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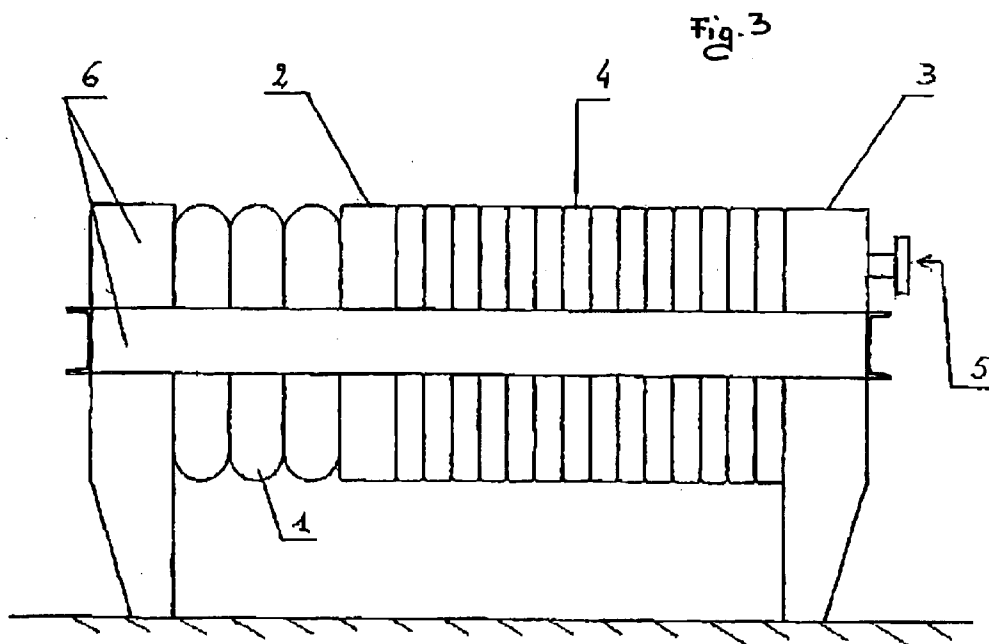
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(54) Title: HYDROPNEUMATIC FILTER PRESS



(57) Abstract: The invention, subject of the present application, concerns the technical field related to the dewatering of the mud deriving from the purification of the waste waters, civil and industrial and from the various chemical/pharmaceutical and minerals processes. The current invention is a filter press where the mud dewatering by means of pressing, occurs contrasting the thrust of the hydraulic pump which introduces the muddy mixture between the plates on the press, with a thrust obtained blowing with a liquid fluid or gassy in pressure, one or more elastic coverings inserted in the press, which replace the oil-pressurized piston.

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DESCRIPTION

Of the industrial invention titled: "Hydropneumatic Filter Press".

Technical Field:

The invention, subject of the present application, concerns the technical field related to the
5 dewatering of the mud deriving from the purification of the waste waters, civil and industrial and
from the various chemical/pharmaceutical and minerals processes.

Background art:

The filter press is an industrial machine used to dewater mud by means of solid-liquid separation
processes. The mud pumped inside the filter at high pressure, is then dewatered by means of filtering
10 plates, which stop the solid part and allow the flow of the liquid part.

Currently the compression of the mud for the dewatering, occurs by means of a cylinder driven by
an oil-pressure gearcase. As shown in Fig. 1 and 2 of chart I, the filtering presses currently used in
each sector are composed by a certain number of filtering plates (4) free to slide on longitudinal
members (7) placed parallel to each other. Those plates are longitudinally held by a stationary
15 plate (3) and by a mobile plate (2). The mobile head is supported by one or more hydraulic cylinders
(8) fixed to the frame (6). According to the current background art, during the filling operation the
plates are closed (see Fig. 2) by means of a strong pressure released by hydraulic cylinders (8)
installed behind the mobile plate (2). During the discharge phase of the filtrate (see Fig. 1), the
cylinders pull back the mobile plate (2) dividing the plates by means of a chain (10) and allowing
20 the separation of the filtrate cake.

Disadvantages: 1) limited possibility to increase the tightening strength; 2) possible accidental oil
leakages, though accidental, and consequent water pollution; 3) space occupied by the machine; 4)
high number of components required for the machine functionality; 5) constant system maintenance
required; 6) slow loading and discharge operations; 7) heaviness of the structure.

25 Disclosure of the Invention:

The solution to some of said issues, has been defined with the device subject of the Italian National Application for the industrial invention n° MS2007A000006 filed on the 19th March 2007, which inventor is Tongiani Stefano, which basically includes:

- The infeed from which the mud are entered by pressure inside the filtering plates;
- 5 - the filtering plates, which are positioned between a mobile plate and a fixed plate;
- The elastic containers, for example cushions, which replace the hydraulic cylinders, and which are positioned between the mobile plate and the frame, are filled with air, water or other fluid in order to move and close the mobile plate with a very strong thrust
- 10 towards the stationary plate.

By virtue of the combination of the said actions, the filtering plates are compressed causing the outfeed of the water from the mud, which in this way, are dewatered.

