

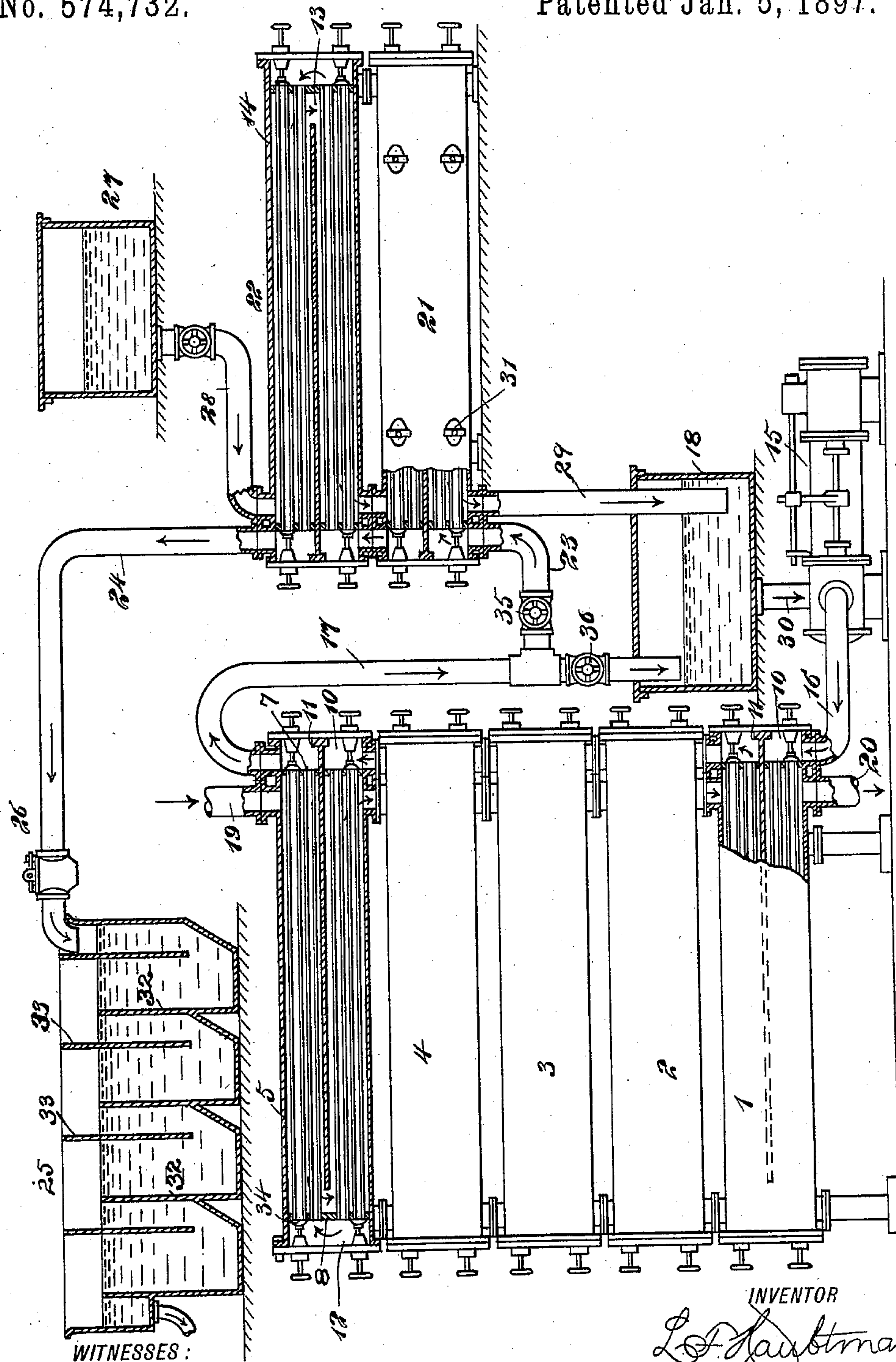
L. F. HAUBTMAN.

