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(54) **COMPRESSOR WITH SUCTION MUFFLER**
VERDICHTER MIT SAUGSCHALLDÄMPFER
COMPRESSEUR AYANT UN SILENCIEUX D'ASPIRATION

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Description

[0001] This invention relates to a compressor, preferably used in refrigerators, which comprises a muffler that minimizes the noise generated by the refrigerant during the refrigeration cycle and, a cylinder head that is used to attach the muffler to the cylinder.

[0002] In refrigerators, in compressors used in refrigeration cycle, suction mufflers are utilized to ensure that the refrigerant used to achieve the cooling reaches the cylinder block without being heated and, that the noise that might be generated by the said refrigerant is prevented. The suction muffler is generally manufactured from plastic material and located either on the cylinder head or between the cylinder head and the valve plate. The refrigerant sucked, reaches a cylinder block by passing through a muffler wherein its portion forming the suction manifold is placed inside the cylinder head. While attempting to minimize the noise generated, it is necessary to improve thermodynamic efficiency. However, heat transfer occurs at the section where the cylinder head and the muffler head are connected, such that the refrigerant and correspondingly the thermodynamic cycle are affected.

[0003] In these applications, the cylinder head is manufactured in single piece and a portion of it is in full contact with the surfaces of the muffler that form the suction manifold. The temperature of the refrigerant sucked into the cylinder rises because of the temperature difference formed at the cylinder head as a result of the discharge of the refrigerant to the exhaust manifold of cylinder head after leaving the cylinder, wherein both the pressure and temperature of the said refrigerant are increased by the compression process in the cylinder. The rise in the temperature of the refrigerant causes its volume to increase thereby resulting in compression of less amount of refrigerant in a standard stroke volume and, decrease of volumetric efficiency of the compressor.

[0004] In the current state of the art, in the European Patent Application EP195486, a description is given of a cylinder head with a special form wherein the contact surfaces between the mentioned cylinder head and the muffler are reduced so as to decrease the heat transfer.

[0005] In the current state of the art, in the United States Patent Documents US 5908287 and US 5697766, a description is given of an application wherein the suction muffler and the cylinder head are attached together by means of a scarf.

[0006] In the current state of the art, in the United States Patent Document US 6358019, a description is given of an application wherein the suction muffler and the cylinder head are attached together by means of recesses and projections.

[0007] The aim of the present invention is the realization of a compressor wherein it is achieved that the refrigerant is transferred to the cylinder without its temperature being increased at the section where the muffler and the cylinder head are connected together and there-

fore, that the volumetric efficiency is increased.

[0008] The compressor designed to fulfill the objectives of the present invention is illustrated in the attached figures where:

5 **[0009]** Fig.1 - is a sectional view of a compressor.

[0010] Fig.2 - is a perspective view of a cylinder head and a suction muffler.

[0011] Fig.3 - is a top view of a cylinder head and a suction muffler.

10 **[0012]** Fig.4 - is an exploded view of a cylinder head, a valve plate and a suction muffler.

[0013] Fig.5 - is a perspective view of a cylinder head and a muffler head.

15 **[0014]** Fig.6 - is a bottom perspective view of a cylinder head and a muffler head.

[0015] Fig.7 - is a top view of a cylinder head and a muffler head.

[0016] Fig.8 - is a top perspective view of a cylinder head and a muffler head.

20 **[0017]** Fig.9 - is a bottom perspective view of a cylinder head and a muffler head, in another embodiment of the present invention.

[0018] Fig. 10 - is a top perspective view of a cylinder head and a muffler head, in another embodiment of the present invention.

25 **[0019]** Fig. 11 - is a top view of a cylinder head and a muffler head, in another embodiment of the present invention.

30 **[0020]** Elements shown on figures are numbered as follows:

1. Compressor
2. Cylinder
3. Cylinder head
- 35 4. Suction muffler
5. Valve plate
6. Outlet opening
7. Muffler head housing
8. Muffler head
- 40 9. Exhaust volume
10. Extension
11. Recess
12. Bridge

45 **[0021]** In home appliances, preferably in cooling devices, the circulation of the refrigerant used to realize the cooling, is achieved by means of a hermetic piston compressor (1).

