In other words, the damping member 10 straddles one of the longitudinal ends of the reception member 4, emerging from the latter. The second portion 12 projecting from the reception element 4 has a length representing between 5% and 50% of the total length of the damping member 10, the lengths being measured along the fixing axis A2.
- [0030] It is clear that the second portion 12 is then intended to be in contact with the fixing system 7. To be more precise, the second portion 12 comprises an end face 12a configured to bear against at least part of the fixing system 7. The end face 12a can

then be in contact with the washer 5b or the support 6 depending on the position of the damping member 10 at the longitudinal ends of the reception element 4.

[0031] As can be seen in figure 2, the reception element 4 supports a first damping member 101 disposed at a first longitudinal end 41 of the reception element 4 and a second damping member 102 disposed at an opposite second longitudinal end 42 of the reception element 4. It is seen that the end face 12a of the second portion 12 of the first damping member 101 then bears against the washer 5b cooperating with the fixing member 5 and the end face 12a of the second portion 12 of the second damping member 102 bears against the ring 6a of the support 6.

[0032] In the embodiment shown the end face 12a of the second portion 12 of the first damping member 101 has an outside diameter D2 less than an outside diameter DR of the washer 5b, or of the nut, intended to bear against this end face 12a. In fact, this makes it possible to prevent the first damping member 101 from breaking, notably in the event of an abnormal shock. Movement of the compressor 1 along the mounting block 3 is possible in the event of a collision to the vehicle. This movement can be limited and stopped by the presence of the washer 5b or the nut. An end face 12a of the second portion 12 of the first damping member 101 having a diameter less than the washer 5b makes it possible to prevent the washer 5b from irreversibly deforming the first damping member 101 or the latter passing over the washer 5b. Of course, this advantage is also obtained if the end face 12a of the second portion 12 has an outside diameter D2 equal to an outside diameter DR of the washer 5b, or of the nut, intended to bear against this end face 12a.

[0033] Moreover, as can also be seen in figure 2, a tube 8 can be provided extending into the hole 20 of at least one of the damping members 10 and along the reception element 4. The hole 20 of the damping member 10 thus participates in centring the tube 8 and the fixing member 5 inside the reception element 4. This tube 8, for example made of steel, constitutes a spacer and makes it possible to withstand a tightening torque applied to the fixing member 5. It should be noted that the tube 8 preferably has a clearance with respect to an inner surface of the reception element 4, notably if the inner surface of the damping member 10 is not flush with the inner surface of the reception element 4. In other words, the tube 8 has a clearance with respect to the reception element 4 if the hole 20 is smaller than the orifice 19. The tube 8 therefore does not propagate vibrations from the compressor 1 to the support 6.

[0034] With the tube 8 present, one of the damping members 10 can be fastened to the tube 8, either by moulding it around the tube 8 or by a tight fit of the damper member 10 on the tube 8. The damping member 10 and the tube 8 thus form a unitary assembly that can be introduced into the orifice 19 in the reception element 4, this assembly then being completed by mounting the second damping member 10. During assembly of the

components of the compressor 1, one of the damper members 10 can advantageously be fastened to one of the ends of the tube 8 by a cement and the other by a force-fit. Alternatively, the two damping members 10 can simply be nested over the tube 8.

[0035] Here the damping members 10 in figure 2 are identical two by two and comprise, as shown in figure 3, a cross section that is constant along the fixing axis A2. It can also be stated that here the section S12 of the second portion 12 of the damping member 10 has an outer perimeter P2 equal to an outer perimeter P1 of a section S11 of the first portion 11. It can also be stated that the area S2 of the end face 12a of the second portion 12 is equal to an area S3 of a cross section of the first portion 11 or the area S1 of an end face 11a of the first portion 11. It should be noted that with equal perimeters P1, P2 the portions of the damping member 10 have no exterior shoulder that can be the seat of vibrations caused by the operation of the compressor 1 or areas sensitive to shear.

[0036] Moreover, the first portion 11 of the damping member 10 is intended to be pressed against the reception element 4. To this end figure 4 shows in section that the reception member 4 includes a recess 40 to house the damping member 10. To be more precise, this recess 40 is configured to house the first portion 11 of the damping member 10. The first portion 11 then has an external surface 11b intended to be in direct contact with, in bearing engagement with, an inner surface 40a of the recess 40 of the reception element 4. The recess 40 then has dimensions complementary to the first portion 11. To be more precise, it is the walls 40b forming the recess 40 that have dimensions complementary to the first portion 11.

