(No Model.)

M. DEHNE & C. HARZER.

FILTER PRESS.

No. 564,422. Patented July 21, 1896.

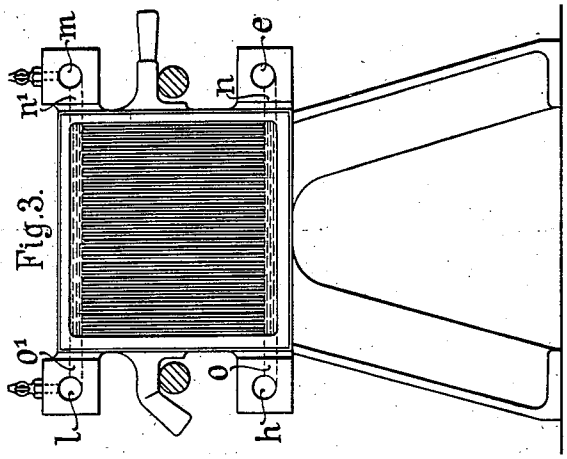

Fig.3.

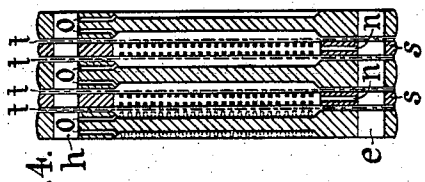

Fig.4.

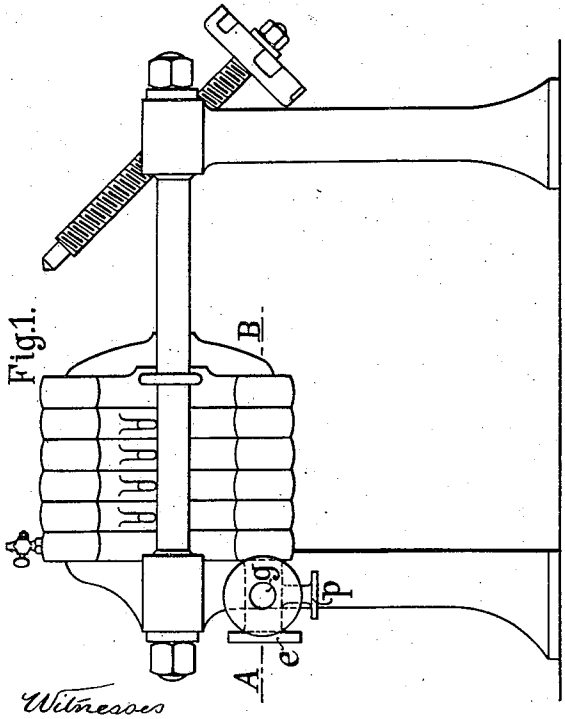

Fig.1.

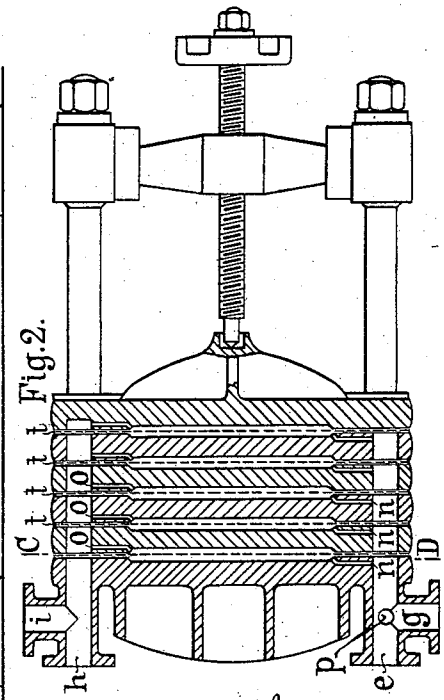

Fig.2.

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UNITED STATES PATENT OFFICE.

MAX DEHNE, OF HALLE-ON-THE-SAALE, GERMANY, AND CURT HARZER, OF LONDON, ENGLAND, ASSIGNORS TO THE FIRM OF A. L. G. DEHNE, OF HALLE-ON-THE-SAALE, GERMANY.

FILTER-PRESS.

SPECIFICATION forming part of Letters Patent No. 564,422, dated July 21, 1896.

