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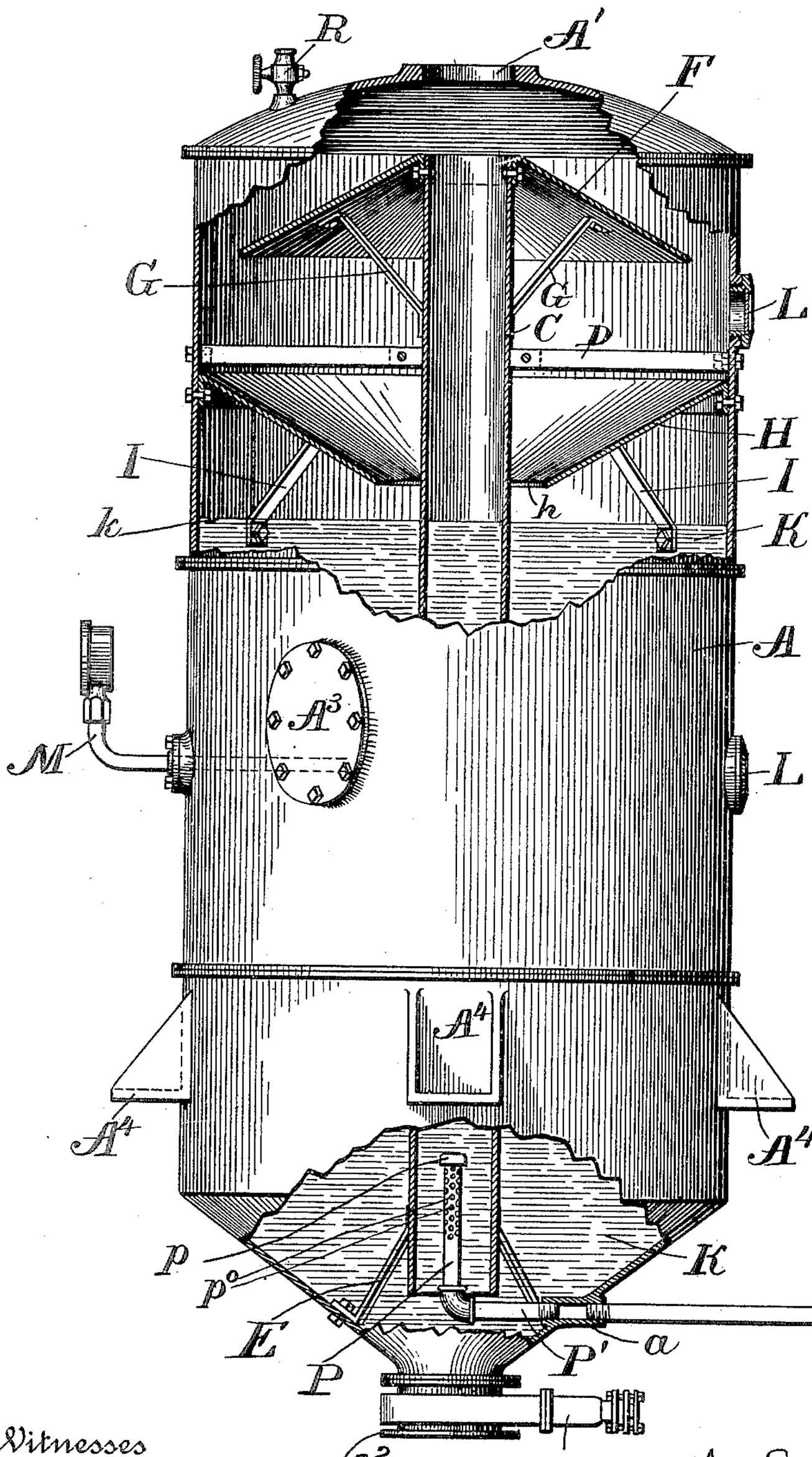
A. L. MARSHALL.

