No. 608,446.

Patented Aug. 2, 1898.

E. P. EASTWICK, JR.

SUGAR CRYSTALLIZER.

(Application filed Apr. 16, 1897.)

(No Model.)

FIG. 3.

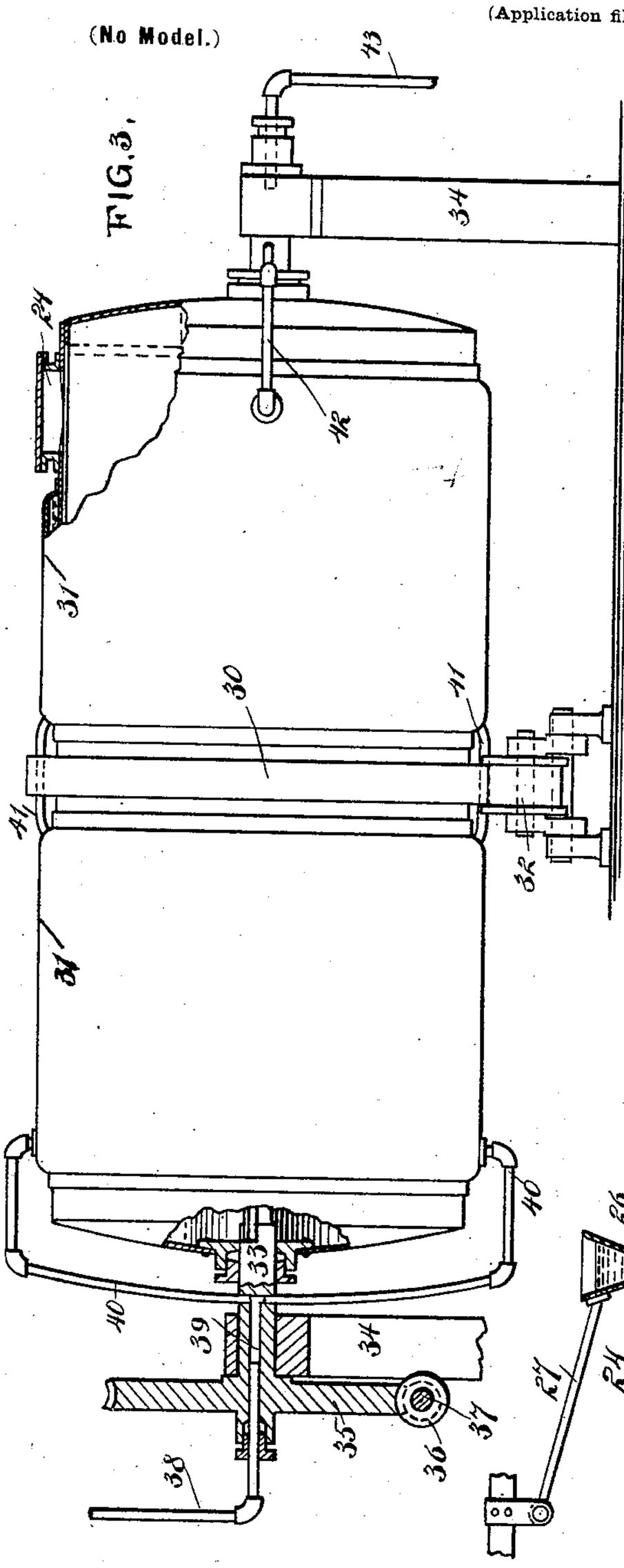


FIG. 1.

