

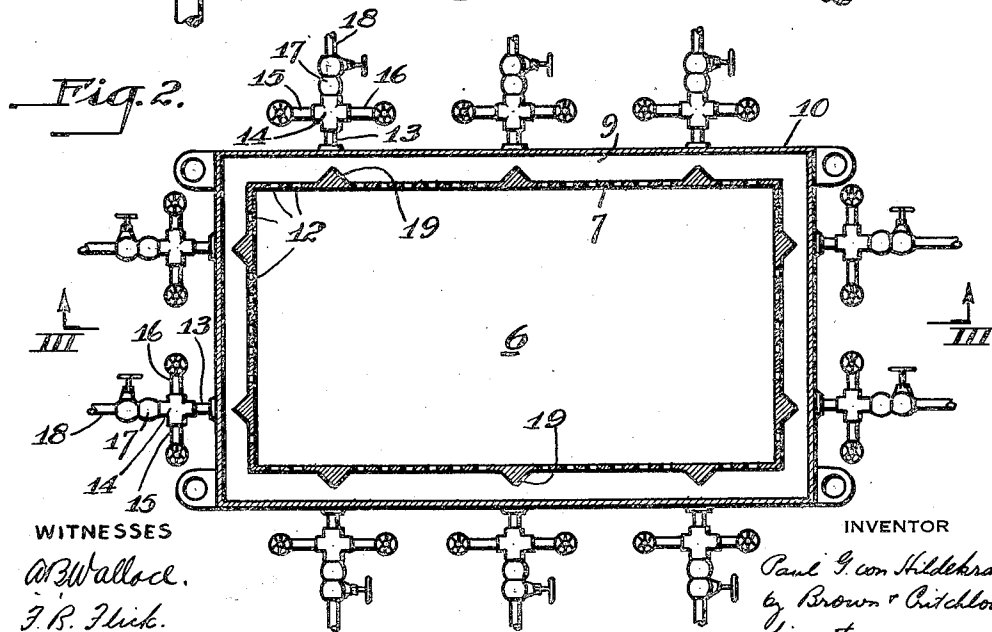
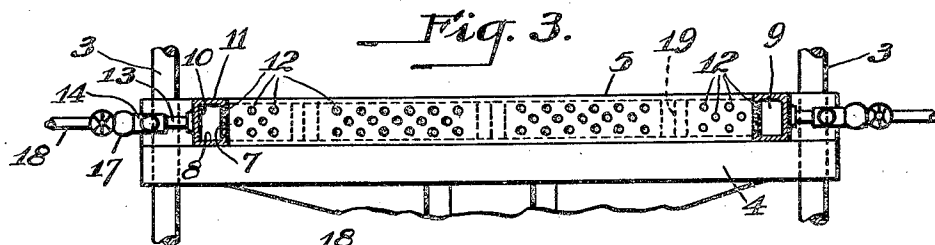
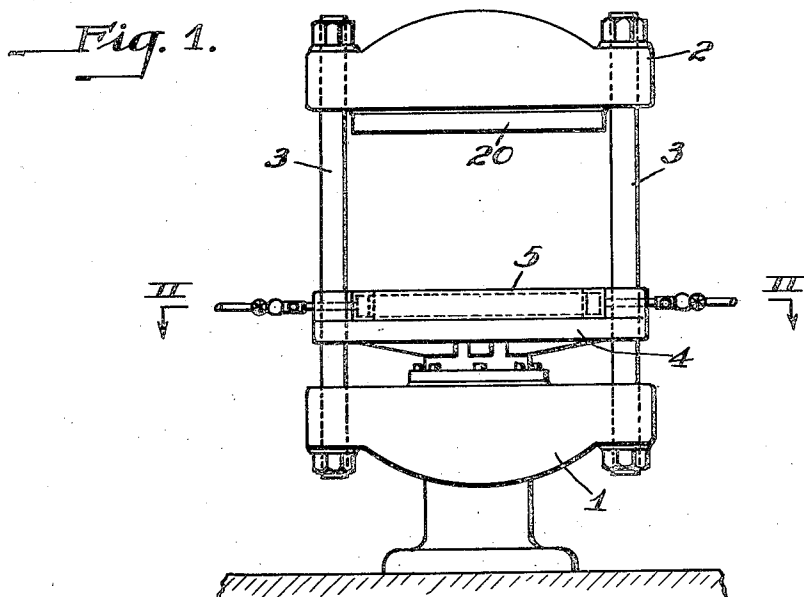
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APPARATUS FOR MAKING PRESSED WOOD FIBER PRODUCTS

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UNITED STATES PATENT OFFICE

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APPARATUS FOR MAKING PRESSED WOOD FIBER PRODUCTS

Application filed November 20, 1928. Serial No. 320,604.

