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(54) **Title:** COMPRESSOR

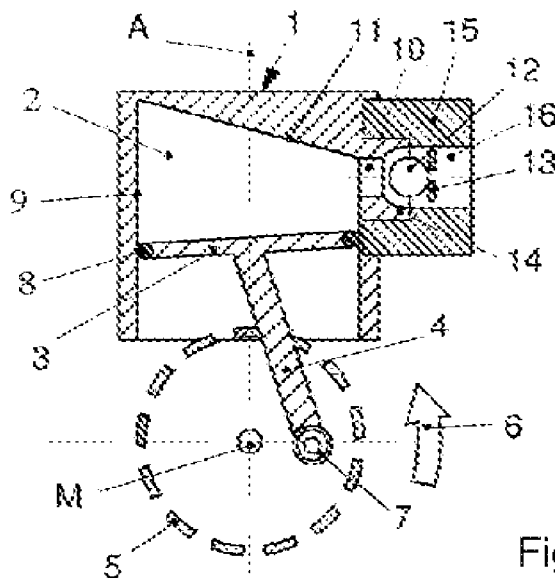


Fig. 1

(57) **Abstract:** Compressor comprising a cylinder (9), a piston (3), and a pressure chamber (2) delimited by the cylinder and the piston, wherein the pressure chamber has a longitudinal axis (A) along which the piston moves. The piston, which is connected to an eccentric (5), performs a wobbling movement relative to the longitudinal axis. The outlet (10) of the pressure chamber is arranged radially with respect to the longitudinal axis.

COMPRESSOR

The invention relates to a compressor for delivering a medium from a pressure chamber in a head through an outlet into a line, wherein a piston is arranged in the pressure chamber and
5 the pressure chamber has a longitudinal axis along which the piston moves.

Prior art

Compressors are known, and available on the market, in a wide variety of forms and
10 embodiments. They generally serve to draw in a medium and convey said medium onward. In the present case, reference is made in particular to compressors used in conjunction with tire sealing agent which is introduced into a tire, wherein said compressors then generally also serve for inflating the tire. A compressor of said type is required for example in DE 101
06 468.

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DE 20 2006 008 219 U1 has described a compressor for generating compressed air, having a housing and having a drive which, via an eccentric shaft, moves a pressure piston that is guided in spring-loaded fashion in a cylinder.

20 DE 10 2008 061 311 has disclosed a compressor for delivering a gas out of a pressure chamber for the purposes of inflating a tire, wherein a piston is arranged in the pressure chamber so as to be capable of performing an oscillating movement. The piston is assigned a transmission element which converts a rotational movement of a drive shaft into an oscillating movement. Furthermore, the piston is assigned a seal which changes its spacing
25 to a pressure chamber wall upon a change in the direction of movement of the piston. In this way, a gap is formed for drawing in the compressed air. Said device is composed of a multiplicity of individual parts that must be assembled.

Problem

The problem addressed by the present invention is that of reducing the number of individual components and reducing the structural space. The intention of this is to make the compressor more lightweight and to make the assembly process much cheaper and less susceptible to errors.

Solution to the problem

10 The problem is solved in that the piston performs a wobbling movement relative to the longitudinal axis.

This refinement makes it possible for the piston to assume a predetermined spacing to the pressure chamber internal wall for the purposes of drawing in the medium, but to then close said spacing for the purposes of discharging the medium. In this way, a seal is simplified and is subject to the least possible loading.

In a preferred exemplary embodiment, the corresponding wobbling movement of the piston is effected by means of an eccentric. The piston is connected to the eccentric by way of a piston rod, wherein said piston is preferably mounted obliquely on the piston rod. When said piston is then caused to perform a wobbling movement by means of the eccentric, the above-described spacing of the piston to the pressure chamber internal wall is produced and is closed again. This may be realized with or without the seal, wherein, in a preferred exemplary embodiment, at least one annular seal is arranged on the circumference of the piston. It may however also prove to be expedient for an internal wall of the pressure chamber to be designed to be flexible, such that it can yield to a wobbling movement of the piston.

In a simple exemplary embodiment, the eccentric is simply of disk-shaped form, with the piston rod being connected eccentrically to said eccentric.

