June 13, 1933. H. SKÖLDBERG 1,913,641

APPARATUS FOR EXTRACTING LIQUID FROM MATERIAL

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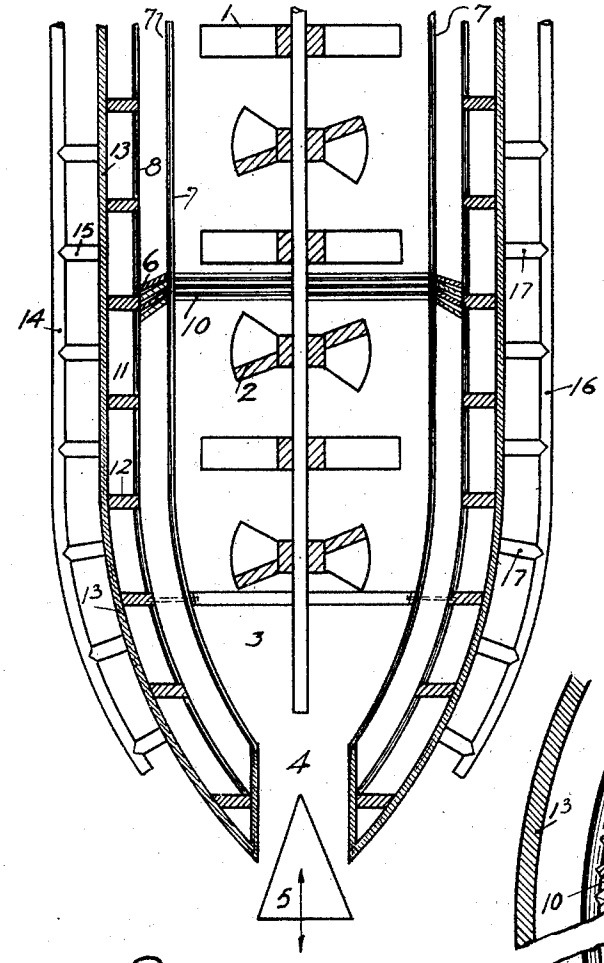

Fig. 1.

Fig. 3.

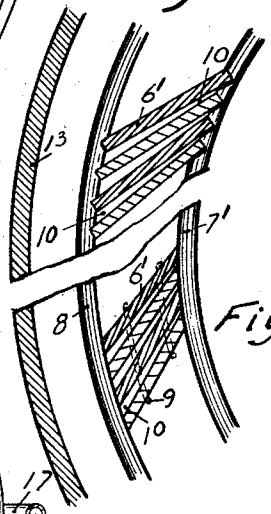

Fig. 3a

Fig. 2.

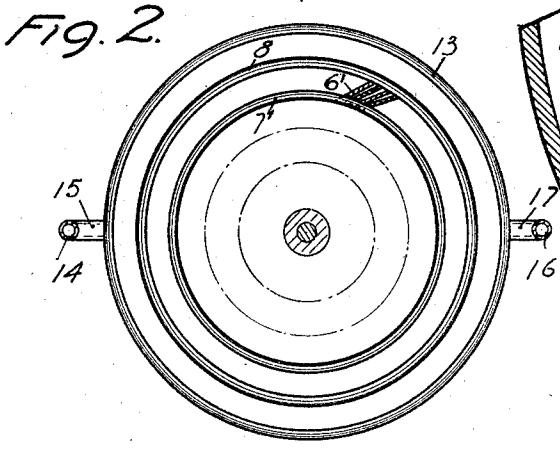

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Fig. 4.

