

(No Model.)

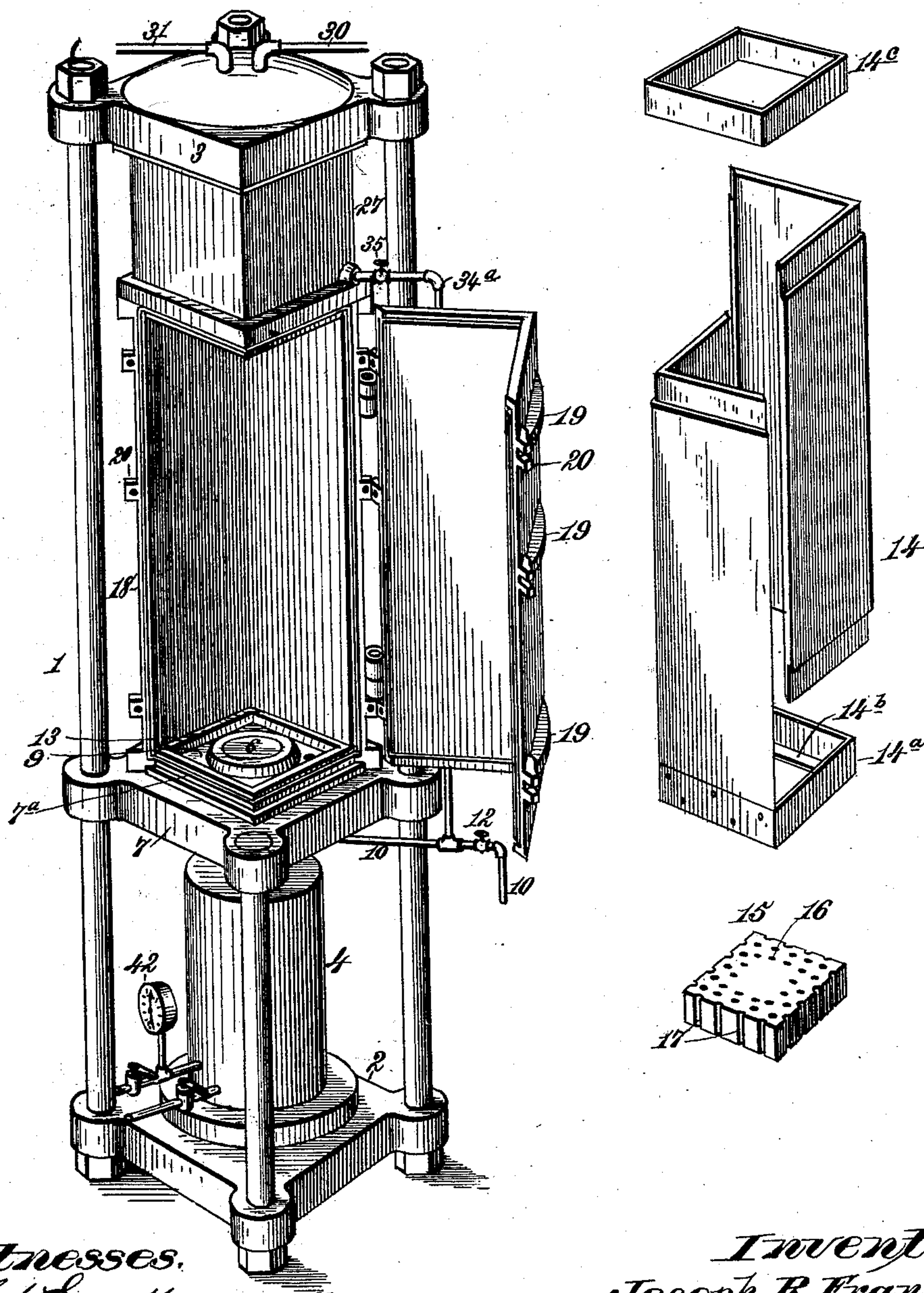
3 Sheets—Sheet 1.

J. R. FRANCE.
APPARATUS FOR THE MANUFACTURE OF CELLULOID AND SIMILAR
COMPOUNDS.

No. 393,752.

Patented Dec. 4, 1888.

Fig 1.



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(No Model.)

