

W. J. NORRIS.

PRESS FOR EXPRESSING LIQUIDS AND FORMING ARTICLES FROM PULP AND OTHER MATERIAL.
APPLICATION FILED OCT. 16, 1917.

1,273,527.

Patented July 23, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

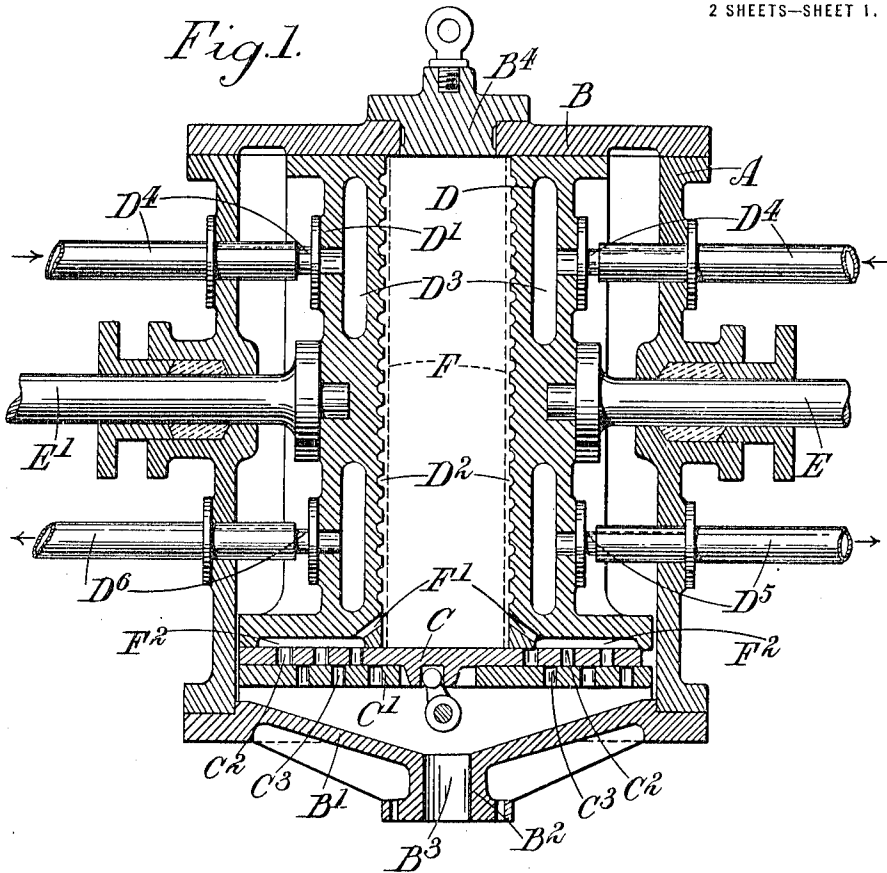
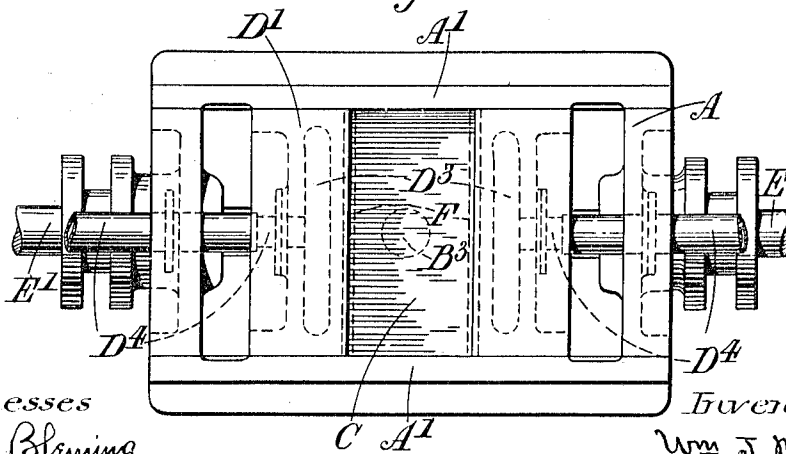


Fig. 2.



