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J. C. McLACHLAN.

DESICCATING PROCESS.

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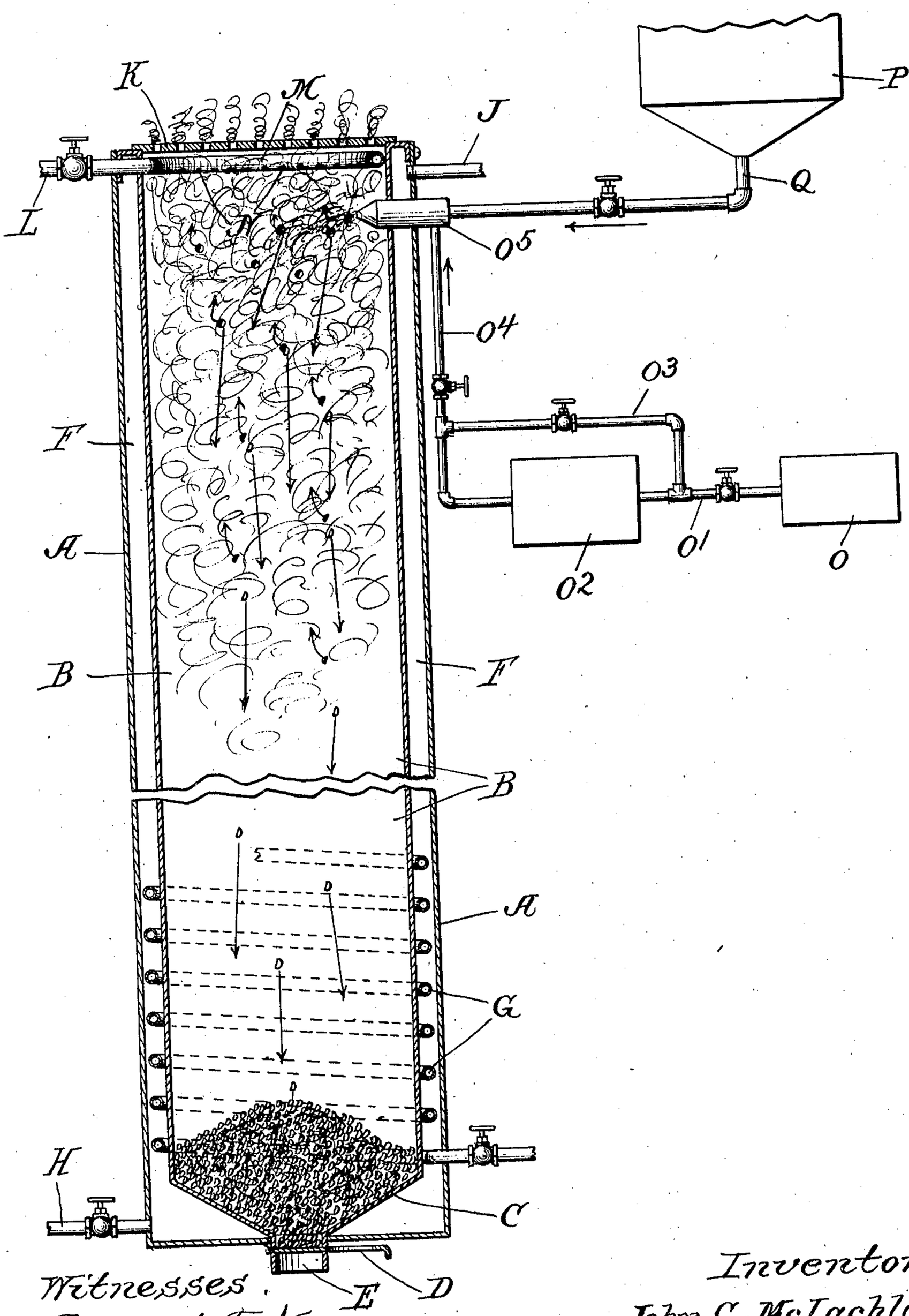

Witnesses.
Edward T. Wray.
Howard L. Kraft.

Inventor.
John C. McLachlan.
by Parker & Co
Attorney's.

UNITED STATES PATENT OFFICE.

