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4 Sheets—Sheet 1.

C. H. LOEW.

FILTER.

No. 605,110. Patented June 7, 1898.

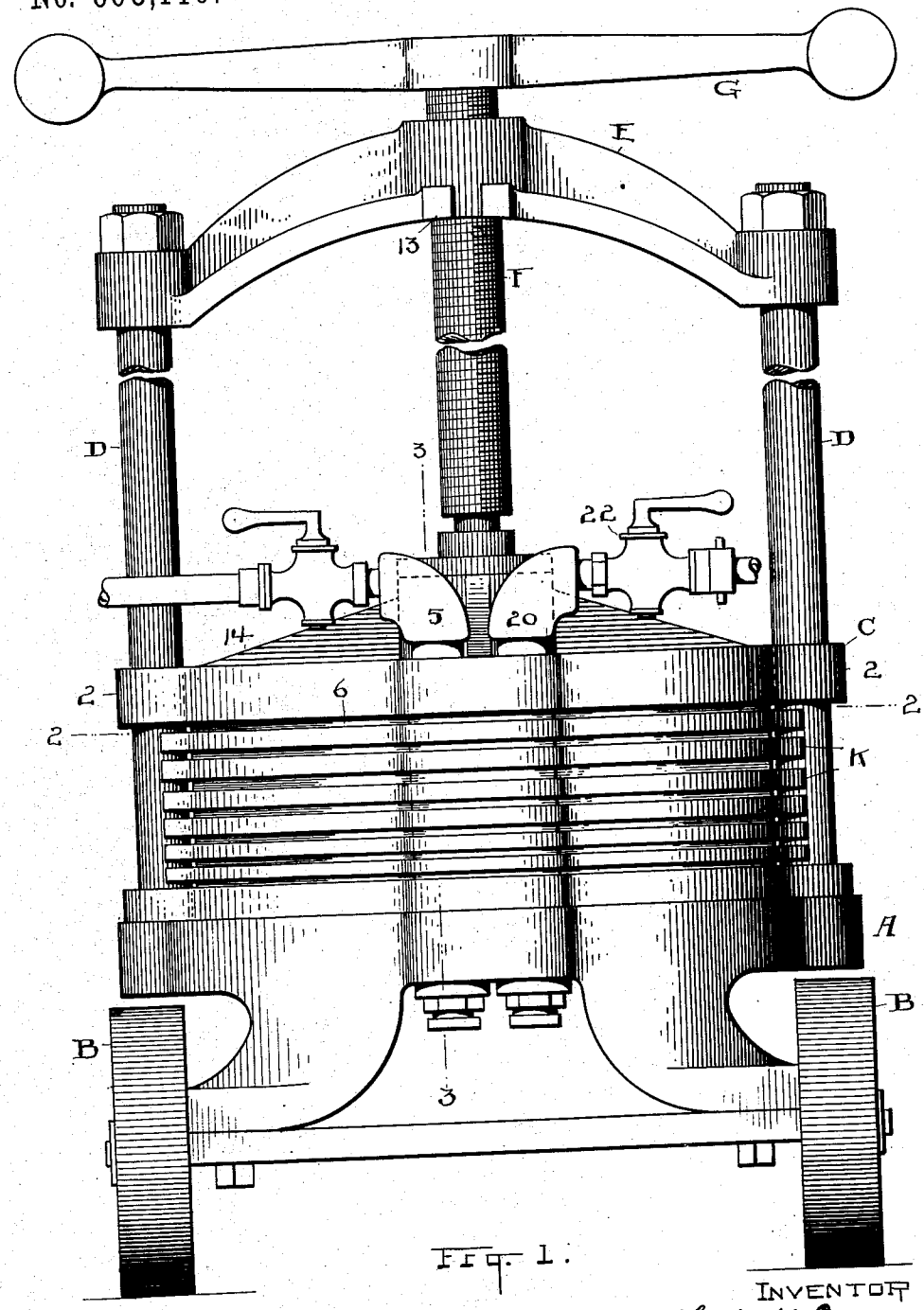


Fig. 1.