APPARATUS FOR CLARIFYING SACCHARINE SOLUTIONS.

No. 574,732.

Patented Jan. 5, 1897.

FIG. 1.



WITNESSES:

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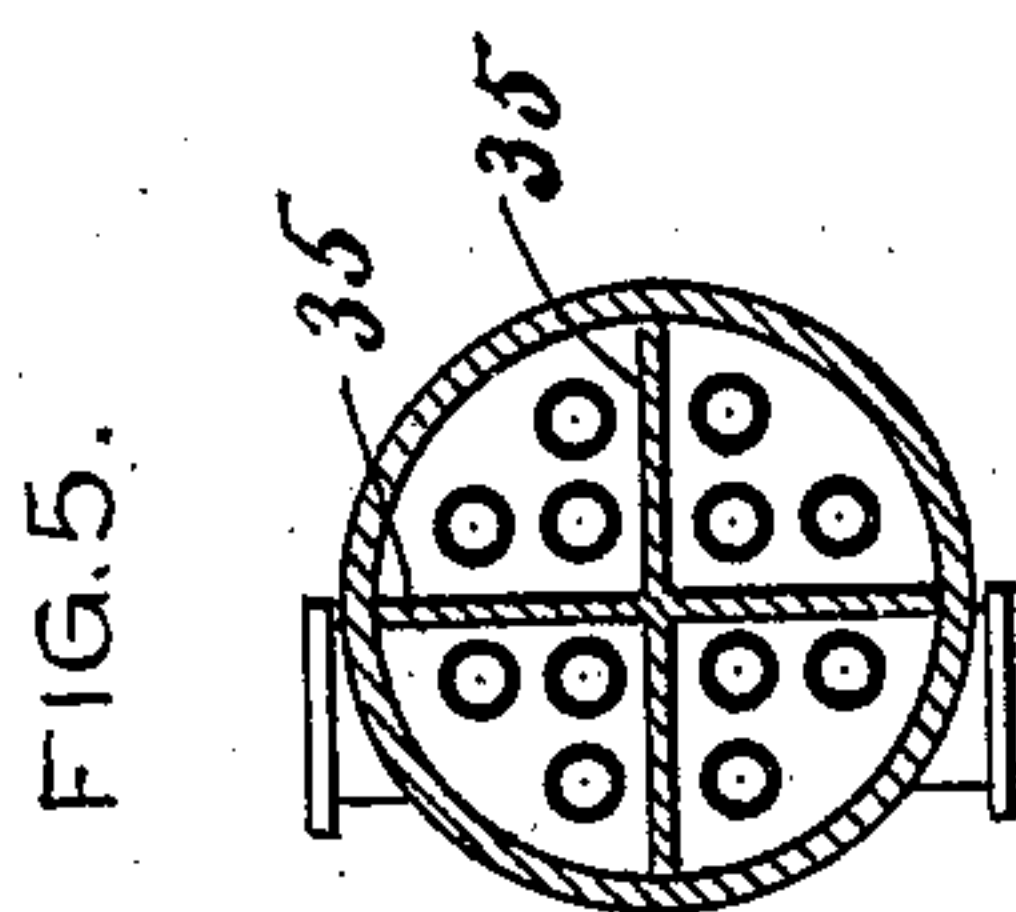
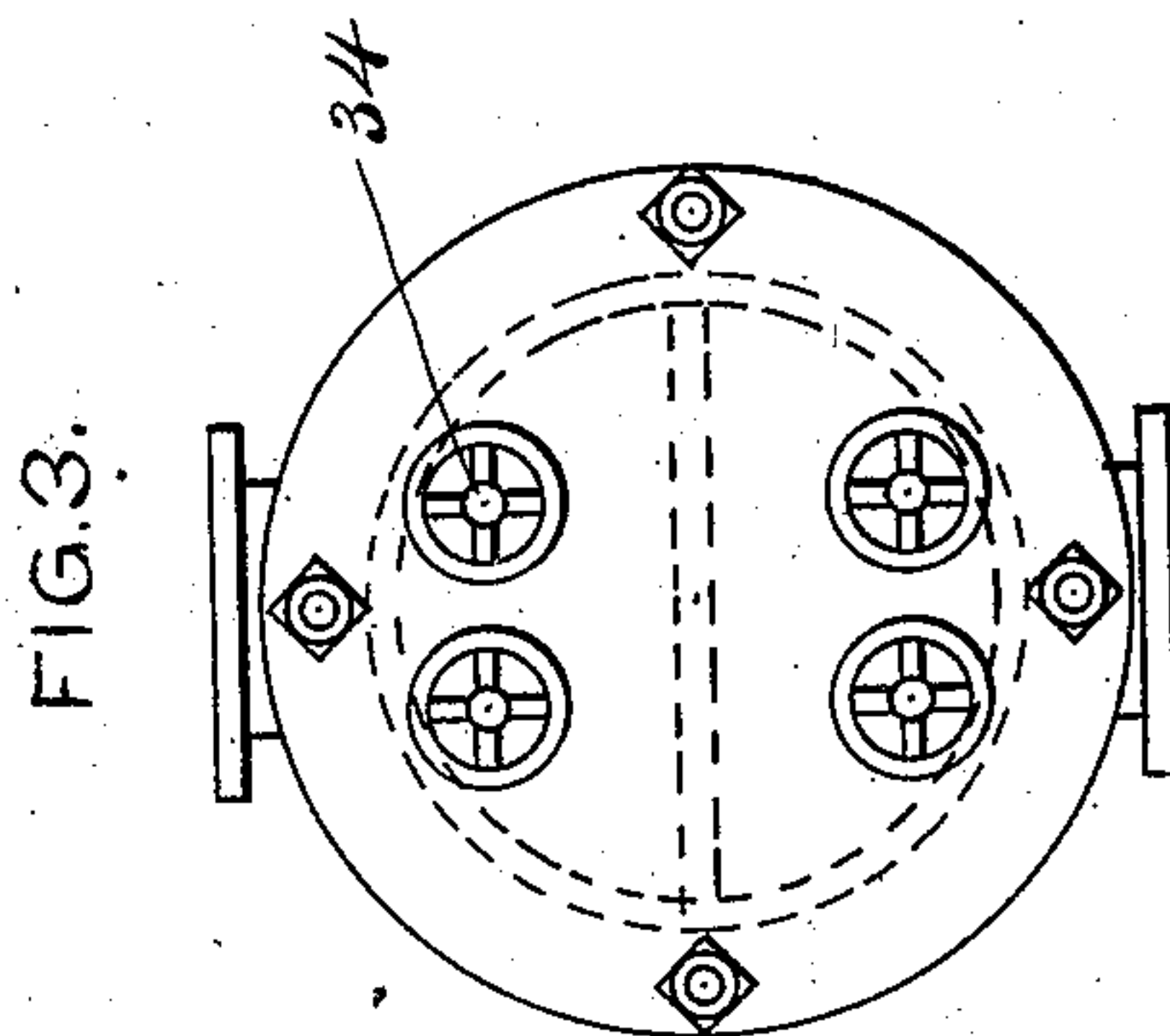
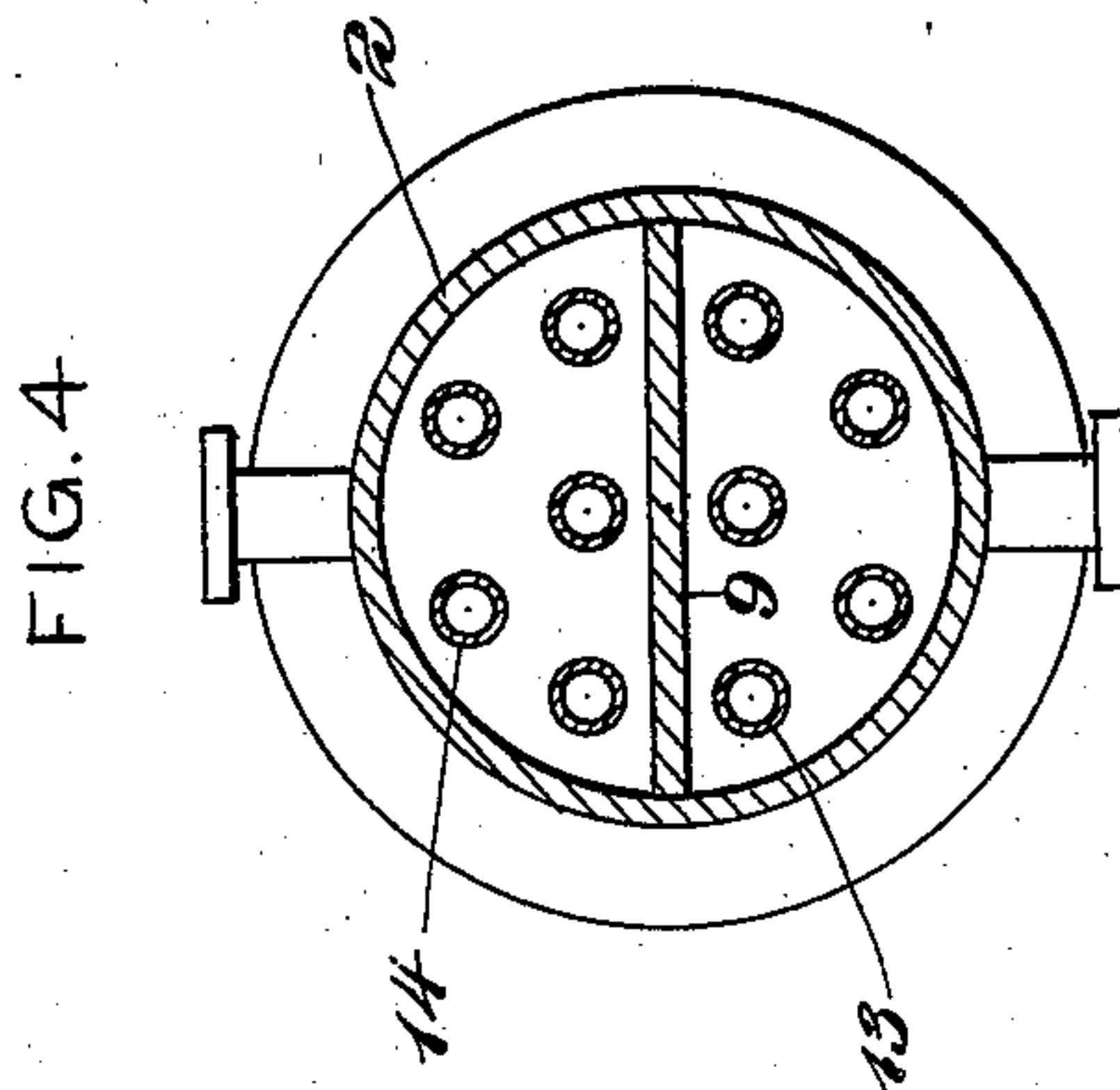
