No. 861,893. PATENTED JULY 30, 1907.

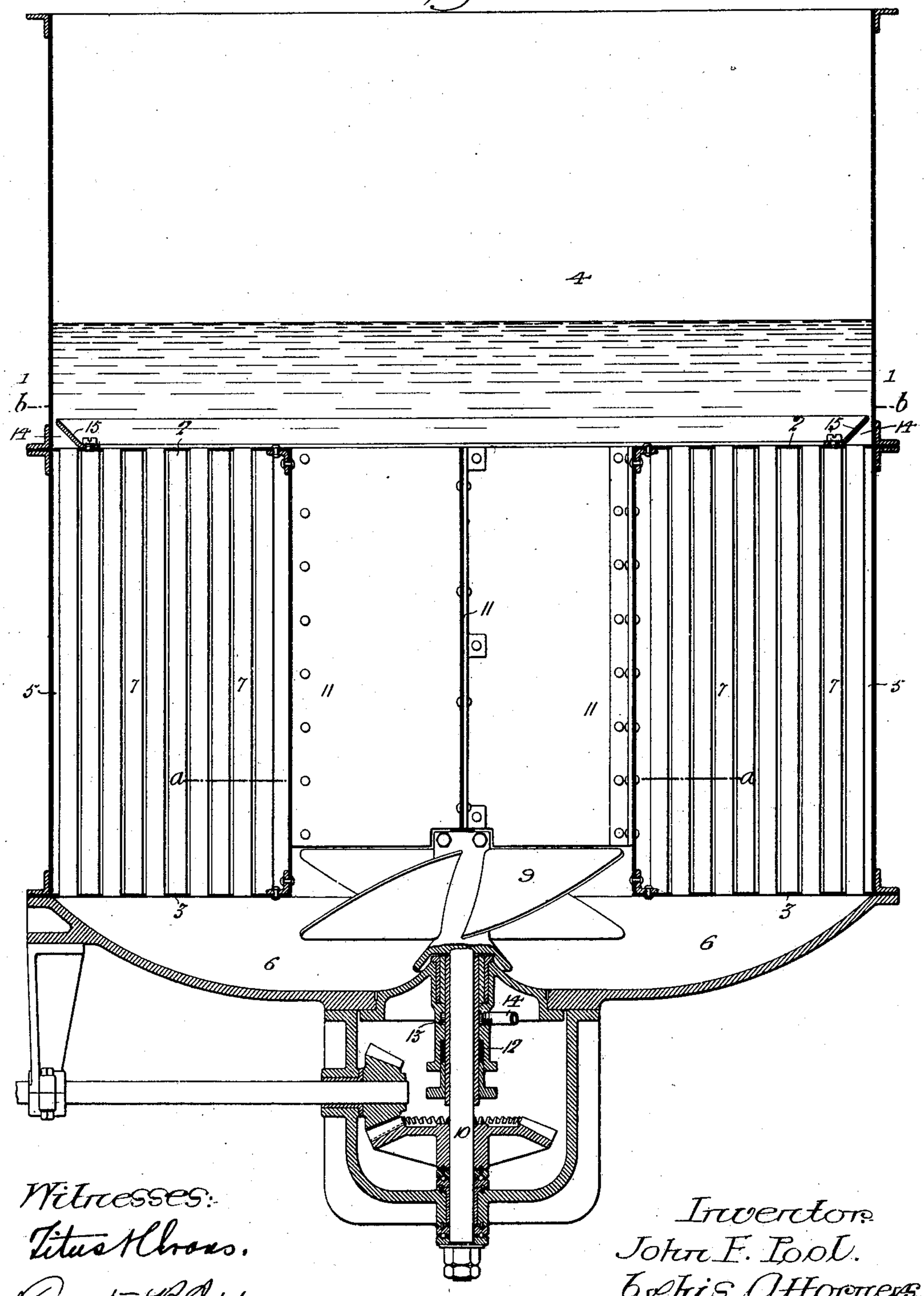
J. F. POOL.

APPARATUS FOR MAKING SUCRATE OF LIME.