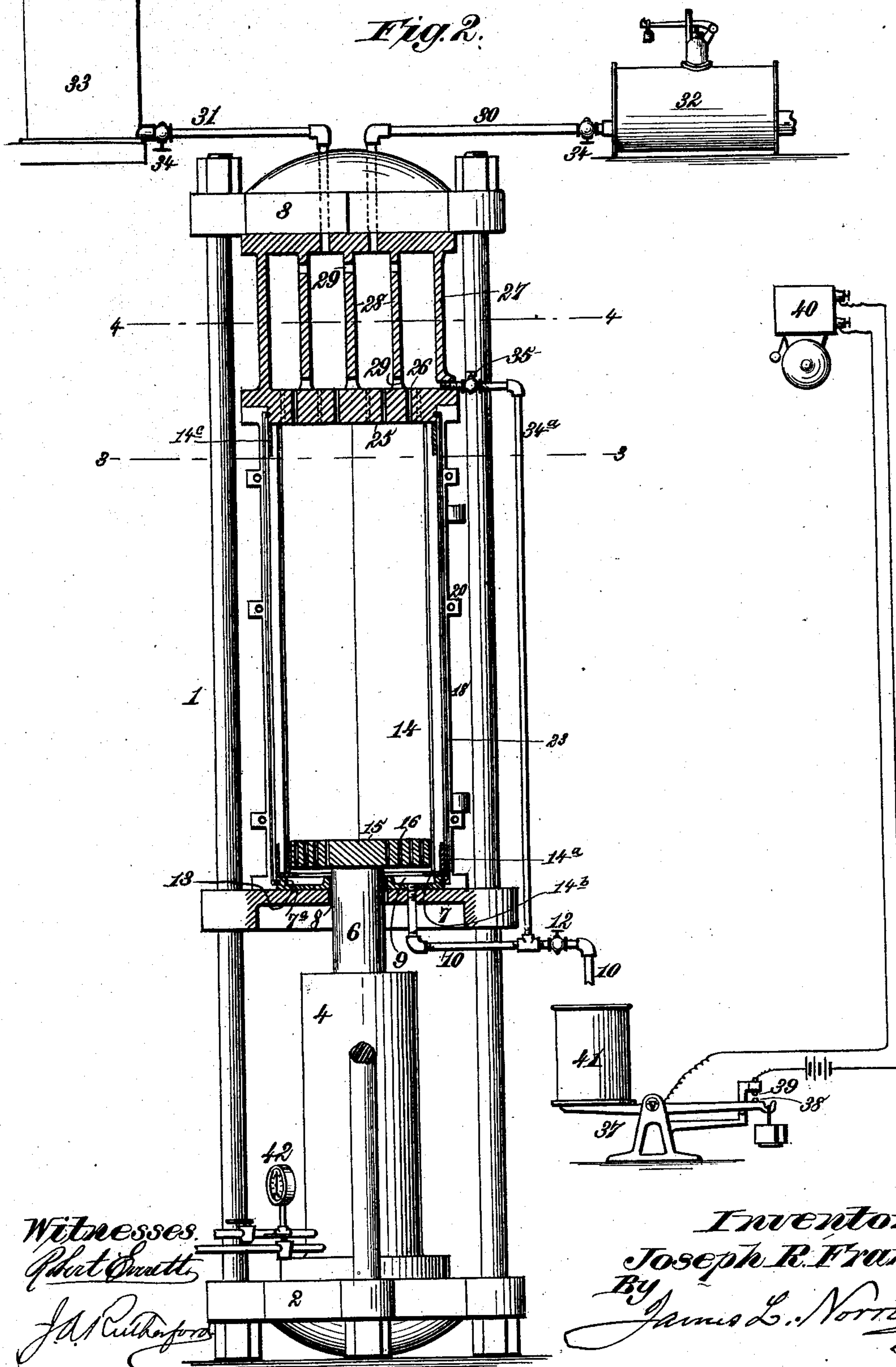
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(No Model.)

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APPARATUS FOR THE MANUFACTURE OF CELLULOID AND SIMILAR COMPOUNDS.

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Fig 3.

Patented Dec. 4, 1888.