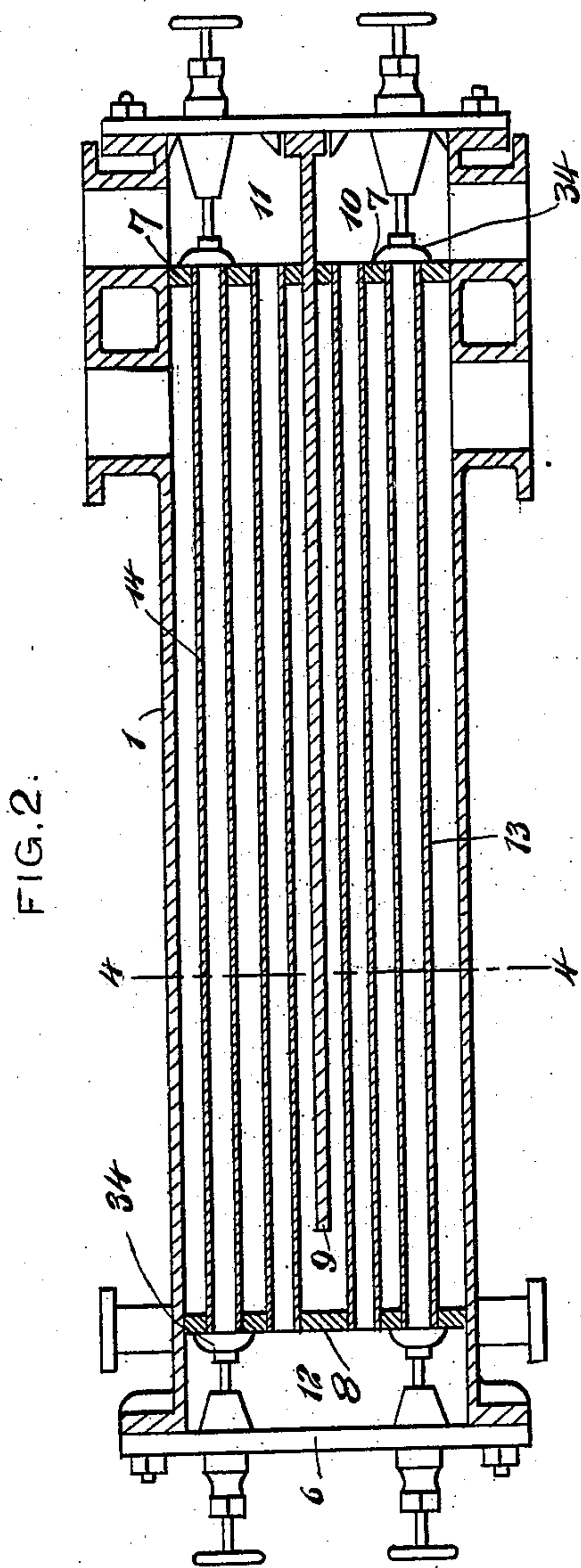
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# UNITED STATES PATENT OFFICE.

