No. 696,217. Patented Mar. 25, 1902.

M. WEINRICH.

APPARATUS FOR PURIFYING MASSE-CUITE.

(Application filed Feb. 26, 1901.)

(No Model.) 3 Sheets—Sheet 1.

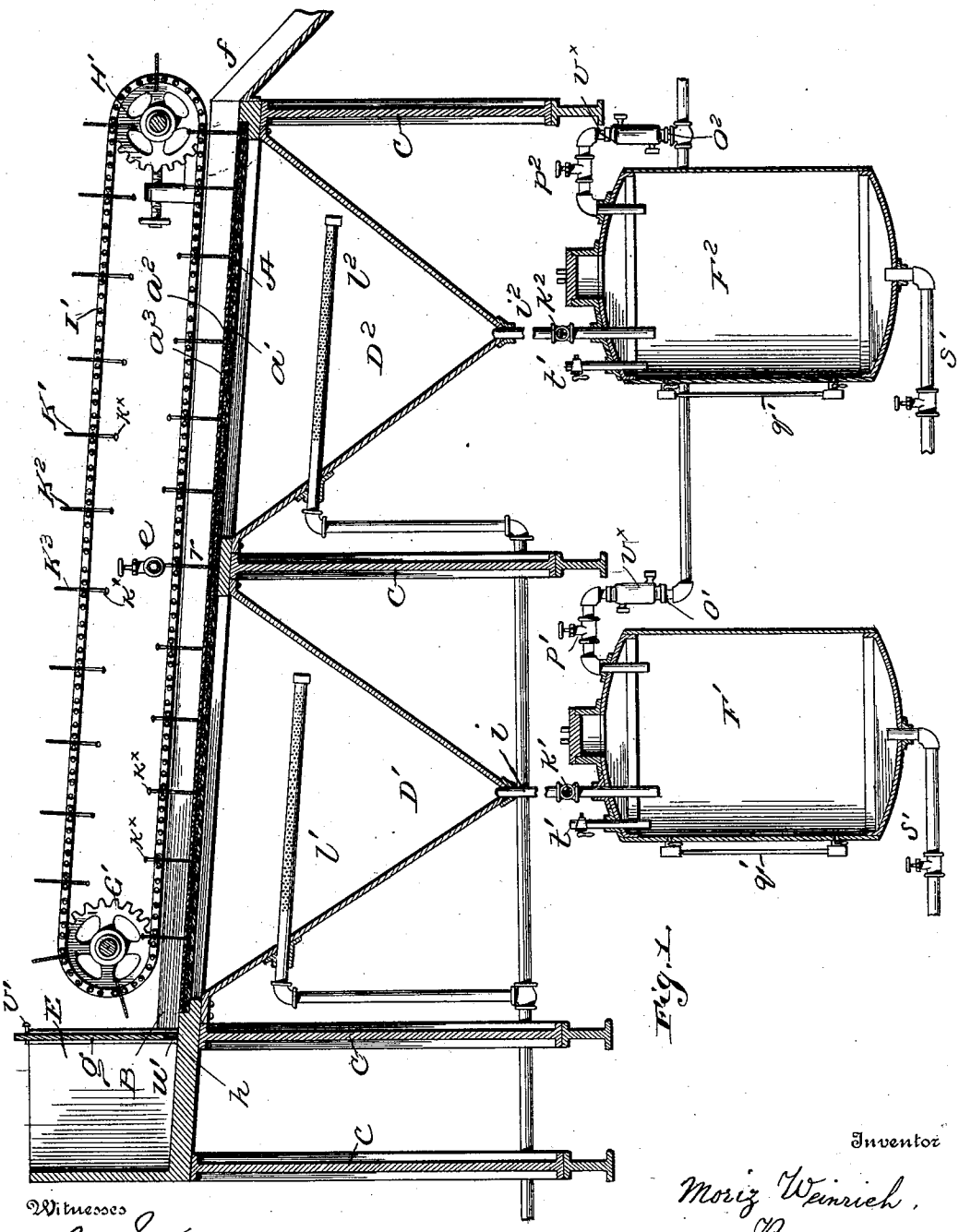


Fig. 1.

