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(54) **INTEGRAL PISTON PUMP HAVING AN ANTI-LEAK SYSTEM**

(57) The present invention relates to a piston pump having a configuration that enables same to avoid leaks of the working fluid thereof, made up of a body comprising a single integral part, which is connected to the flange of the pump, enabling identical coupling thereof to the de-

vices with which the pump is normally used, and maintaining the axis of the piston completely aligned with the gasket of the pump flange, creating an anti-leak system for piston pumps.

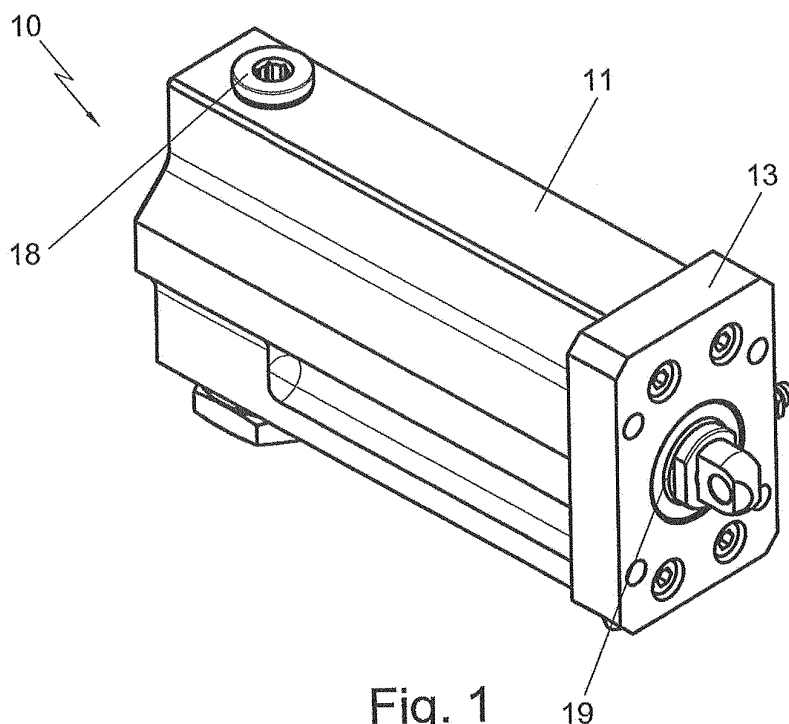


Fig. 1

Description

Object of the Invention.

[0001] More specifically, the invention refers to a new piston pump with an anti-leak system based on an integral body.

State of the Art.

[0002] Different types of piston pumps exist; more specifically those used in applications of foaming materials such as polyurethane and one or two-component epoxy coating.

[0003] These pumps are made up of several assembled components, having a compression chamber, the distribution base, the outlet flange of the pump, connecting tubes between the openings and the struts-aligners between the flange and the base, among other components.

[0004] This configuration causes that both by assembly and by use, the pump is not perfectly aligned and the gaskets used to seal the compression chamber, where the piston works, suffer greater wear and tear, causing losses of the product being pumped.

[0005] In this manner, the use of this type of pump with several components that constitute the body of the pump, suffer losses of the product due to lack of alignment of the different components fitted.

Scope of the Invention.

[0006] The creation of a new pump with a configuration that avoids the losses associated to their use, improving this characteristic with the passing of time and the consequence of the deterioration of its components.

Description of the Invention.

[0007] The invention presented here is materialised in a piston pump, which is used for moving fluids in a system that is habitually installed in equipment for foaming polymers, as well as epoxy coatings, among other equipment.

[0008] This piston pump is designed with an integral body, integrating in a single part the compression chamber, the distribution base, the connecting tube, the struts-aligners of the pump, as well as the means for assembling these parts.

[0009] In this manner, there is a single component manufactured in a material of the necessary structural characteristics and properties so it can be manufactured and used as a unit body, and which is preferably aluminium with a METCER system hard anodising treatment or made of steel with a hard chrome treatment.

[0010] There may be different designs of the unit body, giving priority to the structural strength of the design and minimizing the amount of material used. In the standard

design, it has the characteristic of corresponding with the regular connections of piston pumps commonly used in foaming equipment. This make it possible to replace already installed old equipment without having to carry out any modifications or to adapt the equipment with the original piston pump made of several components, by matching the connection means with the equipment. Alternatively, the pump can be made to specific dimensions that do not correspond to existing equipment applications.

