No. 749,627. PATENTED JAN. 12, 1904.

E. PASSBURG.

PROCESS OF DRYING SUGAR LOAVES.

APPLICATION FILED FEB. 26, 1903.

NO MODEL.

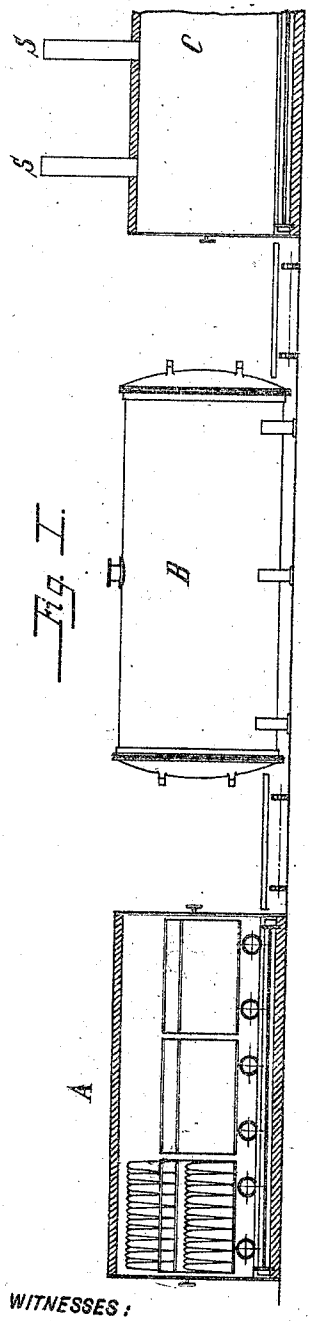


Fig. I.

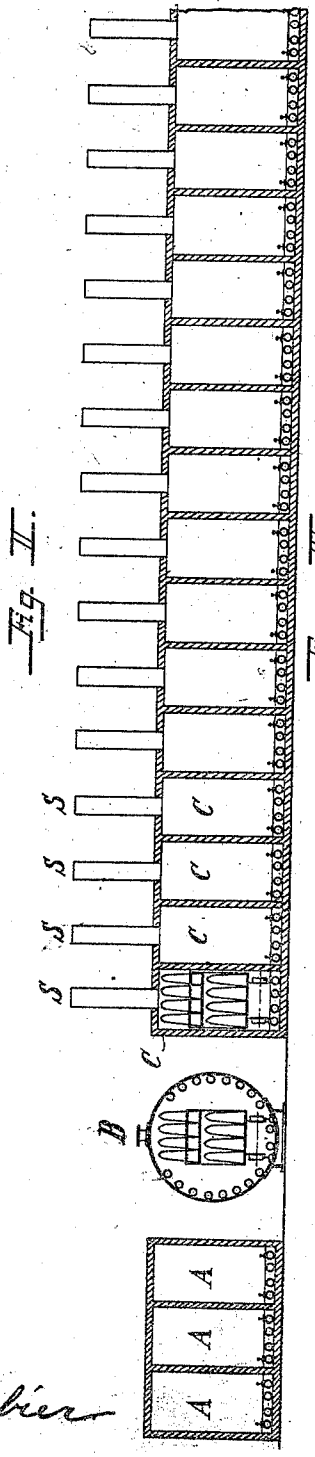


Fig. II.

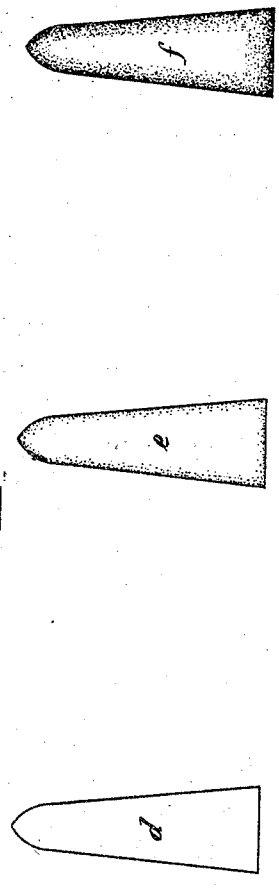


Fig. III.

