C. TELLIER.

PROCESS OF DESICCATING.

APPLICATION FILED JUNE 29, 1911.

1,076,923. Patented Oct. 28, 1913.

Fig. 1

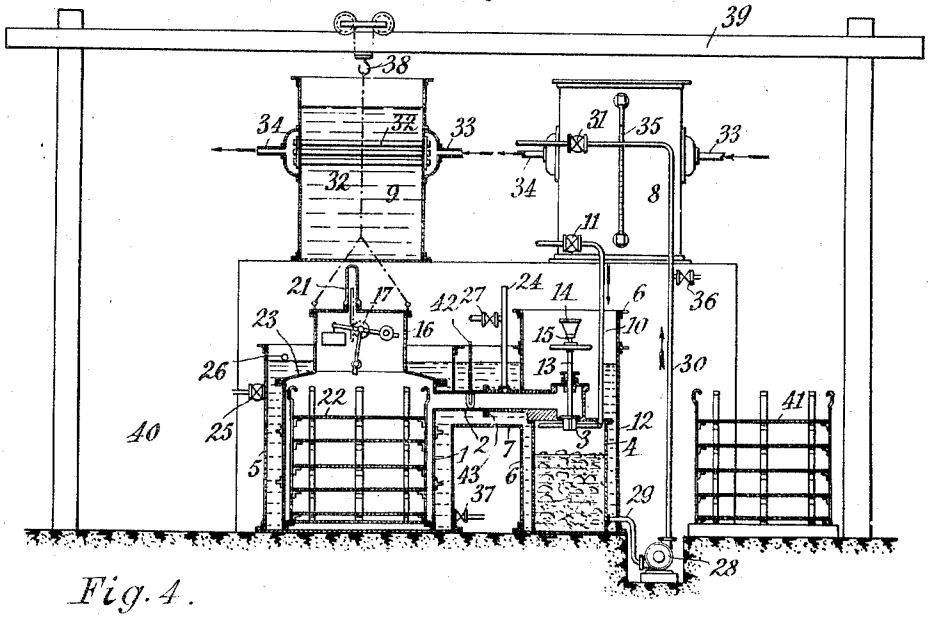


Fig. 4.

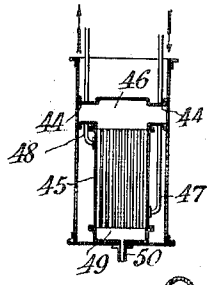


Fig. 3.

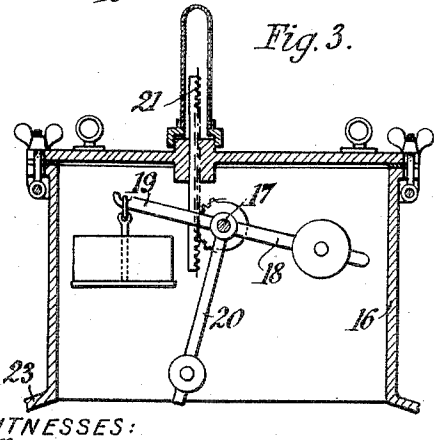
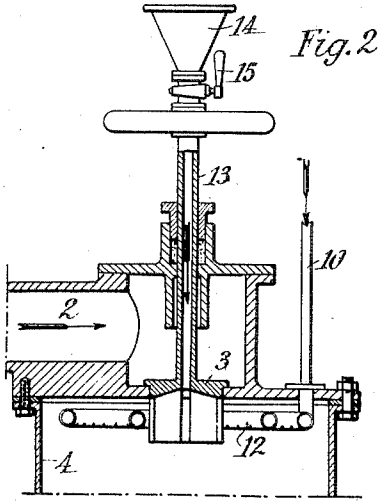


Fig. 2.



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UNITED STATES PATENT OFFICE.

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PROCESS OF DESICCATING.

1,076,923. Specification of Letters Patent. Patented Oct. 28, 1913.

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To all whom it may concern:

Be it known that I, CHARLES TELLIER, a citizen of the Republic of France, residing in Paris, France, have invented certain new and useful Improvements in Processes of Desiccating, of which the following is a specification.

This invention relates to a process for desiccating in a vacuum as completely as possible and in presence of an absorbent, fresh meat, vegetables and in general any moist organic or inorganic material from which a vapor is to be disengaged or distilled.

The invention will be described with reference to the accompanying drawings in which—

Figure 1 is a diagrammatic sectional elevation of the whole installation. Figs. 2 and 3 are detail sectional views drawn to an enlarged scale. Fig. 4 is a sectional detail view showing a modification.