The invention relates to apparatus for press forming boards and similar articles from fiber, especially from cellulose fiber, and the chief object is to provide simple and effective apparatus for use in connection with a process of forming highly porous fiber articles which is disclosed and claimed in my copending application, Serial No. 320,603 filed November 20, 1928.

10 The process referred to comprises suspending fiber free from binder of any kind in an inert medium, such as water, in a cold closed die, and while thus suspended, expressing the major portion of the suspending medium and
15 compacting the fiber to form a board of the desired thickness. In the preferred practice of that invention, air is injected into the die prior to the pressing operation. Chemically prepared wood fiber is preferably used, and,
20 most suitably, pure cellulose fiber produced in accordance with another copending application, Serial No. 320,601, filed by me November 20, 1928. The fibrillation process referred to comprises incipiently attacking the cell in-
25 crustants and opening the grain of the wood, preferably by digestion with milk of lime, and then compacting the wood under mechanical pressure and removing the balance of the incrustants by digestion, preferably with
30 caustic soda.

The fiber produced in this manner is soft and strong, and the major portion of the fibers retain their natural length. This fiber is particularly adapted for use in forming
35 pressed articles by the forming process hereinbefore referred to. Using that fiber and process, there is obtained after drying, a highly porous, coherent product which pos-
40 sesses superior sound and heat insulating properties, and which is produced wholly without binder of any nature. The product is strong and stiff, is grainless and of substantially uniform density throughout and
45 it is not subject to deterioration.

This invention may be described in connection with the accompanying drawings, in which Fig. 1 is a front elevation of a press embodying the invention; Fig. 2 a horizontal
50 section through the die taken on line II—II,

Fig. 1; and Fig. 3 is a vertical section through the die, taken on line III—III, Fig. 2.

According to this invention, the apparatus comprises a die member provided with a pressing chamber for holding the fiber sus- 55 pension and in which the pressed article is formed. The die is provided with means for preventing the suspending medium from escaping prematurely, and this means preferably comprises pressure-responsive valves ef- 60 fective only upon production of a predetermined pressure in the pressing operation. Means are also provided for introducing air into the chamber. A ram or pressing platen cooperates with the die chamber for com- 65 pacting its contents, and preferably this member makes a fluid tight fit with the walls of the chamber. These members are mounted and actuated in any desired manner.

Having reference now to the preferred em- 70 bodiment shown in the drawings, Fig. 1 shows a press of a form commonly used in various arts. It comprises a fixed stationary base 1, a head 2, carried by posts 3 secured to the base, and a vertically movable table 4. 75 The table is guided by the posts 3 and is reciprocated with respect to the head by hydraulic or other means, not shown. Carried by the table and also guided by the posts, is a die member indicated generally by the nu- 80 meral 5.

The die shown comprises a box-like pressing chamber 6 bounded by inner walls 7 integral with the base 8. An annular conduit 9 surrounds the outside of chamber 6, this 85 conduit being preferably formed between the inner walls 7 and outer walls 10, integral with base 8, and closed at the top by a web 11, as shown in Fig. 3. The inner walls are provided with a plurality of openings 12, which 90 connect the chamber 6 and conduit 9, and small enough to prevent passage of fiber therethrough. A screen may also be disposed on the conduit side of walls 7, for the purpose of preventing passage of fiber into the 95 conduit, as will be understood in the art.

In the practice of the invention disclosed in my application Serial No. 320,603, it is preferred to form the fiber suspension in the die. To that end the die is provided with means 100

for introducing suspending medium, as well as with the air connection and pressure-responsive outlet valves previously referred to. For simplicity of construction these three elements are combined in the manner shown in Fig. 3. The outer walls 10 of the die are tapped and threaded to receive a plurality of nipples 13, spaced symmetrically around the die for a purpose hereinafter set forth. A cross or other suitable four-way connection 14 is connected to the outer end of each nipple, and one side opening of each is connected to a water supply line 15, and the other side to a compressed air line 16. These lines are suitably valved. A one-way valve connection 17 is made at the other arm of the cross to a drain line 18. Valve 17 is preferably of the spring-impelled type, which is effective only when the pressure exceeds a predetermined value.

It is essential in the forming process referred to that the fiber be uniformly suspended or floated in the suspending medium, and also that the medium be expressed uniformly from all sides of the die. This is in part achieved by the foraminous nature of the chamber walls, and by the use of the regularly spaced inlet and outlet valves. In order to further secure this uniformity of suspending action, baffles 19 are formed in the conduit on walls 7 opposite the nipples. Water, air or other fluid entering the conduit impinges on these baffles and is diverted uniformly toward each side, so that it enters the die at substantially the same rate at all points.

