L. E. SCHMALZ.

MANUFACTURE OF SUGAR.

No. 192,531. Patented June 26, 1877.

Fig. 1

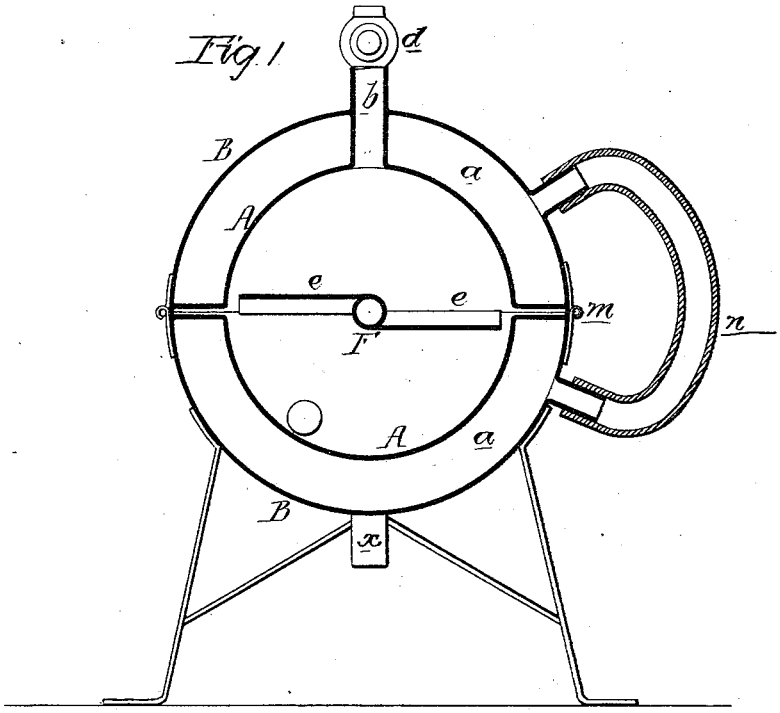
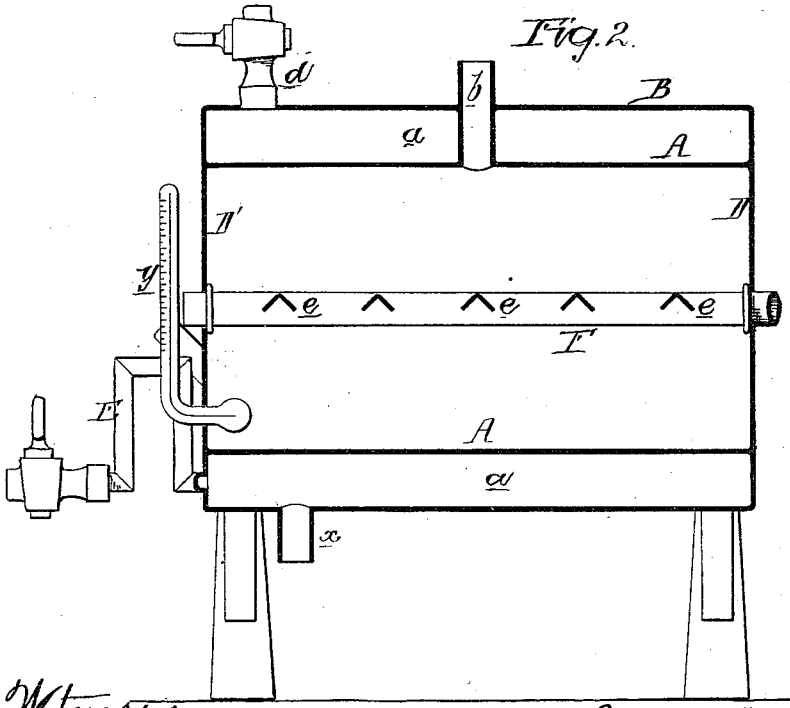


Fig. 2.



Witnesses
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UNITED STATES PATENT OFFICE.

LOUIS E. SCHMALZ, OF THE CANTON OF BERNE, SWITZERLAND, ASSIGNOR OF ONE-HALF HIS RIGHT TO ELBERT A. CORBIN, TRUSTEE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN MANUFACTURE OF SUGAR.

Specification forming part of Letters Patent No. **192,531**, dated June 26, 1877; application filed October 19, 1876.

To all whom it may concern:

Be it known that I, LOUIS E. SCHMALZ, of the Canton of Berne, Switzerland, have invented certain Improvements in the Manufacture of Sugar, of which the following is a specification:

The object of my invention is the rapid and economical conversion of partially-concentrated saccharine sirups into marketable sugar, having no traces of molasses, by agitating the said juices when they have reached a given density, and while they are subjected to heat, and protected from the deteriorating influence of the atmosphere, and after granulation takes place by agitating the granulated mass while exposed to heat, and thereby producing dry sugar, ready for transportation.

In carrying out my invention different kinds of apparatus may be employed, but I prefer that shown in the accompanying drawing owing to its simplicity and efficiency in practice.

Figure 1 is a transverse section of the apparatus, and Fig. 2 a longitudinal section.

The concentrating-vessel consists, in the present instance, of a hollow cylinder, A, surrounded by a jacket, B, both being secured to heads D D′, which close the cylinder at the opposite ends, and also close the annular space *a* between the cylinder and the jacket. Into this space steam is introduced through a bent pipe, E, at one end of the vessel, and at any suitable point is an outlet, *x*, to be furnished with a suitable valve or faucet for permitting the escape of the steam and water of condensation when necessary.

At the top of the vessel there is a pipe, *b*, communicating with the interior of the cylinder A, for the escape of the vapors, as explained hereinafter, and on the jacket at any suitable point there should be an appropriate safety-valve, which may be attached to the faucet *d*.