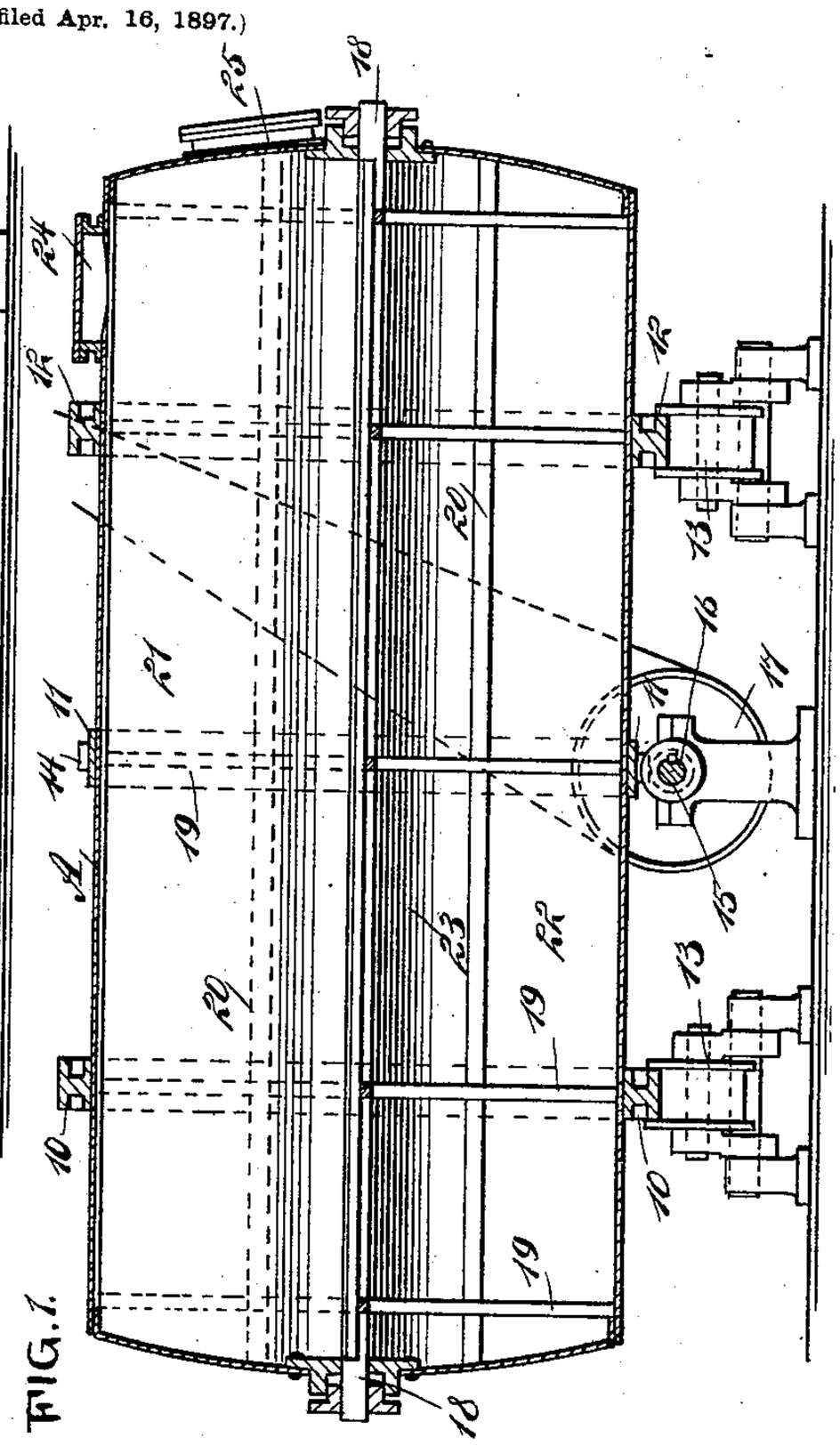


FIG. 2.