50 **[0022]** The compressor (1) comprises a cylinder (2) which provides the pumping of the refrigerant in it, a cylinder head (3), located above the cylinder (2), whereby the refrigerant that is sucked and discharged is circulated, a valve plate (5) between the cylinder (2) and cylinder head (3), above which the cylinder head (3) is placed, a suction muffler (4) with insulating properties, placed onto the cylinder head (3), and preferably made of plastic material, wherein acoustical energy of the refrigerant circulated inside it, is reduced thereby minimizing the noise

generated during the circulation and, which ensures that the refrigerant reaches the cylinder head (3) without being heated.

[0023] The suction muffler (4) comprises a muffler head (8) whereby it is attached to the cylinder head (3) and, an outlet opening (6) on the muffler head (8) permitting the refrigerant to pass to the cylinder (2) there-through.

[0024] The cylinder head (3) comprises a muffler head housing (7) into which the muffler head (8) fits, an exhaust volume (9) wherein the refrigerant discharged from the cylinder (2) is circulated and, a bridge (12) whereby the upper edges of the muffler head housing (7) are connected together and, the muffler head (8) is fixed inside the muffler head housing (7).

[0025] The muffler head (8) and the muffler head housing (7) incorporate one or more extensions (10) used to connect to each other and, one or more recesses (11) where the extension (10) is fitted. The muffler head (8) and the muffler head housing (7) are in contact with each other only at the mentioned extension (10) and recess (11) and between them, there is provided a gap (B) functioning as an insulator, whereby it is achieved that the heat transfer is reduced by minimizing the contact of the muffler head housing (7) with the hot portions of the cylinder head (3) and, that the refrigerant is prevented from being heated.

[0026] In one embodiment of the present invention, the recess (11) is positioned on the muffler head (8) whereas the extension (10) that is used to fix the muffler head (8) by fitting it into the said recesses (11) is positioned on the muffler head housing (7).

[0027] In another embodiment of the present invention, the extension (10) is positioned on the muffler head (8) whereas the recess (11) where the extension (10) is fitted into is positioned on the muffler head housing (7).

[0028] In another embodiment of the present invention, at least one extension (10) in the form of a pin is positioned on the bridge (12) whereas recesses (11) in a form and amount appropriate with the said extensions (10) are positioned on the muffler head (8) (Fig.6, Fig.7, Fig.8).

[0029] In another embodiment of the present invention, the extensions (10) in the form of a triangle prism, positioned at the both lateral surfaces of the muffler head housing (7), are fitted into the recesses (11) positioned at the lateral surfaces of the muffler head (8), which are suitable for the extensions (10) from the aspects of form, position and number. The muffler head (8) and the muffler head housing (7) are located so that up and down motion is prevented as a result of the triangle prism forms of the extensions (10) and recesses (11), and are fastened to the valve plate (5) wherein their front and back motion is prevented by means of the bridge (12) placed on the said extensions (10) and, except for the extensions (10) and the recesses (11), a gap (B) reducing the heat transfer is left in between (Fig.9, Fig. 10, Fig. 11).

[0030] In another embodiment of the present inven-

tion, the muffler head housing (7) comprising an extension (10) with projections in different directions which are utilized to prevent motion in different directions, is placed on the muffler head (8) comprising an recess (11) suitable for the said extension (10) from the aspects of form and position and, is fastened to the valve plate (5) by means of screws wherein between the mentioned muffler head housing (7) and the muffler head (8), except for the extensions (10) and the recesses (11), a gap (B) reducing the heat transfer is left (Fig.5).

[0031] By means of the application according to the present invention, the contact surface of the muffler head housing (7) and the muffler head (8) is reduced, resulting in that the refrigerant is taken into the cylinder cooler and thus denser and thereby, it is achieved that the performance of the compressor (1) is increased.