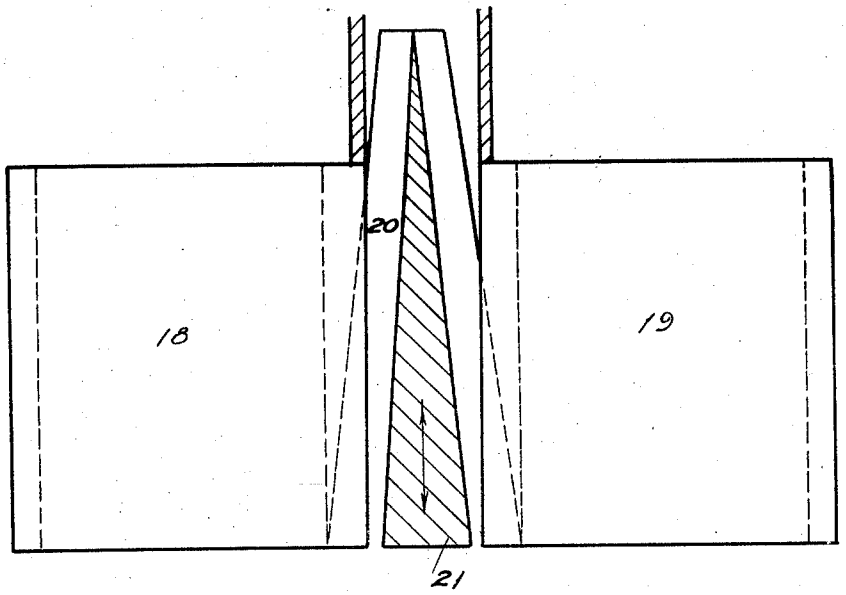

Fig. 5.

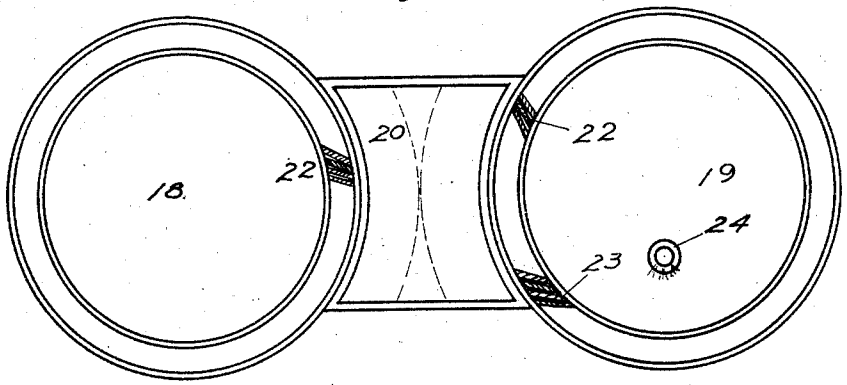

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Fig. 6

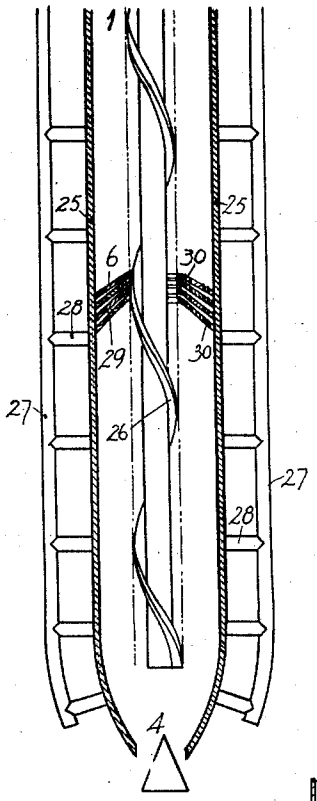


Fig. 8

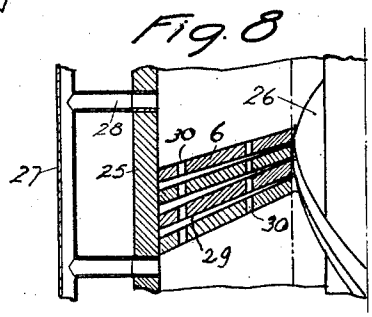
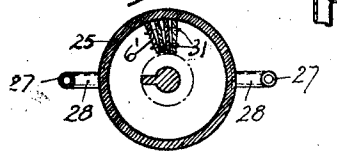


Fig. 7



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UNITED STATES PATENT OFFICE

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APPARATUS FOR EXTRACTING LIQUID FROM MATERIAL

Application filed January 21, 1928, Serial No. 248,553, and in Sweden January 29, 1927.

This invention relates to the extraction of liquid by mechanical means from masses of material which consist of very finely divided, especially colloidal, substances, such as peat. Experiments, which have been made during the last few years, however, have shown that water contained in peat may be extracted in a much greater degree than hitherto was thought to be possible. A practical method however has not been obtained for the reason that the sieve employed has shown a tendency to become choked by the material, the outer layer of which has parted with its content of liquid that has been abstracted by the pressure used, the material being transformed into a layer impenetrable to the liquid. The result is that the content of liquid has been augmented toward the middle of the mass of material, which is pressed in one stage. Moreover it has been shown necessary to clean the sieve after each pressing operation, with the aid of which the material being pressed is enclosed at the same time as it transmits the liquid.