APPLICATION FILED OCT. 18, 1905.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

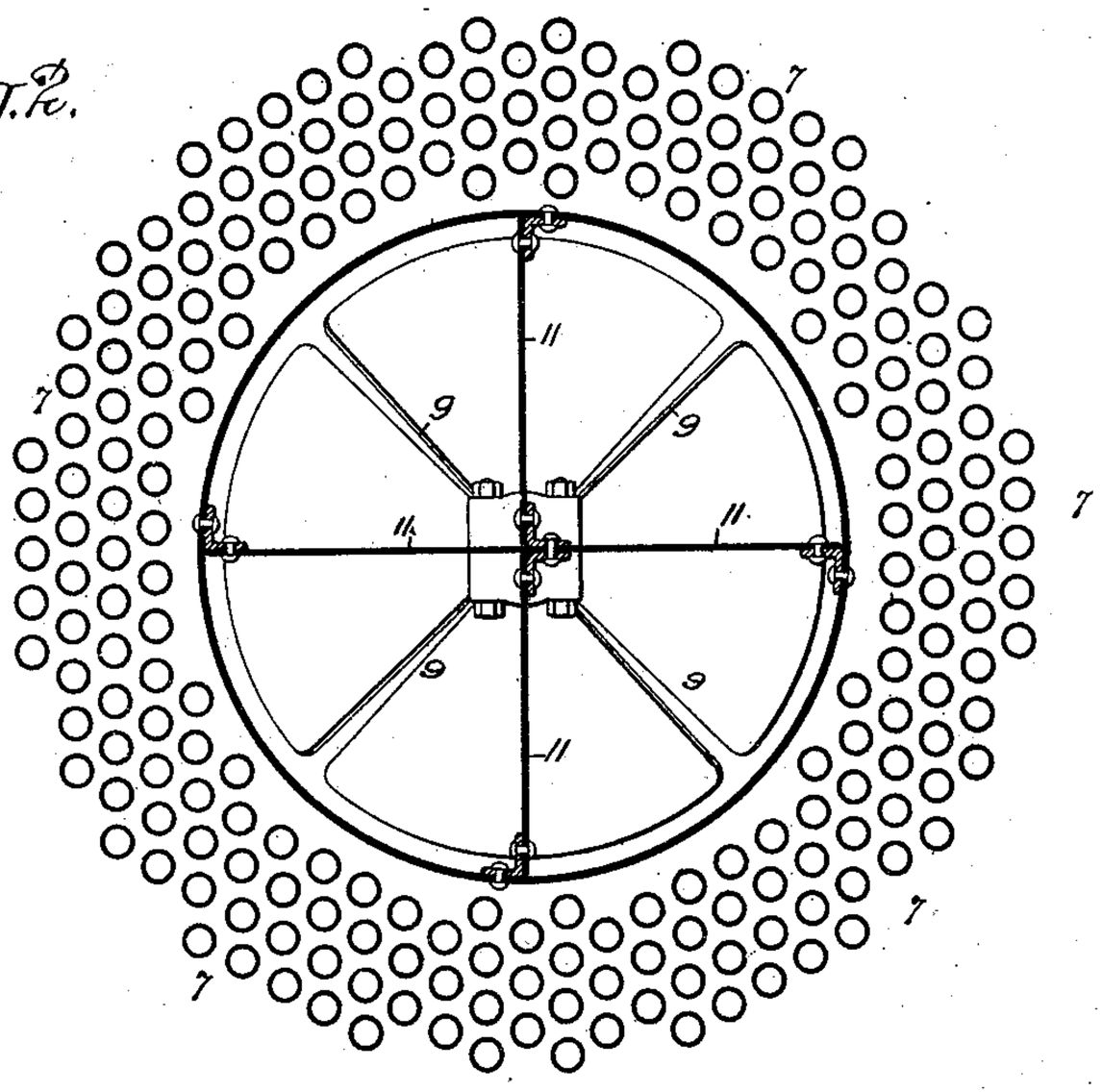
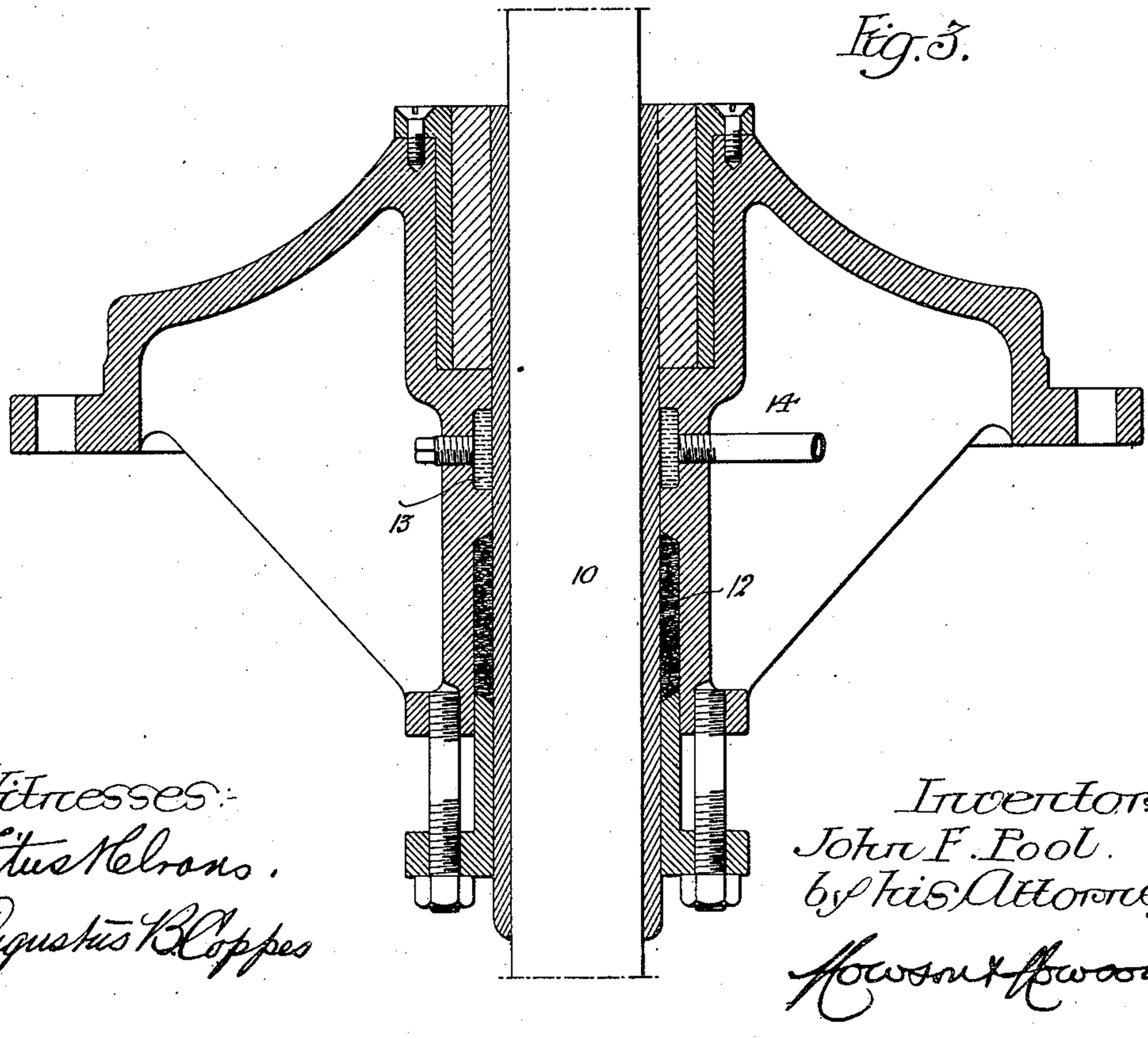


