



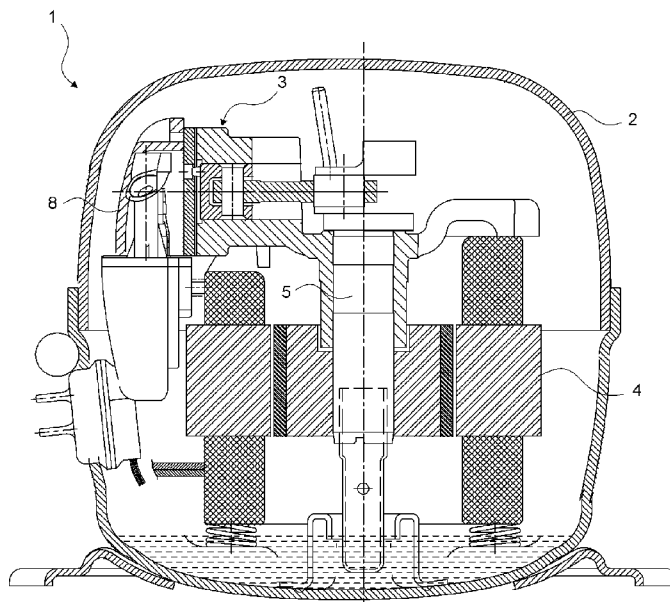
- (51) International Patent Classification:
F04B 39/00 (2006.01) *F04B 39/12* (2006.01)
- (21) International Application Number:
PCT/EP2018/067568
- (22) International Filing Date:
29 June 2018 (29.06.2018)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
A 2017/11734 09 August 2017 (09.08.2017) TR
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,

(54) Title: COMPRESSOR WITH EFFECTIVE SEALING PROVIDED BETWEEN THE CYLINDER HEAD AND THE CYLINDER HOLE

Figure 1



(57) Abstract: The compressor (1) of the invention comprises a housing (2) enclosing the movable parts, a body (3) on which the parts are assembled, a crank (5) rotating in the housing (2), an engine (4) enabling the crank (5) to be rotated, a cylinder (6) enabling pumping the circulating fluid, a face surface (9) disposed on the body (3), a cylinder hole (7) provided on the face surface (9), in which the cylinder (6) is placed, a suction muffler (8) enabling the circulating fluid to reach the cylinder (6) without being heated and the noise caused by the circulating fluid to be prevented, a cylinder head (10) connecting the suction muffler (8) and the cylinder (6), directing the sucked and pumped circulating fluid, a valve plate (11) enabling the circulating fluid to be sucked and pumped by forming a connection between the cylinder head (10) and the cylinder (6), a suction valve leaf (12) enabling the fluid to be sucked into the cylinder (6), an exhaust valve leaf (13) enabling the circulating fluid in the cylinder (6) to be discharged.



UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

Description

COMPRESSOR WITH EFFECTIVE SEALING PROVIDED BETWEEN THE
CYLINDER HEAD AND THE CYLINDER HOLE

- [0001] The present invention relates to a compressor comprising a cylinder head whose sealing member thrust surface is contracted.
- [0002] In coolers, particularly in hermetic type compressors used in cooling cycle, suction mufflers are used enabling the circulating fluid used for providing cooling to reach the cylinder region without heating up, and the noise caused by the cycling fluid to be prevented. In general, a suction muffler is made of plastic material and is placed on the cylinder head or between the cylinder head and the valve plate. The sucked cycling fluid reaches the cylinder by passing through the portion forming the suction pipe, and the suction muffler provided in the cylinder head. While attempting to minimize the noise generated during this process, it is also required to improve the thermodynamic efficiency. However, heat transfer occurs at the portions where the cylinder head joins the suction muffler head, affecting the thermodynamic cycle.
- [0003] In the state of the art applications, the cylinder head thrusts the face surface of the body via a sealing member, and the thrust is applied from the edges of the face surface of the body which is distant from the body cylinder hole whose surface is a high-pressure zone. While the thrust force applied by the bolts is constant, the thrust pressure decreases on the thrust region enlarged due to being on the sides. Another problem experienced is the thrust being decreased due to the deformations forming on the cylinder head generating the thrust. The decreasing thrust causes the high-pressure gas to leak, leading to a decrease in efficiency.
- [0004] State of the art European Patent Application no. EP 195 486 discloses a compressor in which heat transfer between a suction muffler and a cylinder head is minimized by contracting the contact surface in between.
- [0005] The aim of the present invention is to realize a compressor with increased volumetric efficiency enabling a cycling fluid to be transferred to a cylinder without increasing its temperature and pressure by preventing thrust pressure decreases at the portions where the cylinder head and the

cylinder hole contact each other.