Claims

1. A compressor (1) comprising; a cylinder (2) which provides the pumping of the refrigerant in it; a suction muffler (4) whereby acoustical energy of the refrigerant circulated inside it, is reduced thereby minimizing the noise generated during the circulation and, which ensures that the refrigerant reaches to the cylinder (2) without being heated; a muffler head (8) whereby the suction muffler (4) is attached to a cylinder head (3) and, a muffler head housing (7) where the muffler head (8) fits into; and **characterized by** the muffler head (8) and the muffler head housing (7) comprising one or more extensions (10) and one or more recesses (11) which are used to attach them together, in contact with each other only at the mentioned extensions (10) and recesses (11) and, wherein a rise in temperature of the refrigerant is prevented by reducing the heat transfer by means of a gap (B) provided between the muffler head and the muffler head housing, functioning as an insulator.
2. A compressor (1) as described in Claim 1, **characterized by** the cylinder head (3) which comprises a bridge (12) whereby the edges of the muffler head housing (7) are connected together by the extension of the said bridge (12) from the upper edges of the muffler head housing (7) to the interior of the muffler head housing and, helps to fix inside the muffler head housing (7).
3. A compressor (1) as described in Claims 1 and 2, **characterized by** the muffler head (8) that comprises a recess (11) and a muffler head housing (7) that comprises an extension (10) utilized to fix it by fitting into the said recess (11).
4. A compressor (1) as described in Claims 1 and 2, **characterized by** the muffler head (8) that comprises an extension (10) and a muffler head housing (7)

that comprises a recess (11) into which the said extension (10) fits.

5. A compressor (1) as described in Claims 1 to 4, **characterized by** the muffler head (8) and a muffler head housing (7) that comprise a cylindrical extension (10) and a cylindrical recess (11) into which the said extension (10) fits.
6. A compressor (1) as described in Claims 1 to 4, **characterized by** the muffler head (8) and a muffler head housing (7) that comprise an extension (10) in the form of a triangle prism and a recess (11) in the form of a triangle prism into which the said extension (10) fits.
7. A compressor (1) as described in Claims 1 to 4, **characterized by** the muffler head (8) and a muffler head housing (7) that comprise an extension (10) in a form and position to prevent motion in different directions and a recess (11) in a form and position suitable for the mentioned extension (10) into which the said extension (10) fits.

Patentansprüche

1. Verdichter (1), umfassend:

einen Zylinder (2), der vorsieht, dass das Kühlmittel in ihm gepumpt wird; einen Saugleitungs-dämpfer (4), durch den akustische Energie des darin zirkulierenden Kühlmittels reduziert wird, wodurch das Geräusch minimiert wird, das während der Zirkulation erzeugt wird, und der sicherstellt, dass das Kühlmittel den Zylinder (2) erreicht, ohne erwärmt zu werden; einen Dämpferkopf (8), durch den der Saugleitungs-dämpfer (4) an einem Zylinderkopf (3) angebracht ist, und ein Dämpferkopfgehäuse (7), in das der Dämpferkopf (8) eingepasst ist; und **dadurch gekennzeichnet, dass** der Dämpferkopf (8) und das Dämpferkopfgehäuse (7) eine oder mehrere Verlängerungen (10) und eine oder mehrere Vertiefungen (11) umfassen, die benutzt werden, um sie miteinander zu verbinden, wobei sie nur an den Verlängerungen (10) und Vertiefungen (11) miteinander in Kontakt stehen, und wobei ein Anstieg der Temperatur des Kühlmittels verhindert wird, indem die Wärmeübertragung mit Hilfe eines Spalts (B) reduziert wird, der zwischen dem Dämpferkopf und dem Dämpferkopfgehäuse vorgesehen ist und als Isolation dient.

2. Verdichter (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Zylinderkopf (3) eine Brücke (12) umfasst, durch die die Kanten des Dämpferkopfge-

häuses (7) durch die Erstreckung der Brücke (12) von den oberen Kanten des Dämpferkopfgehäuses (7) in das Innere des Dämpferkopfgehäuses verbunden sind, und die zu einer Befestigung im Dämpferkopfgehäuse (7) beiträgt.

