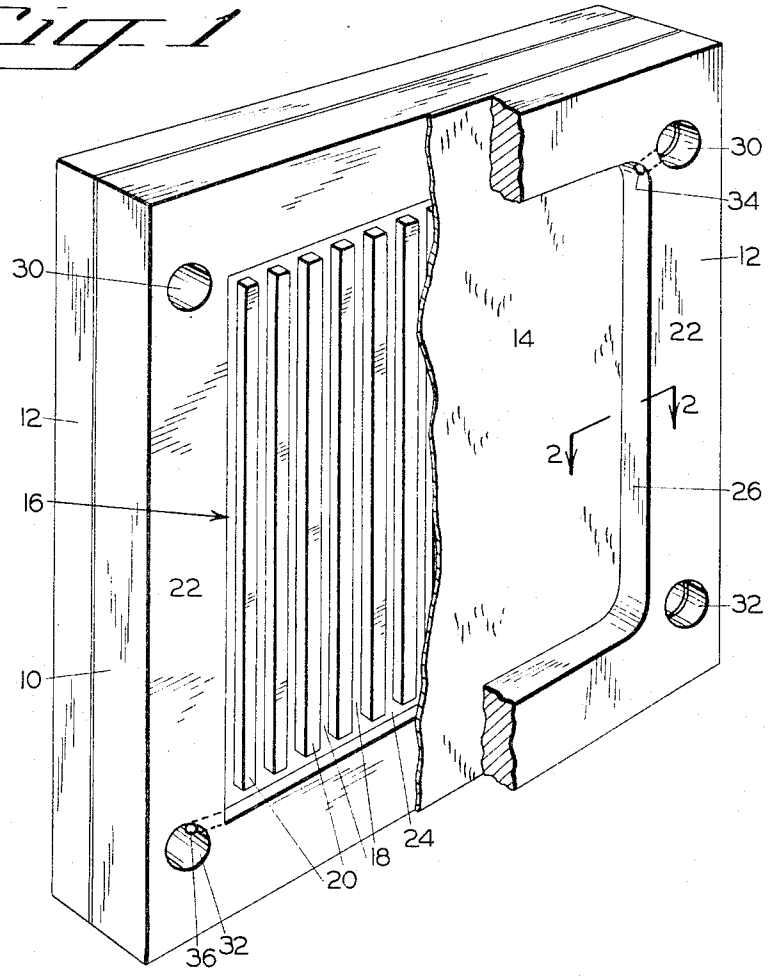
Oct. 11, 1966 L. G. WINTERSTEIN 3,278,033

FILTER PRESS PLATE CONSTRUCTION

Filed Feb. 17, 1964

Fig 1



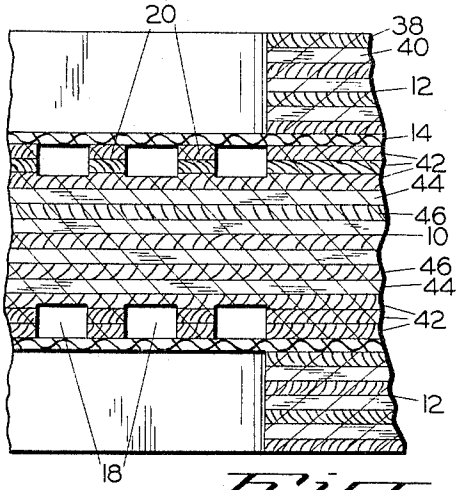


Fig 2

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FILTER PRESS PLATE CONSTRUCTION

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This invention relates to improvements in filter press plate constructions.

It has been found that the plates and frames of filter presses for certain materials are best constructed from wood. The construction of wood press elements heretofore employed has comprised an assemblage of solid wood pieces with said pieces being integrally joined as by glue and/or joints such as tongue and groove joints. Such filter press elements are not practical in operation because the individual solid wood pieces tend to warp, and furthermore the component pieces become disconnected at the joints, with the result that the press ineffectively filters the material and the material leaks out of the press. This situation is very undesirable as the press must be shut down frequently to replace the deteriorated elements. In addition, the waste of material is costly especially if rare metals are being filtered.