[0011] This integral body has a compression chamber inside, which comprises a interior cylindrical space where the piston moves, this chamber being communicated to the distribution base of the pump, integrated in the body, and with the exterior of the integral body through openings, having, according to the design of the pump, connection tubes between parts of the compression chamber and the distribution base and/or the outside. In the opening where the piston is inserted, it is secured by means of the pump flange where the means for guiding the piston shaft are housed, as well as means to ensure sealing between the shaft, the chamber and the outside.

[0012] The rest of the openings that communicate with the exterior have valves and/or caps fitted according to the design of the pump, with their corresponding gaskets.

[0013] These gaskets are commonly of the O-ring type, made of polymer material.

[0013] With this integral body pump, sealing between the shaft, the chamber and the outside is subject to much less deterioration in than the gasket in the flange guiding the pump shaft in regular piston pumps. This is due to the alignment between the elements assembled, being much less in this integral configuration than those that are fitted to regular pumps, where alignment errors accumulate in every assembly, which are minimised in this invention and create an anti-leak system in the pump. This resolves the excessive interaction between the shaft and the sealing system, commonly formed by a polymer gasket, avoiding rapid wear and correcting the action on a plane in which the gasket cannot do it work effectively.

[0014] According to tests carried out on a piston pump with the advantageous characteristics of this integral configuration, up to 100 times more operating cycles without leaks are achieved for the same gasket than with current state of the art pumps. Tests indicate around 200,000 cycles without any sign of leakage at normal working pressures, between 10 and 400 bar (current equipment can suffer from leaks of fluid at around 2000-3000 cycles), which enable cheaper gaskets to be used, as it is not necessary to increase the quality of these components to try to remedy the alignment errors of the components, using a high quality and therefore more expensive gasket.

[0015] Pump operation is identical to current existing pumps, compressing the fluid that is pushed into the compression chamber (monoblock) by the piston that runs up and down this chamber, pumping the product to the equipment circuit where the pump is fitted.

[0016] The shaft, that has the head of the piston on its

inner end, moves longitudinally along the chamber, projecting outside the chamber on its stroke, this being the moment when the gasket does its work of retaining the fluid compressed in the pump inside the integral body.

[0017] If working with fluids that require the shaft to be protected on the stroke outside the integral body, there is a lubricated liner or similar element, which avoids possible interaction of the medium with the shaft.

[0018] This invention, as well as avoiding alignment errors between the different parts such as the liner, the distribution base and the piston shaft, incorporating an integral pump avoids these alignment faults, it also enables rapid and secure assembly, reducing the number of elements to be assembled, therefore reducing costs and production time.

[0019] Therefore, the new integral piston pump enables:

- A reduction in costs and time needed for manufacturing and assembly, as there are fewer parts to assemble.
- Precise alignment of the piston with the compression chamber and with the distribution base.
- Reduce gasket wear to avoid leaks, by the action of the shaft on the gaskets.
- To replace existing pumps with new ones, without having to make modifications to fit them.

[0020] Other details and characteristics shall be shown throughout the description below referring to drawings attached to this report which are shown for illustrative but not limiting purposes a practical embodiment of the invention.

[0021] Below is a list of the different parts of the invention, which are indicated in the drawings attached to this report with their respective numbers; (10) pump, (11) integral body, (12) piston shaft, (13) pump flange (10), (14) head of the piston, (15) gasket, (16) compression chamber, (17) valve, (18) cap, (19) guide bush, (20) connecting tube between the openings.

Description of the drawings.

[0022]

Figure 1 is a perspective view of the integral piston pump.

Figure 2 is a section of the integral piston pump.

Figure 3 is an exploded perspective view of the integral piston pump.

Description of a preferred embodiment of the invention.

[0023] In one of the preferred embodiments of this invention, the new pump (10) comprises an integral body (11) made preferably of aluminium or with a hard anodising METCER system treatment or steel with hard chrome treatment, formed as mentioned, by a single

piece, comprising the liner of the pump, the connection tubes, the struts-aligners and the distribution base.