The main advantages are the following: 1) better filtration mainly due to the possibility to increase the tightening strength; 2) total ecological compatibility; 3) less machine space; 4) less number of

15 required components for the functionality of the machine; 5) less maintenance required; 6) faster loading and discharge operations; 7) lighter structure.

The solution to the problems above mentioned and the improvement of the above explained solutions, have been defined by some shrewdness which are part of the object of the present application, which are the following.

- 20 The mobile head contains several pneumatic or hydraulic cushions, which are closed between two metal sheets even very thin. The closing phase occurs by moving the entire mobile head forward and backwards, for example by means of a gear motor and rack. When the position of the mobile head results to be suitable is then blocked, for example by means of mobile pins agent on the holes drilled on the longitudinal members. At this point the cushions are to be blown up to release the tighten
- 25 force.

The main advantage of the present Hydro-pneumatic Filter press can, therefore, be so specified:

- 1) Better filtering: since we can increase the working force even operating at low pressure compared to the oil-pressured cylinder. Basically, by using retractor cushions (1) blown up with air or water, it is possible to exploit all the mobile plate surface reaching the tighten forces of the plates
- 5 (4) highly above the ones performed by the hydraulic cylinders (8), even if the pressure inside the cushion is low. For what said the filtrate cake discharged by the filter press will be considerably drier than the one filtered with the up to date filter presses.
- 2) Improvement under the ecological point of view: eliminating the hydraulic cylinders (8) and therefore the relative control power pack, the machine results to be without oil. This, so, eliminates
- 10 the problem of oil leakage during replacements or oil dripping from the cylinder seals.
- 3) Smaller machine space: eliminating the cylinders (8) you also eliminate the space taken up by the sleeves of those last which extend behind the frame (6).
- 4) Lower manufacturing costs: eliminating hydraulic cylinders and the power pack, you also eliminate a good part of the cost, recuperated only in small part because of some components added
- 15 with the usage of cushions.
- 5) Lower operating costs: due to the lack of hydraulic system especially of the cylinders which require constant maintenance.
- 6) Faster opening and closing of the machine: the system with the cushions results to be faster compared to the one with the power pack and hydraulic cylinders. The faster loading and discharge
- 20 operations is even more obvious when using air.
- 7) Lighter machine due mainly to the possibility to use pneumatic material.

Brief description of the drawings:

In the hydro-pneumatic filter press, object of the current application, there are no longer hydraulic cylinders which have been replaced with elastic containers blown up with air, water or other fluid.

- 25 As shown in Fig. 3 of chart II, the mud are introduced with pressure through the infeed (5) inside the

filtering plates (4), positioned between the mobile plate (2) and the stationary plate (3). The cushions (1), positioned between the mobile plate mobile (2) and the frame (6), previously blown up with a fluid, move and block the mobile plate (2) and the filtering plates (4) with a very strong thrust towards the fixed plate (3). By virtue of the combination of the said actions, the mud are compressed
5 causing therefore the out feed of the water and the dewatering of the mud itself.

As shown in Fig. 4 and 5 of chart III, the mobile head contains pneumatic or hydraulic cushions (1), which are closed between two metal sheets (11) even very thin. The closing phase, so, occurs by moving the entire mobile head forward and backwards, for example by means of a gear motor and a rack. When the position of the mobile head results to be suitable is then blocked, for example by
10 means of mobile pins agent on the holes (9) drilled on the longitudinal members (7). At this point the cushions are to be blown up to release the tighten force.

Best way for carrying out the invention:

The mud are introduced with pressure through the suitable infeed inside the filtering plates, positioned between the mobile plate and the stationary plate. There are some elastic coverings
15 between the mobile plate and the frame, which are blown up with air or water in order to move or block the mobile plate and the filtering plates with a very strong thrust towards the fixed plate – therefore causing the discharge of the water from the mud, those in such way are dewatered.

The above described, and with the help of the drawings, it is only an unrestrictive example.

Obviously, it is the object of the present application even what it is not directly described or
20 illustrated when it is part of the main scope of the present invention.

CLAIMS

1) Device for the pressing of mud for a hydro-pneumatic filter press, composed of :

- an infeed through which the mud are pressured inside the filtering plates;
- filtering plates, which are positioned between a mobile plate and a stationary plate;
- a mobile plate;
- a stationary plate;
- tightening means of the filtering plates, positioned between the mobile plate and the frame;

characterized in that said tightening means are made by elastic coverings, which are blown up with air, water or another fluid in order to move and block the mobile plate and the filtering plates with a very strong thrust towards the fixed plate – causing therefore the discharge of the water from the mud, that in such way are dewatered – and this allows to obtain a higher pressing push using water operating pressure and, so, it allows a better squeezing, a total ecological compatibility, a smaller machine space, less components necessary for the machine functioning, less maintenance of the system, faster loading and discharge operations and a lighter frame.