LEON FRANCOIS HAUBTMAN, OF NEW ORLEANS, LOUISIANA.

## APPARATUS FOR CLARIFYING SACCHARINE SOLUTIONS.

SPECIFICATION forming part of Letters Patent No. 574,732, dated January 5, 1897.

Application filed August 26, 1896. Serial No. 603,946. (No model.)

*To all whom it may concern:*

Be it known that I, LEON FRANCOIS HAUBTMAN, of New Orleans, in the parish of Orleans and State of Louisiana, have invented certain  
5 new and useful Improvements in Apparatus for Clarifying Saccharine Solutions, of which the following is a full, clear, and exact description.

The invention relates to an apparatus for  
10 clarifying saccharine solutions from sugarcane or similar sugar-producing material, and the object is to provide a device, by means of which the solution may be rapidly clarified without contact with atmospheric air.

15 In carrying out my invention I employ a series of heating vessels, one connected with another, and through which the solution to be clarified is forced in one direction, while the heating medium is forced through the vessels  
20 in an opposite direction.

The invention further comprises vessels in which the hot solution is reduced in temperature by a cold solution flowing through said vessels in its course to the clarifying vessels.

25 Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

30 Figure 1 is a partial elevation and partial section of an apparatus embodying my invention. Fig. 2 is a longitudinal section of a heating or clarifying vessel, drawn on an enlarged scale. Fig. 3 is an end view. Fig. 4  
35 is a section through line 4 4 of Fig. 2, and Fig. 5 is a sectional view of a cylinder of modified construction.

The several heaters or clarifying vessels are here shown as made in the form of cylinders 1, 2, 3, 4, and 5, one arranged above the other  
40 and connected one with another. These vessels are all similarly constructed, and this construction may be clearly seen in the enlarged view, Fig. 4, in which the cylinder 1, closed at its ends by cap-plates 6, is provided with  
45 interior tube-sheets 7 and 8.

