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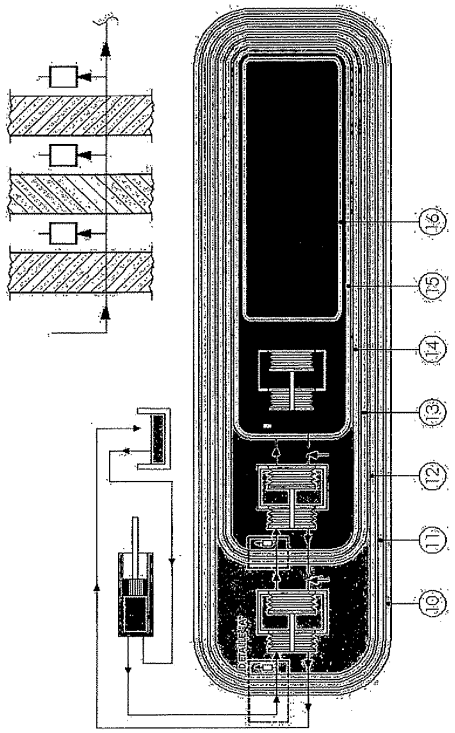
(54) **MULTICHAMBER AND MOTOR PUMP WITH SEVERAL CHAMBERS FOR MOTOR PUMP**

(57) The mechanism subject of the invention is basically a modification of the "Multichamber and motor pumps for generating ultra high pressure" where more efficiency is acquired in the space and in its operation upon having several chambers for each motor pump which is installed, mainly the ones located towards the exterior. Or each chamber permits in the inside of its walls the injection of liquid at intermediate pressures between the pressure the chamber has in its interior and its exterior.

FIG. 1



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Description

[0001] The present invention is an improvement of the patented invention "Multi-chamber and Motor-pumps to generate Ultra high pressure", corresponding to the Chilean patent application request No. 2331-06, of the same inventor; and that can be applied in several fields or can have different uses in the fields of: alimentary and food to ultra high pressure; cutting of metal plates with liquid jets, ultra high pressure sintering, researches of new materials, etc.

[0002] The previous state of the art is based on the development conditions of the new way of achieving ultra high pressure, iterating the pumping operation, so that the pumped liquid is divided in two, for; on one hand reducing the pressure in a "motor" cylinder, delivering power to the other part of the liquid that increases even more the pressure and recursively is divided again thus increasing the pressure even more. In this technique, there is a simple chamber for every motor-pump as in the invention "Multichamber and motor-pumps to generate ultra high pressure"; it has not been realized that it is more advantageous that it has double walled chambers, triple wall or more for each motor-pump, or that it has several chambers for each motor-pump.

Detailed description of the invention

[0003] It is a matter of an improvement to the system of the "Multichamber and Motor-pumps to generate ultra high pressure", in which it has one motor-pump for each chamber so that when the concentric chambers are considered to go from the outside towards the inside, it has one chamber then another chamber with its corresponding motor-pump then this way it comes to the last chamber that is the most internal and which supports the highest pressure. In this case the walls of each chamber are monolithic or it does not carry anything on the inner side of the walls.

[0004] The mechanism of subject invention is basically a modification to the "Multichamber and motor-pumps to generate ultra high pressure", in that more efficiency is acquired within its space and in the operation when we have several monolithic chambers for every motor-pump that is installed, mainly those which are located in the outer section. Or every chamber allows in the inner portions of its walls, the injection of a liquid at intermediate pressures between the pressure that it has inside in its inner portion and its outer portion.

[0005] Let us assume that the chambers can be of "multiple" walls this way, we have that chamber 1 is formed by several chambers or semi chambers: where chamber 1 is made by the chambers 1,1; the chamber 1,2; ... the chamber 1,m. The chamber 2 is composed by the chambers 2, 1; chamber 2,2; ... the chamber 2, k; and so on. It starts with an external pump, which raises the pressure up to P1, but when it begins to pour liquid, at a lower pressure than P1, it will start to fill under pressure the whole system, when the pressure is equal to P1, 1; it indicates that the outer chamber 1,1 is full and the valve 1,1 is closed and continues transferring liquid to the other chambers, particularly to chamber 1,2; and when it reaches a pressure equal to P1, 2 lower that P1, the valve 1,2 is closed so it continues with the chamber 1,3 and this way reaches the chamber 1,m with P1, m = P1.