Application filed November 26, 1894. Serial No. 529,923. (No model.) Patented in Germany January 3, 1894, No. 78,620; in England January 10, 1894, No. 575; in France, January 10, 1894, No. 235,432, and in Austria-Hungary April 25, 1894, No. 1,580 and No. 13,754.

To all whom it may concern:

Be it known that we, MAX DEHNE, a subject of the King of Prussia, German Emperor, residing at Halle-on-the-Saale, Prussia, Germany, and CURT HARZER, a subject of the Queen of Great Britain, residing at London, England, have invented certain new and useful Improvements in Filter-Presses, (for which we obtained Letters Patent in France January 10, 1894, No. 235,432; in Germany January 3, 1894, No. 78,620; in Great Britain January 10, 1894, No. 575, and in Austria-Hungary April 25, 1894, No. 1,580 and No. 13,754,) of which the following is a specification.

This invention consists in providing a cleansing arrangement for filter-presses for use in the filtration of substances leaving slimy residuums.

In the filtration of fluids the separated portions of which do not form cake-like masses in the filter-chambers, but merely leave slimy residuums on the filter-cloths, the great disadvantage is that the cloths after a short time become completely impermeable on account of the coating of slime upon them, and the filtering action therefore ceases. It then becomes necessary to open the filter-press and either to cleanse the cloths or to replace them by fresh ones, which, of course, occupies considerable time.

By the present invention the filter-press is so arranged that when the coating of the cloths with slime commences to take place and the filtration either ceases or becomes less effective a cleaning of the cloths, *i. e.*, the removal of the coating of slime, can be effected without the necessity of opening the filter-press. This object is carried out by means of a special or peculiar arrangement of the filter-cloths in the chambers by a novel method of and means for conveying to the press the material to be filtered and of leading away the filtrate, as well as by the conveyance of water to the chambers for cleansing purposes, which together permit of the working of the apparatus without a change of filter-cloths.

A filter-press constructed according to this invention is shown in the accompanying drawings, in which—

Figure 1 is a side elevation; Fig. 2, a sectional plan on the line A B, Fig. 1; and Fig. 3 is a cross-section on the line C D, Fig. 2. Fig. 4 shows a sectional plan of a slight modification in the arrangement of the filtering-surfaces.

The press is in general of the ordinary kind, consisting of filter-plates forming chambers, and which plates rest on rods or bars connecting the head portion of the apparatus with the screw portion, the plates being pressed against the former by the action of the screw. Between each two plates a filter-cloth *t* is strained, which divides each chamber into two compartments.

From the bottom of each alternate compartment branches off a small side channel *n*, all of which channels terminate in a large duct or channel *e*, through which the fluid matter to be filtered is conveyed into the various filtering-compartments by means of the small channels *n*. Here the fluid material becomes filtered by means of the filter-cloths, leaving behind its slimy portions.

In order that air-bubbles should not be formed on the entry side of the chambers by the incoming fluid, a small air-escape channel *n'*, Fig. 3, is formed at the top of each chamber by which the air can escape to a channel *m*, which is provided with a small cock or stop. From the bottom of every other alternate compartment a small channel *o* branches off and these channels terminate in a large exit-channel *h*, which conducts the filtrate out of the press. If now the process of filtration has so far proceeded that the filtration has become markedly defective, or has even completely ceased through the clogging of the cloths, the cleansing of the cloths can be effected without the opening of the press being rendered necessary, and therefore without any changing of the cloths, by means of an inflow of water under pressure. For this purpose the supply of unfiltered liquid to the inlet-channel *e* will be cut off, and after the filtrate has been run off the exit-channel *h* will also be closed and the tap *p* on the inflow-channel *e* will be opened in order to empty the filled compartments by way of the channels *n*, channel *e*, and tap *p*. In order to quicken this proceeding, it is ad-

visable to open the air-cocks on the channel *m*, which are closed after the fluid has been run off. After the closing of tap *p* two other channels *i* and *g*, in connection with *h* and *e*, respectively, will be opened.