[0037] In a direction parallel to the fixing axis A2 the recess 40 is delimited by a shoulder 4a inside the reception element 4. This shoulder 4a serves as a bearing surface at the end face 11a of the first portion 11 of the damping member 10. The presence of the recess 40 delimited by the shoulder 4a then forms a spot facing inside the reception element 4 that can receive the damping member 10. It should be noted that this spot facing advantageously has a diameter less than or equal to the outside diameter DR of the washer 5b, or of the nut, intended to bear against the end face 12a of the second portion 12 of the damping member 10. In other words, this means that the first portion 11 of the damping member 10 has a diameter D1 less than the outside diameter DR of the washer 5b.

[0038] According to a second embodiment of the invention illustrated by figures 5A and 5B, the damping member 10 is similar to the first embodiment except that it comprises a ring 9 located in the part housed in the reception element 4. In other words, the ring 9 is situated on the first portion 11 of the damping member 10, originating from the external surface 11b that delimits the first portion 11. The ring 9 is then positioned nearer the end facing 11a of the first portion 11 than the end face 12a of the second

portion 12.

- [0039] To be more precise the ring 9 projects and here extends radially relative to the external surface 11b of the first portion 11. A ring 9 of this kind makes it possible to retain the damping member 10 in the reception element 4, notably during transportation of the compressor 1 or during assembly of the compressor 1 onto its support 6. Of course, the ring 9 could also extend obliquely relative to this external surface 11b.
- [0040] Figure 5B shows that the projecting ring 9 is configured to be inserted in a groove 13 in the reception element 4. To be more precise, this groove 13 is in the wall 40b delimiting the recess 40. The groove 13 has dimensions complementary to the ring 9. To assist the insertion of a damping member 10 of this kind in the reception element 4 a chamfer 14 can be provided on the external perimeter of the recess 40. A chamfer 14 of this kind has a slope relative to the fixing axis A2 of the order of 30° for example.
- [0041] Of course, it would equally be possible to provide a ring 9 in the form of a groove on the damping member 10 and a rib projecting from the wall 40b delimiting the recess 40 and intended to be inserted in the groove on the damping member 10.
- [0042] According to an embodiment of the invention illustrated by figures 6A and 6B a cross section of the second portion 12 of the damping member 10 has an outer perimeter less than or equal to an outer perimeter of a cross section of the first portion 11 of the damping member 10.
- [0043] According to this embodiment the damping member 10 has a diameter varying between its two longitudinal end faces 11a, 12a. In fact, there are defined here a first diameter D1 corresponding to the diameter of the end face 11a delimiting the first portion 11, a second diameter D2 corresponding to the diameter of the end face 12a delimiting the second portion 12, and a third diameter D3 between the end face 11a delimiting the first portion 11 and the end face 12a delimiting the second portion 12, and the third diameter D3 is then greater than either the first diameter D1 or the second diameter D2. To be more precise it is seen in figure 6A that along the fixing axis A2 the diameter increases regularly between the first diameter D1 and the third diameter D3 and then decreases regularly between the third diameter D3 and the second diameter D2. The third diameter D3 is advantageously situated in the portion 11 intended to be integrated into the reception element 4.
- [0044] Figure 6B also shows that here the recess 40 of the reception element 4 takes the form of a bend having a shape complementary to the damping member 10. A chamfer can be provided on the outer perimeter of the recess 40 in order to assist with the insertion of the damping member 10. A chamfer of this kind can have a slope of the order of 30° relative to the fixing axis A2 for example.
- [0045] It should be noted that here the diameter of the end face 12a of the second portion 12

is also less than the outside diameter DR of the washer 5b.

- [0046] Other shapes of the damping member 10 are possible. In fact, for the section of the second portion 12 to have an outer perimeter less than or substantially equal to the outer perimeter of a section of the first portion 11, there could equally be provided a damping member 10 having a conical shape with an outer perimeter increasing regularly from the end face 12a of the second portion 12 to the end face 11a of the first portion along the fixing axis A2. Moreover, the invention also encompasses the situation in which two damping members 10 on the same reception element 4 have different shapes. In fact, the damping members 10 can be a combination of the embodiment two by two on the same mounting block or at least two mounting blocks.
- [0047] The foregoing description explains clearly how the invention makes it possible to achieve the objectives set for it and notably to propose a compressor in which at least one of the damping members has no shoulder outside the reception member that can be the seat or vibrations and consecutively of shear caused by the operation of the compressor. This damping member therefore does not generate any noise likely to be heard by the users of the motor vehicle and has increased reliability compared to the prior art solution. Moreover, because of their shapes, a damping member of this kind is simpler to manufacture, notably by overmoulding it, whilst providing more efficient vibrational decoupling compared to damping members comprising shoulders.

