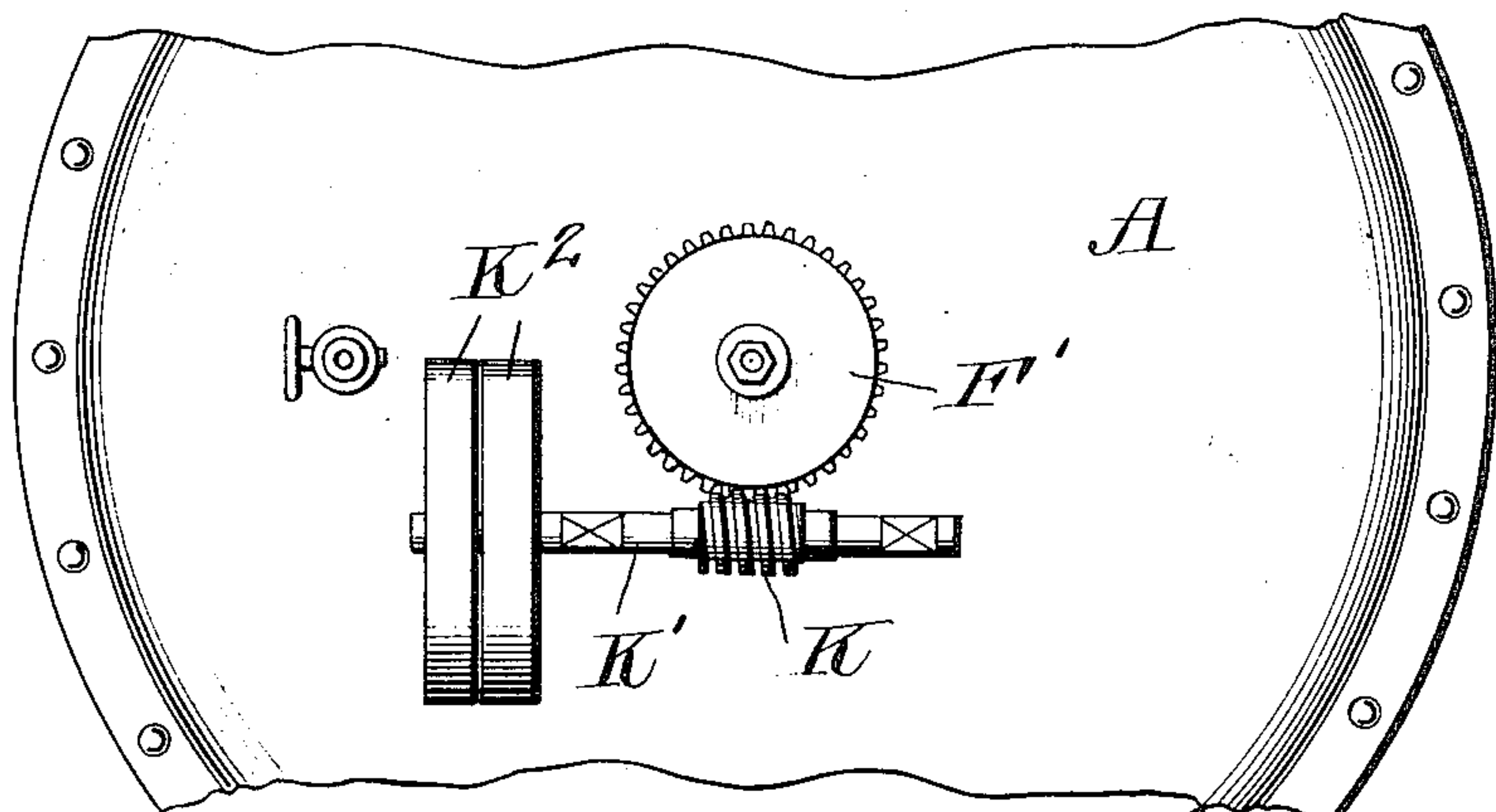