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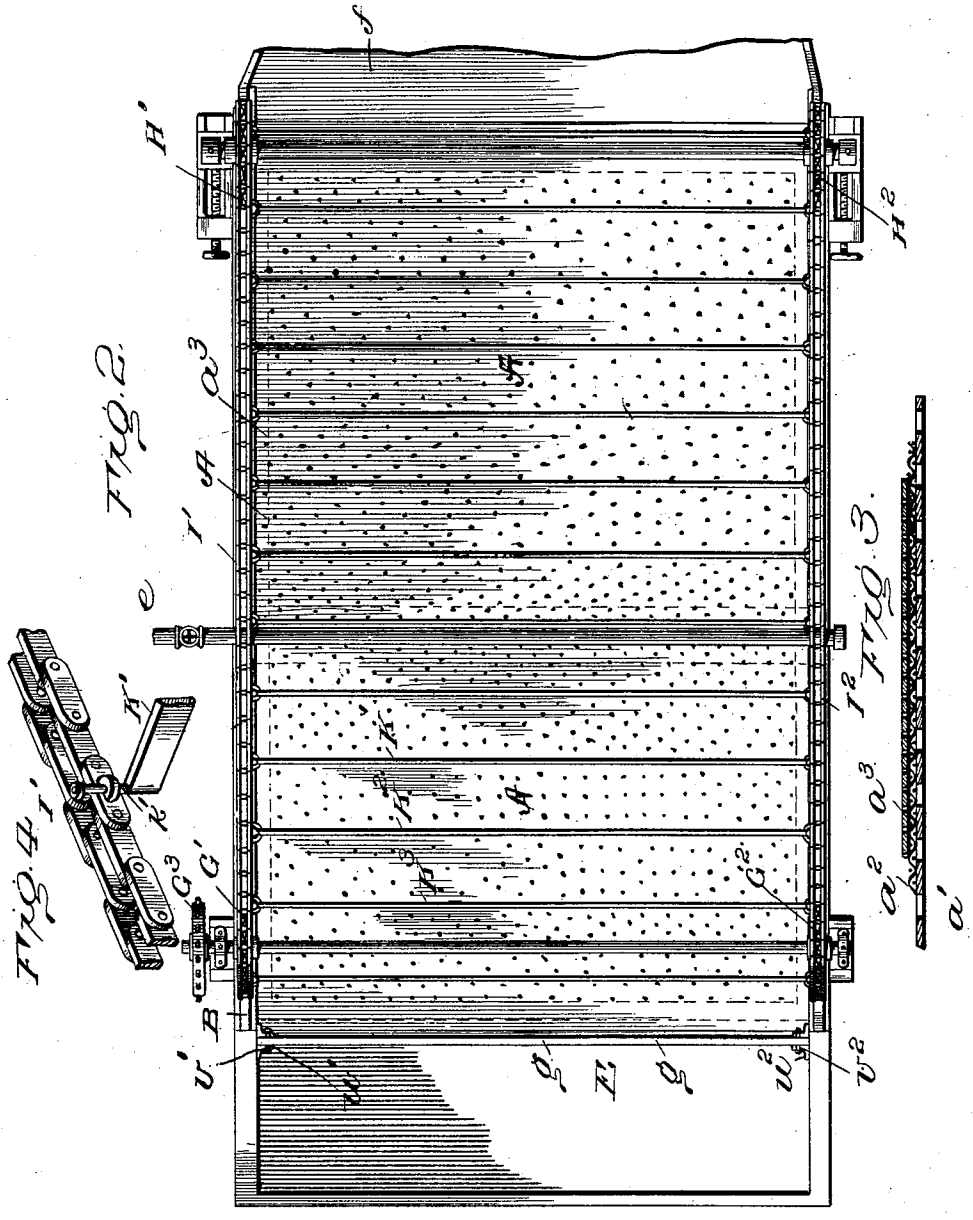
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(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