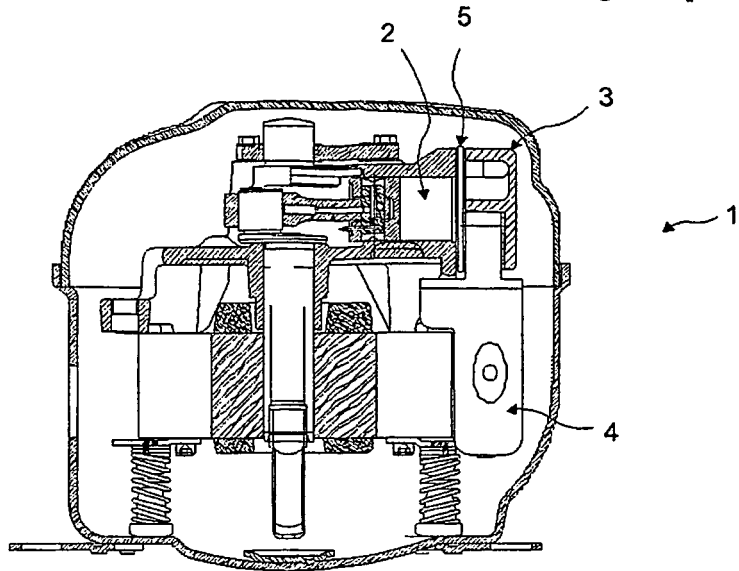
3. Verdichter nach Anspruch 1 und 2, **dadurch gekennzeichnet, dass** der Dämpferkopf (8) eine Vertiefung (11) umfasst, und dass ein Dämpferkopfgehäuse (7) eine Verlängerung (10) umfasst, die benutzt wird, um sie durch Einpassen in die Vertiefung (11) zu befestigen.
4. Verdichter nach Anspruch 1 und 2, **dadurch gekennzeichnet, dass** der Dämpferkopf (8) eine Verlängerung (10) umfasst, und dass ein Dämpferkopfgehäuse (7) eine Vertiefung (11) umfasst, in die die Verlängerung (10) einpassbar ist.
5. Verdichter nach den Ansprüchen 1 bis 4, **dadurch gekennzeichnet, dass** der Dämpferkopf (8) und ein Dämpferkopfgehäuse (7) eine zylinderförmige Verlängerung (10) und eine zylinderförmige Vertiefung (11) aufweisen, in die die Verlängerung (10) einpassbar ist.
6. Verdichter nach den Ansprüchen 1 bis 4, **dadurch gekennzeichnet, dass** der Dämpferkopf (8) und ein Dämpferkopfgehäuse (7) eine Verlängerung in der Form eines Dreiecksprismas und eine Vertiefung (11) in der Form eines Dreiecksprismas umfassen, in die die Verlängerung (10) einpassbar ist.
7. Verdichter nach den Ansprüchen 1 bis 4, **dadurch gekennzeichnet, dass** der Dämpferkopf (8) und ein Dämpferkopfgehäuse (7) eine Verlängerung (10) in einer Form und Position umfassen, die eine Bewegung in unterschiedliche Richtungen verhindert, und eine Vertiefung (11) in einer Form und Position, die für die Verlängerung (10) geeignet ist, und in die die Verlängerung (10) einpassbar ist.

Revendications

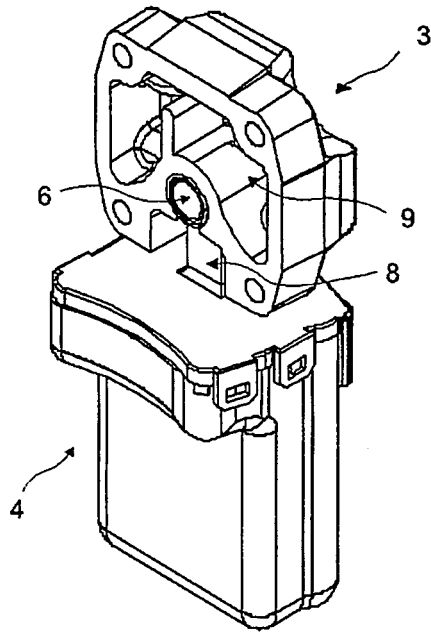
1. Un compresseur (1) comprenant un cylindre (2) qui permet le pompage du réfrigérant dans ledit compresseur, un aspirateur silencieux (4) grâce auquel l'énergie acoustique du réfrigérant circulant dans ledit compresseur est réduit en minimisant le bruit généré lors de la circulation, système assurant également que le réfrigérant atteigne le cylindre (2) sans être chauffé ; une tête de silencieux (8) par lequel l'aspirateur silencieux (4) est attaché à la tête du cylindre (3) et un boîtier de tête de silencieux (7) dans lequel la tête de silencieux (8) est placée ; **caractérisé par** la tête de silencieux (8) et le boîtier de tête de silencieux (7) comprenant une ou plusieurs