Claims

- [Claim 1] Compressor (1) for a vehicle air conditioning installation comprising:
- a casing (2) including at least one mounting block (3),
 - at least one of the mounting blocks (3) including:
 - a reception element (4) intended to cooperate at least with a fixing system (7) of the compressor (1),
 - two vibration damping members (10, 101, 102) located in part in the reception element (4), each damping member (10, 101, 102) comprising a hole (20) intended to have pass through it at least one part of the fixing system (7), at least one of the damping members (10, 101, 102), termed the first damping member (10), comprising:
 - a first portion (11) located entirely inside the reception element (4), and
 - a second portion (12) located entirely outside the reception element (4), comprising an end face (12a) configured to bear against at least part of the fixing system (7),
- characterized in that a section (S12) of the second portion (12) of the first damping member (10) has an outside perimeter (P2) less than or substantially equal to an outside perimeter (P1) of a section (S11) of the first portion (11) of said first damping member (10).
- [Claim 2] Compressor according to Claim 1, characterized in that the end face (12a) of the second portion (12) has an area (S2) equal to an area (S1, S3) of a section of the first portion (11).
- [Claim 3] Compressor according to Claim 1 or 2, characterized in that a tube (8) extends into the hole (20) of at least one of the damping members (10, 101, 102).
- [Claim 4] Compressor according to any one of Claims 1 to 3, characterized in that the reception element (4) includes a recess (40) housing the first damping member (10).
- [Claim 5] Compressor according to the preceding claim, characterized in that the recess (40) is delimited at least in part by an inner shoulder (4a) serving as a bearing surface for the first damping member (10).
- [Claim 6] Compressor according to Claim 4 or 5, characterized in that the recess (40) is delimited by walls (40b) having an inside diameter less than or equal to an outside diameter (DR) of a washer (5b) of the fixing system (7) intended to bear against the end face (12a) of the second portion (12) of the first damping member (10).

- [Claim 7] Compressor according to any one of the preceding claims, characterized in that the end face (12a) of the second portion (12) of the first damping member (10) has an outside diameter (D2) less than or equal to an outside diameter (DR) of a washer (5b) of the fixing system (7) intended to bear against the end face (12a) of the second portion (12) of the first damping member (10).
- [Claim 8] Compressor according to any one of the preceding claims, characterized in that the second portion (12) projecting from the reception element (4) has a length between 5% and 50% inclusive of a total length of the first damping member (10), the lengths being measured along a fixing axis (A2) along which the reception element (4) extends.
- [Claim 9] Compressor according to any one of the preceding claims in combination with Claim 4, characterized in that the first portion (11) of the first damping member (10) has an outer surface (11b) in direct contact with an inner surface (40a) of the recess (40) of the reception element (4).
- [Claim 10] Compressor according to any one of the preceding claims, characterized in that the first damping member (10) has a constant cross section along a fixing axis (A2) along which the reception element (4) extends.
- [Claim 11] Compressor according to any one of Claims 1 to 9, characterized in that the first damping member (10) has:
- a first diameter (D1) of a first end space (11a) delimiting the first portion (11),
 - a second diameter (D2) of the end face, termed the second end face (12a), delimiting the second portion (12), and
 - a third diameter (D3) between the first end face (11a) and the second end face (12a), the third diameter (D3) being greater than either the first diameter (D1) or the second diameter (D2).
- [Claim 12] Compressor according to the preceding claim, characterized in that the first damping member (10) has a diameter that evolves continuously between the first diameter (D1) and the third diameter (D3) and between the third diameter (D3) and the second diameter (D2) along a fixing axis (A2) along which the reception element (4) extends.
- [Claim 13] Compressor according to any one of the preceding claims, characterized in that the first damping member (10) comprises a ring (9) located on the first portion (11).
- [Claim 14] Compressor according to the preceding claim, characterized in that the

ring (9) projects and extends radially relative to an outer surface (11b) of the first portion (11).