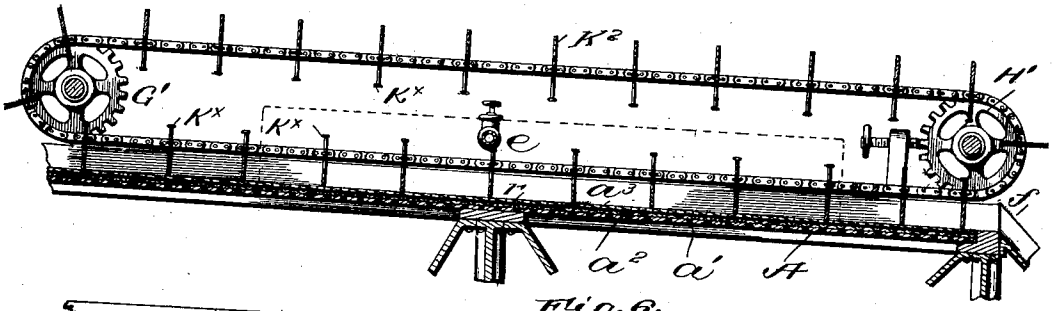
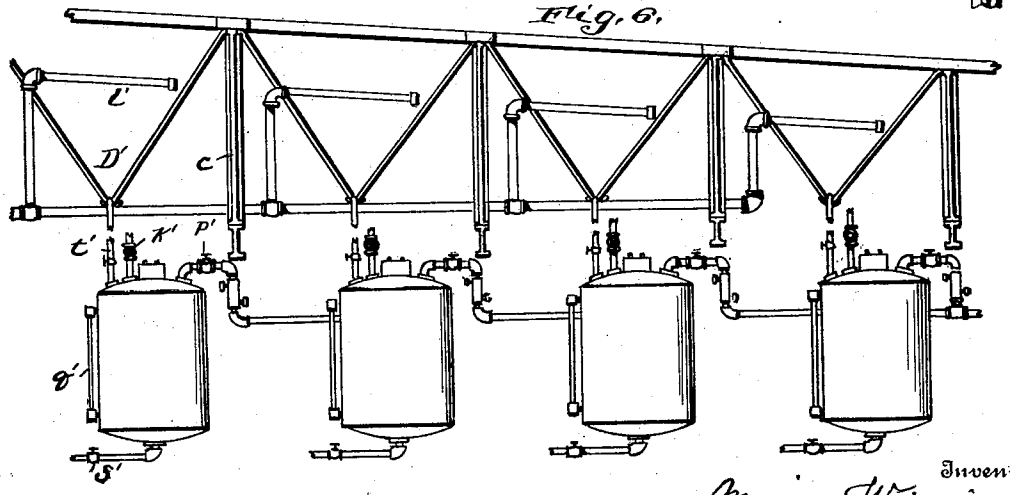


Fig. 6.



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UNITED STATES PATENT OFFICE.

MORIZ WEINRICH, OF YONKERS, NEW YORK.

APPARATUS FOR PURIFYING MASSE-CUITE.

SPECIFICATION forming part of Letters Patent No. 696,217, dated March 25, 1902.

Application filed February 26, 1901. Serial No. 48,915. (No model.)

To all whom it may concern:

Be it known that I, MORIZ WEINRICH, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Apparatus for Cleaning and Washing Masse-Cuite or Raw 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 an apparatus by which masse-cuite or raw sugar mixed with what sugar manufacturers designate as "syrup" into a mass will be freed from most or from all of its adhering dark syrup impurities in a way almost entirely by force of gravity and in a continuous way. To attain this object, I use an apparatus as shown on the accompanying drawings.

Figure 1 is a vertical longitudinal section through the apparatus having oblique bottoms and syrup-receivers. Fig. 2 is a top view of the apparatus; Fig. 3, a detail, enlarged, showing a portion of the table or plate; Fig. 4, a fragment, enlarged, of a portion of one of the endless chains and of a scraper; Fig. 5, a detail indicating where a hood or cover is used if steam be employed. Fig. 6 illustrates a duplication of the vacuum-chambers and of the syrup-receivers.