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By H. J. Fisher Atty

(No Model.) 4 Sheets—Sheet 2.

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Fig. 2.

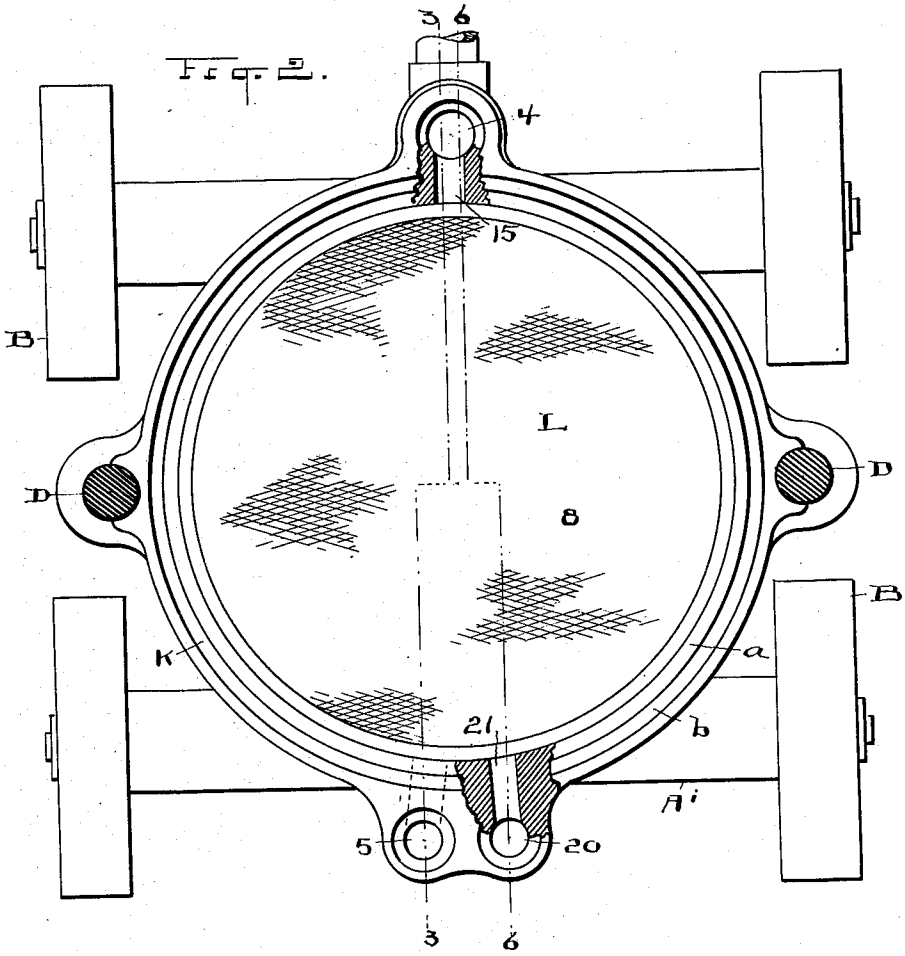


Fig. 4.

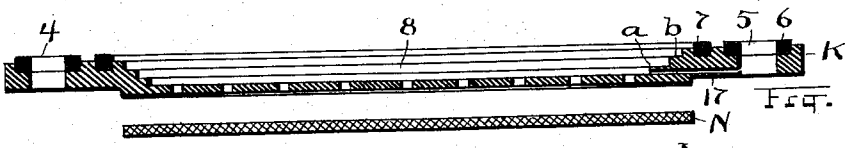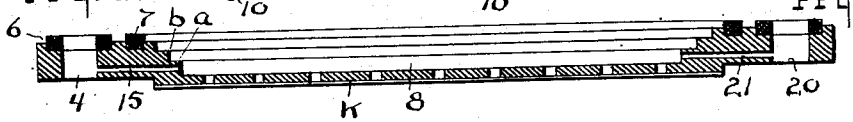


Fig. 5.