[0006] Then a motor-pump is necessary which is located in the chamber 1m which only starts its first operation filling the other chambers, specially chamber 21. As the first pumping of the motor-pump No. 1 is at a lower pressure than P2,k equal to P2, the pressure P1 at which chamber 1m is, declines a little because the motor of motor-pump 1 has eliminated one pumping and the pump of motor-pump 1 has increased the pressure in the inner chambers and therefore it is necessary to expect that an external pump recovers P1 in the chamber 1m, in order to just at this time activating the motor-pump 1 again so that we have the second pumping of the motor-pump 1 and assuming that still P does not reach P2, it will be necessary to wait again that P1 is recovered in P1 in motor-pump 1 to activate again for which the second pumping of the motor pump again lowered the pressure in which pump No. 1 is submerged. It continues to operate until pump No. 1 is able to attain P2K equal to P2 in the whole system.

[0007] Only then, motor pump No. 2 starts to operate together with pump No1 and the outer or external pump until chamber 3j is filled out with liquid at a P3j pressure equal to P3 and so on.

[0008] The inner chambers do not need to be double or more, because as they are subject to higher pressure, their walls can be thinner in order to stand a pressure differential equal to Ph-Phl=P(Ph is the pressure on the inner side and Ph-1 is the pressure on the outer side). When the thickness of the chamber is lower than a small percentage of the diameter (it can be any from 5% or 4% or 3% or any) and stands a difference which is equal to P then it is not necessary to place several chambers associated with each motor pump, because the space saved is no longer relevant.

[0009] The concept is a basic one, the objective is to patent, any chamber containing gas or liquid under pressure inside, will have more resistance when the thickness of the walls is divided, and is submitted to intermediate pressures, than when it is made of solid walls. So that having the same dimensions and made of the same material the chamber made of various chambers stands more pressure that if it was a single chamber made of thicker walls. The space used up by a multi-chamber is reduced and the number of motor pumps, in order to attain a pressure equal to Pn than in the case where it has one motor pump per each chamber.

[0010] A tube consisting of several concentric tubes as a pack can be compared, with intermediate pressures, so that it advances from lower to higher pressure, increasing the pressure as it progresses from the outer

tube to the inner tube. It can support more final pressure, which overcomes the resistance to traction of the material, than if a thicker walled tube is used made of the same material.

[0011] The multi-chamber must be equipped with safety valves and valves that allow the equipment to be taken apart, the same as the one described in the previous invention. It should also carry all types of mechanisms to increase the temperature, which allow to see, etc.