JOHN C. McLACHLAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO INTERNATIONAL DESICCATING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

DESICCATING PROCESS.

No. 806,747. Specification of Letters Patent. Patented Dec. 5, 1905.

Continuation of application Serial No. 144,464, filed February 21, 1903. This application filed February 4, 1904. Serial No. 191,982.

To all whom it may concern:

Be it known that I, JOHN C. McLACHLAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Desiccating Processes, of which the following is a specification.

My invention relates to a process for obtaining in a dried granular or powdery form the solids from liquid or moisture-charged substances. It is applicable, for example, to milk, eggs, blood-serum, ox-gall, and numerous other like materials. With such products it is highly desirable to secure such solids in a dried or powdery condition without cooking the same or coagulating the albuminoids which they contain or overheating them. At the same time it is desirable to accomplish this result with the least possible expenditure of heat and in the shortest possible time. It is also desirable to prevent the mingling of deleterious substances with the material while it is being treated.

I show diagrammatically, part in elevation and part in cross-section, one form of apparatus by which my process can be carried out.

A is an exterior casing of any desired material and preferably of considerable length. For some purposes it should be about thirty feet in length. B is an exterior chamber of any desired material. This chamber is preferably funnel-shaped at the bottom, as indicated at C, and provided with a slide-door D in connection with the discharge-opening E. F is a space between the chamber and casing and in it may be heat-coils G, arranged in any desired manner. H is a pipe opening into the lower part of the receptacle inclosed by the outer casing, and through this hot fluid may be discharged, the same being taken off, if desired, through the pipe J at the top. K is a perforated covering over the top of the chamber B. It may be dispensed with, or any kind of covering may be placed over the top. L is a pipe leading to the top of the chamber B, and M a circle of the same surrounding the upper part and provided with apertures N to admit hot air for heating the contents of the chamber. O is an air-pump, whence leads the pipe O′ to the heater O^2 or to the branch pipe O^3. The heater and the branch are connected with the pipe O^4, which leads to the atomizer O^5, which opens into the upper part of the chamber B. P is a reservoir containing the material to be treated. Q is a pipe leading from the reservoir to the atomizer. As previously suggested, these parts are merely diagrammatic and not to be taken as presenting any more than suggestions as to the manner in which an apparatus could be constructed to carry out my invention. These parts include a reservoir for the material to be treated, with a pipe leading thence to an atomizer, an air-supply for the atomizer comprising an air-pump and heater whereby, if desired, the air may be heated and then carried to the atomizer, a deep or vertically-extended well-like chamber near the top of which the atomizer opens, means for heating said chamber, if and when same is desired, such means consisting, for example, of a steam-coil or a hot-fluid supply to circulate about the chamber or any other means by which heat may be applied to it, an exterior casing to facilitate the heating of the inner chamber, a chamber or space at the lower part of the drying-chamber to be used as a settling or collecting chamber provided with means for drawing off the powder, an opening at the top through which the vapor is permitted to freely escape, though means for facilitating the escape of the vapor might be employed, if found desirable, and means for cleaning the chamber, consisting, for example, of a water-pipe with jets in the upper part of the chamber.

The use and operation of my invention are perhaps clear from the foregoing. It may, however, be well further to suggest that when the particles which are thrown into the upper part of the chamber by the atomizer are permitted to fall they begin to separate, the vaporous subdivided particles to arise being expanded and the more solid particles or particles less charged with moisture to descend. As these latter particles continue to descend they throw off more and more of their moisture until at a certain point toward the bottom of the chamber they have discharged substantially all of their moisture and are deposited in the form of powder or in a granular form, according to the character of the particles in the bottom of the chamber, or what I have called the "collecting-chamber." In the meantime the vapor passes freely out of the upper or open end of the chamber. Obviously the vapor can be conveyed away through lateral

pipes, and, on the other hand, the powdery material could be conveyed to one side; but both of these suggested modifications would be substantially equivalent to permitting the vapor to escape at the top and collecting the powder at the bottom of the drying-chamber. The degree of heat will of course be determined by the climate, the season, the character of the material treated, and other conditions. The air supplied to the atomizer may be of any desired temperature, the material itself may be of any desired temperature, and the variation in either of these conditions will lead to variations in the degree of heat required. A condition often of considerable importance in the application of my process is the absence of air-currents within the chamber B and the absence of any distributing causes which would tend to force the powder back into a vapor-charged area.