Fig. 6.



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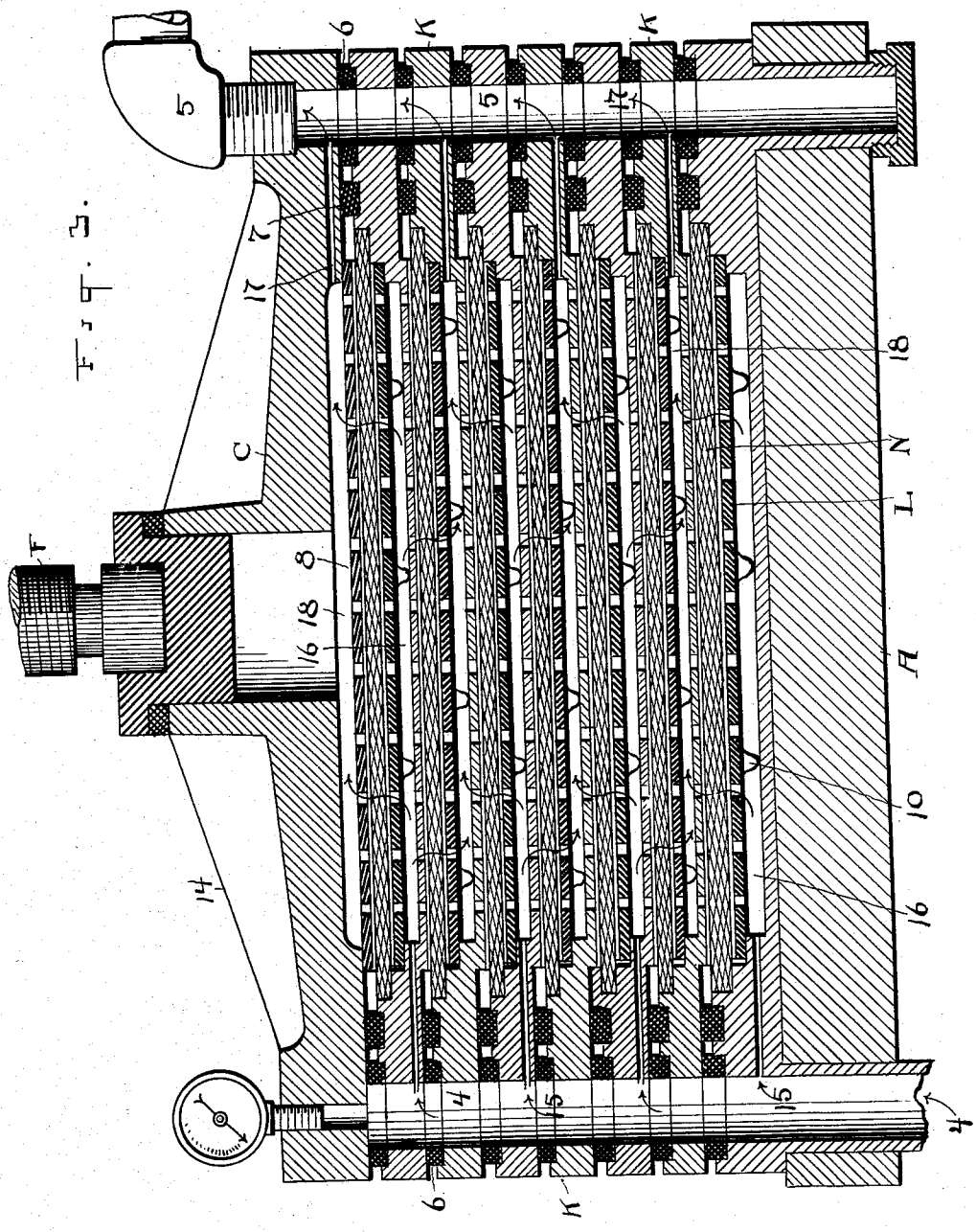
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