

UNITED STATES PATENT OFFICE.

HENRY A. WEBER, OF URBANA, AND MELVILL A. SCOVELL, OF CHAMPAIGN, ILLINOIS.

ART OF DEFECATING THE JUICES OF SUGAR-PRODUCING PLANTS.

SPECIFICATION forming part of Letters Patent No. 285,939, dated October 2, 1883.

Application filed December 26, 1882. (No specimens.)

To all whom it may concern:

Be it known that we, HENRY A. WEBER and MELVILL A. SCOVELL, citizens of the United States, residing, respectively, at Urbana, in the county of Champaign and State of Illinois, and at Champaign, county of Champaign and State of Illinois, have invented an Improvement in the Art of Defecating the Juices of Sugar-Producing Plants; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to use the same.

It is well known that in the process of evaporation of the juices from sorghum, sugar-cane, sugar-beets, and other sugar-producing plants, even after thorough defecation in the usual way, a separation of feculent matter continually occurs, which matter must either be removed by skimming or allowed to subside in settling-tanks. The separation of this feculent matter, even after the most thorough ordinary defecation is due to the fact, discovered by ourselves, that a portion of the foreign matter in the juice requires a higher temperature for coagulation than that at which the fresh juice boils; hence the continual rising of scum or the formation of a sediment as the liquor is concentrated by evaporation and its boiling-point becomes higher is readily explained. In order to free the juice from these impurities at once in the process of defecation, we heat it, after neutralization with lime or its equivalent, to a temperature sufficiently high to cause a coagulation and separation of all these impurities. This temperature is about 230° Fahrenheit—*i. e.*, about the temperature at which sirup of ordinary density boils in an open vessel. Similar results were obtained by varying the degree of heat; but the temperature mentioned above we have found to be the most practical. This heating is done in closed vessels.

For the benefit of those who wish to apply this process, we give a description of the apparatus used by us, and which has proved to be quite satisfactory.

The closed defecators referred to may be constructed in a variety of ways. The form which we have found to be most practical,

however, is that of a cylinder, as this form readily admits of construction so as to withstand the pressure to which the vessel is subjected. For ordinary sugar-works the size best adapted is about four feet in diameter and eight feet high. The heating is done by steam, which may be applied either by means of a jacket or of a copper coil on the inside. We prefer the coil. An upright coil is preferable to a horizontal coil. The bottom of the defecator should be conical, with an opening at the lowest point for the withdrawal of the sediment. For drawing off the defecated liquor; it is advisable to supply three valves or stop-cocks, the first one being placed about six inches from the bottom and the other two four and eight inches higher, respectively. A valve or stop-cock should be placed about eight inches from the top, which is to be open, when the defecator is filled for the escape of air. The defecator is filled only up to this point. The air-space above allows room for the expansion of the liquor. Below this valve, and at a convenient point, a thermometer is inserted for the purpose of the determination of the temperature. The upper head of the defecator contains a man-hole, so as to allow ready access to the interior in case of necessity. The defecator being thus charged with juice, heat is applied until the thermometer shows a temperature of about 230° Fahrenheit. Then the steam is turned off. Owing to the fact that under the existing circumstances the liquor remains quiet in the vessel, the sediment begins to sink as soon as it is formed, and in half an hour, at most, after the prescribed temperature has been reached the feculent matter has all settled to the bottom. Even after the sediment has all subsided, it will not answer to open the defecator nor to withdraw the juice so long as the temperature is above the boiling-point of the juice—*i. e.*, above 210° to 212° Fahrenheit—unless the pressure on the surface of the liquor is maintained, for in this case ebullition would take place and the sediment be agitated. The cooling of so large a mass of liquid by radiation requires some hours, and, if no other means could be employed for a more speedy withdrawal of the juice, a large number of defecators would be required for

each sugar-plant. This difficulty can be obviated in two ways. In the first place, the cooling can be hastened by allowing a stream of cold water to run through the coils. On the other hand, the pressure upon the liquid may be kept constant by connecting the top of the defecator with the steam-supply and turning on steam just before drawing off the liquor. The latter method is much more expeditious and economical, as the excess of heat above 210° Fahrenheit is employed for evaporation, and is not wasted. After the clear liquor is drawn off, the valve at the bottom is opened and the sediment emptied into a settling-tank. By accumulating these sediments and allowing them to settle, practically all the liquor which escapes with the sediment can be recovered.

The advantages of our process of defecation as above described are as follows: first, complete defecation of the juice, which prevents the continual rising of scum or the formation of a sediment during the process of evaporation; second, as the liquid in the closed defecators is always at rest, the feculent matter collects at the bottom, and the clear juice can be drawn off from above it; third, a great saving of sugar ordinarily lost by skimming; fourth, a saving of the labor ordinarily expended in skimming, both in defecating and evaporating; fifth, a great saving of time usually employed in defecating; sixth, a greater yield of crystallized sugar by reason of the greater purity of the liquor.

We are aware that the juices of sugar-pro-

ducing plants have been defecated by heating them in a vessel where the air was excluded by a cover; but in such defecator there was a steam-escape, permitting the escape of the steam generated in heating the juice. We do not, therefore, include in our claims the defecating of the juices of sugar-producing plants by excluding the air from them; but,

Having fully described our invention, what we desire to claim and secure by Letters Patent is—

1. The process hereinbefore described of defecating the juices of sorghum, sugar-cane, and other sugar-producing plants by heating these juices above the ordinary boiling-point.

2. The process hereinbefore described of defecating the juices of sugar-producing plants by superheating them in closed vessels.

3. The process hereinbefore described of defecating the juices of sugar-producing plants by superheating these juices in closed vessels after neutralizing with lime or its equivalent.

4. The process hereinbefore described of defecating the juices of sorghum, sugar-cane, and other sugar-producing plants by superheating these juices in closed vessels, under pressure, after neutralization with lime or its equivalent, and, allowing the sediment to collect at the bottom of the vessels, drawing off the clear liquor.

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Witnesses:

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