The invention to be now described has for object to obviate these inconveniences to the greatest possible extent, and it is characterized thereby, that the superficial layer of the mass abutting against the sieve, having been finally treated or pressed and being rendered impenetrable to the liquid, is prevented from remaining on one and the same spot of the sieve during the pressing operation by being displaced by other parts of the mass which are not finally treated or pressed. For this purpose the sieve and the mass are caused to move in relation to one another in such a manner that a superficial layer is caused to be mixed with those inner parts of the mass which are more rich in water. Devices for this purpose may be constructed in various ways.

The movement between the material being pressed and the sieve should be effected in an inclined direction over the sieve and the sieve consist of parallel spaces of such a width that mainly only the liquid squeezed out from the press goods is transmitted but no part of the material itself.

In the accompanying drawings:—

Figures 1–3 illustrate diagrammatically constructional forms of a press according to the invention,

Figure 1 being a horizontal section of the press;

Figure 2 is a transverse section of the same with a modified arrangement of the sieve, and

Figure 3 and 3*a* illustrating in transverse section on a larger scale two different sieve devices.

Figure 4 is a horizontal plan partly in horizontal section of a modified construction and Figure 5 is a vertical view partly in section of Figure 4,

Figure 6 shows a further modified arrangement in vertical section, while

Figure 7 is a horizontal section of Figure 6 except that longitudinal laminæ 6′ are used in place of discs 6 shown in Figure 6,

Figure 8 is a fragmentary view of Figure 6 to a larger scale.

The mass to be pressed is introduced at one end of the press at 1 and is caused to move in a spiral through the press chamber 3 by means of a transporting and pressing device 2, whereby it is pressed during its advancing motion against the sieve, constituting the peripheral limitation of the press chamber. The material after being pressed is forced out through the opposite end of the press at 4, the exit opening being regulated by means of an adjustable body 5.

The sieve, which in this case is stationary, consists of discs 6, Figure 1, or longitudinal bars 6^1, Figure 2, placed obliquely adjacent to one another. The discs 6 as shown in Figure 1 abut against each other on their inner periphery and are held in position by a series of longitudinal bars 7 on said periphery the outer periphery engaging bars 8. When the bars 6^1 are used they are inserted in between rings 7^1 and 8 which are socketed to receive the ends of the bars as shown in the upper part of Figure 3 or merely resting between the rings as shown in Figure 3*a*, and there held assembled by means of rings 9. The discs 6 or bars 6^1 are arranged so that between them spaces 10 of a desired or requisite width are formed, said spaces, if desired, flaring towards a surrounding chamber 11, wherein

annular stays 12 are provided between the ring 8 or the bars 8 and the outer casing 13 of the press. The essential features of the bars 6^1 or the discs 6 consists therein that they are arranged at such an angle to the direction of the pressure that the pressure within the press chamber 3 against the surfaces of the bars or discs facing each other tends to diminish the width of the space between them, whereas a pressure on the opposite side of the sieve from the chamber 11 tends to augment the width of said space. The bars 6^1 or the discs 6 are therefore not immovably secured to their support (7, 7^1, 8 or 9) but are secured in such a manner that they have a limited amount of movement.

In order to free the spaces from pressed material which may be obstructing them and without appreciably disturbing the working of the press, liquid or air under pressure may be introduced into the chamber 11 through the pipe 14 and its branch pipes 15. The pressure of said liquid or air ought to be higher than the pressure prevailing in the chamber 3, so that it will be able to open the spaces 10 and thus blow out or scavenge any obstructing material. Such an obstruction may be occasioned thereby that the spaces 10 from the beginning have a too great width, so that the material may be introduced by the pressure into said spaces.

The pipe 16 and its branches 17, opening into the chamber 11, serve to drain the water or other liquid from the press goods.

Figures 4 and 5 show diagrammatically another constructional form of a press according to the invention, in which the sieve by which liquid is pressed out of the material is a rotating member. The sieves are here arranged as the mantles of two rotatable cylinders 18, 19, between which the materials to be pressed are caused to advance in a direction parallel to the axes of rotation of the cylinders. Also in this construction the above mentioned condition is fulfilled, viz that the press materials must move in an inclined direction over the spaces of the sieve which are parallel between themselves.