5 It is also preferable for the pressure chamber to be provided, in the interior, with a sloping roof, wherein the slope is approximately matched to the slope of the piston. Said sloping roof then runs toward the outlet and conducts the medium in that direction.

A further part of the invention, which is however preferably realized together with the first part, relates to the outlet itself. Said outlet is no longer arranged at the tip of the pressure
10 chamber but is instead situated radially to the side with respect to the longitudinal axis of the pressure chamber. In said outlet there is situated a valve which prevents a backflow of the medium. For this reason, the valve is in the form of a ball-type check valve. Also conceivable, however, is an embodiment as a bicycle valve, with a corresponding connection nipple being equipped with a sheath which deflects under a pressure from the
15 interior of the pressure chamber, such that the medium can penetrate between the nipple and sheath to corresponding openings which then issue into the line for the pressure medium.

As has already been mentioned in the prior art, it is the intention for the compressor to be
20 used in particular for dispensing a tire sealing agent into a defective tire. For this purpose, the line is then connected to a corresponding container for said sealing agent, such that, by the build-up of a pressure medium, said sealing agent is forced out of the container into the tire. Subsequently, the line may then be connected to a valve of the tire, and the tire inflated. This is one exemplary embodiment of the present invention.

Description of the figures

Further advantages, features and details of the invention will emerge from the following description of preferred exemplary embodiments and on the basis of the drawing, in which:

5

figure 1 shows a longitudinal section through a head of a compressor according to the invention for delivering a medium, at a compression stage;

figure 2 shows the longitudinal section through the head as per figure 1 at the top dead center of a piston;

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figure 3 shows the longitudinal section as per figure 1, at an intake stage;

figure 4 shows the longitudinal section as per figure 1 at the bottom dead center of a piston;

15

figure 5 shows a partial section through a head according to the invention of a compressor for delivering a medium, in the region of a valve.

Figures 1 to 4 show a head 1 of a compressor according to the invention, in which head a pressure chamber 2 is formed. A piston 3 moves in said pressure chamber 2 along a longitudinal axis A. Here, the piston 3 is connected to a piston rod 4 which is articulatedly connected to an eccentric 5. In the exemplary embodiment shown here, the eccentric 5 is in the form of a disk that has a central point M. The eccentric 5 rotates about said central point M, as indicated by the arrow 6. Here, the eccentric 5 drives the piston rod 4 along, said piston rod having an articulated connection 7 to the eccentric 5. Said articulated connection 7 is arranged with a spacing to the central point M.

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In the exemplary embodiment shown, the piston 3 is arranged obliquely with respect to the

piston rod 4, that is to say said piston, at one side, is at an angle of less than 90° with respect to the piston rod 4 and, at the other side, is at an angle of greater than 90° with respect to the piston rod 4. This has the effect that the piston 4, driven by the eccentric 5, performs a wobbling movement relative to the longitudinal axis A.

5

On its circumference, the piston 3 is provided with an annular seal 8 which serves for sealing off the pressure chamber 2 by virtue of the fact that, at certain stages of the movement of the piston 3, said annular seal bears against an internal wall 9 of the pressure chamber 2.

10 An outlet 10 for the medium to be delivered is provided laterally, that is to say radially, with respect to the longitudinal axis A. The pressure chamber 2 forms a roof 11 that slopes obliquely toward said outlet 10.

In the exemplary embodiment shown, the outlet 10 is assigned a ball 12 of a ball valve,
15 which ball can be acted on by a corresponding pressure medium 13.

For the outlet 10, a nipple 14 is formed on the head 1, onto which nipple there is pushed a hose 15 that forms a line 16 to a container for a tire sealing agent. Said hose 15 may alternatively also be connectable to a valve of a tire.

20

The present invention functions as follows:

As per figure 1, the upward movement of the piston 3 causes a medium to be compressed in the pressure chamber 2 and forced through the outlet 10, and through the ball valve formed
25 by the ball 12, into the line 16. In the process, the medium is conducted to the outlet 10 by means of the sloping roof 11. At this stage, the annular seal 8 bears firmly against the inner wall 9 of the pressure chamber 2.

