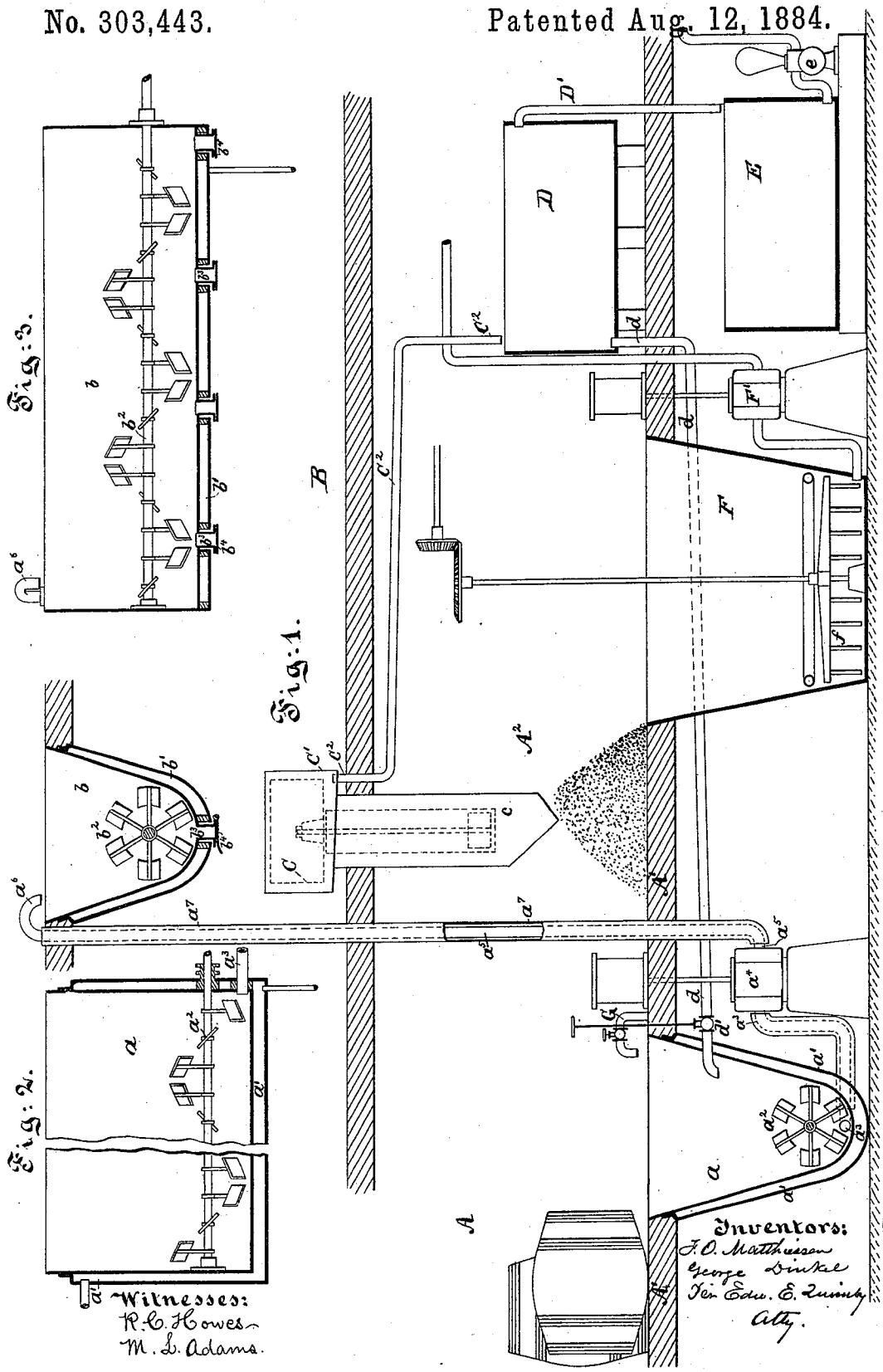
(No Model.)

F. O. MATTHIESSEN & G. DINKEL.

PROCESS OF WASHING RAW SUGAR.

No. 303,443. Patented Aug. 12, 1884.



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UNITED STATES PATENT OFFICE.

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PROCESS OF WASHING RAW SUGAR.

SPECIFICATION forming part of Letters Patent No. 303,443, dated August 12, 1884.

Application filed May 3, 1884. (No model.)