Witnesses
E. B. Blenning
Charles Livingston

Inventor
Wm. J. Norris
by Robert R. Palmer
Attys.

W. J. NORRIS.

PRESS FOR EXPRESSING LIQUIDS AND FORMING ARTICLES FROM PULP AND OTHER MATERIAL.

APPLICATION FILED OCT. 16, 1917.

1,273,527.

Patented July 23, 1918.

2 SHEETS—SHEET 2.

Fig. 3.

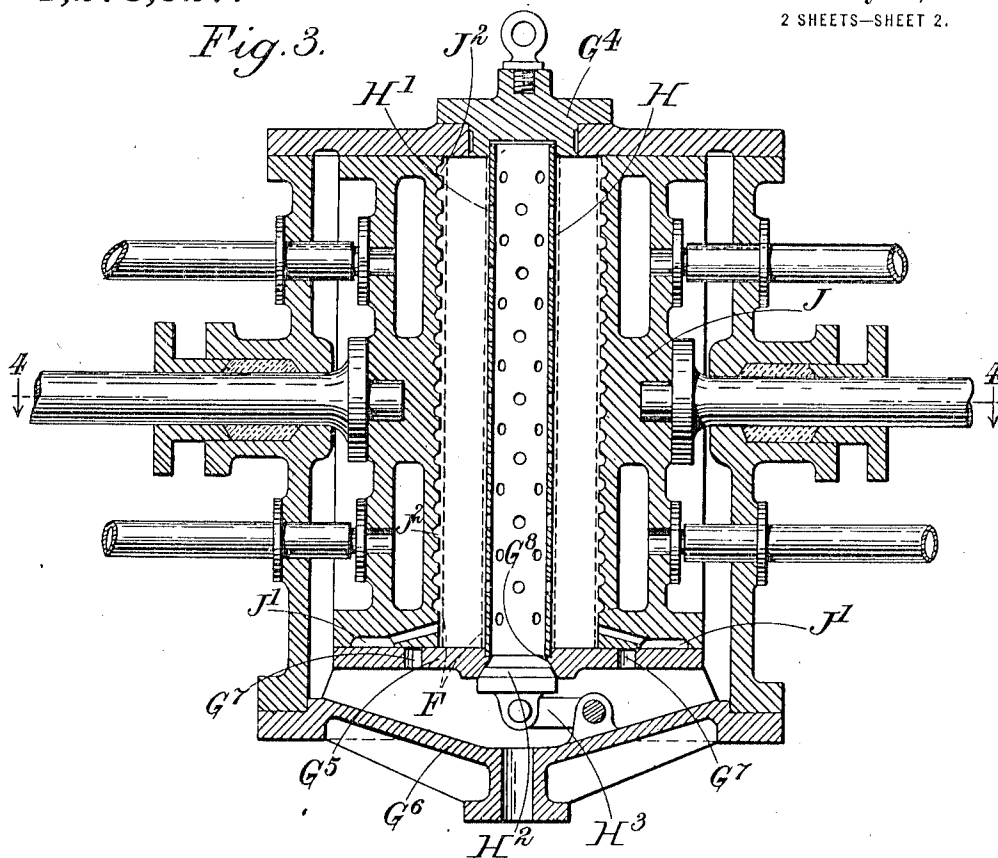
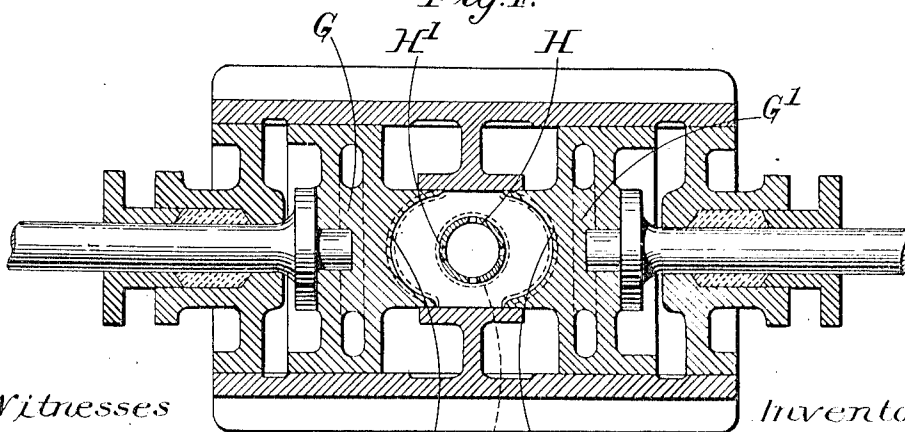


Fig. 4.