The apparatus shown in Figs. 1, 2 and 3 consists essentially of a receiver 1, containing the materials under treatment and communicating, through a pipe 2 having a valve 3, with a receiver 4 containing the absorbent material, such as pumice for example. These two receivers in which a perfect vacuum should be possible are on this account not exposed to the free atmosphere but are surrounded by two boxes or envelops of sheet iron or brick-work 5, 6. These two boxes communicate with each other through a duct 7 which, if necessary, may contain a partition preventing the liquids contained in the boxes from mixing.

The receiver 4 communicates with one or other of two identical reservoirs 8, 9 containing concentrated solution of potash, which when valve 3 is closed is allowed to flow on to the pumice in receiver 4 from a pipe 10 controlled by a cock 11. This pipe terminates in a perforated distributing spiral 12 which surrounds the valve 3. In order to facilitate the complete filling of the receiver 4, the stem 13 of valve 3 is a pipe terminating at its upper part in a funnel 14 having a cock 15 (Fig. 2). As soon as the solution of potash makes its appearance in the funnel the cock 15 is closed. Instead of the funnel there may be a rubber tube connected with one or other of the reservoirs 8 and 9, (Fig. 1).

For controlling the operation the receiver 1 is surmounted by a short tube of large cross section 16 which contains a three-armed lever pivoted at 17. The arm 18 carries a weight of 1 kilo; arm 19, which is in line with arm 18, carries a suitable weight of the material under treatment, and the arm 20 has a counterweight corresponding with the weight of the quantity of water to be removed in the operation from the said suitable weight of the material. An indicating rod 21 actuated by a rack and a toothed sector keyed to the turning pivot of the lever moves in a glass tube so that at any moment the loss of weight suffered by the materials suspended on the arm 19 during the operation can be ascertained.

The materials under treatment are arranged on a metal rack 22 contained in the receiver 1 and covered by the cover 23 which carries a short pipe 16. This cover merely rests on the receiver, a tight rubber washer being interposed. The receiver 4 is full of solution of potash impregnating the pumice and under these conditions, the valve 3 being closed, it suffices to make the vacuum as complete as possible. For this purpose the receiver 1 communicates through tube 24 with an air pump not shown in the drawing. The cover 23 being applied to the receiver 1 by atmospheric pressure, as soon as a vacuum is made completely closes the receiver. Water is then run into the boxes 5 and 6 through a three-way cock 25 so as to insure absolute tightness to the apparatus. The overflow 26 limits the level of this water. The vacuum is now to be made as complete as possible and for this purpose the receiver 1 is put into communication through pipe 24 with a reservoir of carbon dioxid, such as a bottle containing the liquefied gas or a gas holder charged from vessels in which a carbonate is being decomposed. When the carbon dioxid has attained the ordinary pressure in the receiver, the cock 27 is closed. The pump is now put in action and the gaseous mixture is withdrawn from the receiver 1. It is pumped into water washers under pressure to recover the carbon dioxid so as to use this continually. Under these conditions the imperfect vacuum previously created before the carbon dioxid is introduced is again formed but the residual gaseous mixture in the receiver consists in large proportion of carbon dioxid and a small proportion of air. The pump is now stopped, and valve 3 is opened. At the same time a small pump 28

draws the solution of potash through pipe 29 and lifts it through pipe 30 into reservoir 8 or 9 according to the position of the three-way cock 31 in this pipe 30. The receiver 4 is thus emptied of liquid, save that which is absorbed in the pumice. The latter, owing to its large surface, absorbs with great ease the atmosphere from receiver 1 composed, as already stated, chiefly of carbon dioxid which combines with potash, leaving an almost perfect vacuum in the apparatus. The operation may be repeated a certain number of times until an absolute vacuum has been attained, but in practice a single operation suffices. After the carbon dioxid there passes over into the receiver 4 an aqueous vapor from the materials under treatment, which vapor is absorbed by the potash. In order to render this absorption continuous the cock 11 is opened, so that a stream of potash flowing through the distributer 12 washes the pumice which thus maintains its absorbing power, while the pump 28 is continually operated and returns the liquid into one or other of the reservoirs 8, 9. These two reservoirs are necessary to ease the working, for one contains the solution under use and the other receives that which is supplied by the apparatus for concentrating the solution of potash. The latter apparatus may be of any suitable kind.

The operation entails condensation of aqueous vapor and the solution has a tendency to become hot. In order to maintain it at the best temperature for absorption there may be arranged in each reservoir 8, 9 a series of tubes 32, traversed by cold water entering at 33 and issuing at 34. To insure that the whole surface of these tubes is operative each of the tubes has at its exit end an orifice of proportions calculated to compel the water to distribute itself equally to all the tubes and in consequence to use completely their capacity for interchanging heat.

