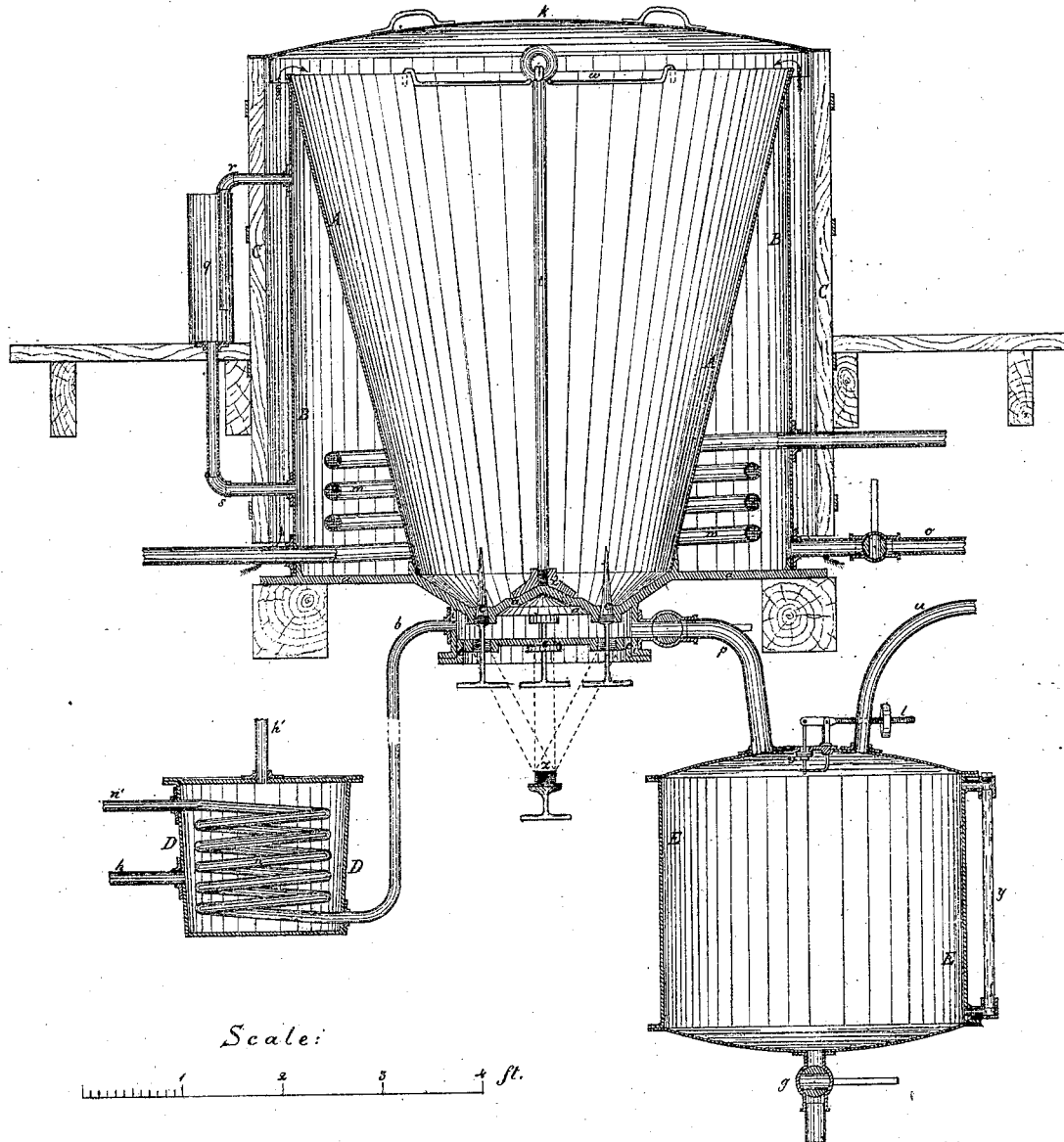


A. F. W. PARTZ.

Improvement in Refining Sugar.

No. 114,192.

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Witnesses:
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AUGUST F. W. PARTZ, OF OAKLAND, CALIFORNIA.

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IMPROVEMENT IN REFINING SUGARS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, AUGUST F. W. PARTZ, of Oakland, in the county of Alameda and State of California, have invented certain Improvements in the Refining of Sugar; and I hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to the molding, draining, and drying of sugar in process of refining; and

Its nature consists in the employment of large stationary molds incased in vessels wherein water or air can be heated and held at certain temperatures, in expediting the drainage of the sirup by atmospheric pressure in a manner easy of regulation, and in drying the sugar by compressed heated air introduced at the bottom of the molds and forced through the crystallized sugar.