APPARATUS FOR CRYSTALLIZATION IN MOTION.

(Application filed May 4, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

ALBERT L. MARSHALL, OF NEW ORLEANS, LOUISIANA.

APPARATUS FOR CRYSTALLIZATION IN MOTION.

SPECIFICATION forming part of Letters Patent No. 668,110, dated February 12, 1901.

Application filed May 4, 1900. Serial No. 15,530. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. MARSHALL, a a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Apparatus for Crystallizing Sugar; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in crystallizers especially intended for the crystallization of sugar from the masse-cuite or syrup that has been boiled down to the desired degree of consistency.

It is well known that sugar may be crystallized out of syrup in two ways—either by allowing the syrup to stand quiescent for a considerable length of time, when the grains will form by a series of gradual accretions, or by keeping the mass from which the grains are separated in continual motion, when the grains increase in size more rapidly by mechanical action which may be compared to the formation of hailstones or to the increasing size of a snowball rolling down hill. Where the masse-cuite is allowed to remain quiescent, it takes a much longer time to effect the same amount of granulation than with the mechanical method, and in large factories where immense masses of material are to be treated the cost of the granulating tanks or cars and of storing same becomes a very important item. My present invention relates to the latter method of crystallization, where the granulation is accelerated by mechanical means, and the said invention will be understood by reference to the accompanying drawings, in which—

A represents a large tank, preferably cylindrical in form, provided with any suitable inlet A′ and any suitable outlet A^2, the latter being controlled by any suitable valve—as, for instance, a gate-valve B. A manhole with a suitable plate A^3 therefor should preferably be provided for access to the interior of the tank when required. The tank is supported upon any suitable platform (not shown) in any convenient way—as, for instance, by the brackets A^4.

Through the center of the tank A, I provide a hollow tube C, open at both ends, which may be held in place in any convenient way, as by means of the braces D and E. Secured to the top of this tube I provide a scattering-plate F, preferably in the form of the frustum of a cone, which should be suitably braced, as by means of the struts G, and beneath this I provide another scattering-plate H in the form of an inverted frustum of a cone, which is secured to the inner face of the tank and has an annular opening *h* surrounding the tube C. This scattering-plate H is braced in any convenient way, as by means of the struts I. The number and form of these scattering-plates F and H may be varied at will so long as the fundamental idea is carried out that the masse-cuite is to be given a zigzag motion as it falls. The tank is filled with masse-cuite K up to about the level indicated at *k* in the figure. Suitable eyeglasses L are provided, as also a temperature-gage M.

Projecting up into the bottom of the tube C, I provide the pipe P, having a cap *p* at its upper end and lateral perforations p^0. This pipe is connected, by means of the short pipe P′, screwed into the socket *a*, to the pipe P^2, also screwed into the same socket, which pipe is controlled by a valve p^2 and connects to a suitable air-blast, (not shown,) from which either heated or cool air may be blown, as desired. A steam-pipe Q, controlled by a valve *q*, is also connected to the pipe P^2, so that steam may be blown into the tank for the purpose of washing out the same when the masse-cuite is withdrawn.

One or more air-cocks R are provided at the top of the tank, and the opening A′ would in ordinary practice be closed by the supply-pipe and valve therein, (not shown,) by means of which the masse-cuite is supplied to the tank.

The operation of the device is as follows: The tank being charged with masse-cuite to about the level *k*, as indicated, at the temperature from which it comes direct from the vacuum-pan, warm air is admitted to the pipe P^2, and passing through the perforations p^0 it carries the column of fluid in the tube C upward until the air escapes above the top of the tube and the fluid flows over the sides of the scattering-plate F and runs down over

its edge, falling on the scattering-plate H and returning to the body of the material K, the escaping air being carried off by means of the air-cock R. By continuing the air-blast and by gradually decreasing the temperature of the same the granulation may be rapidly and efficiently accomplished.