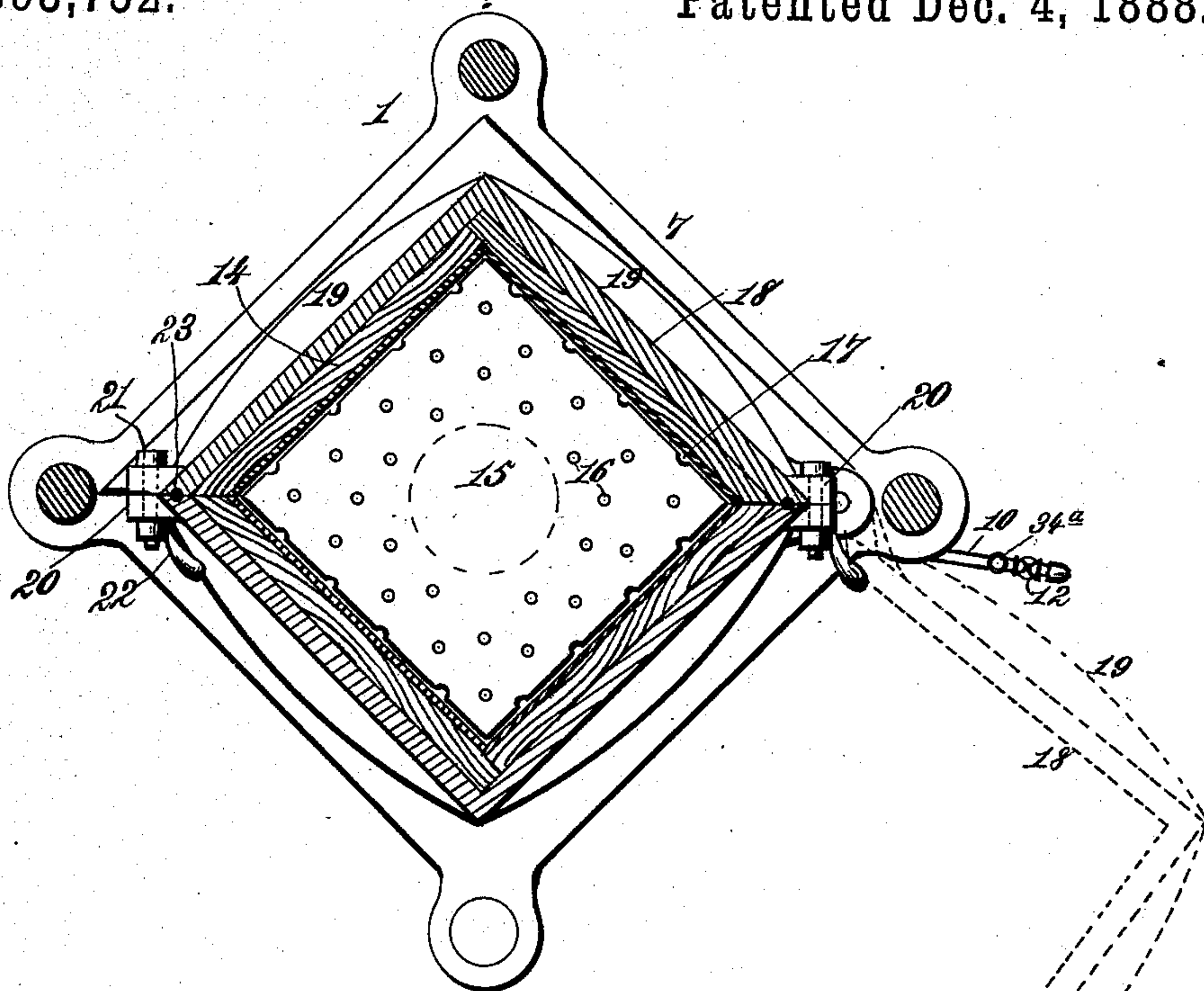
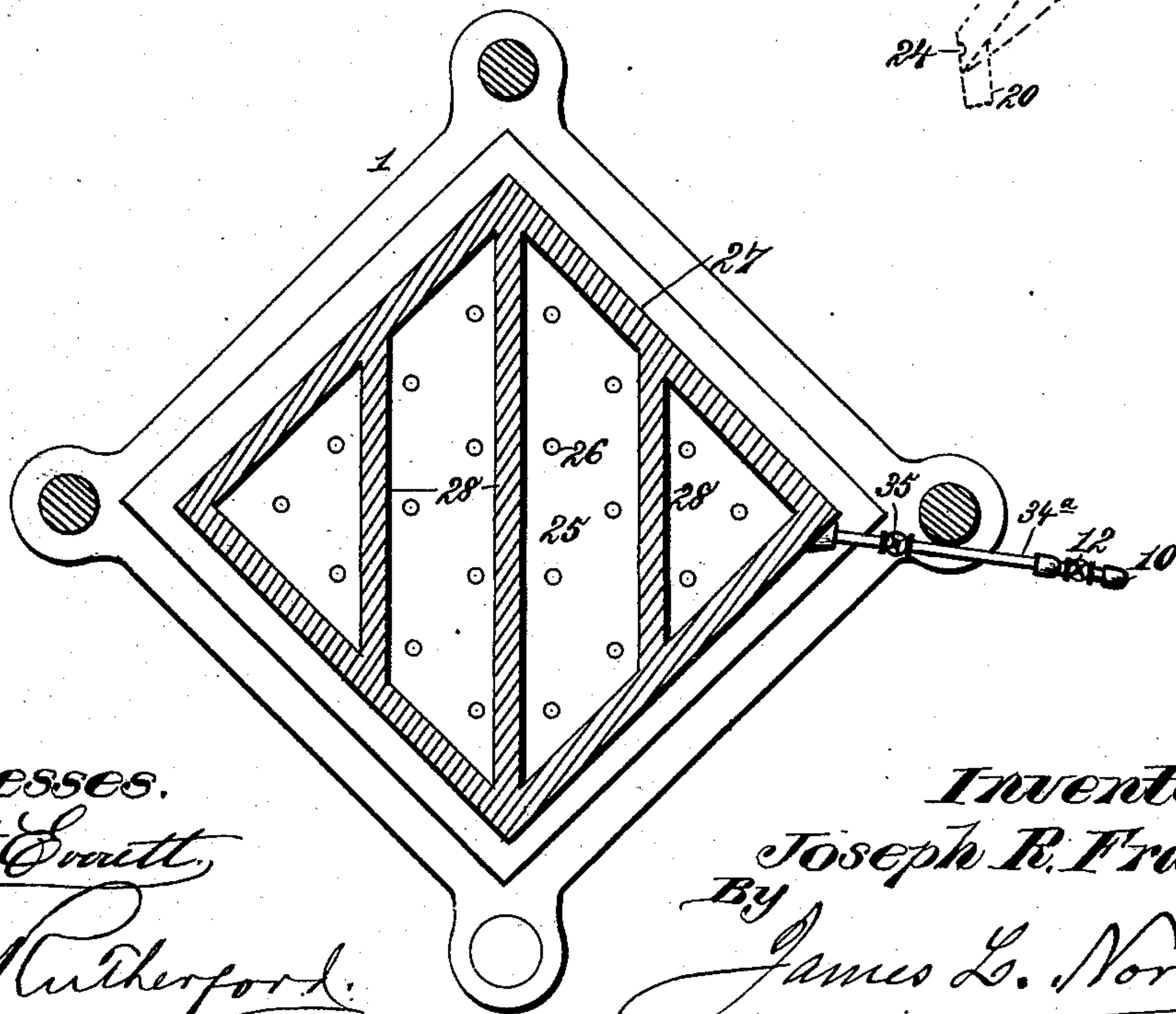


