(No Model.)

C. STEFFEN.

APPARATUS FOR PRODUCING WHITE SUGAR.

No. 441,076. Patented Nov. 18, 1890.

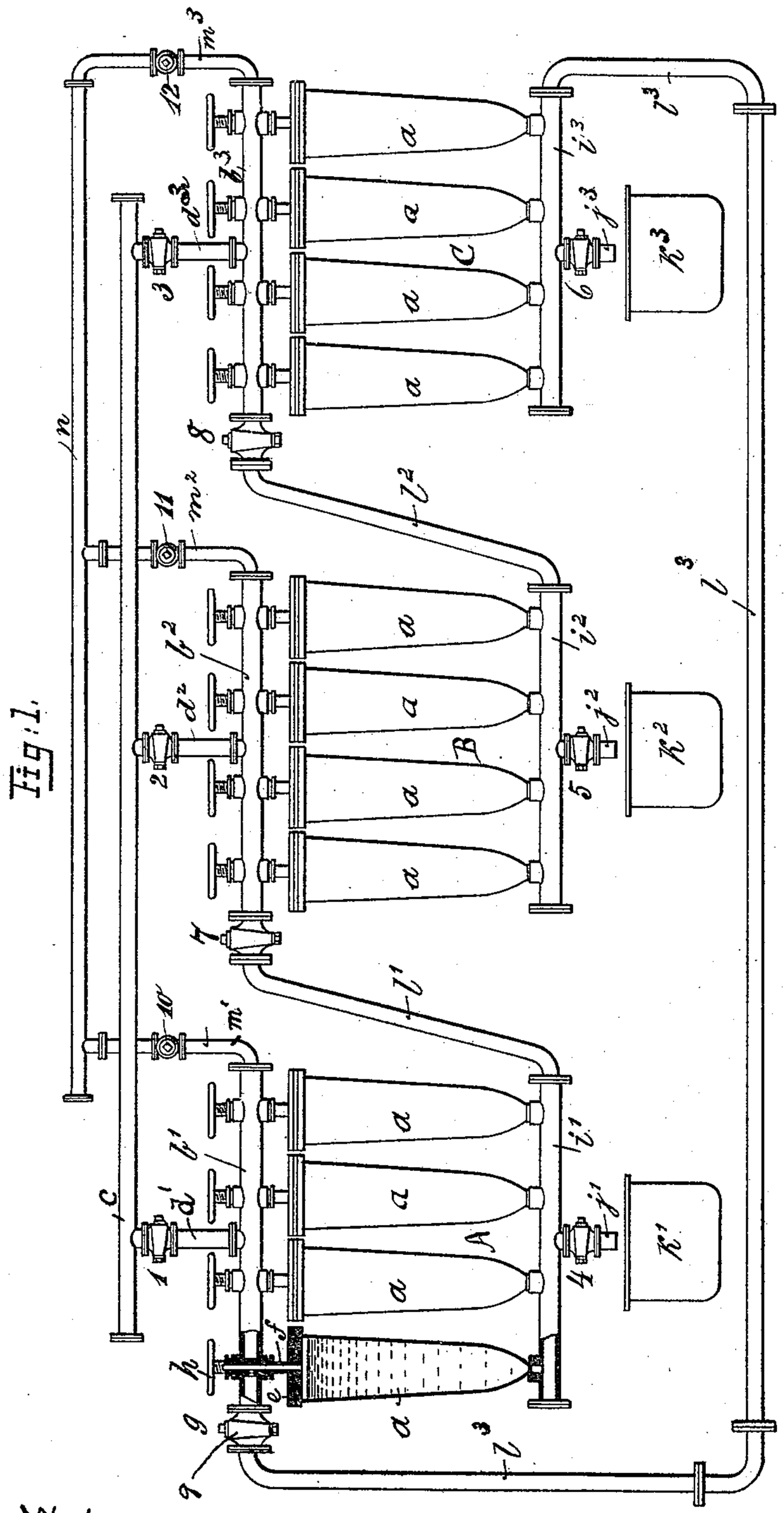

Fig. 1.