[0024] The integral body (11) of several shapes, prioritis- ing the structural resistance of its design and minimis- ing the material used, has an interior cylindrical space which is the compression chamber (16), connected to the exterior of the body (11) by means of different open- ings made in it, to fit piston shaft (12), valves (17) and caps (18). There is also an interior space in the form of a connection tube (20) that connects the different open- ings that link the compression chamber (16) with the out- side.

[0025] This integral body (11) only needs to be fitted with the flange (13) of the pump (10), which (13) incor- porates the corresponding guide bush (19) of the shaft (12), as well as the gasket (15) that ensures sealing be- tween the compression chamber (16), the shaft (12) and the outside of the pump (10).

[0026] The piston shaft (12) acts, as is common in pis- ton pumps, by moving longitudinally along this chamber (16), using the head of the piston (14) as a element to compress the fluid in the chamber (16). As there are no more than two elements; the integral body (11) and flange (13), the alignment of the shaft (12) with the chamber (16), the guide bush (19) and gasket (15) are totally ef- 25 fective, avoiding leaks due to upper wear superior caused by a misalignment of the shaft (12) with regard to the gasket (15).

[0027] In this manner, the pump (10) forms a leak-free system, increasing the simplicity of assembly of the com- 30 ponents.

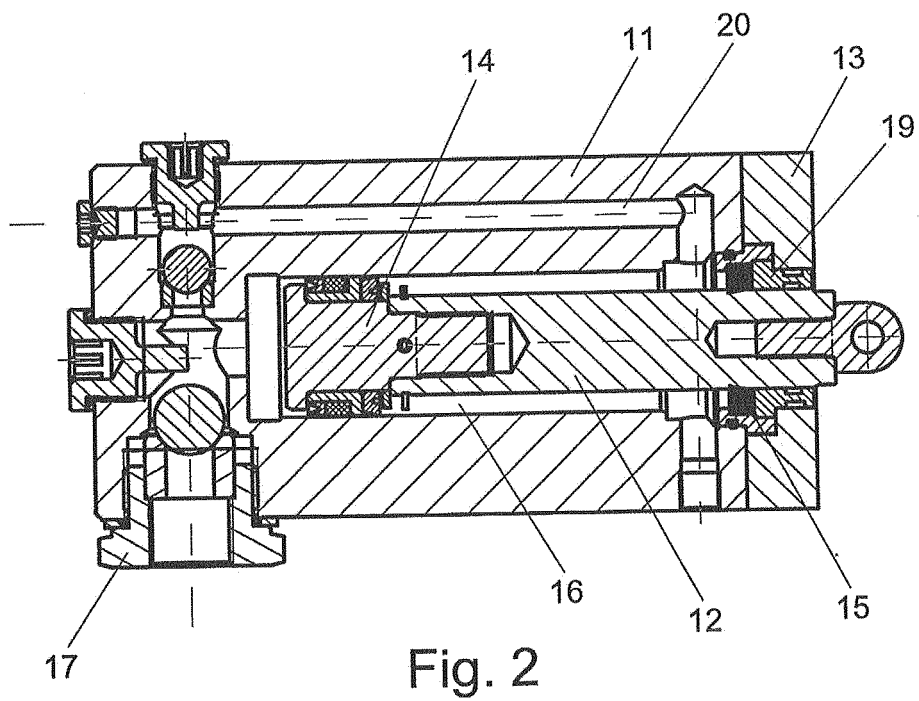
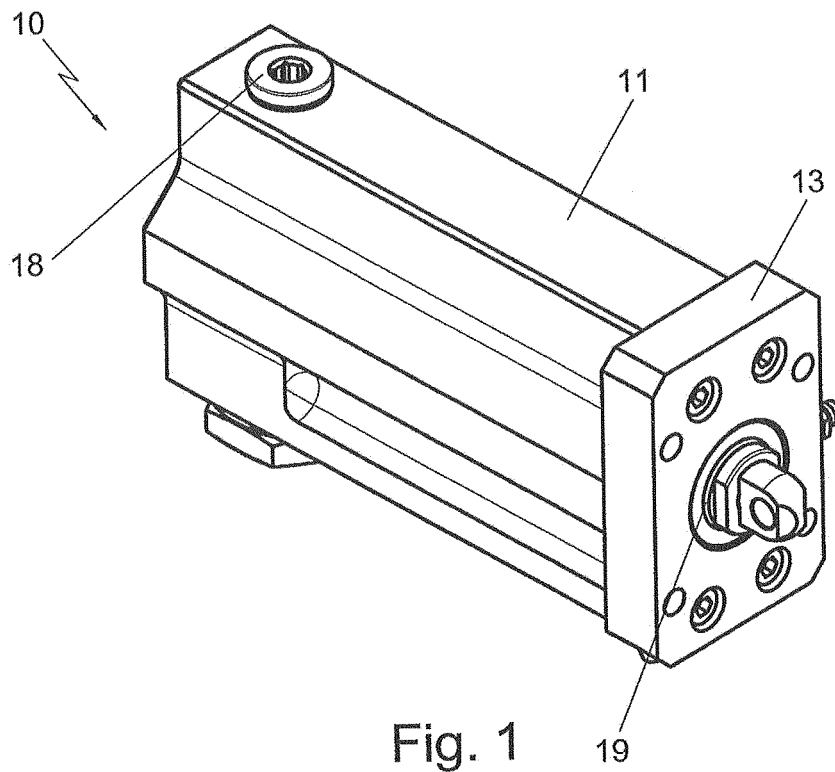
[0028] Attachment is made by standard means, where the exterior design of the integral body (11) and the flange (13) of the pump (10) enable it to be fitted to former in- stallations, without needing to carry out any modification.

