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(54) **MAGNETIC SYSTEM FOR ISOLATED CHAMBER PUMPS**

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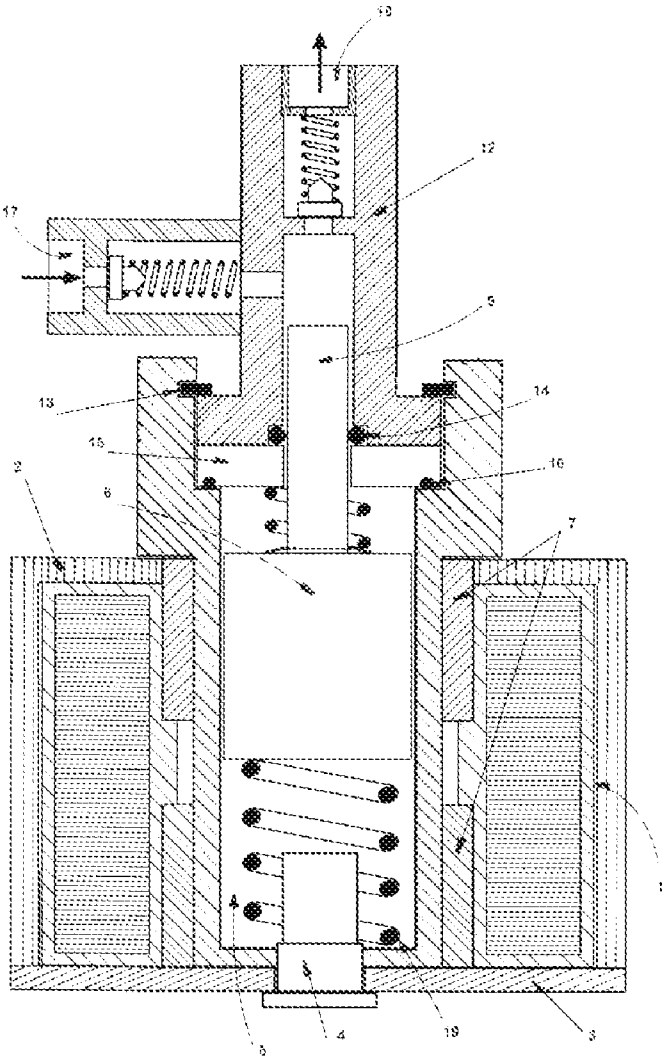
(57) **ABSTRACT**

Vibrating liquid pump with an electromagnetic system comprising a coil (**1**); a metallic frame consisting on a "U" shaped piece (**2**) and a lower plate closure (**3**) which are placed around the coil (**1**) and the bushings (**7**); the screw stud (**4**) is responsible for bonding and fixing the set trough the driver chamber (**5**), where the magnetic core (**6**) moves longitudinally and in alternate direction. The screw stud (**4**) of the magnetic system join the components (**2**, **3**, **7**, **5**) in a single assembly operation and is arranged behind and axially aligned the magnetic core (**6**) to optimize the attractive force and reduce the amount of copper required in the coil (**1**).



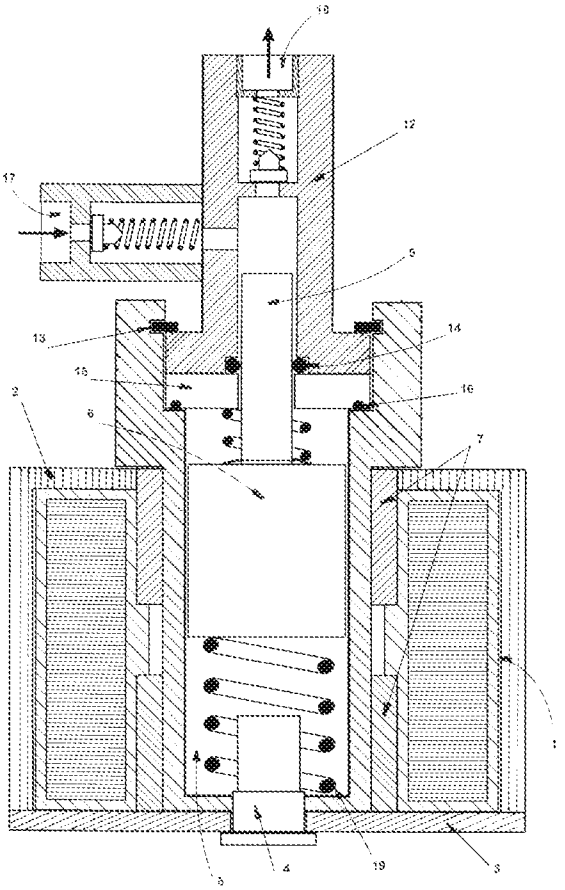


Fig. 1

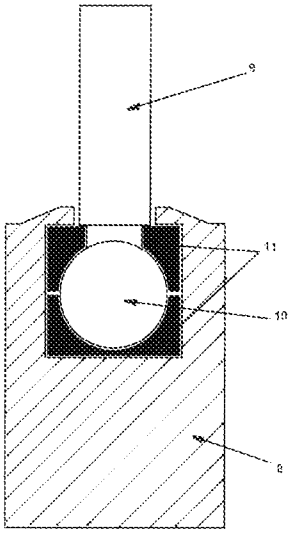


Fig. 2

MAGNETIC SYSTEM FOR ISOLATED CHAMBER PUMPS

BACKGROUND

[0001] Different types of pressure pumps used for moving liquids from one point to another are currently known. Gear pumps, centrifuge pumps, vane pumps, vibrating pumps and others might be mentioned.