Fig. 3.



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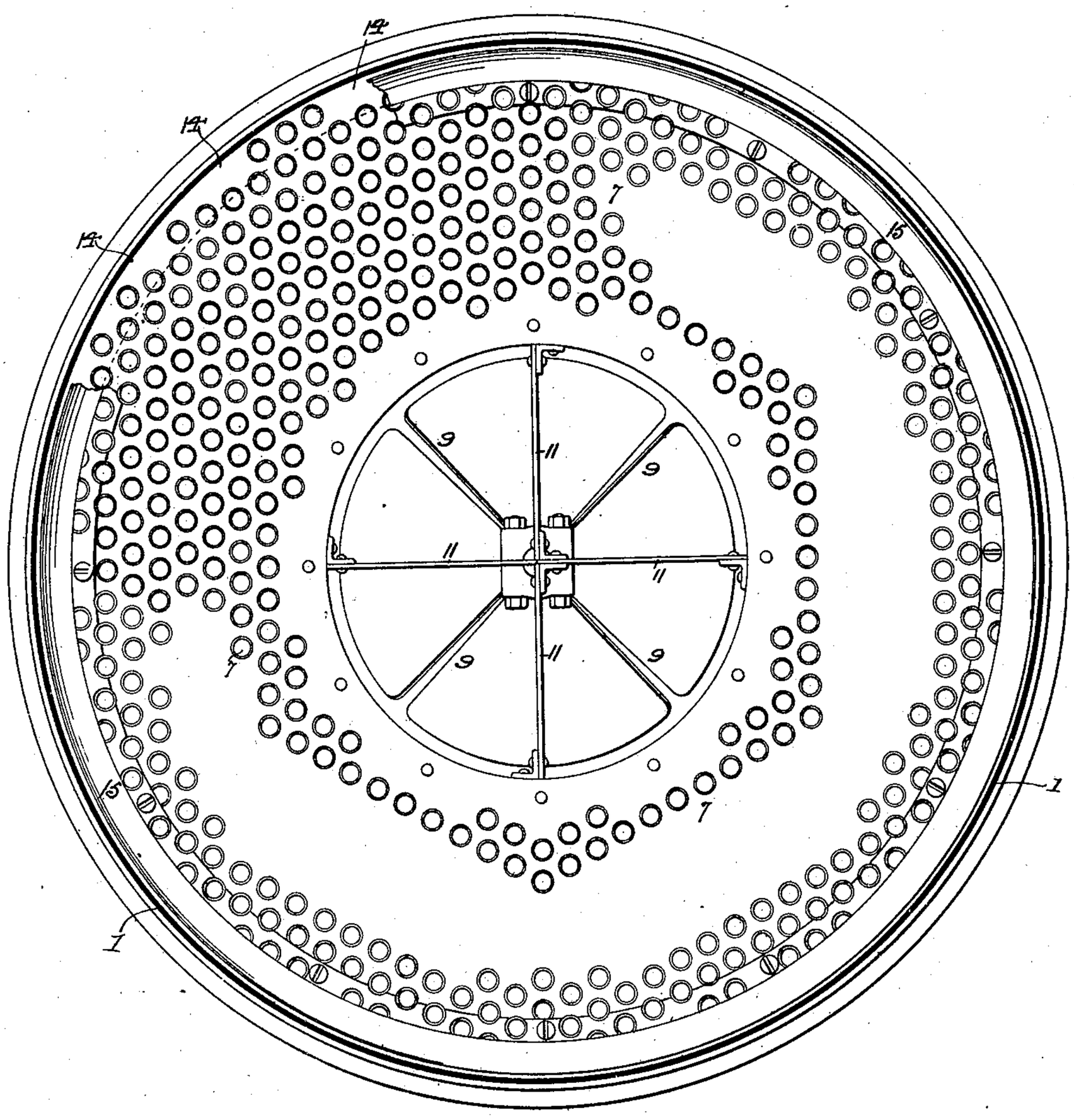
3 SHEETS—SHEET 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN F. POOL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE AMERICAN SUGAR REFINING COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR MAKING SUCRATE OF LIME.

No. 861,893. Specification of Letters Patent. Patented July 30, 1907.

Application filed October 18, 1905. Serial No. 283,344.

To all whom it may concern:

Be it known that I, JOHN F. POOL, a subject of the King of England, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Apparatus for Making Sucrate of Lime, of which the following is a specification.

My invention relates to that class of apparatus in which molasses solution is caused to circulate through a cooler and while thus circulating, has added to it finely powdered lime, one object of my invention being to insure a proper circulation of the molasses solution without the formation of foam on the surface of the same, which tends to cause such admixture of the powdered lime with the solution as to hydrate the lime, the foam also interfering with the proper filtration of the sucrate after the solution leaves the cooler. Another object of my invention being to prevent the lime sucrate from causing injury to the packing of the stuffing-box with which the propeller shaft of the apparatus is provided, and a still further object is to prevent deposit of lime upon the blank spaces of the tube sheet of the cooler at and near the shell or casing of the apparatus, and to insure a good circulation of the molasses solution at that point.

These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawing, in which

Figure 1, is a vertical sectional view of sufficient of an apparatus for making sucrate of lime to illustrate my present invention; Fig. 2, is a sectional plan view of part of the same on the line *a*—*a*, Fig. 1; Fig. 3, is an enlarged vertical section of the stuffing-box for the propeller shaft; and Fig. 4, is a sectional plan view on the line *b*—*b*, Fig. 1, with part of one of the elements broken away, and only a portion of the circulating tubes illustrated.