Figure 2 shows the top dead center position, in which the articulated connection 7 of the piston rod 4 lies on the longitudinal axis A. Here, the pressure chamber 2 has been reduced in size to the maximum extent possible, such that the greatest possible amount of medium has passed from the pressure chamber 2 through the ball valve into the line 16.

5

During the further movement of the eccentric 5 in the direction of the arrow 6 as per figure 3, the piston 3 is adjusted into an oblique position such that the annular seal 8 is lifted from the internal wall 9 of the pressure chamber 2, such that an annular passage 17 is formed. The medium to be delivered can be drawn through said annular passage 17 into the pressure chamber 2 as a result of the increase in size of the latter.

10

When the piston 3 is at bottom dead center, as per figure 4, the articulated connection 7 lies on the longitudinal axis A again, as a result of which the piston 3 has been tilted such that its annular seal 8 bears against the internal wall 9 of the pressure chamber 2. Then, during a further movement of the eccentric 5, the compression stage for the medium to be delivered begins.

15

Instead of the ball valve shown in figures 1 to 4, the head 1 may also be assigned a bicycle valve. In this case, there is mounted onto the nipple 14 a flexible sheath 18, which may for example be composed of silicone. Said sheath 18 is held by the hose 15 that is pushed on. A connection between the outlet 10 and the line 16 in the hose 15 is realized via openings 19 in the sheath 18, which openings issue into a space 20 positioned upstream of the line 16. When medium is forced by the piston 3 into the outlet 10, a front region 21 of the sheath 18 is lifted from the nipple 14 and opens up a path for the medium to the openings 19, such that the medium can pass through the openings 19 into the space 20 and from there into the line 16.

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List of reference signs

5

1	Head	34		67	
2	Pressure chamber	35		68	
3	Piston	36		69	
4	Piston rod	37		70	
5	Eccentric	38		71	
6	Arrow	39		72	
7	Connection	40		73	
8	Annular seal	41		74	
9	Internal wall	42		75	
10	Outlet	43		76	
11	Roof	44		77	
12	Ball	45		78	
13	Pressure medium	46		79	
14	Nipple	47			
15	Hose	48		A	Longitudinal axis
16	Line	49			
17	Annular passage	50			
18	Sheath	51			
19	Opening	52			
20	Space	53			
21	Front region	54			
22		55			
23		56		M	Central point
24		57			
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Patent claims

1. A compressor for delivering a medium from a pressure chamber (2) in a head (1) through an outlet (10) into a line (16), wherein a piston (3) is arranged in the pressure chamber (2) and the pressure chamber (2) has a longitudinal axis (A) along which the piston (3) moves,

characterized

in that the piston (3) performs a wobbling movement relative to the longitudinal axis (A).

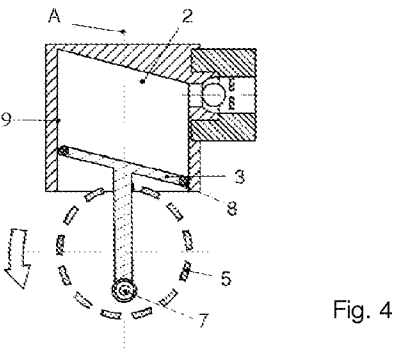
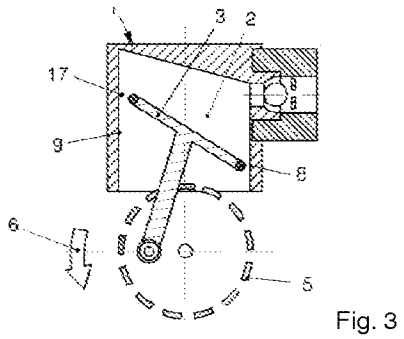
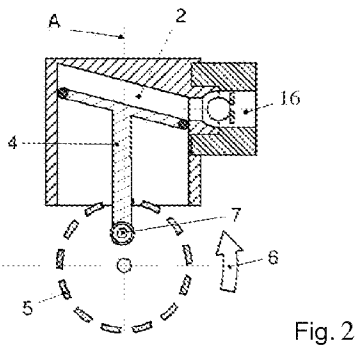
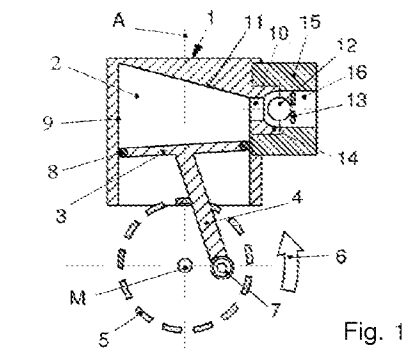
2. A compressor for delivering a medium from a pressure chamber (2) in a head (1) through an outlet (10) into a line (16), wherein a piston (3) is arranged in the pressure chamber (2) and the pressure chamber (2) has a longitudinal axis (A) along which the piston (3) moves, characterized in that the outlet (10) on the head (1) is arranged radially with respect to the longitudinal axis (A).