[0006] The compressor realized to achieve the aim of the present invention and disclosed in the first claim and the dependent claims, comprises a sealing member placed such that its thrust surface is on the periphery of cylinder hole, and a cylinder head placed on the sealing member.

[0007] The thrust surface and the sealing member are contracted so as to be around the cylinder hole where the pressure is high. In addition, since the thrust surface is contracted it would be more durable, preventing thrust pressure decreases due to deformation.

[0008] In an embodiment of the invention, a clearance is provided between the brackets extending outwards from the cylinder head, and the cylinder head resting on the body cylinder hole. In other words, the brackets are spaced from the face surface plane so as not to contact the face surface. Thereby generation of unnecessary thrust force is prevented by avoiding contact between the face surface and the brackets, and it becomes possible to form the thrust surface only around the cylinder hole by the sealing member. Furthermore, a higher pressure is applied on the sealing member for the same level of mounting torque applied via the brackets.

[0009] Four brackets are provided in the preferred embodiment, placed around the portion of the cylinder head resting on the cylinder hole such that there is a given angle in between the brackets.

[0010] In the preferred embodiment of the invention, at least two pins are provided, placed opposite each other so as to be between two brackets. The pins are used to reference to each other and group the cylinder head and the face surface.

[0011] In addition, the compressor of the invention comprises an exhaust connection slot provided on the cylinder head, enabling connection to the exhaust hole, and a protrusion disposed on each one of the valve plate and the sealing member, so as to be conformed with the shape of the exhaust connection slot and provide sealing.

[0012] The compressor realized to achieve the aims of the present invention is illustrated in the accompanying drawings, wherein:

[0013] Figure 1 is a schematic view of a compressor.

- [0014] Figure 2 is a perspective view of the body, the suction muffler and the cylinder head assembled together.
- [0015] Figure 3 is an exploded view of the body, crank, suction muffler, cylinder head and the sealing member.
- [0016] Figure 4 is a frontal perspective view of the cylinder head.
- [0017] The elements in the figures are numbered individually and the correspondence of these numbers are given hereinafter.
1. Compressor
 2. Housing
 3. Body
 4. Engine
 5. Crank
 6. Cylinder
 7. Cylinder hole
 8. Suction muffler
 9. Face surface
 10. Cylinder head
 11. Valve plate
 12. Suction valve leaf
 13. Exhaust valve leaf
 14. Sealing member
 15. Bracket
 16. Clearance
- [0018] 18. Protrusion
- [0019] 19. Exhaust hole
- [0020] 20. Exhaust connection slot
- [0021] 21. Pin
- [0022] 22. Pin bore
- [0023] The compressor (1) of the invention comprises a housing (2) enclosing the movable parts, a body (3) on which the parts are assembled, a crank (5) rotating in the housing (2), an engine (4) enabling the crank (5) to be rotated, a cylinder (6) enabling pumping the circulating fluid, a face surface (9) disposed on the body (3), a cylinder hole (7) provided on the face

surface (9), in which the cylinder (6) is placed, a suction muffler (8) enabling the circulating fluid to reach the cylinder (6) without being heated and the noise caused by the circulating fluid to be prevented, a cylinder head (10) connecting the suction muffler (8) and the cylinder (6), directing the sucked and pumped circulating fluid, a valve plate (11) enabling the circulating fluid to be sucked and pumped by forming a connection between the cylinder head (10) and the cylinder (6), a suction valve leaf (12) enabling the fluid to be sucked into the cylinder (6), an exhaust valve leaf (13) enabling the circulating fluid in the cylinder (6) to be discharged (Figure 1)

[0024] and

- a sealing member (14) placed on the periphery of the cylinder hole (7),
- mounted between the cylinder hole (7) and the cylinder head (10) such that its thrust surface is on the cylinder hole (7)

[0025] (Figure 2 and Figure 3).

