

# UNITED STATES PATENT OFFICE.

EUGEN LANGEN, OF COLOGNE, GERMANY.

## PROCESS OF REFINING SUGAR.

SPECIFICATION forming part of Letters Patent No. 495,614, dated April 18, 1893.

Application filed February 10, 1892. Serial No. 421,038. (No specimens.) Patented in England January 9, 1892, No. 420; in France January 9, 1892, No. 218,563; in Belgium January 9, 1892, No. 97,861; in Germany June 23, 1892, No. 68,189, and in Austria-Hungary August 25, 1892, No. 3,088 and No. 15,975.

*To all whom it may concern:*

Be it known that I, EUGEN LANGEN, a citizen of Prussia, residing at Cologne, in the Empire of Germany, have invented new and useful Improvements in Refining Sugar, (for which I have obtained Letters Patent in Great Britain, dated January 9, 1892, No. 420; in France, dated January 9, 1892, No. 218,563; in Belgium, dated January 9, 1892, No. 97,861; in Austria-Hungary, dated August 25, 1892, No. 3,088 and No. 15,975, and in Germany, dated June 23, 1892, No. 68,189,) of which the following is a specification.

This invention relates to an improved method of refining sugar whereby all the sugar obtainable by recrystallization from the after-products of the refining is led back into the circuit of the refining process in the form of an almost chemically pure sugar solution, so that the refining is carried out without after-products, such as result from the present mode of refining. For this purpose, the dissolved raw sugar, after filtration, is boiled down to a granular filling mass, in the usual manner and thus the No. 1 product of the refining process is obtained.

The essential feature of the invention consists in the now following treatment of the after products resulting from this first treatment. The first sirup, the so called green sirup, is thickened by evaporation in the usual way in a vacuum pan to a stringy or granular consistency, and this thickened mass or magma is then subjected while in a hot condition to the known process of renewed crystallization under motion (such as the "Wulff" or "Bock" process) consisting in introducing it into vessels in which the magma is kept continuously in motion by means of suitable stirrers or agitators, while a regulated lowering of the temperature is effected by suitable known means, such as by the introduction of hot or cold water into the jacket of the vessel, in accordance with the required separation of sugar from the mass. At the same time extraneous sugar crystals are introduced into the mass which have the effect of inducing or accelerating the formation of fresh crystals therein. The crystalline magma

thus produced is then subject to the known process of fractional washing "Steffan's process" for the removal of the mother liquor, and which consists in treating the crystalline magma first with a saccharine liquor which approximates in quality to the mother liquor around the crystals. Such liquor is introduced at the top of the washing vessel and as it penetrates downward, displacing the mother liquor (which is drawn off at the bottom of the vessel) a somewhat better quality of liquor is introduced at top which in its turn displaces the liquor first introduced, and so on, using a gradually purer liquor until the last washing of the crystals is completed by means of perfectly pure saturated sirup. The various washing liquors thus employed are drawn off consecutively and separately from the washing vessel and are collected in separate vessels to be used over again with the exception of the first, poorest liquor drawn off, while for the final washing a fresh quantity of pure sirup is always employed.

By the above described means the mass is divided into a whitish crystalline magma, constituting "Product No. 2," and a low grade sirup, being the mother liquor separated as above.

When the last washing liquor passing away from the mass has been pumped off as much as possible, water is led in thin streams distributed as uniformly as possible over the surface of the mass. The water becomes saturated with sugar and this solution penetrates through the mass, washes it again and finally effects the solution of the entire contents of the washing vessel. If this sugar solution on issuing from the bottom of the washing vessel is at first somewhat colored, it is used as boiling liquor for the No. 1 product while the solution afterward pumped out until the final solution of the entire contents of the washing vessel, is employed for the preparation of the clear liquor.

The low grade sirup first pumped off from the No. 2 product as above described, is again thickened by evaporation, and is also made to crystallize out according to the method of crystallization under motion above de-



scribed. The mass thus produced is then subjected to centrifugal action and the resulting sharp grained yellowish granular sugar (No. 3 product) is employed for inducing or accelerating as above described, the formation of crystals in the mass of the No. 2 product.

As a rule the sirup thrown off from No. 3 product will be of so low a quality with regard to sugar contained in it that it may be considered as molasses and led off from the refinery. If this is not the case the sirup is again subjected to the process of crystallization under motion, and the sugar obtained as No. 4 product is introduced either into the process of No. 3 product or into that of No. 2 product, as crystal generator.

Having thus described the nature of my invention and the best means I know for carrying the same out in practice, I claim—

A method of refining sugar wherein all sugar obtainable by crystallization from the after products of the refining process, is led back into the circuit of the refining process,

in the form of an almost chemically pure sugar solution, such method consisting in first thickening the low grade sirups separated from the crystals (No. 2 product) obtained from the green sirup, then causing such low grade sirup to crystallize by the process of crystallization under motion, then returning the granular sugar thus obtained (No. 3 product) into the masse cuite of the preceding product (No. 2) in order to induce or accelerate the formation of crystals therein, and lastly submitting the combination of crystals of Nos. 2 and 3 products thus obtained to fractional washing whereby the pure sugar solution first above mentioned is obtained.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 21st day of January, A. D. 1892.

EUGEN LANGEN.

Witnesses:

ROBT. M. HOOPER,  
GOTTLIEB LANGEN.