The apparatus consists of an inclined rectangular compound plate A, set at an angle of from ten to fifteen degrees, made of sheet-iron or of cast-iron, provided on three sides with the rim B and the feeding-trough E and resting on suitable standards C C C C.

D′ D² represent casings, forming vacuum-chambers, having converging inclined bottoms, as hereinafter described. As shown on the drawings, the plate is composed of three layers or parts a' a^2 a^3 (see Fig. 3) and is perforated to its greater part with holes. The holes in the lower layer should have a diameter of about one-fourth of an inch. It is covered with a wire sieve a^2, as shown, having meshes of about one-fourth inch diameter. On top of this wire sieve is fastened a sheet a^3 of copper or of brass which should be similar to a centrifugal sieve, finely and closely perforated as far as the perforations of the plate A extends. The rim B should have a height of about three inches.

The feeding-trough E, which receives and distributes the mass to be treated, may have a width and a height of from nine to twelve inches, its inner side g being arranged to slide up and down in the guides u' u^2, which may be made of angle-iron, and to be set higher or lower, as desired, by the adjusting-pins v' v^2. By raising g more or less above A the opening h beneath g will be there formed along the whole width of A, so that the mass will run in a stream of uniform thickness from E upon plate A.

G′ and G², as well as H′ and H², are two pairs of sprocket-wheels fastened on shafts which rest and turn on suitable bearings, as shown. One of the shafts is provided with a third sprocket-wheel G³ or a cog-wheel connected to any suitable driving-gear, as may be needed. Over the four sprocket-wheels run the two endless chains I′ and I², which are connected by a number of scrapers K′ K² K³, &c., made of iron or wood and which are set, say, from six to eight inches apart and hung in such a way that they may vertically slide by means of their supporting-pins k^x when the scraper and their chains I′ I² are in motion, and thus causing the scrapers to drop by gravity closely over the perforated plate A.

e is a perforated pipe extending over the whole width of the plate and through which what sugar manufacturers designate as "claircе" or water or steam is distributed upon the mass.

f is a chute for discharging the cleaned mass.

The two oblique casings D′ and D², made of sheet-iron or of cast-iron and severally in the form of an inverted pyramid, as indicated in Fig. 1, extend through the whole width of the plate and are fastened air-tight to it. They severally connect, as shown, through the pipes i' and i^2 and valves k' k^2 with the respective syrup-receivers F′ and F².

l' l^2 are pipes for introducing steam into the bottoms D′ D² for warming and cleaning the perforated plate A from beneath. The sides of these bottoms may be made vertical in-

stead of oblique, as shown; but I prefer oblique sides, as they form no corners in which syrup would remain and become sour.

The pipes o' o^2, with valves p' p^2, connect, respectively, the receivers F' F² with a vacuum-pump or an injector $v^\times$, of any known form, for creating a partial vacuum in F' and F², respectively, and from these through the pipes i' i^2, respectively, in the space within the chamber between the casings D' and D², respectively, and thence through the plate A.