To all whom it may concern:

Be it known that we, FRANZ O. MATTHIESSEN, of Irvington, New York, and GEORGE DINKEL, of Jersey City, New Jersey, have invented certain Improvements in Apparatus for Washing Raw Sugar, of which the following is a specification.

Our improvements are designed, especially, to facilitate the carrying out of the process of washing raw sugar shown and described in Letters Patent of the United States No. 191,539, granted to Franz O. Matthiessen, and our invention embraces an arrangement of apparatus by means of which raw sugar delivered into the receiving-room of the refinery is fed into one end of a steam-jacketed mixing-trough containing a rotating horizontal stirrer with spirally-inclined blades, by the operation of which the raw sugar is moved from the end of the trough at which it is received to the opposite end, from which it is pumped after it has been reduced to a semi-liquid state by mixture with the desired quantity of water or with sirup or molasses with or without water, as circumstances may require. By means of the pump the magma withdrawn from the mixer is forced up through a hot-water-jacketed pipe and delivered into one end of an elevated steam-jacketed distributing-trough having a series of outlets in its bottom, which are provided with suitable valves, and are arranged immediately over the baskets of a corresponding series of centrifugal machines in which the magma is drained. The sirup or molasses driven out of the magma is collected in the stationary drum surrounding the centrifugal machine, from the lower edge of the inclined bottom of which it is conducted by a suitable pipe to a receiving-tank, from the bottom of which a drain-pipe leads back to the mixing-trough. This drain-pipe is provided with a suitable valve for controlling the supply of molasses to the mixing-trough. The receiving-tank is provided with an overflow-pipe, by means of which the surplus of molasses or sirup above the quantity required for return to the mixing-trough is conducted to a second tank, which, for convenience, we call the "surplus" tank, for such subsequent disposal as may be desired. The baskets of the centrifugal machines are provided with discharge-outlets at the bottom, by means of which, after the draining operation is completed, the washed sugar is discharged through suitable chutes and falls to a lower floor, from which it is from time to time, as may be required, shoveled into a melting-tank provided with a stirrer rotating upon a vertical axis, wherein it is dissolved in a suitable quantity of water, preparatory to being pumped up to the washed sugar blow-ups in the refinery. By this mode of organizing our apparatus elevators for elevating the raw sugar are dispensed with and the magma is delivered to the centrifugal machines in such a heated condition that the molasses or sirup is easily drained from it. Having been raised to the suitably-elevated distributing-trough, the magma falls therefrom by its own gravity to the centrifugal machines, from which the raw sugar, after having been drained, falls by its own gravity to the chamber in which the melting-tank is situated, while the molasses or sirup drained from the magma is conducted down into the receiving-tank, from which a portion of it is conducted back to the mixer, while the surplus overflows into the surplus-tank. The entire process of forming the raw sugar into a magma by mixture with more or less sirup or molasses with or without fresh water, keeping the magma warm and draining it in the centrifugal machines, dropping the washed and drained raw sugar from the centrifugals to the melting-room, conducting the required quantity of sirup or molasses back to the mixing-trough, and collecting the surplus of molasses or sirup in the surplus-tank is thus performed continuously and with great facility.

In the accompanying drawings, representing a portion of a refinery containing our improved apparatus, Figure 1 is a vertical section of the basement and first and second and third floors of the refinery. Fig. 2 is a longitudinal vertical section of the mixing-trough, and Fig. 3 is a longitudinal vertical section of the distributing-trough.

It will of course be understood that in the drawings no especial attention is paid to dimensions, and that the only material particu-

lars in the arrangement of the apparatus are the relative elevations of the various devices shown.

The raw-sugar room A is preferably upon the first floor, A′, of the refinery, on a level with the street.

The mixing-trough *a* has a round bottom and flaring sides, the upper edges of which are on a level with the floor A′. The bottom and sides, and, if desired, the ends, of the mixing-trough are surrounded by the steam-jacket *a′*, into which steam is introduced from a suitable boiler in the usual manner. In the bottom of the mixer is a horizontal stirrer, a^2, provided with radial arms, to which are affixed spirally-inclined blades, by the rotation of which the contents of the mixing-trough are stirred, and at the same time propelled toward the discharge end of the trough, into which is inserted the induction-pipe a^3 of the pump a^4. The eduction-pipe a^5 of the pump a^4 extends vertically upward, and is provided at the top with the curved nozzle a^6, by means of which the magma is discharged into the distributing-trough *b*, which is suitably supported at or near the ceiling of the second story of the refinery. The vertical pipe a^5 is surrounded by a hot-water jacket, a^7, suitably supplied with hot water in the usual manner. If the pump a^4 is at a considerable distance from the mixer, the induction-pipe a^3 of the pump is also surrounded with a steam or hot-water jacket.