[0029] Having sufficiently described this invention us- ing the drawings attached, it is easy to understand that any modification may be made to the detail which may be deemed to be appropriate, whenever these changes do not alter the essence of the invention summarised in the following claims.

Claims

1. "INTEGRAL PISTON PUMP HAVING AN ANTI-LEAK SYSTEM" as used for the pumping of fluids, by the action of compression carried out by a piston that travels up and down a compression chamber **characterised in that** the pump is formed by an in- 45 tegral body, which where the integral body is at- tached by means fasteners to the pump flange, the piston being aligned by means of two elements; in- tegral body and the flange, has an compression chamber inside open to the outside of the body by means of the openings of the stroke of the piston shaft, on which there are valves and caps necessary to attach the pump to the equipment that needs it.

2. **"INTEGRAL PISTON PUMP HAVING AN ANTI-LEAK SYSTEM"** according to claims 1 **characterised in that** the integral body comprises in a single component at least the liner of the compression chamber, the distribution base, the connection tubes between openings and the pump struts-aligners. 5
3. **"INTEGRAL PISTON PUMP HAVING AN ANTI-LEAK SYSTEM"** according to the claim 1 **characterised in that** the flange has at least some means for attaching to the integral body, means for attaching to the equipment or installation, means for guiding the piston shaft and at least one gasket between the piston shaft, the compression chamber and the flange. 10 15
4. **"INTEGRAL PISTON PUMP HAVING AN ANTI-LEAK SYSTEM"** according to the claim 1 **characterised in that** the integral body is made preferably of aluminium with a hard anodising METCER system treatment, or alternatively, of steel with hard chrome treatment. 20
5. **"INTEGRAL PISTON PUMP HAVING AN ANTI-LEAK SYSTEM"** according to the claims 1 and 3 **characterised in that** the pump flange is attached to the equipment or installation that the pump serves in a standard manner, as is common in the previous piston pumps that it replaces. 25 30 35 40 45 50 55