It is therefore an important object of the present invention to provide wood filter press elements which overcome the disadvantages set forth above.

More particularly, it is an object of the present invention to provide filter press elements which are constructed of laminated wood and in general comprise an unjointed one-piece structure efficient in operation and having an improved press life, and furthermore which are simple in structure, inexpensive to manufacture, and perform effectively to accomplish a desired filtering operation.

It is another object to privde a laminated wood filter employing a novel arrangement of laminations wherein the wood grain of said laminations in the filter area extend in the same direction.

Briefly stated, the present invention resides in filter press elements constructed from a sheet of wood made up of a plurality of wood plies. One of the press elements, namely a filter plate, while being made up of wood plies, utilizes a novel wood grain disposition wherein the grain of adjoining inner plies extend in opposite directions and the gain of certain adjoining outer plies extend in a common direction. The various plies are joined by a suitable glue and particularly one which is resistant to moisture or at least resistant to the material being filtered. The present-day water-proof glues have been found to be satisfactory in the majority of uses.

A conventional filter press element comprises press plates and spacer frames, between which are mounted filter media such as filter cloth or paper. The filter plates are provided with inner filtration field areas comprising multiple vertical channels, such channels being cut directly in the face of the plate and in spaced relation so that individual passageways are provided and separated by uncut or ridged portions. The ends of these channels communicate with cross channels which in turn communicate with suitable drain ports. The filtration field preferably is substantially flush with the face of the plate for engagement by the filter cloth.

The invention will be better understood and additional objects and advantages will become apparent from the following description taken in connection with the accompanying drawings which illustrate a preferred form of the device. It is to be understood however that the invention may take other forms and that all such modifications and variations within the scope of the appended claims which will occur to persons skilled in the art are included in the invention:

FIGURE 1 is a perspective view of an assembly of filter plates and frames employing the principles of the present invention; and

FIGURE 2 is an enlarged fragmentary sectional view taken on the line 2—2 of FIGURE 1.

Referring now in detail to the drawings, the press is formed of one or more filter plates **10** and spacer frames **12**, the plates and frames being disposed alternately in the press and with filter media **14** such as cloth or paper disposed therebetween.

Filter plates **10** are provided with a filtration field **16** on each face thereof comprising a plurality of cut channels **18** defining ridges **20** between them. The filtration field **16** is defined by peripheral side areas **22**. Lateral channels **24** are provided at opposite ends of the field **16** and are in communication with each of the channels **18** whereby a filtered liquid is adapted to flow from the channels **18** into the channels **24**.

Spacer frames **12** have an open center **26** of substantially the size of the filtration field **16** on the plates **10**. Filter media **14** are disposed and held between the filter press elements by a friction binding engagement between the frames **12** and the side areas of the plates **10**, the press elements being securely clamped together by suitable clamp means.

The filter plates and spacer frames are provided with upper corner apertures **30** and lower corner apertures **32** which serve to introduce a slurry to be filtered and to discharge the filtered liquid, respectively.

The various apertures **30** and **32** in the respective corners are in longitudinal registry to form passageways for receiving and discharging the slurry and liquid.

In a preferred arrangement the spacer frames **12** have ports **34** leading from the passageways **30** to the interior of the frames, and the frames **10** have ports **36** leading from passageways **32** to the filtration field **16**. In this arrangement, slurry under pressure is forced into the passageways **30** from which it moves into the center area of the spacer frames through ports **34**.

The slurry then is subjected to the filter media and the filtered portion thereof flows into the field **16**. Such filtered liquid flows from the field into discharge passageways **32** by means of ports **36**. Slurry is thus first moved into the central portion of spacer frames **12** and the liquid is filtered through the filter medium whereby the filtered liquid will be discharged and the cake deposited in the spacer frame **12**.