The materials to be pressed are introduced with the requisite pressure into a chamber 20 between the cylinders 18, 19 the areas of inlets and/or outlets of which may be controlled by means of a movable body 21. The cylinders 18, 19 are hollow, and their casings consist of sieves formed by bars 22 (which, as above indicated, may be substituted by discs) provided in the manner above described with reference to Figures 1–3 or in any other suitable manner, so that in any case between said bars 22 spaces 23 are formed of a desired or requisite width, flaring towards the interior of the cylinders or not.

The liquid extracted from the pressed material is discharged from the interior of the cylinders by means of a suitable discharging device (not shown) and through the pipe 24 liquid or air may be introduced into the spaces, which lead out from the chamber 20, for their blowing out or scavenging.

For obtaining the desired pressure for feeding and pressing the material against the sieve any suitable device, such as a mud pump, may be used.

Figure 6 shows a modified arrangement according to which the discs 6 abut at their outer ends towards a concentric wall 25 enclosing the chamber 3, in which a conveyor screw 26 presses the goods from the inlet 1 to the outlet 4. Pipes 27 opening into the space 29 between the discs 6 by means of branch pipes 28 are provided. As shown on a larger scale in Figure 8 the discs 6 are provided with holes 30, through which the spaces 29 are put in communication with one another and with the branch pipes 28.

Figure 7 illustrates a section of the same arrangement as shown in Figure 6, except that the discs 6 are substituted by longitudinal laminæ 6^1, which are held in place by means of wire rings 31 or the like. The sieve elements in the form of discs or slats closely abut each other at their ends adjacent to the press chamber. According to the fact that the surfaces of said rings or slats even in a well-ground condition are not perfectly smooth, but are provided with small cavities and projections, the spaces between said cavities and projections form small channels for the escape of the water pressed out from the material. The sizes of these channels are automatically adjusted according to the pressure of the press material with the aid of overlapping surfaces of the sieve elements, on which the pressure acts so that the sieve elements are compressed more or less in accordance with the variations of said pressure.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material therein, a plurality of movably mounted sieve elements arranged in louvre like formation inclined to the radii of the press chamber and closely abutting on their inner edges, the spaces between the elements being varied inversely in accordance with the pressure applied to the material in the press chamber.

2. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material therein, a plurality of movably mounted sieve elements arranged in louvre like formation inclined to the radii of the press chamber, and closely abutting on their inner edges, the adjacent surfaces of said elements converging towards one another,

the spaces between said elements being varied inversely in accordance with the pressure applied to the material in the press chamber.

3. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material therein, a plurality of movably mounted sieve elements arranged in louvre like formation inclined to the radii of the press chamber and abutting but overlapping on their inner edges, the adjacent surfaces of said elements converging towards one another, the spaces between the elements being varied inversely in accordance with the pressure applied by the material on the said overlapping inner edges.

4. A press as claimed in claim 1, in which the sieve elements consist of bars longitudinally arranged within the press chamber.

5. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material therein, a plurality of movably mounted sieve elements in the form of bars arranged in louvre like formation longitudinally within the press chamber, said elements abutting on their inner edges the spaces between said bars at said inner edges being varied in accordance with the pressure applied to the material in the press chamber.

6. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material therein, a plurality of movably mounted sieve elements in the form of bars arranged in louvre like formation longitudinally within the press chamber and abutting on their inner edges, the adjacent surfaces of said elements converging towards one another whereby the spaces between the elements may be varied inversely in accordance with the pressure applied to the material in the press chamber.

7. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material therein, a plurality of movably mounted sieve elements in the form of bars arranged in louvre like formation longitudinally within the press chamber and abutting but overlapping on their inner edges, the adjacent surfaces of said elements converging towards one another the spaces between the elements being varied inversely in accordance with the pressure applied by the material on the said overlapping edges.

8. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material to be pressed, and for making the said material abut against a sieve, which constitutes the limitation of said press chamber, said sieve consisting of freely movable elements, the inner portions of which are brought in contact with one another by the pressure of the material.

9. In a press for extracting liquid from a mass of finely divided solid material, a press chamber, means for applying pressure to the material to be pressed, and for making said material abut against a sieve, which constitutes the limitation of said press chamber, said sieve consisting of freely movable elements, which at their inner portions are brought in contact with one another by the pressure of the material, and means for intermittently establishing a pressure of a fluid in opposite direction to the pressure on the material for cleaning the sieve.

In testimony whereof I have signed my name to this specification.

HARRY SKÖLDBERG.