The distributing-trough *b* is provided with a steam-jacket, *b′*, suitably connected with a steam-boiler, and is also provided with a horizontal stirrer, b^2, of similar construction to the stirrer a^2. At suitable intervals the bottom of the distributing-trough has discharge-outlets b^3, each of which is provided with a valve, b^4. The series of discharge-outlets b^3 are immediately over a corresponding series of centrifugal machines, which are arranged upon the second floor, B, of the refinery.

One of the centrifugal machines, C, is shown in Fig. 1. By means of the ordinary valves in the bottoms of the centrifugal machines the raw sugar, after having been drained, is discharged through suitable chutes, one of which, *c*, is shown in Fig. 1, by which the raw sugar is conducted down to the melting-room A^2 of the refinery, which in the drawings is represented as being on the first floor, A′. Each centrifugal machine is provided with the usual drum, C′, having an inclined bottom, from the lower part of which a drain-pipe, C^2, conducts the molasses or sirup which has been drained out of the magma down to the receiving-tank D, which in the drawings is also represented as being in the first floor, A′, of the refinery. A drain-pipe, *d*, leads from the bottom of the receiving-tank D back to the mixing-tank *a*, and is provided with a valve, *d′*, by means of which the supply of molasses or sirup to the mixing-tank is regulated. An overflow-pipe, D′, conducts the excess of molasses from the tank D to the surplus-tank E in the basement, from which the molasses or sirup is pumped by means of a pump, *e*, for such further treatment as may be desired. The washed raw sugar discharged from the centrifugals is from time to time shoveled into the melting-tank F, provided with a stirrer, *f*, where it is dissolved in a suitable quantity of water, and from which it is pumped by means of a pump, F′, to the washed sugar blow-ups in the refinery.

In carrying out this process of washing raw sugar the first batch of raw sugar is dissolved in fresh water, which is supplied to the mixing-trough *a* from the service-pipe G. Thereafter the liquid for mixing with the raw sugar is composed, either wholly or partially, of molasses or sirup returned to the mixer through the pipe *d* from the receiving-tank D. The proportion of molasses or sirup available for mixture with the raw sugar will vary according to the quantity of impurities present. By this mode of washing raw sugar, which consists in using the molasses or sirup over and over in the mixer, the impurities of the sugar are concentrated in the molasses or sirup, and in dealing with raw sugar of very low grade the quantity of impurities present may be so great as to permit the return to the mixer of only a small quantity of the molasses or sirup drained from such low-grade sugar. In practice, however, it will be easy for the operator to regulate the quantities of fresh water and molasses or sirup introduced into the mixer with the raw sugar to form the magma therein, so that the washing operation will be continuous.

We claim as our invention—

1. A steam-jacketed mixing-trough, substantially such as described, in combination with a pump connected with the discharge-outlet of the said mixing-trough, and provided with a hot-water jacketed eduction-pipe for leading the magma upward to an elevation above the centrifugal machines in which it is to be drained.

2. A mixing-trough, substantially such as described, and a pump for removing the magma from the mixing-trough and forcing it up to a prescribed elevation, in combination with a steam-jacketed distributing-trough, substantially such as described, for receiving the magma pumped up from the mixing-trough, and a series of centrifugal machines arranged beneath suitable valves in the bottom of the distributing-trough to receive the hot magma discharged therefrom.

3. A mixing-trough, substantially such as described, means for removing the magma from the mixing-trough and elevating and delivering it to one or more centrifugal machines, in combination with a drain-pipe for conducting off the molasses or sirup drained from the magma, and a receiving-tank to receive such molasses or sirup arranged below the level of the centrifugal machines and above the level

of the mixing-trough, and provided with a discharge-pipe for conducting molasses or sirup from the receiving-tank to the mixing-trough, as and for the purpose set forth.

4. In a system of apparatus substantially such as described, a steam-jacketed mixing-trough, means for removing the magma therefrom and raising and delivering it to centrifugal machines arranged upon a higher elevation, means for conducting back to the mixing-trough the molasses or sirup, or any desired portion of the molasses or sirup, drained from the magma by the centrifugal machine, and a melting tank or tanks arranged below the level of the centrifugal machines for melting the washed raw sugar dropped from the centrifugal machines, and a pump or pumps for removing the contents from the melting tank or tanks.

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Witnesses:
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