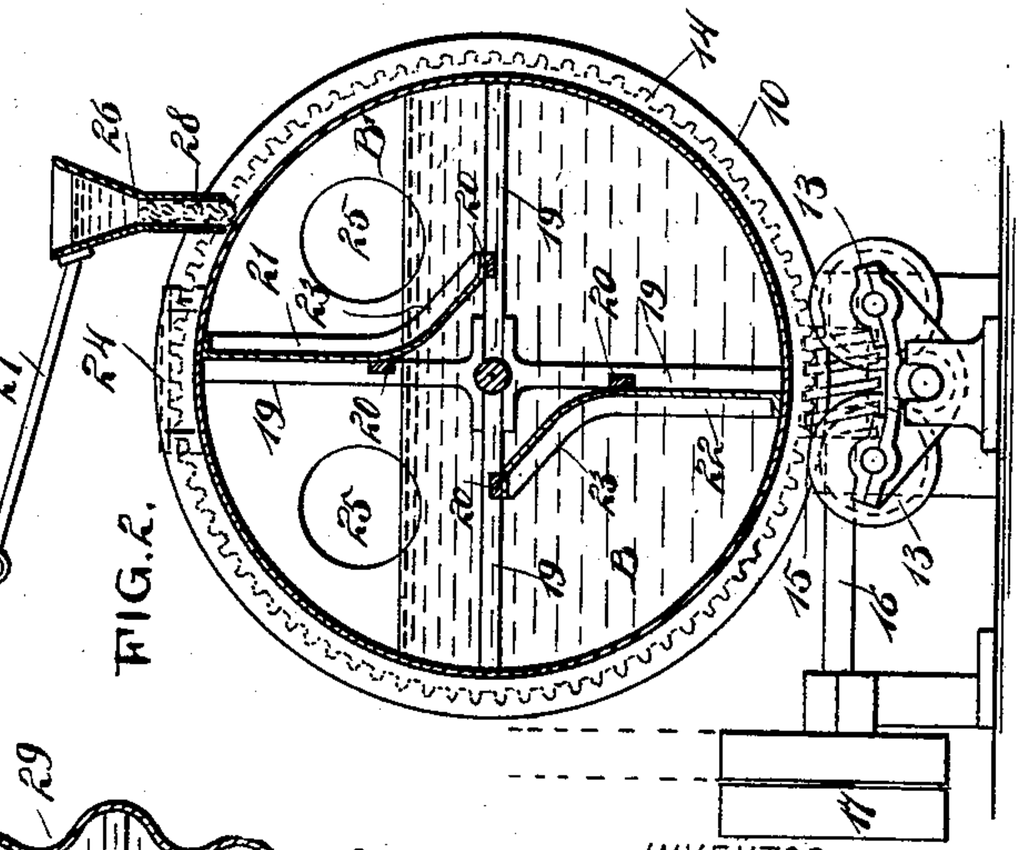
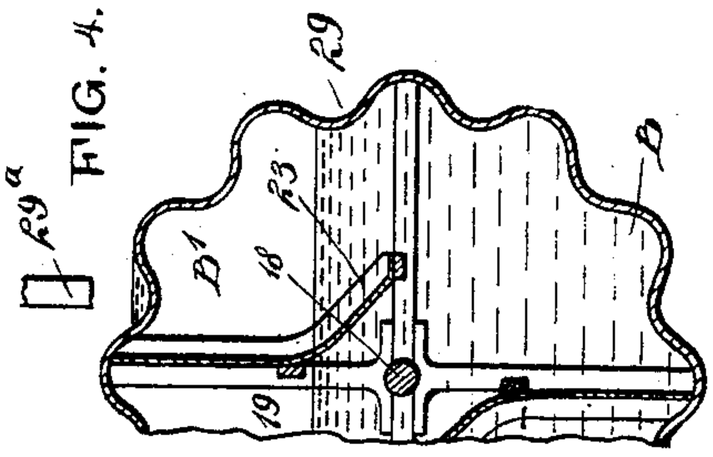


FIG. 4.



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SUGAR-CRYSTALLIZER.

SPECIFICATION forming part of Letters Patent No. 608,446, dated August 2, 1898.

Application filed April 16, 1897. Serial No. 632,460. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. EASTWICK, Jr., of New Orleans, in the parish of Orleans and State of Louisiana, have invented a new and Improved Apparatus for Crystallizing Sugar in Motion, of which the following is a full, clear, and exact description.

The object of my invention is to provide an apparatus for crystallizing sugar in motion which will give a more complete movement to the mass than has been heretofore attained by such an apparatus.

Another object of the invention is to so construct the apparatus that it will obviate the grinding and breaking of the grains incident to the ordinary apparatus by reason of the arms, spirals, or paddles ordinarily appertaining to such machines scraping against the inside of the cylinder, since in the improved device the cylinder and its agitators turn together, effecting a thorough mixture of the masse-cuite without any tendency to injure the grain of the sugar.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

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.

Figure 1 is a longitudinal vertical section through the improved apparatus. Fig. 2 is a transverse section through the apparatus. Fig. 3 is a side elevation of a slightly-modified form of the apparatus, parts being broken away; and Fig. 4 is a transverse section through a slightly-modified form of the cylinder of the apparatus.