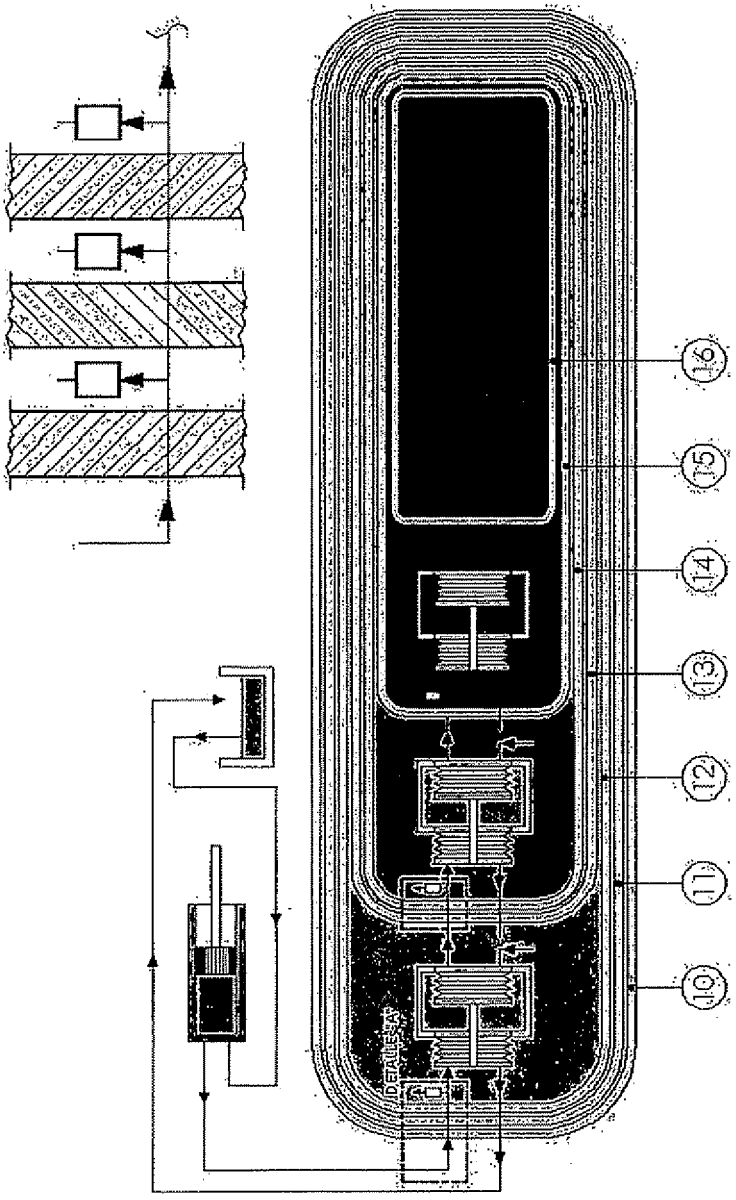
[0012] Any type of chamber is full when the filling up valve is closed by the pressure. This is, it is filled by the liquid under pressure at a pressure which depends on the pressure said valve is regulated to.

Claims

1. A multi-chamber with motor-pumps which outer chambers are not equipped with motor-pumps nor space for their installation, only after m chambers where it takes a motor-pump which motor unloads outwards and the pump inwards, then oriented towards the inside k chambers without motor-pumps or space for motor-pumps up to the second motor-pump, which motor unloads into the previous chamber that has motor-pump, and which pump unloads towards the inside, and so on **CHARACTERIZED; in that** the external pump operates filling the first m chambers up to P11, P12.., P1m that is equal to P1 until it activates motor-pump No. 1, which does a pumping to the chamber 21 (13) with the power delivered by the motor of motor-pump No. 1 when unloading a load pumped towards the exterior, the pressure of chamber 1m(12) is lowered slightly and it stands still waiting for another pump load to fill chamber 1m (12) to only now operate a second movement of motor pump No. 1 and has to wait until it recovers the pressure, after several pumpings of motor pump attains P2j = P2 and is now only ready to start the pumping with motor pump No. 2 which at its own time unloads the motor of motor pump No. 2 up to chamber 1,m (12) where motor pump 1 is located and the motor pump 2 is still until the pumped load arrives from motor pump No. 1 in order to recover pressure P2 and the motor pump 2 starts to operate towards chamber 31 (15) and so on until pressure Pn is attained in chamber n.

2. A multi-chamber with motor-pumps which outer chambers do not have motor-pumps nor space for their installation, up to after m chambers where a motor-pump is located outwards and the pump towards the inner then k chambers are installed towards the inner portion without motor-pumps nor or space for motor-pumps up to the second motor-pump, which motor unloads towards the previous chamber that has motor-pump, and whose pump unloads towards the inner portion and so on **CHARACTERIZED, in that** when it starts to fill a chamber, or the external pump, must fill the first chamber (10) after the motor-pump, at a pressure Ps1, which after the chamber s2 to Ps2, and this way up to the chamber st at Pst pressure that is equal to Ps; for which all the chambers must have a derivation for the inlet of liquid with a load valve; VCS, and allows up to a determined pressure at a predetermined pressure Ps, I and which does not allow the inlet of a liquid at a pressure higher than Ps, i and in the chambers equipped with motor pumps they should have a discharge valve VDi from the motor of the motor pump up to the previous chamber which is equipped with a motor pump and the pump continues towards the inner chambers with the pressure line which comes out of the pump of the motor pump.

FIG. 1



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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