2) Device for pressing mud for hydro-pneumatic filter press, as claimed in claim 1) characterized in that:

- the elastic pneumatic or hydraulic coverings are enclosed between two metal sheets where one is integral with a mobile head and the other metal sheet is free;
- the closing phase occurs by moving all the mobile head forward and backwards, by means of a gear motor and rack;
- when the mobile head is in the desired or suitable position it is blocked by means of mobile pins agent on holes drilled on the longitudinal members;

this allows to obtain the desired thrust of the filtering plates between the free metal sheet and the stationary plate.

- 3) Device for pressing mud by hydro-pneumatic filter press, as claimed in claim 1) or 2), characterized in that can be made of any type of material, even different for each components, as long as it is adequate to the scope;
- 4) Device for the pressing of mud by hydro-pneumatic filter press, as claimed in the previous claims, characterized in that each component can be made of shapes, number and dimensions different from the one shown and described, as long as the scope of this is respected;
- 5) Device to press mud with an hydro-pneumatic filter press, made according to one of the previous claims;
- 6) A method to dewater the mud by means of liquid-solid separation processes characterized in that it comprises the following phases:
- the mud, through an adequate infeed, are pressured inside the filtering plates, which are positioned between the mobile plates and the stationary plate;
 - between the mobile plate and the frame, there are positioned some elastic coverings, which are blown up with air or water in order to move and block the mobile plate with a very strong thrust towards the stationary plate;
 - the filtering plates are so compressed between the mobile plate and the fixed plate, therefore causing the water to come out of the mud, dewatering those lasts.
- 7) A method to dewater mud by means of solid/liquid separation processes, characterized in that it comprises the following phases:
- the mud, through an adequate infeed, are pressured inside the filtering plates, which are positioned between the mobile head and a stationary plate;
 - inside the mobile head, enclosed between two metal sheets where one is integral to the mobile head, and the other is a free one, there are some elastic coverings, which are blown up with air or water in order to block the filtering plates between the free metal sheet with a very strong thrust towards the stationary plate;

- the closing phase occurs by moving the mobile head backward and forward, by means of a gear motor and rack;
- the head is blocked on the desired or suitable position by means of mobile pins agent on the holds drilled on the longitudinal members;
- the filtering plates are so compressed between the stationary plates and the free metal sheet, causing therefore the out feed of the water from the mud, which are in this way dewatered.

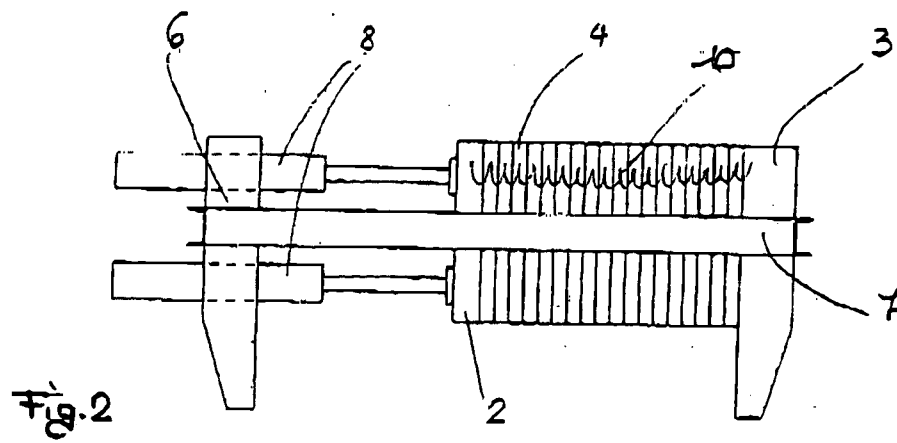
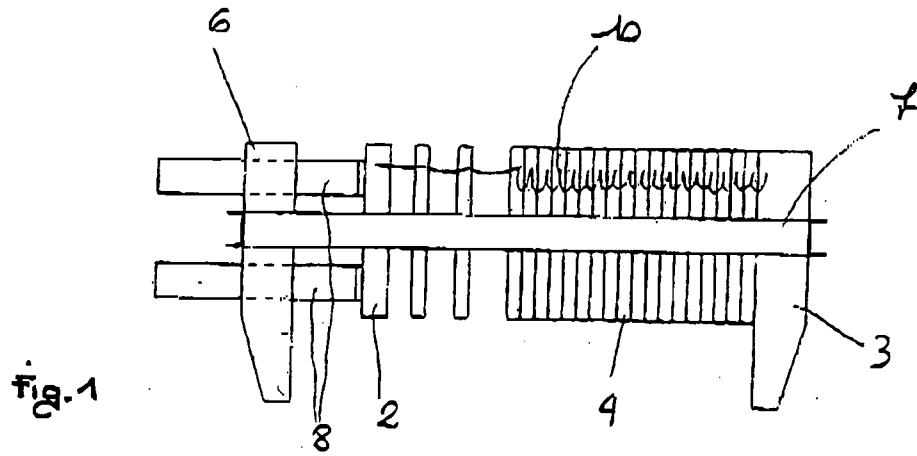


Fig. 3