- extension (10) et un ou plusieurs renforcement (11) qui permettent d'attacher tous les deux ensembles, de façon à ce que chacune des extensions (10) soit en contact avec un renforcement (11), et dans lequel l'augmentation de température du réfrigérant est empêchée par la réduction de la chaleur transmise par le moyen des ouvertures (B) placées entre la tête de silencieux et le boîtier de tête de silencieux, tout en fonctionnant comme un isolateur. 5
10
2. Un compresseur (1) selon la revendication 1, **caractérisé par** la tête de cylindre (3) munie d'un pont (12) sur lequel les bords du boîtier de tête de silencieux (7) sont liés tous par l'intermédiaire de l'extension dudit pont (12) par le haut des bords du boîtier de tête de silencieux (7) à l'intérieur du boîtier de tête de silencieux et aidant à la fixation dans le boîtier de tête de silencieux (7). 15
3. Un compresseur (1) selon les revendications 1 et 2, **caractérisé par** la tête de silencieux (8) qui contient un renforcement (11) et un boîtier de tête de silencieux (7) muni d'une extension (10) utilisée pour sa fixation dans ledit renforcement (11) de façon adéquate. 20
25
4. Un compresseur (1) selon les revendications 1 et 2, **caractérisé par** la tête de silencieux (8) qui contient une extension (10) et un boîtier de tête de silencieux (7) muni d'un renforcement (11) dans lequel ladite extension (10) est placée. 30
5. Un compresseur (1) selon les revendications de 1 à 4, **caractérisé par** la tête de silencieux (8) et le boîtier de tête de silencieux (7) qui contiennent une extension cylindrique (10) et un renforcement cylindrique (11) dans lequel ladite extension (10) est placée. 35
6. Un compresseur (1) selon les revendications de 1 à 4, **caractérisé par** la tête de silencieux (8) et le boîtier de tête de silencieux (7) qui contiennent une extension (10) sous forme d'un prisme triangulaire et un renforcement (11) sous forme d'un prisme triangulaire dans lequel ladite extension (10) est placée. 40
45
7. Un compresseur (1) selon les revendications de 1 à 4, **caractérisé par** la tête de silencieux (8) et le boîtier de tête de silencieux (7) qui contiennent une extension (10) en une forme et position de façon à empêcher le mouvement dans différentes directions et un renforcement (11) en une forme et position adéquates pour la dite extension (10), dans lequel ladite extension (10) est placée. 50
55

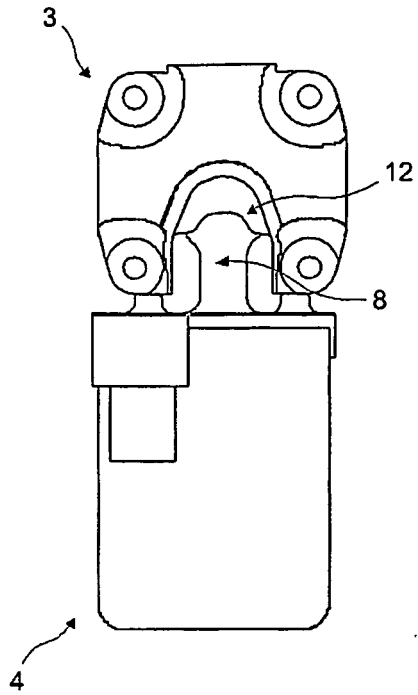
[Fig. 001]