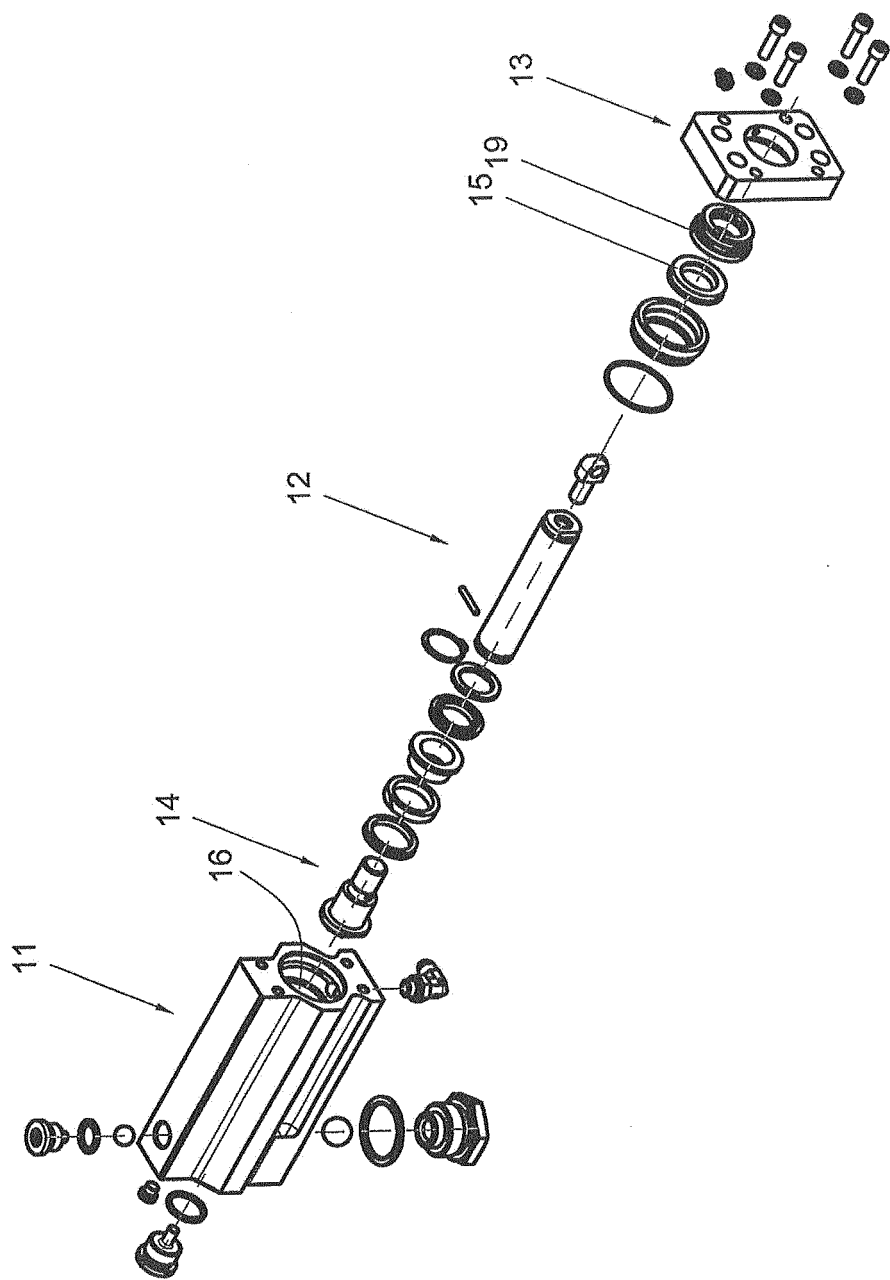


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2012/070305

A. CLASSIFICATION OF SUBJECT MATTER

F04B53/16 (2006.01)

F04B39/12 (2006.01)

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)

EPODOC, INVENES

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP1770274 A1 (DENSO CORP) 04/04/2007, abstract; paragraph [41], figure 1.	1-5
X	WO2011003789 (DELPHI TECHNOLOGIES HOLDING S A R L ET AL.) 13/01/2011, page 8, lines 21 - 24; figure 1.	1
A	EP1666726 A2 (HYDAC FLUIDTECHNIK GMBH) 07/06/2006, figure 5.	1
A	GB2044347 A (EL PASO POLYOLEFINS) 15/10/1980, page 1, lines 67 - 78.	1
A	CN202203012U (CHONGQING HONGJIANG MACHINERY CO LTD) 25/04/2012, figures & CN202203012U Abstract from DataBase WPI. Retrieved of EPOQUE.	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:	"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
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"E" earlier document but published on or after the international filing date	
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"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

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Form PCT/ISA/210 (second sheet) (July 2009)

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International application No.

Information on patent family members

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Form PCT/ISA/210 (patent family annex) (July 2009)