Witnesses
G. B. Fleming
Charles Livingston

Inventor
Wm. J. Norris
by Baker, Payne & Lunde
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM JAMES NORRIS, OF LONDON, ENGLAND.

PRESS FOR EXPRESSING LIQUIDS AND FORMING ARTICLES FROM PULP AND OTHER MATERIAL.

1,273,527.

Specification of Letters Patent. Patented July 23, 1918.

Application filed October 16, 1917. Serial No. 196,850.

To all whom it may concern:

Be it known that I, WILLIAM JAMES NORRIS, a subject of the King of England, residing in London, in England, have invented certain new and useful Improvements in Presses for Expressing Liquids and Forming Articles from Pulp and other Material, of which the following is a specification.

This invention is for improvements in or relating to presses for consolidating materials containing liquid and driving out the liquid therefrom, and has particular reference to the manufacture of boards or tubes from paper pulp by means of presses of the known type wherein a chamber is provided between two opposed plates which, when advanced toward each other, compress the pulp between them, the surfaces of the plates being channeled and covered with wire-gauze so that the water can escape from the chamber by means of the channels which communicate with the exterior of the press, but the pulp is retained and compressed to form a solid board or other article.

It has been found with these presses that unless the press is operated very quickly, the water drains away too fast so that the pulp begins to settle at the bottom of the chamber, with the result that the article formed has greater density at the bottom than at the top, and moreover, the press-plates tend to be forced out of parallel because of the greater resistance offered to them at the bottom than at the top.

According to this invention, a press of the type described, has combined with the means for draining away the liquid, a valve whereby the liquid can be prevented from flowing away until such time as is desired. The press-plates may be hollow and heated by fluid admitted to the hollow interior so as to dry the article after it has been formed by pressure.

The valve may take various forms, a convenient construction being that wherein two plates are employed placed flat one on the other and which constitute the floor of the press, both plates being perforated and one being movable relatively to the other so as to bring the perforations of the two plates into register for opening the valve and out of register for closing the same.

The invention comprises other details of

construction all of which are hereinafter described and whereof the novel features are pointed out in the claims.

It will be appreciated that the press can be used for consolidating any material containing liquid whether such material be pulped or otherwise, for example peat could be consolidated by this means or any other material from which it is desired to express the liquid so as to form a comparatively dry body of the solid matter.

In the accompanying drawings:—

Figure 1 is a central vertical section through a press constructed according to one method of carrying out this invention;

Fig. 2 is a plan of the same with the top plate removed;

Fig. 3 is a central vertical section through a modified form of press also constructed according to this invention, and

Fig. 4 is a transverse section through the press on the line 4—4 of Fig. 3.

The same letters indicate the same parts throughout the drawings.

The press may be built up in any convenient manner, that illustrated comprising outer walls A, A¹ and top and bottom cover-plates B, B¹. The bottom plate B¹ is dished and provided with a depending neck B² which is bored through at B³ to communicate with the hollow provided by the dishing of the bottom B¹. Above this hollow, two plates C, C¹ are mounted which constitute the floor of the press, and press-plates D, D¹ slide on the upper plate C of these floor-plates. Rams E, E¹ extend through stuffing-boxes provided in the plates D, D¹ and are operated by any convenient mechanism, not shown in the drawings, to advance the plates toward one another when required or to withdraw them. The covering-plate B at the top of the press has a central plug B⁴ which is removed when the press is to be charged with "pulp." A chamber is thus provided between the plates D, D¹, the floor plate C, and the plug B⁴, which chamber is shaped to the article the press is intended to form. In the construction shown in Figs. 1 and 2, it is intended only to compress the "pulp" into slabs or boards. The working faces of the press-plates are channeled at D² and the channeling is covered by wire-gauze F. The chan-