[0002] The choice of the type of pump basically depends on the requirements it must meet, such as: dimensions/weight, maximum pressure, maximum flow, flow at working pressure, power consumed, characteristics of the fluid to be moved (oils, acids, food, etc.), price or noise level.

[0003] Vibrating piston pumps, which are of the type referred to in this invention, work by alternatively moving a magnetic core using a tubular electro-magnet around the said magnetic core. The use of AC power generate magnetic pulses that result in the magnetic core moving to a centred position within the magnetic field produced by the electro-magnet, and a rear spring serves to push it back again from this natural equilibrium position when powered producing the alternative movement thereof.

[0004] The electromagnetic systems currently used in vibrating pumps has a reduced efficiency due to the single use of a tubular electro-magnet disposed around the magnetic core making it to move to a centred position on the magnetic field generated.

[0005] Another key component of the magnetic system of vibrating solenoid pumps is the piston, and due to the design, manufacturing specifications and materials currently used there are some room to improve its efficiency and costs. To manufacture pistons, three processes are the most commonly used nowadays: full machining starting from a larger piece of stainless steel, press-bonding the ferritic stainless steel core and the stainless steel plunger or by plastic moulding a plunger over the ferritic stainless steel core.

[0006] Finally yet importantly, usually the compression chamber is assembled to the magnetic system by screwing or press-bonding and to ensure tightness several O-rings are used, resulting in assembly time and costs that can be improved.

[0007] The technical problem raised is therefore to develop a vibrating pump provided with an electromagnetic system which will improve the magnetic attraction over the piston thereby enabling to obtain the performances of current pumps with lower raw material costs, mainly cooper and that can be assembled more simply and quickly shortening the process time while reducing the dimensions of the set.

BRIEF DESCRIPTION OF DRAWINGS

[0008] To complement the description made and in order to make it easier to understand the features of the invention, this report is accompanied by a set of drawings, which are merely illustrative and not restrictive, representing the following:

[0009] FIG. **1** shows a schematic drawing of an example of the vibrating piston pump in accordance with the invention, sectioned by a vertical plane; and

[0010] FIG. **2** shows a schematic drawing of an embodiment of the core-plunger assembly according to the invention, sectioned along a vertical plane.

BRIEF SUMMARY

[0011] This invention concerns an electromagnetic system for vibrating piston pump with an isolated compression chamber suitable for moving liquids; consisting of a electromagnetic system that alternatively drive a plunger as compression means which pushes the liquid in a compression chamber towards an outlet. The vibrating pump, which is the subject of this invention, has features intended to increase the efficiency of the electromagnetic driver system due to an specific metallic structure, a flexible piston comprising two or more materials and the assembly of the compression chamber by clipping methods, allowing it to obtain similar results as current vibrating pumps with less cooper, iron and lower assembly costs while consuming less electricity during operation. CLAIMS

1. Vibrating pump for liquids applicable in the displacement of fluids, comprising a compression chamber (**12**) provided with an inlet (**17**) and an outlet (**18**) for the liquid; an electromagnetic system comprising a coil (**1**) a metallic frame consisting on a "U" shaped piece (**2**) and a lower plate closure (**3**) which are placed around the coil (**1**) which contain the bushings (**7**) and the a screw stud (**4**) responsible for bonding and fixing the assembly trough the driver chamber (**5**); a pumping means comprising a magnetic core (**6**) extending in a plunger (**9**) into the compression chamber (**12**) which moves longitudinally and in alternate direction inside the drive chamber (**5**) thanks to the alternative attraction force of the electromagnet and the compression spring (**19**); characterized in that: the screw stud (**4**) bonding and fixing the set is disposed behind the magnetic core (**6**) and axially aligned therewith to optimize the attractive force and to reduce the amount of copper required in the coil (**1**).

2. Vibrating pump according to claim **1**, characterised because the pumping means are constituted by a compression spring (**19**) and a magnetic core (**8**) extending in a plunger (**9**) fixedly but with freedom of axial deflection due to the patella (**10**) and the semi-housing (**11**) which house the said plunger inside the magnetic core (**8**).

3. Vibrating pump according to claim **1**, characterised because the compression chamber (**12**) is inserted into the driver chamber (**5**) and fixed by the fork (**13**) that holds the compression chamber (**12**) joined to the said drive chamber (**5**) and free to rotate 360° on its axis; a sealing means (**14**) and a washer (**15**) prevents the liquid to leak to the magnetic system and the seal (**16**) holds the assembly under tension to prevent leakage and noise.

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