[0026] The circulating fluid in the cylinder hole (7) is compressed by the rotational motion of the engine (4). The circulating fluid enters the cylinder hole (7) by opening of the suction valve leaf (12) provided on the valve plate (11), and is compressed. Upon reaching a desired pressure, the circulating fluid is transmitted to the cylinder head (10) by opening of the exhaust valve leaf (13). The cylinder head (10) thrusts on the valve plate (11), and the valve plate (11) in turn thrusts on the sealing member (14) thereby providing sealing between itself and the face surface (9). By means of the invention, the thrust surface is reduced so as to be only around the cylinder hole (7) where the pressure is high. In addition, since the thrust surface is contracted, it would be more durable, preventing the decreases in thrust pressure due to deformation.

[0027] In an embodiment of the invention, the compressor (1) comprises a plurality of brackets (15) extending outwards from the cylinder head (10), and a clearance (16) disposed between the brackets (15) and the cylinder head (10) resting on the cylinder hole (7). By this, the brackets (15) are spaced from the face surface (9) plane so as not to contact the face surface (9). Thereby generation of unnecessary thrust force is prevented

by avoiding contact between the face surface (9) and the brackets (15), making it possible to form the thrust surface only around the cylinder hole (7) by the sealing member (14). Furthermore, a higher pressure is applied on the sealing member (14) for the same level of mounting torque applied via the brackets (15).

- [0028] In another embodiment of the invention, four brackets (15) are provided. In this embodiment, the brackets (15) are preferably placed symmetrically to the horizontal and the vertical axes.
- [0029] The thickness of the sealing member (14) is selected according to the required clearance volume.
- [0030] In an embodiment of the invention, the compressor (1) comprises an exhaust hole (19) on the face surface (9), used for discharging the high-pressure exhaust gas, and an exhaust connection slot (20) provided on the cylinder head (10), providing a connection to the exhaust hole (19). In the preferred embodiment, the exhaust connection slot (20) is provided between two brackets (15). In this embodiment of the invention, the compressor (1) comprises a protrusion (18) disposed on each one of the valve plate (11) and the sealing member (14), so as to be conformed with the shape of the exhaust connection slot (20) and provide sealing (Figure 4).
- [0031] In another embodiment of the invention, the compressor (1) comprises at least one pin (21) grouping and referencing the cylinder head (10) and the sealing member (14) to each other, and at least one pin bore (22) provided on the face surface (9) so as enable the pins (21) to enter the face surface (9). In the preferred embodiment of the invention, two pins (21) and two pin bores (22) are provided opposite each other between two brackets (15) such that they are mutually above and below the cylinder hole.

Claims

1. A compressor (1) comprising: a housing (2) enclosing the movable parts, a body (3) on which the parts are assembled, a crank (5) rotating in the housing (2), an engine (4) enabling the crank (5) to be rotated, a cylinder (6) enabling pumping the circulating fluid, a face surface (9) disposed on the body (3), a cylinder hole (7) provided on the face surface (9), in which the cylinder (6) is placed, a suction muffler (8) enabling the circulating fluid to reach the cylinder (6) without being heated and the noise caused by the circulating fluid to be prevented, a cylinder head (10) connecting the suction muffler (8) and the cylinder (6), directing the sucked and pumped circulating fluid, a valve plate (11) enabling the circulating fluid to be sucked and pumped by forming a connection between the cylinder head (10) and the cylinder (6), a suction valve leaf (12) enabling the fluid to be sucked into the cylinder (6), an exhaust valve leaf (13) enabling the circulating fluid in the cylinder (6) to be discharged, characterized by
 - a sealing member (14) mounted on the periphery of the cylinder hole (7), between the cylinder hole (7) and the cylinder head (10) such that its thrust surface is on the cylinder hole (7)
2. A compressor (1) according to claim 1, characterized by a plurality of brackets (15) extending outwards from the cylinder head (10), and by a clearance (16) disposed between the brackets (15) and the cylinder head (10) resting on the cylinder hole (7).
3. A compressor (1) according to claim 1 and 2, characterized by the brackets (15) spaced from the face surface (9) plane so as not to contact the face surface (9).
4. A compressor (1) according to any one of the claims 1 to 3, characterized by four brackets (15) placed symmetrically to the horizontal and the vertical axes.
5. A compressor (1) according to any one of the preceding claims, characterized by an exhaust hole (19) on the face surface (9), used for discharging the high-pressure exhaust gas, and by an exhaust connection slot (20) provided on the cylinder head (10), providing connection to the exhaust hole (19).
6. A compressor (1) according to claim 5, characterized by an exhaust connection slot (20) provided between two brackets (15).