There should also be in connection with the vessel a thermometer, *y*, the bulb of which is exposed to the contents.

In the present instance the thermometer is attached to one of the heads of the vessel.

Through the center of the vessel extends a shaft, F, having its bearings in the opposite heads D D′, and to this shaft are secured two sets of vanes or paddles, *e*, those of one set being opposite to the spaces between the vanes of the opposite set, so as to insure a thorough stirring and disintegrating of every portion of the contents of the vessel.

In order that ready access may be had to the interior of the vessel, I prefer to make it in two semi-cylindrical parts, hinged together at *m*, each part having a semi-cylindrical steam-chamber, between which there must be a constant communication at all times through the medium of a flexible pipe or pipes, *n*, which will yield when the upper portion of the vessel is turned on its hinges, or other connections may be employed for insuring the entrance of steam into both chambers, and maintaining a uniform temperature in both, and at the same time permitting the turning of the upper half of the vessel on its hinges without affecting the uniformity of temperature.

It should be here understood that the sirups, before they are treated in the above-described vessel, must have been clarified and concentrated to a density not greater than from about 30° to 36° Baumé.

The reason of this is as follows:

When the sirup, in manufacturing sugar by the usual processes, has arrived at the crystallizable point of density — that is to say, from 38° to 41° Baumé—its crystallizing property has already been deteriorated, partly by too long exposure to a high temperature, which causes the scorching of the sirup, and partly by undergoing a sudden change of temperature when it was transferred from the hot pans to the coolers, and the result is the production of molasses and a corresponding loss of marketable sugar.

In order to obviate this I commence the practice of my process on the sirup before it has reached the point of crystallizable density—that is to say, when it is at a density of from 30° to 36° Baumé.

Before the concentrating-vessel described above, however, is ready to receive the partly-concentrated sirups, it must be prepared by heating it to a temperature equal or nearly

equal to that of the sirups when they have reached the above density by preliminary treatment, for any sudden change of temperature in transferring the partially-concentrated sirups to the vessel will tend to impair their crystallizing properties.

The lower half of the vessel having been nearly filled with the heated and partly-concentrated sirup, the upper half is turned over on its hinges, and properly secured to the lower half, after which the shaft F is caused to rotate slowly.

From the commencement of this process the sirup is gradually increased in temperature by the application of heat through the medium of the steam-chamber, for, although the temperature of the chamber is, during the process, less than that of the sirup, the latter is increased in temperature owing to its agitation and confinement. Although the outlet *b* is sufficientiy large to permit the free escape of the vapor generated witnin the vessel, it is not sufficiently large to permit the entrance of air; hence the vessel is practically closed during the process.

The point of crystallizable density will vary to a limited extent in different kinds of sirups, but it always occurs when the contents of the vessel are at a temperature of from 238° to 241° Fahrenheit; hence, if the peculiar quality of the sirup be pre-determined, the figures on the thermometer will be a positive guide.

When the crystallizable density has been reached, steam must be at once cut off and the faucet *d* opened, after which the operation may be continued for a few minutes until crystallization is completed, when the mass can be removed and dried by any of the known processes.

It is much more economical, however, to complete the drying in the same vessel, in the following manner:

After the steam has been cut off from the chamber and the safety-valve opened, there will be, owing to the bent steam-pipe E, sufficient hot water in the chamber for drying the sugar, the latter being agitated and disintegrated by the vanes *e*, and every particle of water thereby exposed, so that the moderate heat will suffice to reduce the mass to dry marketable sugar having no traces of molasses, and this dry sugar can, on opening any suitable valve or gate at the bottom of the vessel, be discharged into barrels or sacks ready for transportation.

The following may be mentioned as some of the most important advantages derived from the practice of the above-described process:

First, an increased yield of sugar from the sirup treated, the gain being nearly thirty-three per cent.

Second, economy in obtaining this increased yield. The ordinary processes cannot be practiced without a large residuum of molasses, whereas the entire sirup is converted into marketable sugar, having no traces of molasses.

Third, economy in the means employed. An approximate estimate of this economy may be made by those who are familiar with the manufacture of sugar when they bear in mind that the above-described simple apparatus takes the place of the costly appliances usually employed for separating and curing sugar, and with the array of coolers, casks, forms, centrifugal machines, and drying-houses.

Fourth, economy of time and labor. The time occupied for converting partly-concentrated sirup into marketable sugar is short, and the necessity of the curing and repeated handling of the sugar and resultant waste is obviated.

Fifth, the superiority of the sugar is such that there is none of the usual waste during transportation.

The invention is not confined to the treatment of sirups resulting directly from the juices of the sugar-cane, although this may afford the widest field for its use, but it is adapted to the treatment of all such sirups in refineries as have to be converted into crystallized sugar of the best qualities, but in some cases the treatment of the juices should be under a vacuum.

I claim as my invention—

1. The mode described of effecting the final concentration and crystallization of partly-concentrated saccharine juices or sirups, which mode consists in subjecting the same, when they have reached a density of from about 30° to 36° Baumé, and while protected from the deteriorating influences of the atmospheric air, to heat and agitation, substantially in the manner described.

2. The mode herein described of effecting the crystallization of partly-concentrated sirups, and drying the crystallized mass to the condition of marketable sugar, by a continuous process—that is to say, by subjecting the partly-concentrated juices to heat and agitation while protected from the deteriorating effects of the atmosphere, and drying the crystallized mass by subjecting it to like treatment under the same conditions, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS E. SCHMALZ.

Witnesses:
HENRY HOWSON, Jr.,
HARRY SMITH.