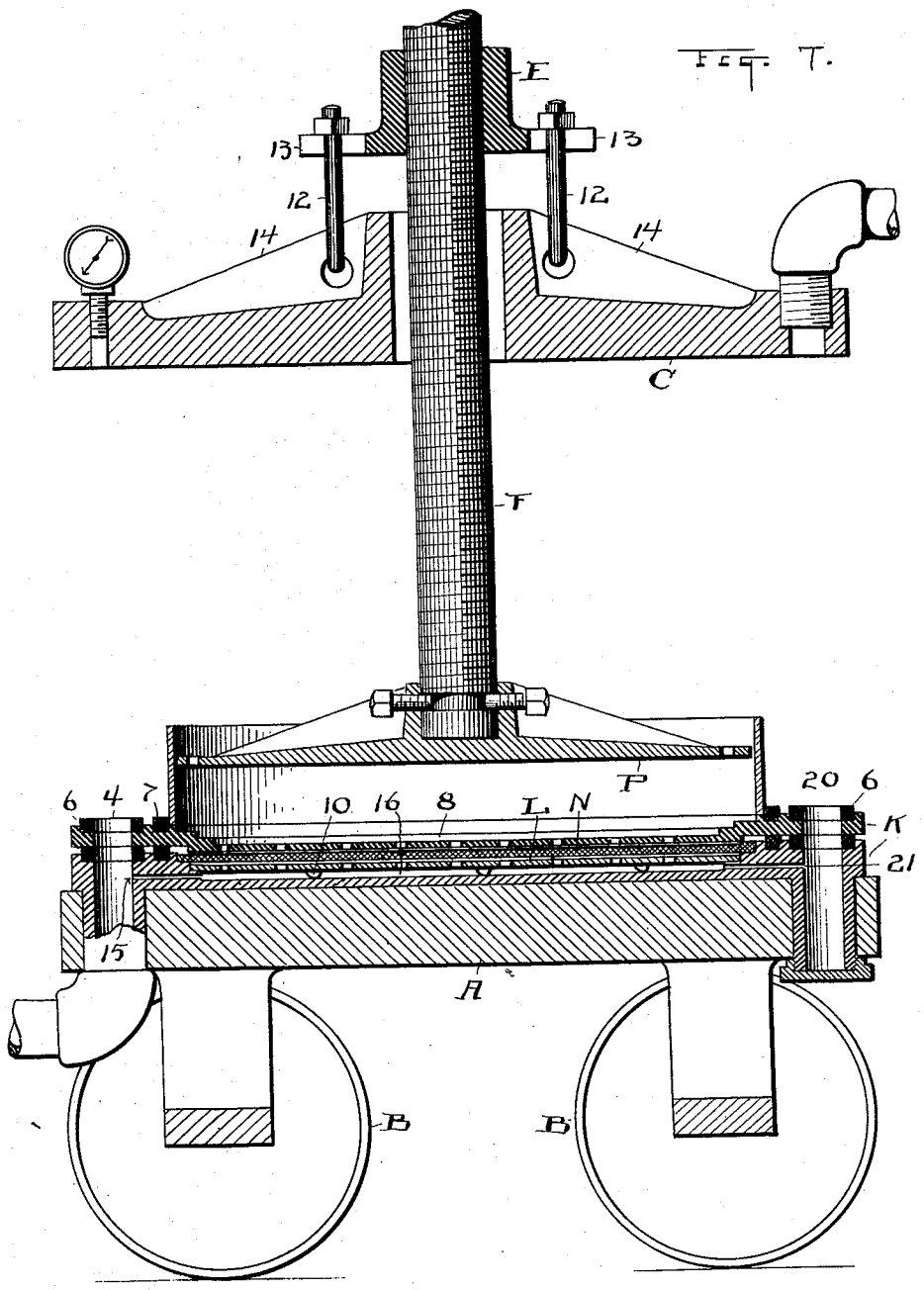
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Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES H. LOEW, OF CLEVELAND, OHIO.