nels communicate with one another at convenient intervals and at the bottom communicate by perforations F^1 with channels F^2 formed on the under-side of the press-plates D, D^1 . The floor-plate C has at its sides perforations C^2 , and these perforations are covered by the press-plates but communicate with the channels F^2 . The floor-plate C^1 is similarly provided with perforations C^3 and the plate C is made movable relatively to the plate C^1 so that the perforations C^2 can be brought to register with the perforations C^3 or otherwise as required.

The interior of the press-plates D, D^1 is chambered as shown at D^3 , that is to say, the plates are hollow with a central solid portion which receives the rams E, E^1 and telescopic conduits D^4 communicate with the chamber D^3 at the top and other telescopic conduits D^5 communicate with the chamber D^3 at the bottom. Means not shown in the drawings are provided for circulating hot fluid, for example, hot air, through the chambers D^3 , the fluid entering by the conduits D^4 and leaving the chambers by the conduits D^5 .

The operation of this press is as follows:—

The chamber between the plates D, D^1 having been filled with "pulp" and the filling plug B^1 secured firmly in place by suitable means, the mechanism is set in operation for advancing the rams E, E^1 . The first advance tends to consolidate the mass and squeezes a certain amount of the fluid into the channels D^2, F^2 , and fills the holes C^2 in the top floor-plate C . This plate is now moved to bring the holes C^2 into register with the holes C^3 of the plate C^1 . Any convenient means may be provided for moving the plate C , and the pressing is continued; the water can now flow freely away as it is expressed from the solid material until the solid material only remains and has been molded into the required plate or slab.

While the slab thus formed is still in the press, and in fact, if desired, during the pressing operation also, hot air is forced through the conduits D^4 and thus circulates through the plates D, D^1 , and passes out by the conduits D^5 . When further movement of the press-plates is arrested by the solidity of the slab formed or by the limit of movement being reached which is allowed for giving the required thickness of board, the slab may be left in position under pressure and simultaneously dried by this heating of the press-plates.

Further, if desired, means for exhausting the air from the press may be attached to the neck B^2 so that a vacuum is created within the press, and the material is thus dried *in vacuo*. Any convenient apparatus may be employed as the exhausting means to create the vacuum, and such means do not

require to be illustrated or described in detail in this specification as in itself it constitutes no part of the present invention.

It will be appreciated that the heating of the press-plates may be dispensed with, in which case they need not be hollow, and the telescopic pipes D^4, D^5 would be dispensed with, but the use of some valve to prevent the flow of liquid from the press until pressure is already on the "pulp" is essential to the present invention.

In Figs. 3 and 4 a modified form of the press is illustrated for molding hollow cylindrical bodies. The construction of the press in the main is the same as that already described, but the press-plates G, G^1 are provided with hollow faces G^2, G^3 to give the required shape to the molded article, and a central core in the form of a pipe H is provided midway between the plates G, G^1 . This core H is in the form of a tube or pipe which extends from the top of the press where it enters a recess in the filling-plug G^4 , into the floor-plate G^5 which is situated above the bottom plate G^6 in the same manner as has been described with reference to the plate C in Figs. 1 and 2. The floor-plate G^5 , however, does not move endwise and is not necessarily provided with a second plate beneath it, although it has in it perforations G^7 which communicate with channels J^1 in the bottoms of the press-plates J as before, and these channels communicate with grooves J^2 in the faces of the press-plates, as described with reference to the grooves or channels F in the faces of the plates D, D^1 .

The core tube H is perforated at H^1 and is closed at the bottom by a valve H^2 . The valve finds a seating in the bottom of an orifice G^8 in the plate G^5 , which orifice is concentric with the bottom of the tube H and communicates freely therewith. Means are provided, such as the arm H^3 , for holding the valve in the closed position, and this arm is connected to any convenient operating-mechanism, not shown in the drawings, whereby the valve can be withdrawn from its seating when required.