Extended longitudinally of the vessel and entirely across the same is a partition 9, which terminates at a point a short distance from the inner side of the tube-sheet 8, thereby  
50 forming a space for the passage of a heating medium, as will be hereinafter explained. The partition 9 extends between the tube-

sheet 7 and the head 6. Therefore at this end of the vessel is formed the receiving-chamber 10 and a discharge-chamber 11. At the opposite end a transferring-chamber is formed, the walls of which are provided by the tube-sheet 8 and the head 6. The chamber 10 is connected with the chamber 12 by a number of tubes 13, and the chamber 12 is connected  
60 with the discharge-chamber 11 by a number of tubes 14. The several tubes of course extend through the tube-sheets 7 and 8, those connecting the chambers 10 and 12 being arranged below the partition 9 and those connecting the chambers 11 and 12 being arranged above said partition.

A pump 15 communicates with the receiving-chamber 10 of the lower vessel 1 of the series by means of a pipe 16, and the discharge-chamber 11 of this lower vessel connects with the receiving-chamber 10 of the vessel next above it, and these connections between the vessels continue to the upper one. The discharge-chamber 11, however, of the  
75 upper vessel connects with a pipe 17, which extends downward into a receiving-tank 18.

A heating medium, such, for instance, as steam, is admitted to the space between the tube-sheets in the upper vessel 5 by means of  
80 a pipe 19, and this space is connected with a similar space of the vessel next below, and these steam connections continue to the lower vessel 1, which has an outlet 20 for the exhaust-steam.

85 Arranged adjacent to the clarifying vessels is a pair of cooling vessels 21 and 22, one arranged above the other, and precisely similar in construction and connections to the clarifying vessels above described. In these clarifying vessels, however, a heating medium is not employed, as it is their office to reduce the temperature of the clarified solution to a point below the boiling-point, prior to its discharge into a settling-tank to be hereinafter  
95 described. Therefore in these cooling vessels the clarified solution is forced back and forth through the several tubes 13 and 14, and a cold solution to be subsequently treated in the spaces within which the pipes are arranged,  
100 so that said cold liquid may absorb considerable of the heat contained in the liquid treated.



From the pipe 17 a pipe 23 leads into the receiving-chamber of the lower vessel 21, and from the discharge-chamber of the upper vessel 22 a pipe 24 leads to and discharges into a settling-tank 25. The pipe 24 is preferably provided with a pressure-regulator, here shown in the form of a safety-valve 26, so as to give a certain fixed amount of pressure in the closed vessel corresponding to the degree of heat desired in the vessel.

From a discharge-tank 27 a valved pipe 28 leads into the space surrounding the tubes 14 and 13 in the upper vessel 22, and a pipe 29 leads from the chamber surrounding the pipes in the lower vessel 21 into the receiving-tank 18, which is connected by a pipe 30 with the pump 15. The vessels 21 and 22 may be provided with hand-holes having covers 31, so that by removing the said covers the interiors of the vessels may be reached for the purpose of cleaning them.

The settling-tank 25 has a series of partitions 32, extended upward from the bottom to near its top, and a series of partitions 33, extending from the top portion downward to near the bottom of the tank and alternating with the partitions 32.

The heat, as soon as it strikes the liquors to be treated or clarified, separates the pure liquor from the impurities, and to keep these impurities from settling in the tubes in transit, this liquor must have a rapid circulation through the tubes. To keep up this rapid circulation, about the same quantity of liquor must be handled in a certain time, otherwise the liquor will deposit some of its impurities in the tubes and finally stop them up. To obviate this, I provide each end of certain of the tubes in both the heating vessels and the cooling vessels with valves 34, having stem portions extended outward through the heads 6. This will enable an operator to employ the necessary number of tubes for the quantity of liquor to be treated. In each vessel I have shown five tubes above the partition 9 and five tubes below the said partition. For instance, with all the tubes open, a satisfactory circulation for two hundred and fifty thousand gallons daily is provided. If it is desired to pass through the tubes two hundred thousand gallons per day, one pipe on each side of the partition should be closed by its valve. If only one hundred and fifty thousand gallons are to be circulated, two pipes on each side of the partition should be closed. Therefore it follows that the greater the number of tubes closed the less liquid it will take to keep up the proper circulation, thus making one apparatus available for different quantities of liquor by the more handling of the valves 34.