FILTER.

SPECIFICATION forming part of Letters Patent No. 605,110, dated June 7, 1898.

Application filed October 11, 1897. Serial No. 654,749. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. LOEW, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Filters; and I do declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in filters for fermented and other liquors, such as beer, wine, whisky, and the like; and the invention consists in the construction, combination, and arrangement of parts, substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of my new and improved filter. Fig. 2 is a plan view looking down from line 2 2, Fig. 1. Fig. 3 is a vertical sectional elevation on a line corresponding to 3 3, Fig. 2, but considerably enlarged as compared with said figure. Fig. 4 is a cross-section of one of the primary perforated filter-plates and its packing also on line 3 3, Fig. 2, taken on the line of the liquor inlet and outlet. Fig. 5 is a cross-section of one of the secondary filter-plates, as hereinafter described. Fig. 6 is a cross-section of a primary filter-plate and its packing corresponding to Fig. 4, but traversing the liquor-inlet and the air-outlet, as indicated by line 6 6, Fig. 2. Fig. 7 is a central sectional elevation of the filter as the parts appear when the filter is being repacked.

A represents the base of the filter, supported in this instance and preferably on a carriage or truck with wheels B, so as to be portable and readily transferred from place to place. Liquid or fluid connections are made through the base A, as hereinafter described, and the said base is arranged horizontally and carries the entire superstructure of the filter.

C is the top or cover, shaped to conform to the outline of the base. In this instance a circular form is shown; but it might be rectangular, hexagonal, or the like without affecting the spirit or nature of the invention.

D represents two tubular columns or posts on opposite sides of the filter and fixed firmly in the base at their lower ends and secured in the extremities of the cross beam or yoke E at their upper ends. The elevation of the said columns and the yoke or beam E from or above the base is such that all the necessary operations in the use of the filter may be conducted below said yoke or beam and without disturbing its fixed position. A heavy operating-screw F is threaded centrally through the cross-beam E, and has a suitable lever or levers G at its upper end, whereby the screw is rotated.

The cover or top C of the filter is provided with perforated ears 2, on which it is adapted to slide up and down as occasion requires, the said cover being down in position for use as seen in Figs. 1 and 3 and raised out of using position as in Fig. 7. This latter position is rendered necessary to obtain access for packing the filter, as hereinafter described.

Now, referring to Fig. 3, we have an enlarged sectional elevation of the body of the filter wherein the work is done. The filter is supposed to be in operating condition when the parts are assembled as in this view, which is a section on line 3 3, Fig. 2, bisecting the inlet and the outlet passages for the liquid which is being filtered. Thus the vertical channel 4 at one side of the filter indicates the main inlet-passage, and the channel at the opposite side (marked 5) indicates the main outlet-passage. These passages, respectively, are formed by holes through ears or projections on opposite sides of the primary perforated filter-plates K, packing 6 and 7 confining the liquid, the said plates being arranged successively one upon the other, substantially as shown. Any suitable packing may be used. Six or eight of the plates K will suffice for ordinary purposes; but more may be used if more filtering capacity is needed. Said several plates K are alike, so that they may be used interchangeably, and their entire border or edge is raised as compared with their filtering area or body, and on this border are ledges *a* and *b*—first, for the secondary perforated filter-plate L, and, secondly, for the filtering material or media N, which is packed solidly upon the plate L. Thus a chamber is formed between the two plates K and L for the liquid. Both plates K and L are preferably cast, and in order that the plate L may sustain the heavy pres-

sure brought upon it in packing the paper-pulp or like filtering material N it is provided on its under side with scattered lugs 10, which bear on the plate K below, and as the filter is built up from the bottom it follows that the pressure is not alone upon the plates immediately at the top, but through them upon the plates and material beneath. In this way very heavy pressure may be brought to bear upon the filtering material and a very solid cake or layer of it be produced without injury to the plates K and L.