In the application of my process to milk I have used milk either with or without the cream, both hot and cold, and have used to operate the atomizer air both hot and cold. I have also heated the drying-chamber to various temperatures. Under proper conditions the solids of the milk after falling for twenty-five to thirty feet and sometimes less will be deposited in the form of fine powder, with practically all of the moisture driven off. This powder can then be bottled or packed and is ready to be shipped. It preserves its condition for long periods and when mixed with suitable quantities of water is practically not distinguishable from ordinary fresh milk. If permitted to stand, it will raise the usual amount of cream, and the same may be made into butter not to be distinguished from ordinary fresh butter. The vapor being constantly expanded by the heat rises out of the chamber, and the dry powder is deposited below the vapor-charged area. The solid portions drop down responsive to the law of gravity.

I claim—

1. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray, causing the spray to descend through a drying-chamber containing heated air free from the products of combustion, and separating the vapors from the solids in the same chamber by discharging the vapors above and collecting the solids below after they have passed out of the vapor-charged area.

2. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray, discharging the spray into a drying-chamber, separating the vapors from the solids by the joint action of heat, which expands the vapors and causes them to move in one direction, and gravity, which causes the solidifying material to move in the other direction, and continuing this process until the solids, practically free from vapor, have passed out of the vapor-charged area.

3. The process of obtaining the solid constituents of liquids in the form of a dry powder, which consists in atomizing said liquids and heating the same to such a degree as will evaporate only the watery constituents thereof, allowing said solid constituents to precipitate by gravity as soon as the atomization has been accomplished, simultaneously removing the watery vapor, and continuing the precipitation of the solid constituents and the elimination of the watery vapor until the desired product is obtained.

4. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray, causing the spray to descend through a drying-chamber containing air heated to a temperature not exceeding 150° Fahrenheit and free from the products of combustion, and separating the vapors from the solids in the same chamber by discharging the vapors above and collecting the solids below, after they have passed out of the vapor-charged area.

5. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray, causing the spray to descend through a drying-chamber heated to a temperature not exceeding 150° Fahrenheit, and separating the vapors from the solids in the same chamber by discharging the vapors above and collecting the solids below, after they have passed out of the vapor-charged area.

6. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray by means of heated air free from the products of combustion, causing the spray to descend through a drying-chamber, and separating the vapors from the solids in the same chamber by discharging the vapors above and collecting the solids below, after they have passed out of the vapor-charged area.

7. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray by means of heated air, causing the spray to descend through a drying-chamber, and separating the vapors from the solids in the same chamber by discharging the vapors above and collecting the solids below, after they have passed out of the vapor-charged area.

8. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray, dropping it through a drying-chamber, vaporizing the liquid constituents of its particles as they fall, and continuing this process of separating the vapors and solids by discharging the vapors above and collecting the solids below, after they have passed out

of the vapor-charged area and are substantially free from moisture.

9. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray, passing it through a drying-chamber, vaporizing the liquid constituents of its particles as they pass, and separating the vapors as soon as formed from the solids, by moving the vapors in one direction and the solids in another during such vaporizing process, and continuing such process until the solids have passed out of the vapor-charged area and are substantially free from moisture.

10. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray, discharging it and permitting it to drop through still air in a drying-chamber, vaporizing the liquid constituents of its particles as they drop, through the action of heat, and separating the vapors and solids, drawing such vapors off in one direction and discharging the solids in another, continuing such separating until the solids have passed substantially out of the vapor-charged area and are deposited as powder.

11. The process of obtaining the solid constituents of liquids in the form of dry powder, which consists in converting the liquid into a fine spray by the action of heated air, discharging it, and permitting it to drop through still air in a drying-chamber, vaporizing the liquid constituents of its particles as they drop, through the action of heat, and separating the vapors and solids.

JOHN C. McLACHLAN.

Witnesses:
HOMER L. KRAFT,
ANSON B. SWEET.