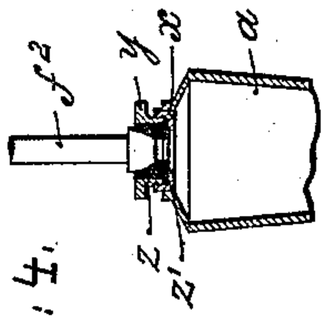

Fig. 4.

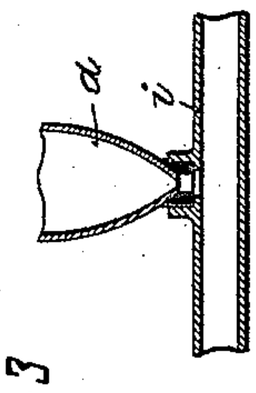

Fig. 3

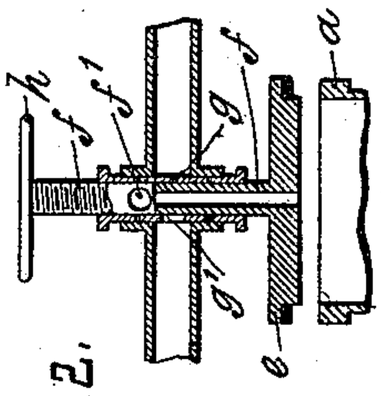

Fig. 2.

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APPARATUS FOR PRODUCING WHITE SUGAR.

SPECIFICATION forming part of Letters Patent No. 441,076, dated November 18, 1890.

Application filed August 10, 1889. Serial No. 320,347. (No model.)

To all whom it may concern:

Be it known that I, CARL STEFFEN, of the city of Vienna, Austria-Hungary, have invented certain new and useful Improvements in Apparatus for Producing White Sugar, of which the following is a specification.

My invention relates to the construction of an improved apparatus for producing white sugar from sugar mass by purifying the sugar crystals in the said mass from the sirup adhering to the said crystals.

The process of refining the sugar crystals is effected by means of a saturated aqueous solution of pure sugar, which is fed over the sugar mass to be lixiviated, so as to take up and carry off the sirup adhering to the crystals and produce a pure white sugar entirely free from sirup. The lixiviating-fluid, which has become impure by the admixture of sirup washed off the sugar crystals, is driven off by a fresh quantity of lixiviating-fluid, which is either forced or sucked through the sugar mass to be refined.

In order to carry out my said process for producing white sugar, I employ the apparatus represented in the accompanying drawings.

Figure 1 is an elevation, partly in section, and Figs. 2, 3, and 4 are sections of details, of the apparatus.

The apparatus, denominated the "lixiviating-battery" in the following description, consists of a series of sets or groups A B C of vessels of like form, the accompanying drawings representing the same, as sugar-loaf molds a' to a. The single molds are in connection with a common tube b' b^2 b^3, which said tube is connected to the main supply-pipe c for the lixiviating-fluid by means of the pipes d' d^2 d^3. The separate vessels or molds a are brought into connection with the pipes b', &c., by means of the hollow spindle f, connected to the air-tight cover e of each vessel or mold, which spindle carries a hand-wheel or its equivalent h, and is provided with screw-threads and guided in an appropriate stuffing-box. The arrangement is such that when the lid or cover e is perfectly closed communication is established between the pipe b', &c., and the vessel a (or the free space in the same above the mass of sugar to be treated) by means of the orifice g' of the piece of tubing g and the boring f' of the hollow spindle f. The lower ends of the molds a fit into sockets of the tube i' i^2 i^3, Fig. 3, said pipes or tubes being provided with cocks or valves 4 5 6, &c., and outlet-nozzles j j^2 j^3 for drawing off the lixiviating-fluid into vessels k' k^2 to k^3. The connection of the pipes or tubes for attaining a systematic lixiviation, as represented in Fig. 1, is so arranged that the pipe i' of the first group A of molds is, by means of the pipe l', connected to the supply-pipe b^2 of the second group or set B of molds, the drain-pipe of this second set or group of molds with the supply-pipe of the third set or group C of molds, and so on until the lixiviating-fluid passes into the drain-pipe i^3 of the last set or group of molds, which in its turn is in communication with the pipe b' of the first set or group of molds through the pipe or tube l^3. Each of the supply-pipes b' b^2 b^3 communicates through the branch pipes m' m^2 m^3 with a supply-pipe for compressed air, which is admitted as soon as the supply of lixiviating-fluid is cut off in order to press the fluid remaining in the molds out of the same and thus permit the refined sugar to be removed from the set or group of molds placed out of operation in comparatively dry condition. The pipes d', &c., and m', &c., for the supply of lixiviating or refining fluid and compressed air, respectively, and also the outlet-pipes j, &c., and drain-pipes i', &c., and the tubes or pipes l', &c., for connecting the supply-pipes b', &c., are provided with cocks or valve other equivalent devices marked in numbers or figures, and are opened or closed according to the requirements of the operation.