The apparatus is operated in the following way: Masse-cuite, or raw sugar, mixed with syrup to a mass or magma is run continuously from a mixing apparatus, as they are generally used in sugar-houses, into the trough E, from where it will by gravity slide slowly forward through the opening h in a uniform stream, which, according to the grain and quality of the mass, may have a thickness of from one to two inches, over the inclined perforate plate A. While sliding over the perforated part of this plate a part of the adhering syrup will pass through the holes into the bottom D' and from there through the pipe i' into the syrup-receiver F'. Excepting the mechanical positive action given to the endless chains I and I' and scrapers $k^\times$ $k^\times$ $k^\times$, the operation of the machine is caused by gravity. This procedure will be greatly accelerated by the action of a vacuum-pump or an injector $v^\times$, which will create a partial vacuum through the pipe o' in F' and from there through pipe i' in D'. The natural forward motion by gravity of the mass over the inclined plate is assisted and regulated when needed by the scrapers $k^\times$ $k^\times$ $k^\times$, &c., which can be moved by the endless chains I' and I² over the sprocket-wheels G' G² and H' H², closely over the plate A, so that the velocity and the thickness of the sliding mass remain uniform while traveling over the plate. The velocity of the scrapers when operated should be about one foot in three minutes. When the mass has reached the distance or point indicated at r beneath the perforated pipe e, a spray of claircе or of water or of steam will be poured upon such mass, which will then move on upon the lower part or half of the inclined plate A toward the discharge-chute f. During this time the claircе or water or steam will displace and wash off from the crystals the remainder of the adhering dark syrup, which will pass, mixed with the washing agent, through the holes of the lower part of perforate plate A into D² and thence through i^2 into F². The cleaned crystals will by the forward motion of the mass be pushed slowly over the lowest or discharge end of the plate A into the chute f, from where they will drop upon any suitable conveying device for further treatment. In case the steam be used as a purifier, part of the lower half and part of the upper half of plate A should be covered by a hood (indicated on Fig. 5 by dotted lines) to prevent as much as possible the escape of any steam. This hood may be fastened in any way to the rim B. The syrup running from D' into the syrup-receiver F' will be generally too low in purity for using it again to advantage in the washing process, and is therefore removed for other purposes. By the gage q' it is drawn off through the pipe s'. While this is done the valves k' and p' have to be kept closed and the air-cock l' opened. The syrup running from D² into F² is mixed with the washing agent and is therefore of higher purity than the syrup running into F'. It is drawn off through s^2 in the same way as the syrup from F' and may be used for preparing raw sugar in the mixer for the washing process. The syrup-receivers F and F² may serve, if made sufficiently large, for a number of apparatuses.

The plate A may have a width of from three to six feet, according to the quantity of mass of material which shall be treated by one apparatus. Its length from the point h to r should be three to four feet and be the same from r to f. Instead of setting the plate A on an incline it might be set horizontally; but I prefer the inclined position, as considerable power can be saved in this way.

Instead of two parts with two vacuum-chambers D' D² and two syrup-receivers, as F' and F², the apparatus may be duplicated and consist of four of such parts, as shown in Fig. 6. In this case the syrup gathered in receiver F' will be removed for other purposes, and that gathered in F² may be used for mixing it with raw sugar in the mixing apparatus. The syrup gathered in a such third receiver like F² can be used as a washing agent through the first perforated pipe e, the syrup from a fourth similar receiver for the same purpose through a second perforated pipe e, and only through the last perforated pipe e pure claircе or water or steam will be poured upon the mass. On the other hand, if masse-cuite shall be only converted into raw sugar without using any washing agent the apparatus will consist only of one part with one syrup-receiver, and the pipe e can be dispensed with. In this case only the desired amount of syrup adhering to the sugar crystals will be removed while sliding over the plate A, and the raw sugar will drop over the discharge end through the chute f upon a conveyer.

The advantages of this apparatus are the following: first, mainly gravity feeding and continuous working; second, saving of all hand labor and of almost all power; third, the apparatus is very simple and cheap, and wear and tear are very small; fourth, owing to the thin layer in which the mass is exposed to treatment very low and fine-grained sugar can be cleaned to great advantage, the cleaning of which in thick layers is always very difficult.

I claim—

1. An apparatus for cleaning and washing masse-cuite or raw-sugar mass, having in com-

bination an inclined plate perforated in its greater part, provided with a feeding-trough and with a rim, one or more casings forming vacuum-chambers, a set of scrapers for assisting and regulating the gravity feeding action of the mass, means for distributing washing agents upon the mass to be cleaned, and a chute for automatically discharging the cleaned crystals, substantially as set forth.

2. An apparatus for cleaning and washing masse-cuite or raw-sugar mass, having in combination, an inclined plate perforated in its greater part, provided with a feeding-trough and with a rim, one or more casings forming vacuum-chambers, a set of scrapers for assisting and regulating the gravity forward motion of the mass, means for distributing washing agents upon the mass to be cleaned, a chute for discharging the cleaned crystals, means for creating a partial vacuum and means for introducing steam in said chambers, substantially as set forth.

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

MORIZ WEINRICH.

Witnesses:

JAMES S. FITCH,

M. F. WEINRICH.