3. The compressor as claimed in claim 2, characterized in that a valve is connected downstream of the outlet (10).

4. The compressor as claimed in claim 3, characterized in that the valve is in the form of a check valve.

5. The compressor as claimed in claim 3, characterized in that the valve is in the form of a bicycle valve.

6. The compressor as claimed in at least one of the preceding claims, characterized in that the line (16) can be connected to a container for sealing agent and/or to a tire valve.
7. The compressor as claimed in at least one of the preceding claims, characterized in that the piston (3) is connected to an eccentric (5).
8. The compressor as claimed in claim 7, characterized in that the connection between piston (3) and eccentric (5) is realized by way of a piston rod (4).
9. The compressor as claimed in claim 7 or 8, characterized in that a central point (M) of the eccentric (5) lies on the longitudinal axis (A) of the pressure chamber (2).
10. The compressor as claimed in at least one of claims 7-9, characterized in that the eccentric (5) is of disk-shaped form.
11. The compressor as claimed in at least one of claims 8-10, characterized in that the piston (3) is arranged obliquely on the piston rod (4).
12. The compressor as claimed in at least one of the preceding claims, characterized in that, in the pressure chamber (2), a sloping roof (11) runs toward the outlet (10).
13. The compressor as claimed in at least one of the preceding claims, characterized in that a flexible annular seal (8) is provided on the circumference of the piston (3).
14. The compressor as claimed in at least one of the preceding claims, characterized in that an internal wall (9) of the pressure chamber (2) is of flexible form.



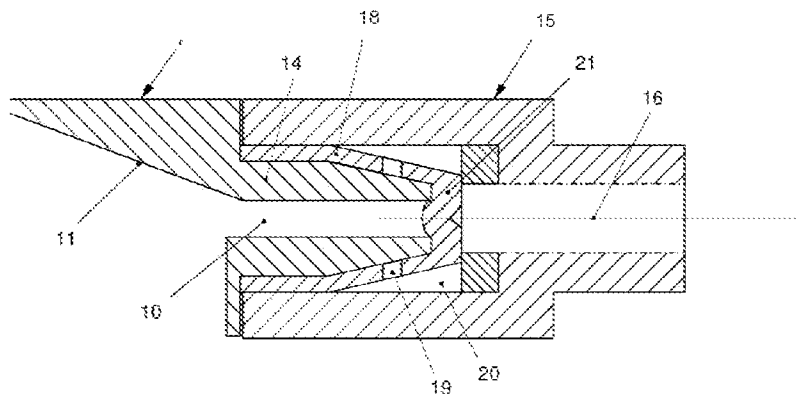


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2014/053021

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, 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	DE 10 2008 031848 A1 (WABCO GMBH [DE]) 7 January 2010 (2010-01-07) paragraph [0016]; figures 1,2 -----	1-10,13
X	EP 2 461 036 A1 (JHOU WEN-SAN [TW]) 6 June 2012 (2012-06-06) figure 3 -----	1,2,6-14
X	US 2 023 466 A (CROWLEY MILLARD E) 10 December 1935 (1935-12-10) figures 1,2 -----	1,6-14
A	DE 101 06 468 A1 (STEHLE MICHAEL [DE]) ILLINOIS TOOL WORKS [US]) 14 August 2002 (2002-08-14) cited in the application the whole document -----	1-14



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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