It may be found in practice that by changing the temperature of the air from warm to cool and then back again to warm, or the reverse, the lowering of the temperature for the time being will start or facilitate granulation, and therefore it may be desirable to give certain variations of temperature to the inflowing air, especially at the beginning of the operation. This treatment with air, however, would depend in a large measure upon the nature of the masse-cuite being treated, as in some cases—where, for instance, first sugars have been run off—granulation takes place very readily, while with the "seconds" and "thirds" the granulation is much slower and the mass more stubborn in yielding to treatment.

I preferably have the tank A large enough to receive an entire "strike" of the finishing-pan, so that the entire mass may be treated simultaneously and the crystallization effected in a single vessel before the mass is fed to the centrifugal driers.

It will be obvious that if the granulation be speedily accomplished the number of tanks required and the extent of the storage-room for said tanks may be largely decreased, and hence economy in time, labor, and material may be secured.

When the tank has been discharged, the sticky matter adhering to the interior of the tank may be readily removed by injecting steam from the pipe Q, and the tank may be washed out from time to time, if required, by a man admitted through the manhole A^3. The mechanical effect of the air passing through the viscous material is also believed, by causing the particles of the viscous matter to rub one on the other, to facilitate and expedite the granulation of the sugar.

It will be obvious that I may increase the number of lifting-tubes C, with their corresponding blowpipes P, as also that I may vary the number, shape, and inclination of the scattering-plates in the upper part of the tank.

While I have shown the tank and the other parts in the form preferred by me, I do not mean to confine myself to this particular form, for I believe that my invention is capable of a wide application to various structures differing largely in detail.

I claim, broadly, as my invention—

1. In a crystallizer, the combination with a tank for holding the liquid, of a scattering-plate above the liquid in said tank, a tube leading from near the base of said tank and opening above said scattering-plate, and means for supplying an air-blast for forcing the liquid continuously upward through said tube and allowing it to fall over said scattering-plate, substantially as described.

2. In a crystallizer, the combination with a tank for holding the liquid, and a plurality of scattering-plates above the liquid in said tank, of a tube open at both ends and leading from near the base of said tank to a point above said scattering-plates, and means for supplying an air-blast forcing the liquid upward through said tube and allowing it to fall over said scattering-plates, substantially as described.

3. In a crystallizer, the combination with a tank for containing the mass to be treated, of scattering-plates provided in the upper part of said tank, a tube extending upward in said tank and extending above said scattering-plate and open at both ends, a perforated air-inlet pipe opening into the bottom of said tube, and means for supplying air to said pipe, substantially as described.

4. In a crystallizer, the combination with a tank for containing the mass to be treated, of a plurality of scattering-plates provided in the upper part of said tank, a tube extending upward in said tank and open at both ends, and a perforated air-inlet pipe opening into the bottom of said tube, substantially as described.

5. In a crystallizer, the combination with a tank for holding the liquid, of a scattering-plate above the liquid in said tank, a tube leading from near the base of said tank and opening above said scattering-plate, means for supplying an air-blast for forcing the liquid continuously upward through said tube and allowing it to fall over said scattering-plate, and means for varying the temperature of the air in said blast, substantially as described.

6. In a crystallizer, the combination with a tank for holding the liquid, and a plurality of scattering-plates above the liquid in said tank, of a tube open at both ends and leading from near the base of said tank to a point above said scattering-plates, means for supplying an air-blast forcing the liquid upward through said tube and allowing it to fall over said scattering-plates, and means for varying the temperature of the air in said blast, substantially as described.

7. In a crystallizer, the combination with a tank for containing the mass to be treated, of a plurality of scattering-plates in the form of frustums of cones reversely disposed provided in the upper part of said tank, a tube extending upward in said tank and open at both ends, a perforated air-inlet pipe opening into the bottom of said tube, means for supplying air to said pipe, and means for varying the temperature of said air, substantially as described.

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

ALBERT L. MARSHALL.

Witnesses:

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CHAS. M. WHITNEY.