WITNESSES:

C. P. Goepel

Harry J. Lubrbier

INVENTOR

Emil Passburg

BY Goepel & Sites

ATTORNEYS.

No. 749,627. Patented January 12, 1904.

UNITED STATES PATENT OFFICE.

EMIL PASSBURG, OF BERLIN, GERMANY.

PROCESS OF DRYING SUGAR-LOAVES.

SPECIFICATION forming part of Letters Patent No. 749,627, dated January 12, 1904.

Application filed February 26, 1903. Serial No. 145,276. (No model.)

To all whom it may concern:

Be it known that I, EMIL PASSBURG, engineer, a subject of the German Emperor, residing at No. 33 Brückenalle, in the city of Berlin, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Processes of Drying Sugar-Loaves, of which the following is a specification.

The drying of sugar-loaves has been carried on up to the present, except in Russia, either in ordinary stove-rooms, in which the loaves are placed in tiers or stories above each other, while the air is heated by heating-pipes arranged at the bottom of the stove-rooms and from there passes along the loaves, absorbing the moisture contained in the same and carrying it off through drain-pipes, or vacuum drying apparatus are used for drying the loaves. The former process has the drawback that the drying not only takes a very long time, (about eight to twelve days,) but also that the sugar-loaves lose to some extent the white color of their surface or mantle through this kind of evaporation and the prolonged effect of the heat, if the clarifying liquor used was not translucent and colorless, so that a yellowish tinge will show itself on the outside or in the mantle, which will make them poor-looking and of less value in comparison with the loaves dried *in vacuo*. The cause of the formation of this yellowish tinge lies in the fact that through capillary attraction the moisture is drawn from the interior of the loaves to the surface and there dried up, for under atmospheric pressure the evaporation of the water of the sugar-loaves can naturally only take place on the surface of the same. This moisture drawn by the capillary attraction to the surface of the sugar-loaves is a solution of sugar or syrup which has been used to give the loaves a white covering and which can never be completely driven out of the loaves, neither by clarifying nor by suction. It very frequently is still tinged slightly; but this slight tinge is not noticeable if the clarifier is distributed through the whole loaf equally. The tinge, however, shows itself distinctly if the clarifier is concentrated into a smaller volume on the edge, the coating, or the mantle of the sugar-loaf. The long period of drying contributes to increase this yellowish tinge, so that in the interior of the loaves dried after this method, from which the clarifier has been drawn by capillary attraction, a white core will be seen, whereas the edge of the loaves where the clarifier has dried up, as shown in Figure 3 at *f*, shows a yellowish tinge.

With the vacuum-drying process, also the one invented by me and protected by United States Patent No. 717,265, and more especially suited for fine-grained loaves, the yellowish tinge of the edge of the loaves, as well as the long drying period, and with it the prolonged action of the heat, are avoided, as through the formation of the vacuum the water is converted into steam in all parts of the previously-heated loaves, also in the interior, and as steam it forces its way through the crystals of the loaves and is carried off by the air-pump. In this process the clarifying-syrup, which was at the beginning of the same evenly distributed in the loaves, crystallizes—that is to say, it becomes dry to a large extent in the course of a few hours through the evaporation of about eighty to ninety per cent. of the original percentage of water contained in the loaf, so that this solidified clarifier can no longer be removed by capillary attraction; but with the vacuum process in order to attain a perfect drying of the loaves when centrifugal action or suction has been used it is necessary that the loaves after having been considerably cooled down in consequence of the evaporation of about seventy to ninety per cent. of their original percentage of water should be warmed again, and then if loaves without cracks are to be obtained the more-strongly-heated mantle of the loaves must be cooled again, so that the heat will remain stored up in the still-damp interior of the loaves in order to bring about the evaporation of the remainder of the water by creating again slowly and gradually a vacuum. This work of the subsequent heating, cooling, and evacuation necessary in order to remove a proportionately small remainder of the water—namely, ten to thirty per cent. of the original percentage—is by far the most tedious part of the whole process and requires about six to eight times more time than does the first evacuation—that is to say, the removal of seventy to ninety per cent. of the

amount of water of loaves heated outside of the vacuum drier.