7. A compressor (1) according to any one of the claims 5 and 6, characterized by a protrusion (18) disposed on each one of the valve plate (11) and the sealing member (14), so as to be conformed with the shape of the exhaust connection slot (20) and provide sealing.
8. A compressor (1) according to any one of the preceding claims, characterized by at least one pin (21) grouping the cylinder head (10) and the sealing member (14) to each other, and by at least one pin bore (22) provided on the face surface (9) so as enable the pins (21) to enter the face surface (9).

Figure 1

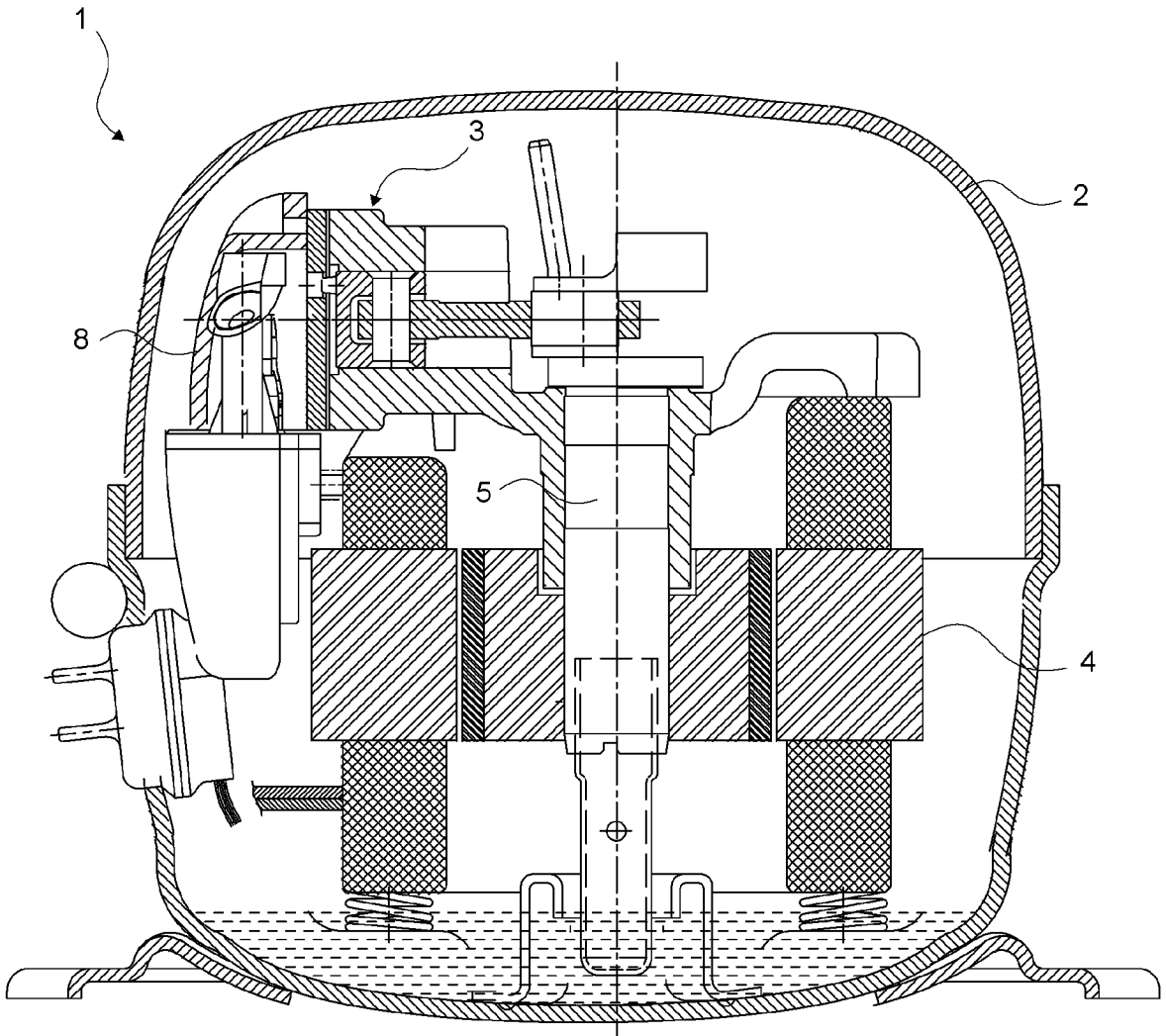


Figure 2

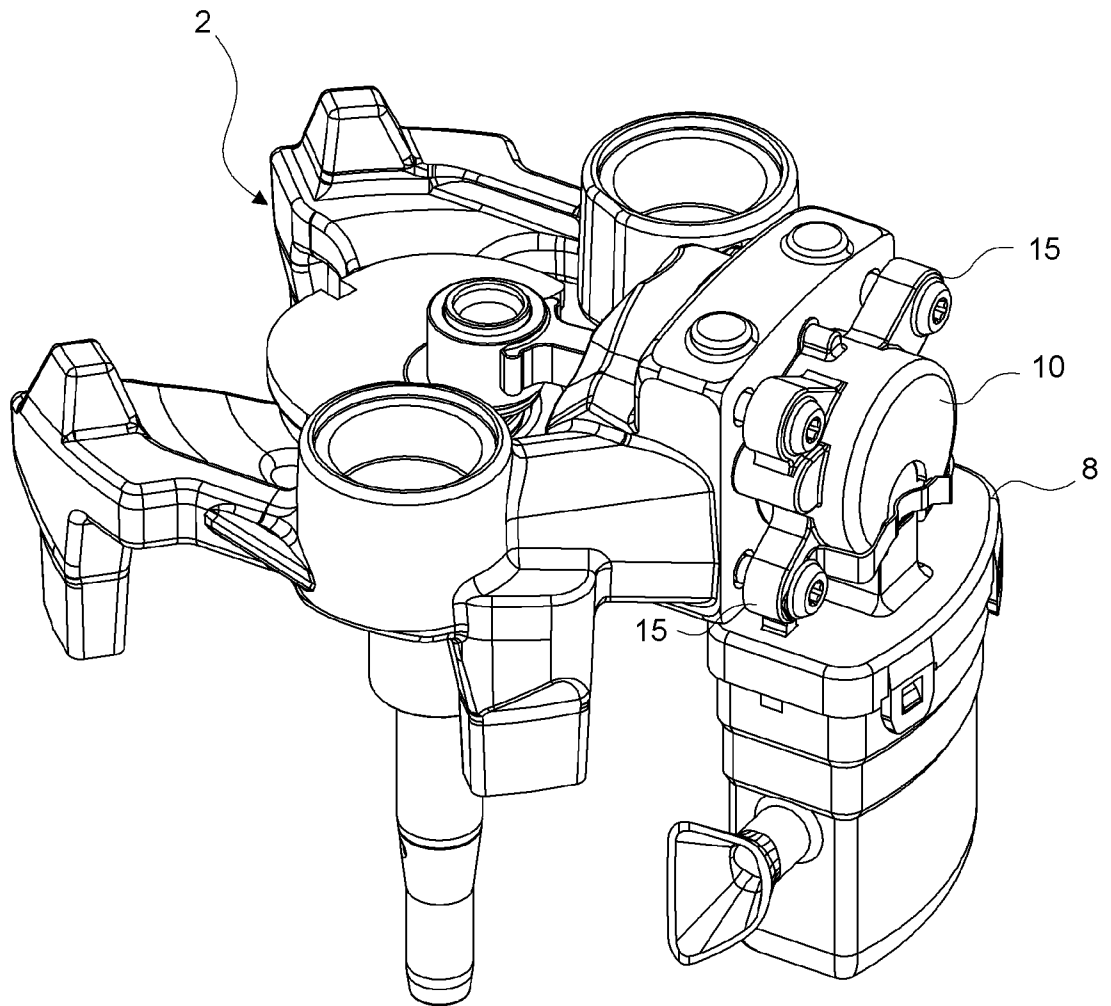