[Claim 15]

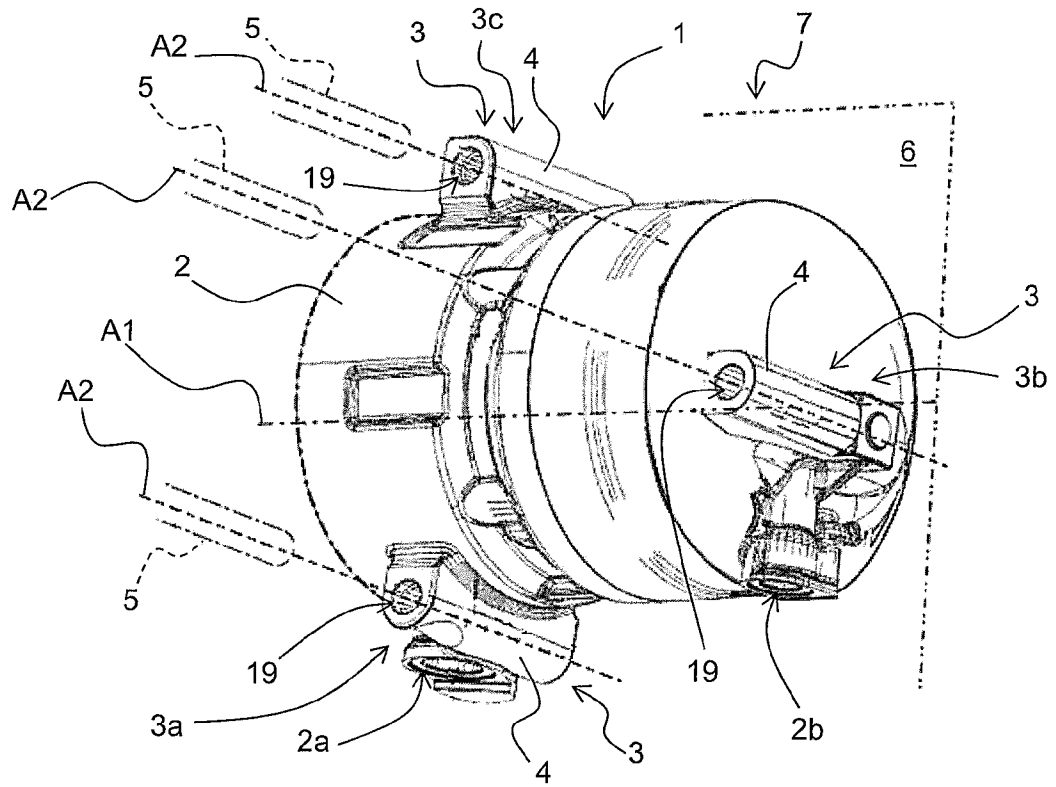
Compressor according to Claim 13 or 14, characterized in that the reception element (4) comprises a groove (13) receiving the ring (9).

[Claim 16]

Combination comprising:

- a compressor (1) defined in any one of the preceding claims, and
- a fixing system (7) comprising at least:
- a fixing member (5) extending in part in the reception element (4) and intended to be fixed into a support (6) of the compressor (1).

[Fig. 1]



[Fig. 2]