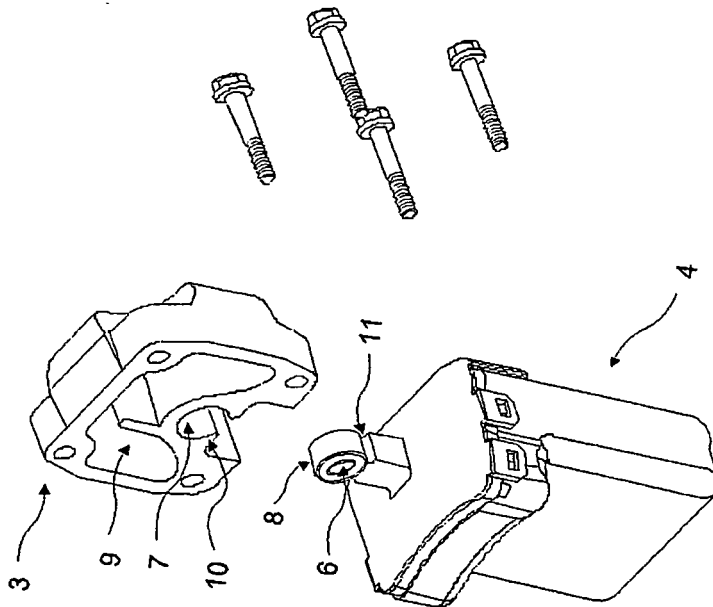
[Fig. 002]

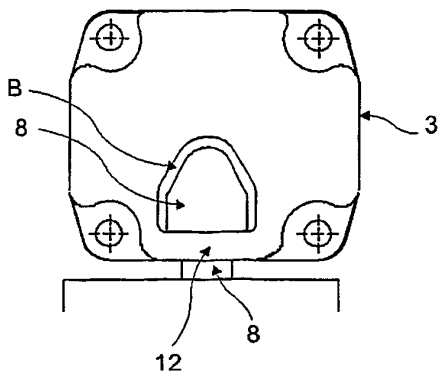
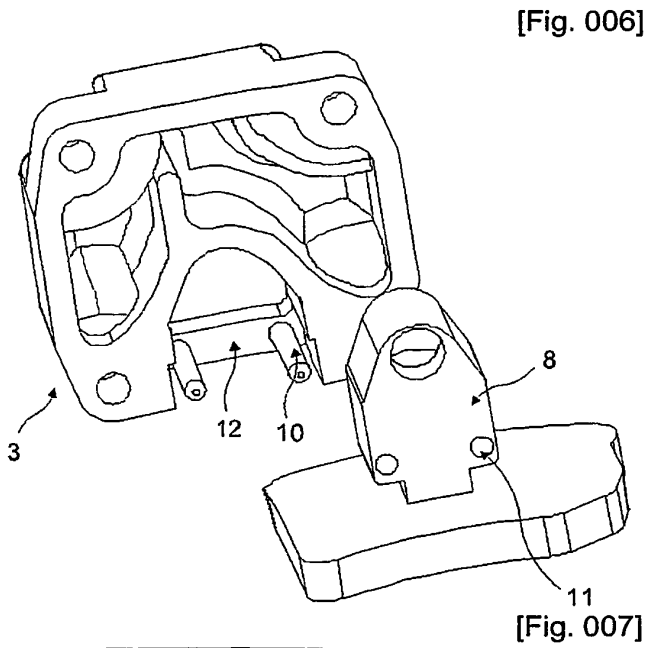
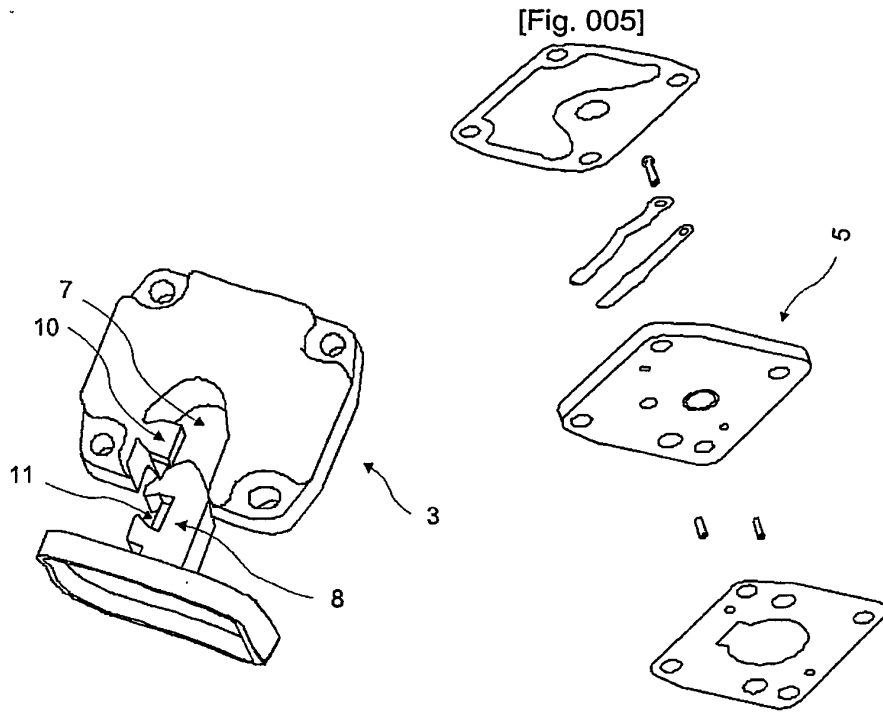