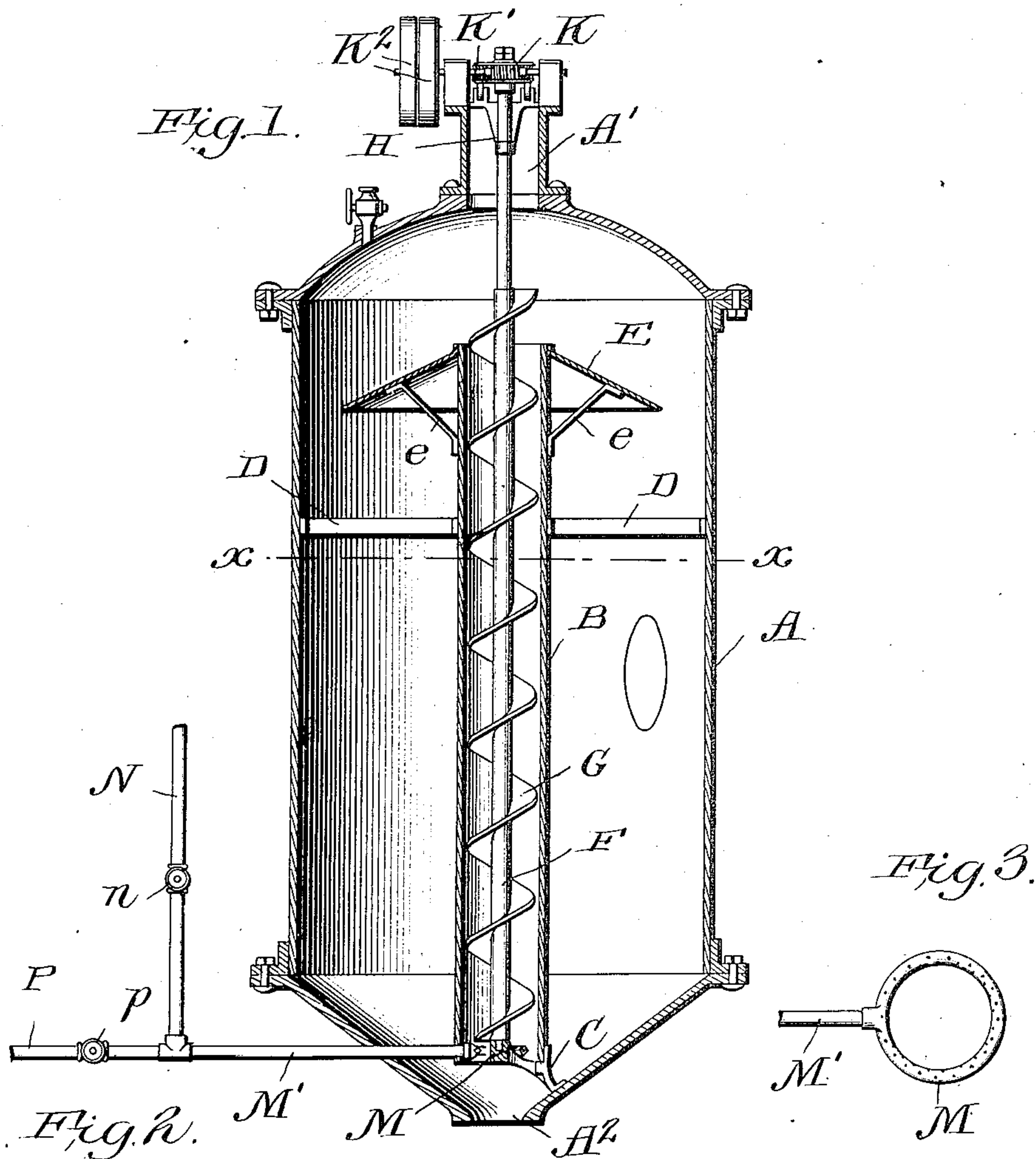