My invention also embraces a certain device hereinafter described for the removal of the sugar from the molds after the completion of the process, together with certain mechanical arrangements for the proper conduction and control of the operation in its various stages.

The following is a description of the apparatus which I employ, reference being had to the accompanying drawing, which represents a vertical section of the same.

A is a sheet-iron cone, and

B a cylinder of the same material. Both are tightly riveted together at their upper edges, while their lower edges are riveted to the cast-iron bed-plate *a*.

i is a cylindrical flange which is cast upon the bed-plate *a*, and upon which is screwed the circular bottom piece *e*.

c c are conical iron plugs provided with handles, by means of which they are screwed into four equidistant holes in the circular depression of the bed-plate *a*.

Directly below these holes there are also four holes in the bottom piece *e* large enough to admit of the plugs *c* being drawn through them, and which, after the removal of the said plugs, may be closed up by four plugs, like that represented by *z*, being screwed into them.

Attached to the circular flange *i*, and opening into the chamber *a i e*, are two pipes, *b* and *p*.

The pipe *b* connects with one end of a "worm," *n*, which is inclosed in an iron vessel, D, while the other end, *n'*, of the said worm communicates with a pump adapted to the production of a continuous current of compressed air.

h h' are pipes by means of which steam may be passed through the vessel D.

The pipe *p* connects with a cylindrical vessel, E, to which is attached another pipe, *u*, which communicates with a pump or some other contrivance suited for the exhaustion of air.

v is a valve which can be so adjusted by means of a weight, movable upon the lever *l*, that it admits air into the vessel E as soon as a certain degree of exhaustion of the air therein is exceeded.

y is a glass tube to indicate the height of a liquid contained in the vessel E.

g is a stop-cock or faucet.

m is a coil of pipe through which steam may be conducted.

o is a pipe which can be closed by a stop-cock, and through which the space A B *a* may be filled with or emptied of water.

q is a cylindrical vessel intended for indicating the height of the said water, which rises into it through the pipe *s*, and also to serve as a convenient means of measuring its temperature by the introduction of a thermometer.

The pipe *r* is for the purpose of allowing the air to escape while the water is rising in A B *a*.

C is an open cylinder made of wood or some other suitable material. It surrounds the cylinder B, leaving a space between, and upon it lies a sheet-iron cover, *k*.

t is a rod slightly tapering downward, upon the lower end of which is screwed the cast-iron piece *z*, which rests upon a conical elevation in the center of the bed-plate *a*.

Its upper end forms an eye and is held in place by a rod, *w*, so bent as to form two prongs, the hooked ends of which rest upon the rim of the vessel A *a*, while a hook at the junction of the prongs catches in the said eye.

The operation is as follows:

The space A B *a* is to about two-thirds of its height filled with water, which, by means of steam passed through the coil *m*, is heated to about 160° Fahrenheit.

The cover *k* is removed and the vessel A *a* is filled with boiled sugar as it comes from the vacuum-pan. The cover being replaced, the sugar is left to "set" for about twenty-four hours, during which time the temperature of the water surrounding the mold A *a* is gradually lowered to about 120° Fahrenheit.

The mold is then uncovered, the pronged rod *w* is taken off, the glutinous substance named "selimear," which has collected on top of the now solidified sugar is removed, the surface of the sugar is "brushed" and leveled, and the cover is replaced, whereupon the plugs *c* are taken out and the plugs *z* screwed into the bottom piece *e*, so that the sirup draining from the sugar may flow through the holes in which the plugs *c* were inserted, and the pipe *p* into the vessel E, from which it is discharged through the faucet *g*.

When the sirup has ceased to flow off freely the faucet *g* is closed, and, by means of the exhaust-pump

connected with the pipe *u*, air is drawn from the vessel *E* until the atmospheric pressure upon the contents of the vessel *A a* amounts to from two to five pounds upon a square inch, according to the quality of the sugar and the manner in which it was boiled, the weight upon the lever *t* having previously been placed conformably.

Thus the flow of the sirup is expedited; but as, at this stage of the operation, the sugar in the lower part of the mold may not yet be firm enough to withstand more than a moderate pressure, some of it might be forced out with the sirup if the exhaustion of the air should be carried too far.

After several hours, a concentrated solution of white sugar, termed "liquor," is poured upon the molded sugar, allowing for each one thousand pounds of the latter from three to four gallons of liquor, and by drawing more air from the vessel *E* the atmospheric pressure is gradually increased a few pounds per square inch.

When most of the liquor has passed through into the vessel *E*, carrying with it part of the brown sirup yet remaining in the sugar, an equal quantity of liquor as before is poured upon it, and some more air is drawn from the vessel *E*.