FIGURE 2 shows particularly the construction of the plates **10** and **12** which essentially comprises the essence of the present invention. First, spacer plates **12** are constructed of a plurality of plies, with the grain direction of adjacent plies extending at right angles relative to each other. That is, a face ply **38** has vertical grain direction, the next ply **40** has horizontal grain direction, the next ply **38** has vertical grain direction, and so on throughout the thickness of the element. It is to be understood that the face plies may just as well have horizontal grain direction, it only being necessary that adjacent plies have different grain directions.

The laminated construction of the filter plates **10** comprises outer layers of plies **42** on each face surface which have a common grain direction and intermediate plies which have their grain direction extending alternately in horizontal and vertical directions or at least at right angles to each other. More particularly, the grain of all the outer plies **42** on both faces of the plate extend in the same direction, for example, in a vertical direction; the grain of the next innermost plies **44** (adjacent plies **42**) extends in a direction at right angles to that of plies **42**, namely, in a horizontal direction, and the grain direction of the next innermost plies **46** is parallel to the grain direction of plies **42**. This alternate grain direction of

the plies continues inwardly of the plate to the desired thickness thereof. Thus, the grain of the wood of all plies **42** on both surfaces of the plate will extend in the same direction, the grain of the wood in plies **44** will be in the opposite direction, and the grain of the wood in plies **46** will be in the same direction as plies **42**, and so on inwardly of the board.

For purposes of illustration, the plies **42** on each face are three in number. More or less, but at least more than one of such plies may be used, however, just as long as they are of sufficient thickness and number to extend interiorly of the plate a greater distance than the depth of channels **18**. As an illustration, and as seen in FIGURE 2, the channels **18** have a depth extending through two of the plies **42** and only partially into the third ply **42**. The number of plies **44**, **46** inwardly of plies **42** is not particularly critical except they must be sufficient in number to provide a stable, non-warping filter element.

The particular arrangement of plies **42** has been found to provide an improved filter element in that it has a substantial improvement in durability and long life as compared to a structure wherein the plies simply have their grain extending at right angles to adjacent plies throughout the plate.

In addition, by reason of the cross grain laminated wood construction of the central portion of the press plate as stated above, such plate is sufficiently rugged to be non-warping and to withstand the forced pressure of the slurry. As the general construction of the elements is primarily a one-piece structure unjointed across its face there can be no separation at joints. When securely fastened or clamped together in assembled relation, the press elements will remain in stable condition and have long filter press life. The plates of the present invention are readily constructed from the laminated wood merely by providing the desired cut-out portions. This construction eliminates any difficult and expensive molding operation.

Having now described my invention and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. A filter press element comprising a body portion having filter field means adapted to receive a liquid in a filtering operation, inlet and outlet means in said press element communicating with said field, said press element being constructed in its thickness dimension of two or more inner plies of wood secured together in face to face relation and with the wood grain of adjacent plies being disposed at right angles to each other, and two or more outer plies secured to said inner plies, the wood grain of said outer plies all extending in the same direction.

2. The filter press element of claim **1** wherein said filter field means includes channel portions on the face of said element, said channel portions being of a depth less than the combined thickness of the said outer plies.

3. A filter press element comprising a body portion having filter field means adapted to receive a liquid in a filtering operation, inlet and outlet means in said press element communicating with said field, said press element being constructed in its thickness dimension of two or more inner plies of wood secured together in face to face relation and with the wood grain of adjacent plies being disposed at right angles to each other, and two or more outer plies secured to said inner plies on each side of the latter, the wood grain of said outer plies all extending in the same direction.

4. A filter press comprising a plurality of alternate filter plates and spacer plates, the filter plates having filtering areas adapted to receive a liquid in a filtering operation, inlet and outlet means in said filter plates and said spacer plates communicating with the filtering areas, said spacer plates being constructed in their thickness dimension of two or more plies of wood secured together in face to face relation and with the wood grain of adjacent plies being disposed at right angles to each other, said filter plates being constructed in their thickness dimensions of two or more inner plies of wood secured together in face to face relation and with the wood grain of adjacent plies being disposed at right angles to each other, and two or more outer plies secured to said inner plies, the wood grain of said outer plies all extending in the same direction.

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