No. 841,030.

PATENTED JAN. 8, 1907.

A. L. MARSHALL.
APPARATUS FOR CRYSTALLIZATION.

APPLICATION FILED MAR. 8, 1906.



Witnesses

J. L. Hockaday
Geo. A. Bepue.

By

A. L. Marshall,
Milkinson & Fisher,
Attorneys.

Inventor

UNITED STATES PATENT OFFICE.

ALBERT L. MARSHALL, OF NEW ORLEANS, LOUISIANA.

APPARATUS FOR CRYSTALLIZATION.

No. 841,030.

Specification of Letters Patent.

Patented Jan. 8, 1907.

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To all whom it may concern.

Be it known that I, ALBERT L. MARSHALL, 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 Crystallization in Motion; 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; and it relates more especially to certain improvements on the crystallizer shown in my Patent No. 668,110, granted February 12, 1901.

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 downhill. 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 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—

Figure 1 represents a central vertical section through the center of the improved crystallizer. Fig. 2 is a plan view showing the means for rotating the screw, and Fig. 3 is a detail showing the perforated annular air-pipe.

A represents a large tank, preferably cylindrical in form, provided with any suitable inlet A' and any suitable outlet A². The inlet and outlet pipes, valves, &c., are omitted, as being well known in the art. The tank is

supported upon any suitable platform (not shown) in any convenient way. Through the center of the tank runs a vertical tube B, open at both ends and suitably supported, as by means of the spider C and the braces D. This tube supports a scattering-plate E, preferably in the form of a truncated cone and braced by braces e.

Journaled in the center of the tube B is a shaft F, carrying the screw G. This shaft is journaled at its lower end in the spider C and at its upper end in suitable bearings H. This screw-shaft may be turned in any convenient way, as by means of the worm-wheel F' meshing with the worm K on the shaft K', which shaft carries fast and loose pulleys K², driven from any convenient source of power. In the bottom of the tube B an annular perforated pipe M is provided, which is supplied with air from the pipe M'. Hot or cold air may be fed to this pipe M' from the pipes N and P, respectively, the supply being controlled by the valves n and p.

The operation of the device is as follows: The tank being charged with masse-cuite to the desired height—about the level *xx*—at the temperature from which it comes direct from the vacuum-pan, warm air is admitted to the pipe M', and passing through the perforations in the annular pipe M it carries the column of fluid in the tube B upward, at the same time agitating the same, and the column overflows above the top of the tube and drains back over the scattering-plate E, where the action of the air is assisted by rotating the screw in the tube. The screw assists in lifting the mass and also in a measure in agitating the same, while the air-bubbles rising through the liquid in a constant direction produce such an agitation as will especially promote crystallization. By continuing the rotation of the screw and by gradually decreasing the temperature of the air-blast 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.

It will be evident that during the first part of the crystallization the air-blast alone may be used to lift the fluid in the tube B, while when the mass thickens, due to the crystallization, the screw may be used to assist the air-blast. Moreover, in “stringy” sugars, where the mass is more or less viscous, the screw will ordinarily be needed throughout the entire operation.

It will be obvious that I may increase the number of lifting-tubes B and also the number of annular perforated air-pipes and that other changes might be made in the apparatus, which could be used without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

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, a pipe

for supplying an air-blast opening into the base of said tube, a screw mounted in said tube, and means for rotating said screw, substantially as described.

2. In a crystallizer, the combination with a tank for holding the liquid, and a scattering-plate 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-plate, an annular pipe opening into the base of said tube, a screw mounted in said tube, and means for rotating said screw, substantially as described.

3. In a crystallizer, the combination with a tank for holding the liquid, and a scattering-plate 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-plate, an annular perforated air-inlet pipe opening into the bottom of said tube, means for supplying air to said pipe, a screw journaled axially in said tube, and means for rotating said screw, substantially as described.

4. 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 at the base of said tube, means for varying the temperature of the air in said blast, a screw mounted in said tube, and means for turning said screw, substantially as described.

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

ALBERT L. MARSHALL.

Witnesses:

CHAS. M. WHITNEY,
ANDREW HERO, Jr.