The crystallizing-tank A is of cylindrical shape, closed at its ends, and in its simpler form (shown in Figs. 1 and 2) is placed centrally within three rings 10, 11, and 12. The two outer rings 10 and 12 rest upon roller-bearings 13, while the central ring 11 is provided with exterior teeth 14, geared with a worm 15 upon a drive-shaft 16, the latter having suitable driving-pulleys 17. A shaft 18 is passed longitudinally through the center of the cylinder, being secured to the ends of the same. The shaft serves as a central brace, and lateral braces 19 are secured at intervals to the fore sides of the shaft and to the inner side wall of the cylinder, as is particularly shown in Fig. 2. Longitudinal bars 20 connect the transverse braces of each series, the said longitudinal bars being nearer the inner than the outer ends of the transverse braces, as is also shown in Fig. 2.

Two plates 21 and 22 are employed, being attached at opposite sides of diametrically-opposed transverse braces 19 and their connecting-bars. Near the center of the cylinder the plates leave the transverse braces to which their major or straight portions are attached, being curved toward the side wall of the cylinder. The curved portions 23 of the plates are bent in opposite directions and rest upon the longitudinal bars 20, connecting the transverse braces 19, which are at an angle to the braces mainly supporting the plates, as is also shown in Fig. 2. The plates constitute shelves, dividing the cylinder into practically two compartments B and B′, connecting at the center of the cylinder, while the main compartments are in a measure subdivided. The shelves extend from the center of the cylinder to its side surface and from end to end of the cylinder. The cylinder is filled to about two-thirds of its capacity with the masse-cuite, and as the cylinder is revolved that portion of the masse-cuite which is at the bottom is carried up by the shelves and delivered at the top of the cylinder without any tendency to break up the grains of the sugar.

In what is normally the top of the cylinder a covered opening 24 is formed, through which the masse-cuite is introduced into the cylinder, and the cylinder is further provided at one or both ends with covered openings 25, which constitute manholes, admitting of access to the interior of the cylinder.

When it is desired to cool the cylinder, this may be accomplished as shown in Fig. 2, in which a funnel-shaped trough 26 is constructed capable of extending practically from end to end of the cylinder, being suspended from any adjacent support 27. The upper or enlarged portion of the trough is filled with water and the lower portion with sponge 28 or other absorbent material, the absorbent filling being brought in engagement with the periphery of the cylinder, so

that when the cylinder revolves its surface will be thinly coated with water, which, quickly drying, will cause the cylinder to rapidly cool, or the cylinder may be constructed as shown in Fig. 4, in which the periphery of the cylinder is provided with corrugations, forming a series of pockets, and ridges intervening the pockets. Water may be delivered to the pockets through a tube 29^a or its equivalent, and the water will be passed from one pocket to the other until completely discharged. Under this arrangement the evaporation of water would not be so rapid as under the cooling arrangement shown in Fig. 2, but in many instances might be more desirable.

In Fig. 3 I have shown the cylinder as jacketed. The cylinder in this case is provided with a central supporting-ring 30, and a jacket 31 is formed upon each side of this ring, the ring being in its turn held to travel upon roller-bearings 32. The shaft 33 in the cylinder is carried some distance beyond the ends and is mounted to turn in boxes placed upon suitable standards 34. The power applied for turning the cylinder consists in forming at one end of the shaft 33 a worm-wheel 35, engaging with a worm 36 on a drive-shaft 37. The cooling material or the material that is to enter the jacket is introduced through a stationary pipe 38, which is carried into a longitudinal channel 39, made in the worm-wheel and that portion of the shaft adjacent thereto, a suitable packing-gland being employed. Branch pipes 40 are carried in opposite directions from the inner end of the channel 39 to a connection with opposite sides of the jacket adjacent to the driving end of the cylinder, the two jackets being connected by short lengths of pipe 41. The material finds its exit from the jacket at the opposite end of the cylinder in like manner as it obtained ingress—namely, branch pipes 42 are carried from the jacket at the discharge end of the cylinder to a connection with a channel made in the shaft at that end of the cylinder, with which channel a stationary offtake-pipe 43 is connected. Apparatus for this purpose has been in use for some time, and as generally constructed consists of a closed or open receptacle which is stationary, having within it moving arms, spirals, or paddles to keep the mass in motion. The method of crystallizing sugar in this way is to form the grain in the ordinary manner in a vacuum-pan and then to drop the entire mass (called "masse-cuite") from the pan into the crystallizing-tank, where the mass is kept in motion for several hours. This movement causes the sugar to crystallize and the grains to grow; but, as heretofore stated, such an apparatus is very defective, since the contact of the revolving agitators with the sides of the tank will break up or destroy the grains, in many cases largely defeating the object sought to be obtained.