The channel *i* is in connection with a supply of water under pressure, which water now enters the compartments of the filtering-chambers by way of the channel *h* and the channels *o* and fills the same. In order here also to prevent the formation of air-bubbles, the air is allowed to escape by way of the channel *o'*, channel *l*, and the cocks or taps adapted thereto. After the latter have been closed the water rushes through the cloths and out of the opposite compartment, washing away the coating of slime and carrying it out of the filter-press by way of the inlet-channels *n*, channel *e*, and tap or cock *g*. The process of cleansing the cloths is effected in this way with great celerity and completeness, so that in a short time the supply of water to *i* can be stopped, whereupon, after closing *g* and opening *e* and *h*, the filtering operation can proceed as before.

In the arrangement shown each filter-chamber is divided, by a cloth stretched across its center, into two compartments, so that in the operation of filtering the liquid to be filtered enters one compartment and the filtrate after being pressed through the cloth escapes from the other compartment. When the filter-cloths are being cleansed, the cleansing liquid enters and passes in the reverse direction.

During both processes of filtration and cleansing the cloth lies against the ribbed surface of the chamber opposite the pressure, and is able thus to withstand during filtration the pressure of the liquid to be filtered, and likewise when being cleansed the pressure of the cleansing fluid, thus leaving channels to carry off the filtrate, &c.

If it is desired to enlarge the filter-surface of a press like the present, on which the enlarged surface may also be cleansed without necessitating the opening of the press, so that each filter-chamber shall contain two cloths, which press against opposite ribbed faces of the chambers and receive the slimy deposit during filtration, it is advantageous to place into each filter-chamber a grate or grid *s*, or it may be a plate furnished on both sides with perpendicular ribs, (see Fig. 4,) so that when filtration is wholly or partially stopped by the clogging of both cloths with slime, and it is desired to cleanse the cloths without opening the press, the cloths find a resistance against the pressure of the cleansing fluid in the plate or grid *s*, so that the two slimy faces of the filter-cloths do not touch. Each filter-cloth leaves its slimy deposit on the ribbed plate or grid *s* by means of the cleaning-water penetrating the cloth from the opposite side, and in this way the rinsing of the cloths is easily effected. When this arrangement of two cloths in each chamber is employed for the object indicated, it becomes necessary, for the purpose of cleansing the cloths without opening the press, to alter the position of the passages leading to and from the filter-chambers in such a manner that, as will be seen in Fig. 4, the passage *n* for the liquid to be filtered is formed in the thickness of the grid or plate *s* and leads into each chamber between the two cloths from the common inlet-passage *e*, while from each compartment behind each cloth a passage *o* for the escaping filtrate will lead to the common outlet-passage *h*, so that when cleansing out the apparatus the passage *h*, with the two passages *o* behind the cloths, will serve as the inlet for the rinsing-water, and passage *n* between the cloths with the common passage *e* will serve for the escape of the cleansing-water and the slime-deposit. It is advantageous to use the supply of cleansing-water at *i* in a warm state. The cleansing can take place periodically, so that an opening of the press will be unnecessary.

We claim as our invention—

1. In a filter-press the combination with filter-plates having surface depressions forming cavities when the plates are set together, of single sheets of filter-cloth placed between the filter-plates so as to divide the cavities into two chambers, there being openings through the filter-plates at opposite sides of the filter-cloths, whereby the material to be filtered passes in one direction and against one surface of the filtering-cloths, and the filtered material passes away at the other side, and the cleansing-water enters in the opposite direction to wash away the slimy residue, substantially as set forth.

2. In a filter-press the combination with filter-plates having surface depressions forming cavities when the plates are set together, of intermediate frame-plates between each pair of filter-plates, said intermediate frame-plates having bars upon both faces thereof, single sheets of filter-cloth placed between the filter-plates and the frame-plates there being openings through the filter-plates and through the frame-plates whereby the material to be filtered enters the openings through the frame-plates and passes through the filter-cloths and the filtered material passes away through the openings in the filter-plates, and thereafter the washing liquid is passed in the opposite direction through the filter-cloths to wash away the slimy residue, the bars of the intermediate plates then acting as supports to keep the slimy surfaces of the filter-cloths apart so that the washing operation is made effective, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

MAX DEIINE.
CURT HARZER.

Witnesses:
MARTIN KÖRNER,
WILHELM WIESENHÜTTER.