1 represents a vessel or tank, usually of cylindrical form and separated by transverse partitions 2 and 3 into three chambers 4, 5 and 6, the chamber 5 being intended for the reception of the cooling fluid, and being crossed by vertical tubes 7, which provide communication between the upper and lower chambers 4 and 6, further communication between these chambers being furnished by a central well at the base of which is a screw propeller 9, mounted upon a vertical shaft 10, the latter being adapted to suitable bearings carried by the bottom of the tank 1, and rotated at the proper speed by gearing below said tank, so as to cause circulation of the solution in the tank, said solution flowing from the upper chamber 4, downwardly through the well, and thence through the chamber 6 and up through the cooling tubes 7.

The action of the propeller has a tendency to cause a whirling motion in the volumes of molasses solution descending the well and this produces a maelstrom or vortex effect at the top of the well, causing air to be drawn down into and to be mixed with the solution, some of this air on its return to the surface being mixed with the molasses solution and remaining on the top of the same in the shape of foam. This has a tendency to cause the lime to hydrate by preventing the powdered lime from coming in contact with the sugar contained in the molasses solution, a result which must be carefully avoided. I therefore provide the well with one or more transverse partitions 11, so as to prevent the whirling motion of the volumes of solution descending the well, the latter being divided into a series of compartments, in any of which the solution will descend vertically, thus increasing the capacity of the propeller by causing it to circulate the solution more rapidly than, in the absence of the partitions, is possible with the same number of revolutions of the propeller. In the present instance, I have shown two partitions 11, crossing each other at right angles, so as to divide the well into four compartments, and serve as an internal brace for the well in addition to their other functions.

In apparatus of the class to which my invention relates difficulty is experienced in maintaining in proper condition the packing for the stuffing-box with which the propeller shaft 10 is provided, the effect of the lime upon the ordinary packing material being to rapidly destroy the efficiency of the same. In carrying out my invention, therefore, I provide, above the packing chamber 12 of the stuffing-box, a supplementary chamber 13, into which water or other fluid having no injurious effect either upon the packing material or upon the sucrate of lime, is introduced through a pipe 14, and is maintained in the chamber 13 under slight pressure, so that any leakage of the lime sucrate into the packing chamber of the stuffing-box is effectually prevented, the pressure of the fluid maintained in the chamber 13 being such that if any leakage takes place it will be leakage from said chamber into the lower chamber 6 of the apparatus.

In disposing the tubes 7 in the cooling chamber it sometimes happens that spaces of considerable area are formed between the tube and near the shell or casing 1 of the apparatus some of such spaces being illustrated at 14 in Fig. 2, and in the operation of the apparatus lime settles and accumulates upon these spaces, because of the insufficient circulation of the solution. In carrying out my invention, therefore, I provide an inclined flange 15, secured at its lower edge to the upper tube sheet or partition 2 of the apparatus, and approaching at its upper edge relatively close to the shell

or casing 1. The lower edge of this flange overlaps or partially overlaps a number of the outer tubes 7, so that the molasses solution rising through said tubes is compelled to flow upwardly through the space between the shell 1, and the upper edge of the flange 15, thereby insuring a good circulation of the solution so as to arrest any downward flow of the powdered lime through said space and prevent settling and accumulation of such powdered lime upon the blank spaces between the tubes. The utilization of all of the powdered lime introduced into the apparatus is thus insured for its intended purpose of converting the molasses solution into a lime sucrate.

The horizontal portion of the flange 15, whereby it is secured to the tube sheet 2, is cut away so as not to obstruct the upward flow through the tubes 7, which the flange overlaps, the duty of said flange being simply to deflect a portion of the flow and not to obstruct the same.

I claim:

1. In an apparatus for making sucrate of lime, the combination of a casing forming a tank, a pair of tube sheets carried by said casing, a series of vertical tubes connecting said tube sheets, means for causing flow of molasses solution through said tubes, and a deflector carrier by the upper tube sheet and disposed close to the wall of the casing, said deflector serving to guide solution rising through said outer tubes toward the wall of the casing.

2. The combination, in apparatus for making lime sucrate, of a casing having chambers connected by a well, a screw propeller for causing circulation of the molasses solution through said well, and transverse partitions crossing said well and connected at the center of the same to serve as braces and prevent whirling movement of the solution in its passage through the well.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JOHN F. POOL.

Witnesses:
WM. E. SHUPE,
JOS. H. KLEIN.