The pressing action is produced by a platen 20 carried by head 2. This platen cooperates with the die chamber to express the suspending medium and compact the fiber. Preferably it makes a sliding fit with the walls of chamber 6 so as to form a fluid-tight joint therewith.

In the use of this press, moist fiber, containing about 25 per cent of water, is placed in chamber 6, and the table is raised to bring platen 20 into and close the chamber. A suitable liquid medium, preferably water, is then introduced in chamber 6, from line 15, to float the fiber in an excess thereof. After the chamber has been partly filled with the suspension thus formed, the liquid is cut off, and air forced in from line 16 to form a blanket of air under pressure in the space above the suspension. When the air pressure has become equalized, line 16 is closed. The valves 17 are selected so that the pressure in the chamber and conduit is insufficient to force them open.

The table-actuating mechanism is now operated to progressively force the platen farther into the die or pressing chamber, and the first action is to increase the pressure of the air lying over the fiber suspension. The pressure gradually increasing, becomes sufficient to force valves 17 open, and water and air are

expressed from the chamber. At the same time, the fibers are compacted, and the pressing action is continued until a board of the desired thickness is obtained. It is preferred that the pressed board retain about 30 per cent of water.

After removal from the press the boards are dried, at about 100° C. for example, when they are ready for use. The boards thus formed are light, strong, and highly porous, their porosity conferring thermal and sound insulating properties superior to the insulators now commonly used. The boards contain no binder of any kind, but they are highly coherent, the fiber being mechanically entangled in a satisfactory structure-retaining fashion. These boards also are of substantially uniform density throughout.

It will be understood that the invention is not limited to the production of flat board of the type described, but that other articles possessing the desirable characteristics described for the boards may also be produced. Also, it is not essential that the die move toward a fixed platen, as the reverse operation is equally satisfactory.

I claim:

1. In a press for making fiber board and the like, the combination of a die member comprising a pressing chamber, an annular conduit surrounding said chamber, a plurality of fluid connections between said chamber and conduit, and a plurality of fluid-pressure responsive fluid outlets disposed in said conduit for drainage of said conduit and chamber; a platen member cooperating in fluid-tight relationship with said pressing chamber, and means actuating one of said members with respect to the other member.

2. A press for making fiber board and the like, comprising the combination of a die member comprising a pressing chamber bounded by perforated walls, an annular conduit surrounding said walls, and one-way discharge valves in said conduit, said valves being actuated by fluid pressure within the pressing chamber, a platen member cooperating with said pressing chamber and adapted to make fluid-tight fit therewith, and means for actuating one of said members with respect to the other member.

3. A press for making fiber board and the like, comprising the combination of a frame, a table mounted for vertical reciprocation in said frame, a die comprising a pressing chamber formed between a base and perforated vertical walls, an annular conduit surrounding said chamber, fluid inlets connected to said conduit, and pressure-responsive one-way discharge valves connected to said conduit, and a platen adapted to make a fluid-tight joint with said pressing chamber carried by the frame for cooperating with the chamber.

4. A press for making fiber board and the

like, comprising the combination of a frame, a table mounted for vertical reciprocation in said frame, a die comprising a pressing chamber formed between a base and perforated vertical walls, an annular conduit surrounding said chamber, means for separately introducing water and air into said conduit, and a plurality of one-way fluid discharge valves effective only at a predetermined pressure disposed symmetrically about said conduit, and a press platen adapted to move in said chamber and form a fluid tight fit therewith mounted thereabove.

5. A press for making fiber board and the like comprising a die member having a pressing chamber adapted to receive a charge of fiber and provided with means to introduce suspending fluid to uniformly distribute the fiber in said chamber, a plurality of normally closed fluid pressure-responsive outlets associated with said chamber for drainage of said fluid, said outlets being opened for drainage of said fluid by application of a predetermined pressure to the fluid, a platen member cooperating in fluid-tight relationship with said chamber, and means actuating one of said members to reciprocate it with respect to the other member.

6. A press for making fiber board and the like comprising the combination of a die comprising a pressing chamber formed between a base wall member and vertical side wall members integral with the base member, a conduit externally associated with one of said members, fluid inlets to said conduit, and pressure-responsive discharge valves connected to said conduit, the wall common to said conduit and chamber being perforated, a platen adapted to make a fluid-tight joint with said pressing chamber, and means actuating the die with respect to the platen.

In testimony whereof, I hereunto sign my name.

PAUL G. VON HILDEBRANDT.