The operation of the apparatus is as follows: If an apparatus of substantially the construction represented in the accompanying drawings is to be set in operation and all the molds are filled with sugar to be refined if pulpy granular sugar mass is used, the sieves having been previons to charging the molds inserted in the same, only the cock or valve I of the tube d', which leads to the supply-pipe b' of the first set or group of molds in the series, and the cocks or valves 7 and 8 are opened, whereas all the others remain closed. The lixiviating or refining fluid flows uniformly above the sugar in all the molds or

vessels of the first group or set *a*, then through the pipes *i'* and *l'* into the supply-pipe b^2 for the second set or group of molds or vessels, through all such said vessels, and so onward until the said fluid has passed through all the molds of the last set or group, when the lixiviating-fluid, highly impurified by the sirup separated from the crystals of the sugar under treatment, is allowed to flow off through the outlet j^3 into the vessel k^3. As soon as the sugar in the molds of the first group or set has been refined to the grade of purity desired, the cock I, leading from the main *c* to the supply-pipe *b'* is closed and the cock 10 opened, so that the compressed air can compress the fluid still remaining in the sugar out of the molds, whereupon the cock 10 is closed. The molds containing the refined sugar can now be removed and the molds or vessels containing a fresh charge of sugar to be refined by lixiviation inserted, so that this set, which on commencing work was the primary set, now becomes the last set in the series of sets or groups forming the battery. For this purpose the cocks 2 and 9 of the surface and the cock 4 of the outlet-pipe *j'* are opened. The lixiviating-fluid flows through the connection d^2 into the supply-pipe b^2 through the molds in this set *a*, and, as aforesaid, through the remaining sets or groups of molds in the battery, the impure fluid passing off through the outlet-pipe *j'* into the vessel or receiver K'. As soon as the refining process is complete in the second group or set of molds or vessels in the battery, the same are, as aforesaid with reference to the first group or set, removed and replaced by another set containing impure sugar, so that this second set or group of molds now forms the last, while the third series or group of molds represents the first set or group, and so on through the entire number of sets or groups of molds in the battery. The process is thus carried out in continuous systematic manner, the first set or group of molds or those longest under treatment in the one operation being exchanged a for new set of freshly-charged molds or vessels, so that the same forms the last set or group for the circulating-fluid in the next operation, from whence the said fluid is allowed to escape in a very impure state into the vessel or receiver located beneath the said set or group of molds.

The form and number of the vessels or molds in a set or group, or the members of sets or groups in the series forming the battery, can be chosen according to requirements, the most importance being attached to the arrangement of the vessels in sets or groups, because in this manner an advantageous operation of the lixiviating or refining fluid on the sugar under treatment is attained.

Having now fully described my said invention, what I claim is—

In an apparatus for refining sugar in the mold, the combination of a plurality of simultaneously-operating sets or groups of molds or vessels, a main supply-pipe connected with each set, a drain-pipe for each of said sets, a connection between the drain-pipe of one set and the supply of the next set, a compressed-air pipe connected with the upper end of each of said sets, and suitable valves in said pipes, whereby any set may be made the first to receive the supply and the compressed air of a continuous circulation, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

CARL STEFFEN.

Witnesses:

ANTHONY STEFFEN,

FRANZ KOLLM.