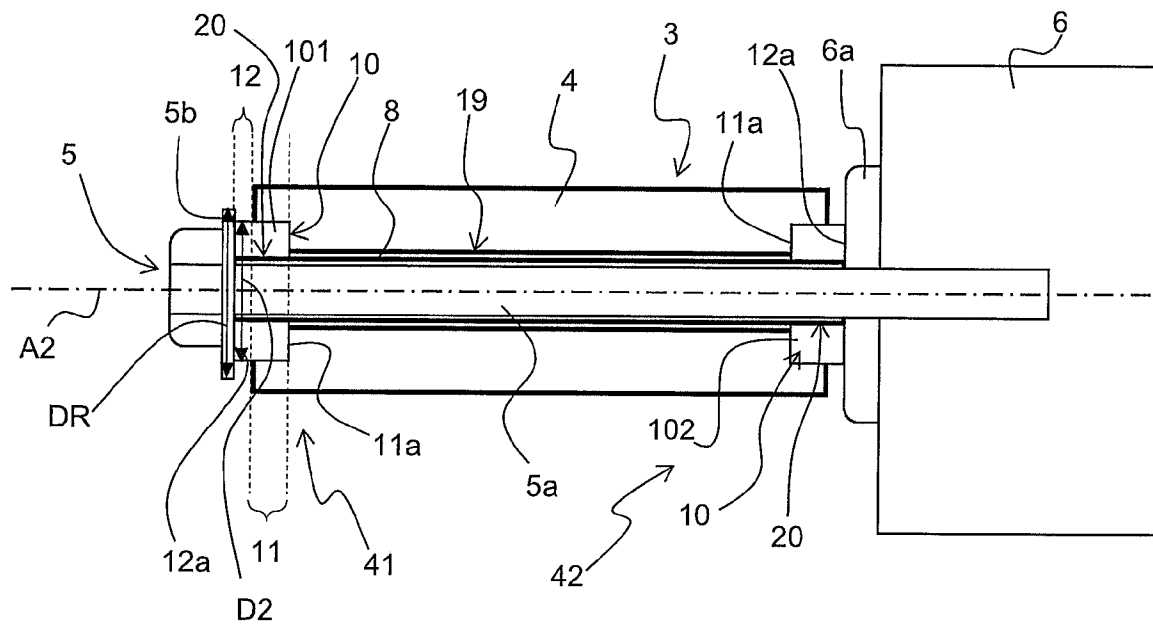
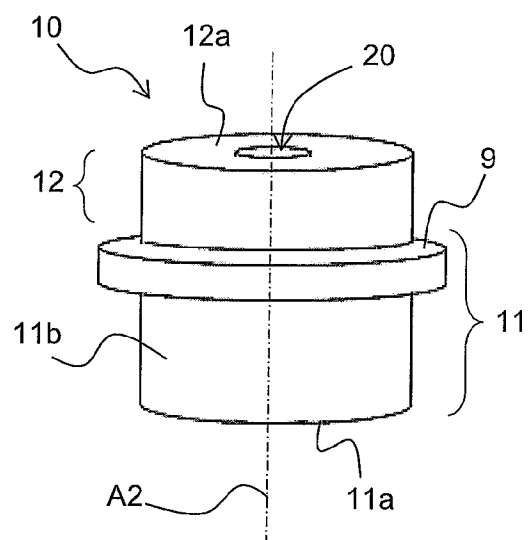
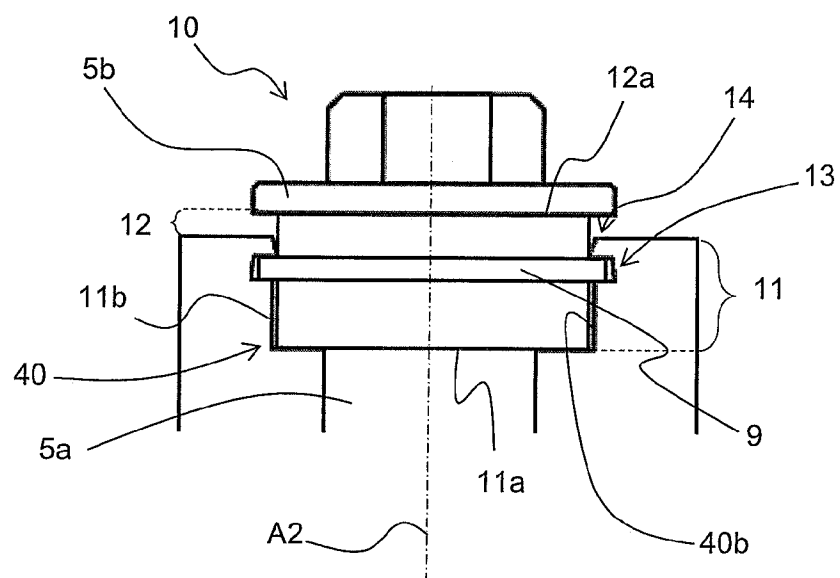


Fig. 1 is a perspective view of a first example of a first member 4. The member 4 has a vertical wall 4a and a horizontal wall 4b. A curved surface 40 is formed on the top of the vertical wall 4a. A dashed line A2 indicates a cross-section.

[Fig. 5A]



[Fig. 5B]



[illegible]

INTERNATIONAL SEARCH REPORT

International application No

PCT/JP2017/043241

A. CLASSIFICATION OF SUBJECT MATTER
 INV. F16F15/08 B60H1/32
 ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F16F B60H F04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/251557 A1 (OTA TAKAYUKI [JP] ET AL) 26 September 2013 (2013-09-26) paragraph [0047] - paragraph [0058]; figures 6-8B	1,2,4,5, 8-10,13, 16
X	JP 2005 220856 A (TOYOTA IND CORP) 18 August 2005 (2005-08-18) paragraph [0019] - paragraph [0028]; figures 2, 4	1,3,4,6, 7,9,11, 13,16
X	JP S63 98490 U (SANDEN CO. LTD) 25 June 1988 (1988-06-25) figures 1, 3	1,3,4, 6-9, 11-13,16
	- / - -	



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

20 February 2018

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Sommer, Jean

INTERNATIONAL SEARCH REPORT

International application No

PCT/JP2017/043241

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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INTERNATIONAL SEARCH REPORT

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