A layer of petroleum covers the solution or potash in the reservoirs 8, 9 to avoid absorption of carbon dioxid from the atmosphere.

A gage 35 on each reservoir 8, 9 shows the extent to which the solution has increased in volume. A test cock 36 enables samples to be drawn from the solution that is at work for the purpose of ascertaining its degree of dilution. By these means the degree of hydration of the potash may be used instead of the balance lever aforesaid for ascertaining the quantity of water withdrawn from the materials.

Steam may be injected into the box 5 through cock 37, to prevent too much chilling of the materials being dried. The excess of water of condensation from this steam flows away through the overflow 26. A heating worm immersed in the box 5 may be used instead of the steam injector 37 but it is more complicated.

A crane 38 running along a girder 39 serves for lifting the cover 23, placing it on the box 6, removing the rack 22, placing it at 40 where it is unloaded, taking up a freshly charged rack 41, bringing this into the receiver 1 and finally replacing the cover 23. These operations do not stop the working.

There may be placed side by side several apparatus analogous to 1 and 4. For diminishing the length of the girder 39 it is preferable to place them at an angle of 90° from the position indicated on the drawing.

In large installations instead of the vertical receiver 1, horizontal receivers may be used and instead of racks small wagons may run on rails. The thermometer 42 serves for controlling the temperature of the vapor produced and for deciding whether steam is to be injected through cock 37. Calcium chlorid may also be used as absorbent.

It is also possible to condense directly by means of cold water or artificial cooling. For this purpose a heat interchanger (Fig. 4) is inserted by means of its connections 44 in the joints 43 of Fig. 2. This apparatus comprises a bundle of tubes 45 communicating at one end with chamber 46; the vapor entering through tube 2 passes freely into the tubes 45 which are open at both ends. A current of very cold water, enters through pipe 47 and leaves through pipe 48 having passed around the tubes 45. Abundant condensation is produced in tubes 45 and the condensed liquid flows into the chamber 49 whence it may be withdrawn through a pipe 50 by a pump not shown in the drawing but analogous to pump 28. This mode of operation is the most simple and the most economic, especially if there is a supply of water of a temperature below 10° C. With a freezing machine one may operate with water at 0° C. or even at a lower temperature but the condenser should be arranged to allow of the extraction of the ice so as to diminish the cost of the operation to almost nothing.

An ejector on the tube 2 may be used instead of the air pump and in this case it is advantageous to use the water of condensation from the tubes 45. In large installations it is important to feed the water deprived of air and recover from the tubular condenser, (Fig. 4) directly to a steam boiler.

Having thus described my invention and the best means I know of carrying the same into practical effect, what I claim is:—

1. A process for desiccating fresh meat, vegetables or any other moist organic or inorganic material, which process consists in replacing the air around the material by carbon dioxid and conducting the desiccation in a vacuum as perfect as possible in pres-

ence of an absorbent of the carbon dioxid, the vacuum being maintained during the whole of the desiccating operation.

2. A process for desiccating fresh meat, vegetables or the like, which consists in withdrawing the air from contact with the meat, surrounding said meat by an atmosphere of anhydrous gas and withdrawing said gas.

3. A process for desiccating fresh meat, vegetables or the like, which consists in withdrawing the air from contact with the meat, surrounding said meat by an atmosphere of anhydrous gas and withdrawing said gas and absorbing the residual gas by an absorbent of the gas.

4. A process for desiccating fresh meat, vegetables or the like, which consists in withdrawing the air from contact with the meat, replacing said air by an atmosphere of carbon dioxid and withdrawing said carbon dioxid.

5. A process for desiccating fresh meat, vegetables or the like, which consists in withdrawing the air from contact with the meat, replacing said air by an atmosphere of carbon dioxid and withdrawing said carbon dioxid and absorbing the residual carbon dioxid by an absorbent of the carbon dioxid.

6. A process for desiccating fresh meat, vegetables or the like, which consists in withdrawing the air from contact with the meat, replacing said air by an atmosphere of carbon dioxid and withdrawing said carbon dioxid and absorbing the residual carbon dioxid by a solution of potash.

7. A process for desiccating fresh meat, vegetables or the like, which consists in withdrawing the air from contact with the meat, replacing said air by an atmosphere of carbon dioxid and withdrawing said carbon dioxid and absorbing the residual carbon dioxid by a solution of potash absorbed in finely divided pumice-stone.

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

CHARLES TELLIER.

Witnesses:
H. C. Coxe,
Gabriel Belliard.