Fig 4.



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UNITED STATES PATENT OFFICE.

JOSEPH R. FRANCE, OF NEW YORK, N. Y.

APPARATUS FOR THE MANUFACTURE OF CELLULOID AND SIMILAR COMPOUNDS.

SPECIFICATION forming part of Letters Patent No. 393,752, dated December 4, 1888.

Application filed January 5, 1888. Serial No. 259,850. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH R. FRANCE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Apparatus for the Manufacture of Celluloid and Similar Compounds, of which the following is a specification.

My invention relates to the manufacture of celluloid and similar compounds; and the purpose thereof is to provide novel and convenient apparatus for the dehydration of the nitrated pulp preparatory to its conversion into celluloid.

Heretofore various methods have been proposed for this purpose, in all of which some practical objection has been experienced. Among others, the extremely sensitive nature of dinitro cellulose and its liability to explode under pressure are well-established facts, and this danger is enhanced in those processes in which the pyroxyline at some particular stage of its treatment approximates desiccation. Moreover, in the present state of the art, a strict practical economy of both time and material employed is essential to the success of any method of dehydrating proposed.

In an application filed by me of even date herewith I have set forth some of the methods heretofore practiced and have pointed out the more prominent objections attending each. It is the purpose of my present invention to provide a simple and efficient mechanism capable of effecting a rapid, safe, and practically economical displacement or removal of the water absorbed by the cellulose in the washing-tanks.