[Fig. 003]

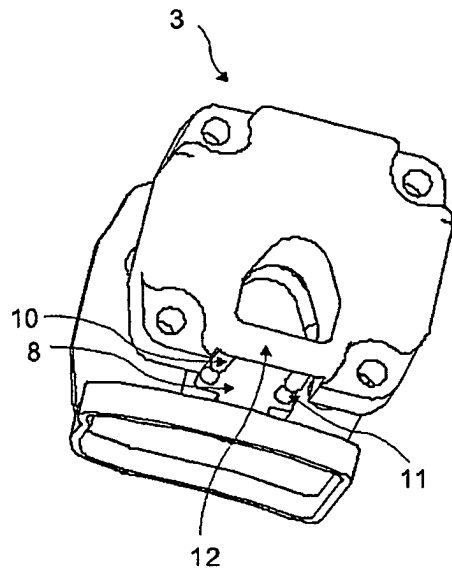


[Fig. 004]

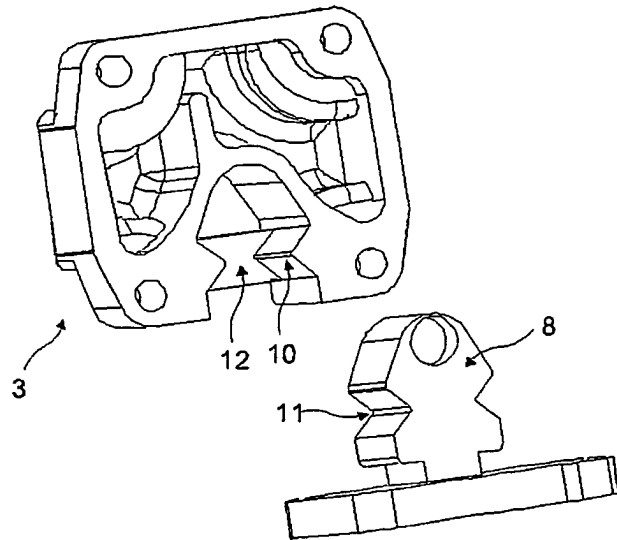




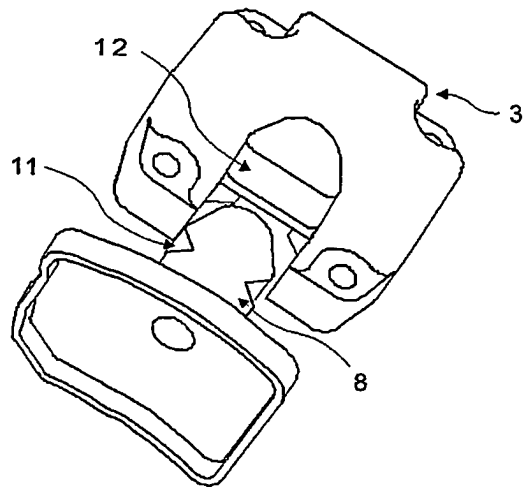
[Fig. 008]



[Fig. 009]



[Fig. 010]



[Fig. 011]