The operation of this press is practically the same as that already described, the "pulp" being introduced into the chamber provided between the plates G, G^1 and around the tube H . Pressure is first applied with the valve H^2 closed, and during this period of pressure, the orifices G^7 will also be shut off from the channels J^1 so that no liquid can escape through the floor-plate G^5 . At the proper moment the valve H^2 is swung down, so that the liquid which by then has entered the tube H through the perforations H^1 can freely drain away, and as more liquid is expressed this continues to drain away through the perforations H^1 and the tube H . As the press-plates advance, the channels

J¹ in the bottoms of the plates presently register with the orifices G⁷ and then liquid can also escape by way of the face-channels or grooves J², the bottom channels J¹, and the orifices G⁷ in the plate G⁵.

The plates G, G¹ can be heated if desired, as described with reference to the plates D, D¹, and the hollow cylindrical bodies formed by this press can thus be dried while in the press; also exhausting means may be applied to the bottom of the press, so that the drying may be effected *in vacuo*.

It has before been proposed to provide the draining means from molds for pressing pulp with draining pipes having stop-cocks attached, but these were intended to be opened during the whole of the pressing and were not designed to withstand the pressure to which they would be subjected if closed during the first movement of the pressing-ram.

It will be appreciated that although any convenient form of valve can be used for controlling the drainage according to this invention and any suitable mechanism may be provided for operating it, the valve and mechanism must be such as to be able to withstand considerable pressure. Such valves and their operating-mechanism are well-known and therefore need no specific description in the present specification.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a press for consolidating material containing liquid the combination of, a collapsible press-chamber having drainage-passages in its walls covered with gauze to permit the escape of the liquid but prevent the solid matter from passing, a discharge-conduit from the press communicating with the drainage-passages and a valve for controlling such discharge-conduit flush with the bottom of the press for the purpose of preventing any flow from the material under treatment during the first collapsing movement of the press.

2. In a press for consolidating material containing liquid the combination of, a collapsible press-chamber having drainage-passages in its walls covered with gauze to permit the escape of the liquid but prevent solid matter from passing, some of the walls of the press being hollow, a discharge-conduit from the press communicating with the drainage-passages, a valve for controlling such discharge-conduit so that no flow takes place therethrough during the first collapsing movement of the press, and means for circulating a heating medium through the hollow walls, for the purpose described.

3. In a press for consolidating material containing liquid the combination of, a

press-chamber having opposed movable walls which slide between the four other walls to collapse the chamber, the two movable walls having channels in the faces which are toward the interior of the chamber and being covered with gauze to allow the liquid to escape but to prevent the solid matter from passing, the said channels communicating with a recess in the bottom edge of each wall, and a discharge-conduit from the press which is provided with ports extending through the inner face of the bottom wall of the press and which lie in the path of the recesses of the bottoms of the movable walls but which ports are so positioned that when the press is fully open they are covered by the thickness of the walls between the inner face and the said recesses so that communication between the drainage-channels and the discharge-conduit is only opened when the walls have advanced a certain distance to collapse the press, for the purpose set forth.

4. In a press for consolidating material containing liquid the combination of, a press-chamber having opposed movable walls which slide between the four other walls to collapse the chamber, the two movable walls having channels in the faces which are toward the interior of the chamber and being covered with gauze to allow the liquid to escape but to prevent the solid matter from passing, the said channels communicating with a recess in the bottom edge of each wall, a discharge-conduit from the press which is provided with ports extending through to the inner face of the bottom wall of the press and which lie in the path of the recesses of the bottoms of the movable walls but which ports are so positioned that when the press is fully open they are covered by the thickness of the walls between the inner face and the said recesses so that communication between the drainage-channels and the discharge-conduit is only opened when the walls have advanced a certain distance to collapse the press, a vertically situated hollow core in the center of the mold parallel to the said movable plates whose inner faces are shaped to approximately correspond to the outer faces of the core, the said core being perforated and covered with gauze to permit drainage of the liquid but prevent passage of the solid material, and a valve which closes the lower end of the core to prevent discharge of the liquid until such time as is desired, for the purpose described.

In testimony whereof I affix my signature.

WILLIAM JAMES NORRIS.