This operation is yet repeated once, twice, or thrice, according to the higher or lower grade of the sugar under treatment. Before, however, the last liquor is poured on the temperature of the water surrounding the vessel *A a* is raised again to from 150° to 160° Fahrenheit, where it is kept to the end of the process.

While the last liquor is passing through the sugar, air is continually drawn from the vessel *E* to form and keep up as complete a vacuum as the apparatus will permit, until air enters the said vessel through the sugar, whereupon the exhaust-pump is yet worked for about an hour, the air drawn through the sugar being previously heated while passing between the cylinders *B* and *C*, as indicated by arrows.

The draining of the sugar being thus practically completed, it now remains to be dried. To this end the stop-cock inserted in the pipe *p* is closed, the cover *k* is removed, "escape" steam is passed through the vessel *D*, and the compression-pump connected with the upper end *n'* of the worm *n* is set to work. Thus a current of air, which is heated in passing through the said worm, is forced by way of the pipe *b*, the chamber *a i e*, and the holes in which the plugs *c* were inserted, into and through the molded sugar, gradually taking up and carrying with it all moisture yet retained in the crystalline mass.

If the pump is of sufficient capacity, having a cylinder of from eight to ten inches in diameter, and is briskly worked, the drying of the sugar may in this manner be effected in a few hours.

Upon the completion of this operation the hoisting-chain of a crane is fastened to the eye at the upper end of the rod *t*, and the whole mass of sugar (which according to the scale adopted in the accompanying drawing will weigh about four thousand five hundred pounds) is lifted from its mold and swung upon a platform. The piece *x* is then screwed off the rod *t* and the latter is drawn out, whereupon the sugar is sawed into pieces or broken up.

• Instead of water, air may be heated in the space *A B a* surrounding the vessel *A a*, although in that case the requisite temperatures will be more difficult to maintain.

Instead of placing the valve *v* upon the vessel *E*, it may to the same purpose be attached to either of the pipes *p* and *u*.

Instead of using two separate pumps for the exhaustion and the compression of air, one pump, if

suitably constructed, may be made to answer both purposes in a way that will readily suggest itself to any practical machinist.

In order to facilitate the breaking up of the sugar, its mass may at once be partially divided by the vertical suspension of some sheets of metal in the mold *A a* prior to the casting of the sugar.

The process above described aims at the saving of labor, fuel, and time in the refining of sugar.

First, it does away with much manipulation pertaining to the employment of numerous small molds, as in the present system;

Second, it does away with the heating of large apartments to from 100° to 130° Fahrenheit, for the purpose of keeping the sugar put up therein at the temperatures requisite for its draining and drying; and

Third, it accomplishes in a few days what now requires a couple of weeks. Besides, the removal of the brown sirup is effected with far less white liquor proportionately than must now be used, and the crystallization of the sugar is more perfect on account of the higher temperature at which it takes place.

I do not claim, broadly, the mode of drying sugar by means of air or heated air forced or drawn through it, nor that of extracting sirup or other liquids from porous substances by means of atmospheric pressure caused by the exhaustion of air, as those parts of my process have been practiced heretofore.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The process substantially as herein described of molding, draining, and drying boiled sugar in large masses.

2. The apparatus herein described for executing the above-claimed process, consisting principally of a mold, *A a*, surrounded by a case, *B a*, and provided with a chamber, *a i e*, underneath its bottom, which chamber communicates by means of a pipe, *b n*, with a compression-pump, and by means of another pipe, *p*, with a receiving-vessel, *E*, which connects with an exhaust pump, all so combined and arranged as to operate substantially as set forth.

3. The incasing-vessel *B a*, in connection with the mold *A a*, substantially as and for the purpose herein specified.

4. In combination with the mold *A a*, the receiving-vessel *E*, when provided with a valve, *v*, for limiting adjustably the degree of exhaustion, arranged to operate substantially as herein described.

5. In combination with the mold *A a*, the rod *t*, provided at its upper end with an eye or hook and at its lower end with the nut or flange *x*, or some equivalent device, substantially as and for the purpose herein set forth.

6. In combination with the mold *A a*, the bottom piece *e*, provided with apertures through which the plugs *c* may be inserted in and withdrawn from their respective holes in the bottom of the said mold, and which apertures, after the removal of the said plugs, can be tightly closed by plugs like *z*, or some equivalent means, substantially as and for the purpose herein specified.

7. The cylinder *C*, in combination with the cover *k* and the mold *A a*, substantially as and for the purpose herein described.

8. The vessel *g* and the pipes *s* and *r*, or their equivalents, in combination with the vessel *B a*, substantially as and for the purpose herein set forth.

AUGUST F. W. PARTZ.

Witnesses:

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