Figure 3

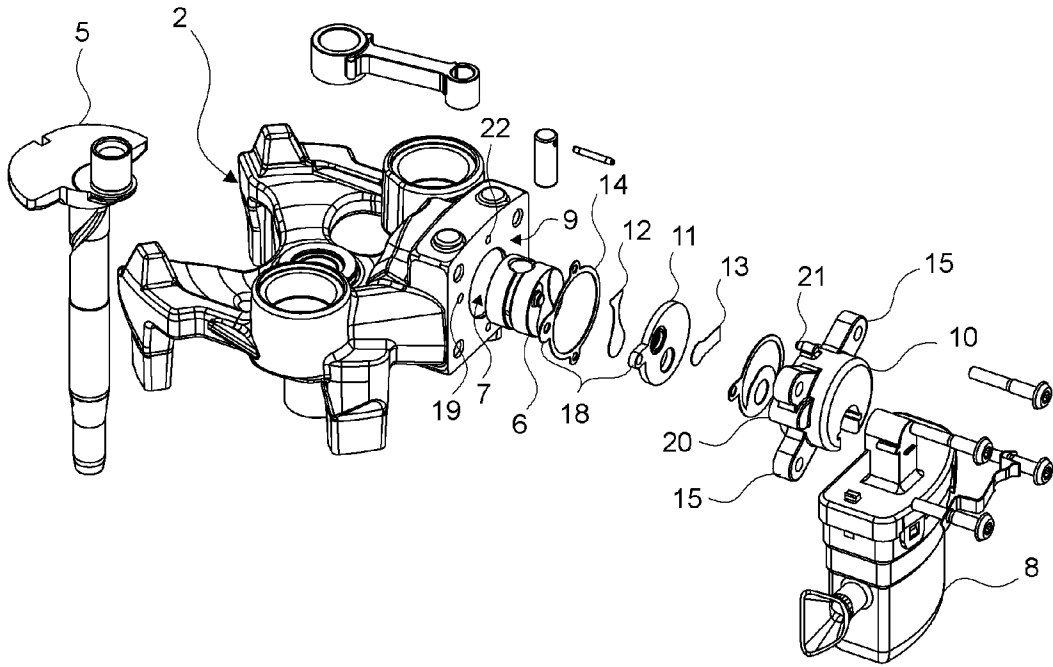
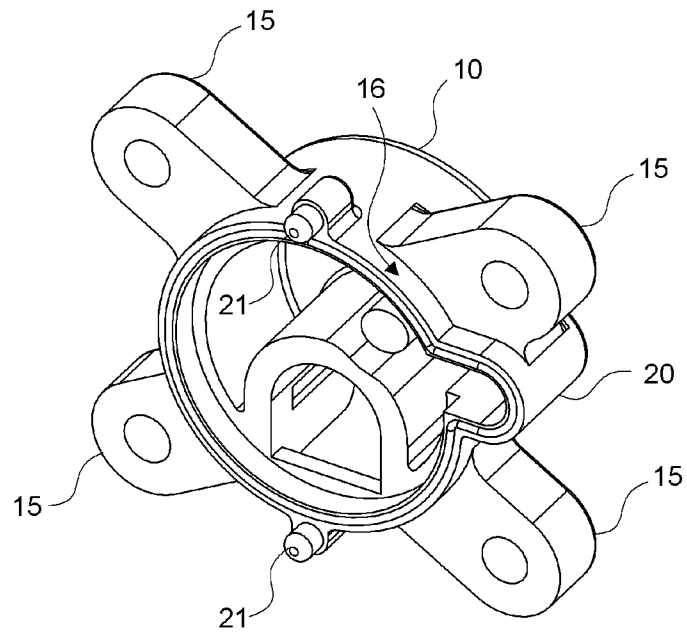


Figure 4



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/067568

A. CLASSIFICATION OF SUBJECT MATTER
INV. F04B39/00 F04B39/12
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)
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

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 195 486 A2 (PHILIPS NV [NL]) 24 September 1986 (1986-09-24)	5-8
Y	column 3, line 16 - line 56; figure 2 -----	1-4
Y	EP 0 961 032 A2 (TOYODA AUTOMATIC LOOM WORKS [JP]) 1 December 1999 (1999-12-01) paragraphs [0011], [0031], [0032], [0038], [0039], [0041], [0043], [0044] -----	1-4
Y	WO 2005/093255 A1 (ARCELIK AS [TR]; KASAPOGLU ERHAN [TR]; KARA SERKAN [TR]; KAYA ATILLA []) 6 October 2005 (2005-10-06) figures 1-11 -----	2-4
A	EP 2 580 475 A1 (ARCELIK AS [TR]) 17 April 2013 (2013-04-17) claim 1 -----	1
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Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search 6 September 2018	Date of mailing of the international search report 14/09/2018
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 Fistas, Nikolaos

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/067568

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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