The invention consists in the several novel features of construction and new combinations of parts, hereinafter fully set forth, and specifically pointed out and defined in the claims.

In the accompanying drawings, Figure 1 is a perspective view of the complete apparatus, the container being removed from the press-box. Fig. 2 is a central vertical section showing the container in place. Fig. 3 is a horizontal section in the plane 3 3, Fig. 2. Fig. 4 is a detail section in the line 4 4, Fig. 2.

In the said drawings the reference-numeral 1 denotes a press-frame, of any suitable con-

struction, erected upon a base, 2, and terminating above in a cap or plate, 3. Upon the base 2 is arranged the cylinder 4 of a hydraulic press, said cylinder having a piston and ram, 6, of any known or suitable construction.

Above the cylinder 4 is a press-table, 7, mounted upon the frame 1, and having a central orifice, 8, through which the ram 6 passes. Upon the table 7 is placed a flanged plate, 7^a, having a recess or chamber, 9, which communicates with the interior of the press-box or container, and has an outlet, 10, provided with a cock, 12.

Upon the plate 7^a is formed a rectangular ledge or flange, 13, upon which sits the end of a container or press-box, 14, consisting, substantially, of an elongated quadrangular chamber divided diagonally, two adjacent walls thereof being rigidly connected, while the other two are separable therefrom to give access to the interior. Upon one half of the container is attached a re-enforcing band, 14^a, having an inwardly-turned flange, 14^b, extending inside the inner face of the container. The walls of the latter are gained to give flush surfaces, as shown in Fig. 1. At the top a second band, 14^c, is employed, which may be detachable, or it may be rigidly attached to the other half of the container.

Within the container is a false bottom, 15, resting on the flange 14^b, and provided with perforations 16 and edge channels 17. This false bottom is so constructed as to fit the container-box and at the same time move easily therein. While I may construct this container of any suitable material, I prefer to make it of wood and line the interior with zinc to reduce the weight and enable the operator to handle it with ease.

Within the press-frame 1 and above the table 7 is erected a press-box, 18, one rectangular half of which is hinged upon the other, the walls of said box surrounding the flange 13 on the plate 7^a. Upon the exterior faces of the walls are formed transverse ribs 19, having projecting ends 20, which, when the box is closed, receive bolts 21, having lever-nuts 22, by which the joint may be closed tightly. To insure perfect sealing of this box, rubber packing-strips 23 are set in grooves in the meeting face of one part and engage with grooves 24 in the similar face of the other

part, as seen in Fig. 3. The length and other dimensions of the press-box are such as to enable it to receive the container, which rests upon the flange 13 of the plate 7^a, the walls of the same being supported by the walls of the press-box.

At the upper end of the press-box is a strong diaphragm, 25, forming the press-head. This diaphragm or partition is provided with perforations 26, which extend through it into an otherwise closed chamber, 27, above, said chamber being divided by partitions 28, each having openings 29 at top and bottom. Communicating with this chamber are two pipes, 30 and 31, the former leading to an air-compressor, 32, of any suitable construction, and the latter to an alcohol-reservoir, 33. A cock, 34, is placed in each pipe. Communicating with the chamber 27 is a pipe, 34^a, entering just at the level of the floor of said chamber and leading down to the waste-pipe 10. A cock, 35, is placed in this pipe.

In convenient proximity to the press is a scale, 37, of any suitable construction, the purpose of which will presently be explained. If desired, electric contacts 38 and 39 may be mounted on the scale beam and arm, respectively, their wires being connected to a call, 40, of any suitable construction.

The manner of operating the apparatus is as follows, to wit: The nitro-cellulose as it comes from the washing-tanks is placed in a hydro-extractor, which is revolved until the quantity of water remaining in the pulp is equal in weight to the pulp. It is then removed and formed into separate two-pound lots, each containing one pound of the pulp with one pound of absorbed or adherent water. A piece of muslin being laid upon the false bottom of the container, the first lot of pulp is laid thereon and compacted and a second piece of muslin is laid over it. A second lot of pulp is then superposed on the second piece of muslin, and so on, until the container is filled with these layers of nitro-cellulose separated by strips of muslin. The container is then closed and placed in the press-box, which is tightly closed, and the hydraulic press being operated, the ram 6 rises, carrying the false bottom 15 up with it, compacting and pressing the nitro-cellulose between it and the diaphragm 25. The pressure is increased to about four hundred pounds to the square inch, at which point the ram is held and allowed to remain for about an hour, the water expressed flowing off through the perforations 16 and channels 17 in the false bottom, whence it passes into the chamber 9 and out through the exit-pipe 10, that which is driven up through the diaphragm 25 being carried off above by the outlet 34^a. After remaining under pressure for about the time mentioned the cock in the air-pipe 30 is opened, and air is forced down through the compressed pulp, penetrating the fiber and opening the cells containing aqueous particles, which are carried down-