In the operation of the improved apparatus it is adjusted with the opening 24 in its uppermost position, as illustrated in the drawings, and is then filled to about two-thirds of its space with masse-cuite. Power is applied to the cylinder through the medium of the drive-shaft, and by means of the worm-gear operated from the shaft a slow rotary motion is given to said cylinder, the shelves therein moving with the cylinder. The material, masse-cuite, lying at the bottom of the cylinder is carried upward by the curved shelves and is discharged into the empty space above, thus giving constant motion to the entire mass. When the operation is accomplished, the apparatus is adjusted so that the opening 24 is at its lowermost position. The power is then shut off and the movement of the cylinder stopped. The entire contents of the cylinder are then discharged from the opening 24 into the ordinary centrifugal mixer and the sugar is worked off in the centrifugal machine in the usual manner. The apparatus herein described takes the place of sugar wagons or cars, in which sugar is allowed to crystallize at rest. The effect of motion is to hasten crystallization and thus reduce the danger of darkening or souring. The plates or shelves extending from end to end inside the cylinder may be straight or any shape desired. They may be in sections, a number of plates, or one single plate. The shaft 18 is not always necessary. The bearings are not restricted to a shaft arranged as shown, nor are rollers the only manner of supporting that may be used. I do not restrict myself to any particular form of gearing or any particular driving mechanism.

The revoluble cylinder need not necessarily be in a horizontal position, but may be inclined in degree and direction to facilitate the discharge of the contained masse-cuite.

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

1. In an apparatus for the crystallization of sugar, a revoluble cylinder, and one or more plates supported within the cylinder and adapted to turn therewith, the said plates extending from end to end of the cylinder and from the sides of the cylinder toward the center, the inner portions of the said plates being curved in outward directions and toward the side walls of the cylinder, the inner ends of the plates terminating at a point between the center of the cylinder and the side walls so as to form pockets or buckets, whereby masse-cuite contained in the cylinder may be mixed by being continuously carried from the bottom and discharged at the top as the apparatus revolves, substantially as set forth.

2. In an apparatus for the crystallization of sugar in motion, a revoluble cylinder, transverse braces extending from the center of the cylinder to the side walls and arranged at angles to each other, and curved plates forming pockets and extending from end to end of the cylinder, the said plates being sup-

ported by said braces and extending from the junction of one set of said braces with the side walls of the cylinder to the braces arranged at angles to the first-mentioned braces and terminating at a point on the braces between the center of the cylinder and the side wall, as and for the purpose set forth.

3. In an apparatus for the crystallization of sugar in motion, a revoluble cylinder, a shaft extending longitudinally through the center of the cylinder, transverse braces secured to opposite sides of the shaft and to the inner side wall of the cylinder, longitudinally-extending bars connecting the transverse braces of each series, and plates attached to opposite sides of diametrically-opposed braces and their connecting-bars, the said plates extending from end to end of said cylinder and from the peripheral surface to a point near the center, the ends of the plates adjacent to the center being curved in opposite directions and resting upon the longitudinal bars connecting the other transverse braces, substantially as shown and described.

4. In an apparatus for the crystallization of sugar in motion, a revoluble cylinder, plates forming shelves rigidly secured in said cylinder and extending from end to end of the same, the said plates extending from the side surface of the cylinder to the center thereof, the inner portions of said plates being curved in opposite directions and toward the side walls of the cylinder, and means for cooling the cylinder, substantially as described.

5. In an apparatus for the crystallization of sugar in motion, a revoluble cylinder, plates forming shelves stationarily held in the said cylinder at each side of the center, the outer portion of the plates being straight and the inner portion being curved in opposite directions and extending to a point near the center of the cylinder, and a water-distributing device, supported adjacent to the periphery of the cylinder, as and for the purposes specified.

6. In an apparatus for the crystallization of sugar in motion, a revoluble cylinder having its peripheral surface corrugated forming a series of longitudinally-extending pockets, means for revolving said cylinder, and means for distributing water to the periphery of the cylinder to cool the same, substantially as specified.

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