Each heating vessel may be provided with a thermometer, so that the heat therein may be ascertained at any time.

In operation the solution to be treated is forced by the pump 15 into the receiving-chamber 10 of the vessel 1, thence through

the pipes 13 into the chamber 12, and thence through the pipes 14 into the discharge-chamber 11, and so on upward and out through the pipe 17, where it may be discharged into the receiving-tank 18 to be again treated, if desired.

It will be seen that the pipe 23 is provided with a valve 35, which may be closed to direct the liquid through the pipe 17 into the vessel or tank 18, and the pipe 17 is provided with a valve 36, which may be closed when it is desired to force the clarified solution through the cooling vessels 21 and 22. Of course while the solution is forced upward through these several heating vessels the heating medium, such, for instance, as steam, is forced downward and out through the pipe 20.

Instead of discharging the clarified solution into the tank 18 the valve 36 may be closed and the valve 35 opened. Then the hot liquid will run through the pipes 13 and 14 in the cooling vessels and out to the settling-tank, and at the same time a crude cold solution from the tank 27 will flow through the cooling-tanks and absorb a portion of the heat of the clarified liquid. This cold liquid of course will flow into the tank 18 to be pumped to the heating vessels.

By forcing the heating medium downward and the liquid upward it is obvious that the hottest liquid is always acted upon by the hottest portion of the steam.

If it is necessary to keep the liquid free of air during treatment, the receiving-tank may be closed air-tight.

To provide for a greater or varied circulation of juice in a clarifying vessel, it may be provided with a series of compartments formed by partitions 35, as shown in Fig. 5.

Each section of the vessel may be filled with one or more tubes and made to suit the quantity of liquor required to be clarified.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for clarifying saccharine solutions, comprising a number of heating vessels, one arranged above another and having connections one with another, each vessel having chambers at its ends, tubes connecting said chambers, valves for closing the ends of certain of said tubes, partitions extended longitudinally through the vessels, means for forcing a solution to be clarified through the series of vessels, and means for directing a heating medium through said vessels, substantially as specified.

2. An apparatus for clarifying saccharine solutions, comprising a series of vessels connected one with another, each vessel having in one end a receiving-chamber and a discharge-chamber, and at the opposite end a transferring-chamber, tubes connecting the receiving-chamber and transferring-chamber, tubes connecting the transferring-chamber and discharge-chamber, valves for closing the ends of certain of said tubes, a partition ex-



tended longitudinally in the vessel and having a space between its end and one of the tube-sheets, means for forcing a heating medium through the several heating vessels, means  
5 for forcing a liquid through the several heating vessels in a direction opposite to that of the heating medium, a tank for receiving the liquid from the heating vessels, and a cooling vessel similar in construction to the heating  
10 vessels, substantially as specified.

3. An apparatus for clarifying saccharine solutions, comprising a series of closed heating vessels having connections for the passage of liquid to be treated, and also having  
15 connections for the passage of steam or other heating medium, circulating-pipes arranged in each vessel, valves at the ends of certain

of the pipes, cooling vessels comprising valve-controlled circulating-pipes, one vessel being connected with another for the passage of a  
20 hot solution and connected one with another for the passage of a crude cold solution, a tank for cold solution communicating with the cooling vessels, a pipe leading from the cooling vessels to a settling-tank, and a pipe  
25 leading from the cooling vessels to a receiving-tank having connection with a pump, for forcing the liquid through the heating vessels, substantially as specified.

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Witnesses:

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JNO. DE BLOIS.