The method of packing is shown in Fig. 7. Here it will be seen that the filter cover or top has been carried up mechanically or by hand to a suspended position on hangers 12, engaging flanges 13 on the cross-beam E and eyes in the webs 14 of the said cover. Here the cover is out of the way and gives free access for packing or unpacking the filter. The packing is accomplished by filling the short cylinder or drum seen in Fig. 7 with liquid pulp. The pulp is prepared in this form, so as to have it pack uniformly when pressed. The follower P is then applied through power-screw F, to which it is attached, and the pulp is pressed into a practically solid mass, as indicated in Fig. 3. Obviously any suitable material in lieu of paper-pulp may be used without departing from the invention.

Between the layer or body of filtering material and the plates above and below the same are placed wire-gauze or other equivalent open-work material which will cover the perforations in said plates, so that the filtering material will not escape through the meshes thereof, and yet room enough will be afforded for the flow of the liquid. The said plates K and L, therefore, are more particularly supports for the filtering material than filtering-plates as such.

Each alternate primary plate K has an inlet passage or duct 15 from the main inlet liquid-passage 4 into the chamber 16 for the unfiltered liquid between plates K and L alternately and outlet passages or ducts 17 from the chambers 18 alternately between plates K and L, as clearly indicated by arrows in both cases. The liquid in any two chambers or spaces 16 is thus caused to be forced through the filtering material between them and the intermediate outflow-chambers or spaces 18 for the filtered liquid above and below.

When the filter is started, there will of course be air in all the chambers or spaces 16 and 18. The air in chambers 18 can be allowed to go forward into the cask or barrel; but the air in chambers 16 must be removed or it will remain as an obstruction in the process. Hence I provide an outlet-passage 20, Fig. 2, which has communication with each of the chambers 16 by a duct 21 and is controlled by a cock 22. This cock is opened long enough when the filter is started to exhaust the air from chambers 16 and is then closed during all further operations.

What I claim is—

1. A filter, substantially as described, having a series of primary perforated filtering-plates and a series of secondary filtering-plates forming together an alternately-open chamber between them for liquid, and chambers for filtering material, in combination with a series of stepped borders supporting said plates and packing between said borders, said borders having fluid-passages, substantially as described.

2. A filter for fermented and other liquids, consisting of a series of primary plates having each a perforated body and a raised border, a series of secondary perforated plates resting against said border and apart from the body of the primary plate to provide a chamber between them, and filtering material held between the perforated portions of said plates on opposite sides of said chambers, substantially as described.

3. The filter substantially as described, consisting of a series of primary plates having each a ledge about its border and a perforated body within said ledge, secondary perforated plates resting on said ledges and spanning the body of said primary plates, filtering material overspreading said primary plates, packing about the borders of said primary plates and inlet and outlet passages to the spaces between said plates, substantially as described.

4. The filter-base, a series of perforated primary filtering-plates resting on said base having each a ledge at its border forming a support for a series of secondary filtering-plates and packing between said borders, in combination with a series of secondary filtering-plates and a layer of filtering material between each of said primary and secondary filtering-plates, the said borders being provided with vertical inlet and outlet passages, respectively, and packing about said passages, substantially as described.

5. The filter consisting of the base and the uprights and a cross-beam connecting the uprights at their top, in combination with a series of perforated primary and secondary plates arranged alternately and having ope spaces between them on one side and filte. ing material between them on the other side, a cap for the filter and a screw in said cross-head to press said plates and filtering material together, the said primary plates having integral borders and the passages 4, 5, and 20 through the same, substantially as described.

6. In a filter substantially as described, the filter-base and a plate above said base to support the filtering material, in combination with means to pack the material on said plate comprising a casing to inclose the said material at the sides and a follower to press the material onto said plate, substantially as described.

7. The filter-base, a perforated plate supported in said base at its sides and at intervals over its surface and having a space for

liquid beneath it, in combination with a casing upon said plate to receive the filtering material in saturated condition, and a follower to enter said casing and press the liquid out of said material and produce a layer of compact filtering material on said plate, substantially as described.

Witness my hand to the foregoing specification this 29th day of September, 1897.

CHARLES H. LOEW.

Witnesses:
H. T. FISHER,
R. B. MOSER.