ward by the air. A considerable percentage of water still remaining in the nitro-cellulose is expelled by the air-treatment alone. The air-treatment is continued for some little time after the water has ceased to come away, and the air-valve being then closed the cock in the alcohol-pipe 31 is opened and alcohol at ninety-five per cent. is allowed to flow into the chamber 27, whence it percolates through the diaphragm 25 and enters the pulp, through which it passes by gravity. The water still remaining in the pulp is driven downward before the descending body of alcohol, which latter, by reason of its less specific gravity, rests upon the slowly-descending body of water.

Practical tests have proven that by the compression of the nitro-cellulose about thirty per cent. of the contained water will be removed, while by the succeeding air-treatment an additional twenty per cent. of water will be removed, thus leaving in the pulp about one-half of the body of water it originally contained. Knowing the weight of this quantity of water, a vessel, 41, is set on the scale 37, and the weight is placed at such a point that it will tip the beam when the weight of water remaining in the pyroxyline or nitro-cellulose is received in the vessel 41. As soon as the electric call 40 announces to the operator that the water is all removed and received in the vessel 41 the alcohol-pipe 31 is closed and a second vessel is substituted for the vessel 41, to receive the hydrated alcohol coming from the pulp, which may afterward be redistilled and saved. The air-pipe 30 is then again opened and the passage of the alcohol downward is hastened by again driving air through the nitro-cellulose, until the latter contains from forty to fifty per cent., by weight, of such alcohol. The air is then cut off, the ram is run down, and the container opened. The nitro-cellulose or pyroxyline will be found therein in compacted layers, easily separable from each other by reason of the interposed sheets of muslin. The quantity of camphor necessary to complete the conversion of the pyroxyline is now placed between the layers, together with coloring-matter and pigments, and the layers are piled one upon another in zinc-lined boxes and tightly covered, to await the action of the converting-roll.

In order to govern the degree of pressure upon the pyroxyline, any form of safety valve or gage, 42, may be attached to the cylinder, whereby the pressure will be indicated or let off at the instant it reaches the maximum point.

What I claim is—

1. In an apparatus for displacing the water in nitro-cellulose, the combination, with a hydraulic press having a press-box, of a container having a false perforated bottom adapted to rise and fall with the rise of the press within said container, the press-box being provided with a perforated diaphragm forming the press-head, substantially as described.

2. The combination, with a hydraulic press having a press-box, of a container, a false perforated bottom moving within said container and carried by the ram of the press, a close compartment above said container separated therefrom by a perforated press-head, and an air-pipe and alcohol-pipe entering said compartment and communicating with the air-compressor and an alcohol-reservoir, substantially as described.

3. The combination, with a hydraulic press having a press-box, of a container, the latter composed of four rectangular walls, whereof two are separable from the other two, re-enforcing bands for connecting the separable halves, and a false bottom rising and falling in said reservoir and having perforations in its body and channels in its edges, substantially as described.

4. The combination, with the hydraulic press having a ram and a press-box, of a container hermetically inclosed therein, the press-table having an opening for the passage of said ram and provided with a recess or chamber having a suitable outlet, a movable and foraminous false bottom resting upon the ram, and a chamber above the container separated

therefrom by a foraminous diaphragm, said chamber having communication with an air-compressor and an alcohol-reservoir by means of pipes having cocks, substantially as described.

5. A container composed of two separable rectangular halves or parts connected by re-enforcing bands at the ends, one of said bands being provided with an inwardly-extending flange and a false bottom resting on said flange, substantially as described.

6. The combination, with a press-box having air-tight joints, of a removable container composed of two separable halves or parts and having a perforated false bottom, a ram raising said bottom, an air-tight chamber above the press-box separated therefrom by a perforated diaphragm or press-head, an alcohol-reservoir and an air-compressor communicating with said chamber by pipes having cocks, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH R. FRANCE.

Witnesses:

EDW. S. FULLER,
GEORGE C. ELLIOTT.