Though the method of completing the drying process of the loaves *in vacuo* be without any doubt the most perfect drying method, because it not only considerably shortens the drying period in comparison with that of the stove-rooms, but also the sugar-loaves are given a uniformly white and beautiful appearance, as the colored clarifier cannot, as above described, concentrate itself in this or that part of the loaf, but remains where it is in consequence of the rapid drying and becomes crystallized. In spite of these advantages the vacuum-drying process has the drawback that a greater outlay is needed to purchase the vacuum apparatus, and an exclusive use of the same has in some cases to be abandoned for economical reasons.

The hereinafter-described combination drying process has for its object to remove the drawback of expensiveness of the plant and yet to preserve as far as possible the advantages of the rapid vacuum drying over the inferior method and results of stove-room drying.

In the accompanying drawings, Fig. 1 represents a view, partly in elevation and partly in section, of a drying plant consisting of a preliminary drier, vacuum-drying apparatus, and final driers consecutively arranged for the successive steps of the drying operations. Fig. 2 shows a synoptic view of the drying plant; and Fig. 3 shows several views of the sugar-loaves as obtained by the vacuum, combined heating and vacuum, and heating processes, respectively.

Similar letters of reference indicate corresponding parts.

This combination drying process consists in heating the warm sugar-loaves in a hot room A, Fig. 1, filled with air and then drying them in a vacuum apparatus B till the greater part of the water (about seventy to ninety per cent.) has evaporated, whereupon the loaves are put into the final drier constructed after the system of the ordinary stove-rooms, so that in them the remainder of the water evaporates on the surface of the loaves. As in consequence of the extraction of the water in the vacuum apparatus B the greatest part of the clarifying liquor becomes dry and hard, and therefore only a small part remains damp. This small quantity may be drawn by capillary attraction to the surface of the loaves in the final drier or drying-chamber C and there be dried. In this way only the edge of the sugar-loaf will show a slightly-darkish color, as the drying period in the final drier C is of far less duration than with the ordinary process, where the loaves are taken into the stove-rooms with their original and full amount of moisture.

There are, for instance, three warming-chambers A A A required, each of which can hold that quantity of sugar-loaves which is to be placed into the vacuum apparatus B, as the period in which the loaves absorb the required evaporation heat in the warmers is about twelve hours, whereas the drying period in the vacuum apparatus amounts to only three to four hours, so that the vacuum apparatus B will receive, at intervals of about four hours. the loaves heated in the three warming-chambers. After a preliminary drying in the vacuum apparatus B they get into the final heater C with drain-pipe S, where they dry and cool in from forty-eight to ninety-six hours. The final heaters must therefore be of a size sufficiently large to hold eighteen times as much sugar as the vacuum apparatus, as the subsequent drying and cooling under atmospheric pressure occupies about eighteen times as much time as the preliminary drying in the vacuum apparatus B. If instead of these final driers vacuum apparatus were used, there would be required six to eight apparatus, whereas with this combination process one is sufficient for drying the same quantity of sugar.

The cost of constructing the final driers is very reduced, so that the cost of the whole plant required for this combination process is considerably less than the cost of a number of vacuum apparatus, for which reason this process may claim to possess the advantage of great cheapness combined with comparatively very favorable results as regards the quality of the dried material.

Fig. 3 shows a sugar-loaf *d* in section, dried *in vacuo*, and consequently of a uniform whiteness in all its parts, whereas *e* represents a sugar-loaf treated by the combination drying process and showing, when compared with the loaf *f*, treated from beginning to end in the stove-rooms, a far less yellow-colored edge.

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

The process herein described of drying sugar-loaves, which consists in subjecting sugar-loaves to the action of a partial vacuum for partially extracting the moisture from the same, transferring said loaves into a non-vacuum drying-chamber, and then subjecting the partially-dried loaves therein to a final heating action for extracting the remaining traces of moisture from the same, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

EMIL PASSBURG.

Witnesses:

WOLDEMAR HAUPT,

HENRY HASPER.