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METHOD FOR ATOMIZING AND DRYING LIQUIDS

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Fig. 1.

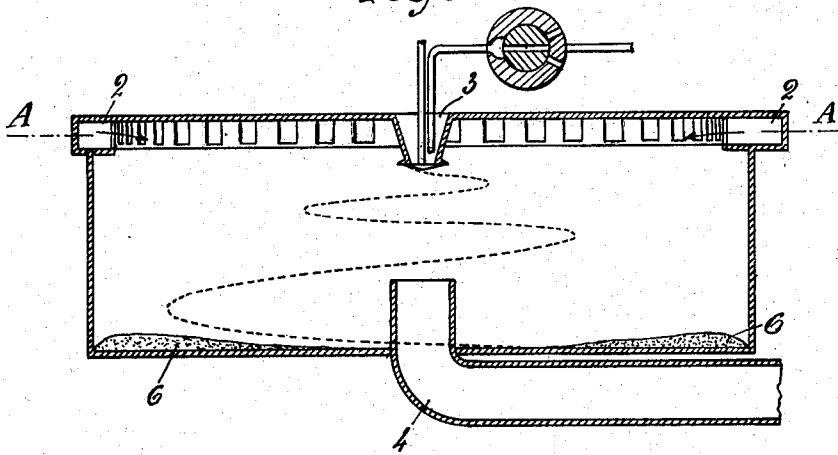
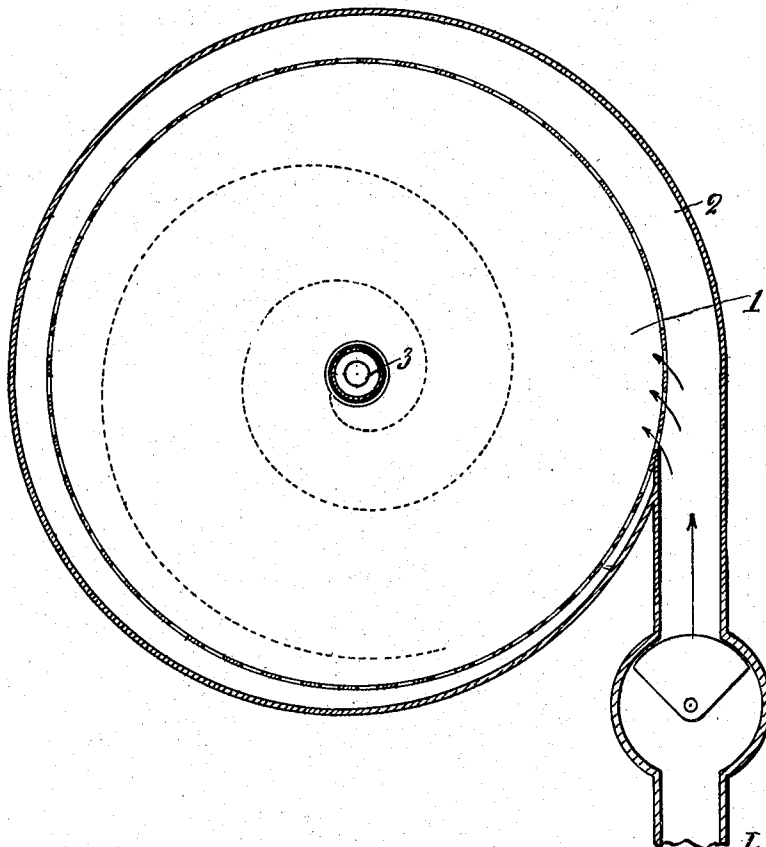


Fig. 2.



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METHOD FOR ATOMIZING AND DRYING LIQUID

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The present invention refers to a method of atomizing and drying liquids.

The characteristic feature of the method consists in that the liquid which is to be dried in an atomized state receives a direction of travel which is essentially at right angles to the direction in which the drying air is travelling, so that the particles of liquid,—also after they have met the drying air—will have an independent movement relatively to the air and the drying effect will be the more intense.

This is an essential condition for obtaining a good product as it has been found to be a fact that in drying various emulsions, such as milk, cream and the like, the best product is obtained by the time which is required for the completion of the drying process being as short as possible while at the same time the temperature employed being as low as possible.

These conditions are met with in the most favourable manner by the particles of liquid during the time they are under the effect of the drying air, being given an opportunity to be exposed to the highest possible influence of the air, whereby the evaporation of the moisture contained in the particles is best promoted.

The idea of the method is to supply the drying air or the liquid intermittently, as this has proved to be of special advantage in treating certain substances which hereinafter shall be separately described.

An apparatus which is particularly well suited for performing the present method is shown in the drawing, in which

Fig. 1 is a vertical section through a drying vessel,

Fig. 2 a vertical section on the lines A—A in Fig. 1.

In the drawing the numeral 1 indicates a vessel of a suitable shape and size. The drying air is conducted into this vessel in a tangential direction through a pipe 2 opening into the upper part of the vessel 1. In the centre of the cover of the vessel 1 is disposed an atomizer 3 of any suitable design, which, however, does not form any part of the present invention.

It should, however, be here said that a rotary atomizer—type Nyrop—would be specially adapted for the purpose.

Immediately beneath the atomizer an air outlet pipe 4 is arranged in the bottom of the vessel 1, having its upper end projecting upwards into the said vessel.

With the apparatus thus described the method forming the subject matter of the present invention is performed in the following manner:

The liquid to be treated is introduced into the vessel 1 through the atomizer 3 in such a manner that the atomized liquid will be violently dashed into the vessel, in which it will, under action of the centrifugal force, its gravity and the influence of the current of air entering through the pipe 2, travel through a spiral curve the turns of which increase in diameter, approximately as indicated in the drawing by the dotted lines.

While the atomized liquid is travelling along this course all the moisture contained in its particles will be evaporated and the remaining powder, which consists of the solid and the not readily evaporated components of the emulsion, will, eventually, settle on the bottom of the vessel 1, as indicated at 6 in Fig. 1, while the used drying air together with the moisture it has absorbed will pass off from the vessel through the pipe 4.

From the foregoing description of the performance of the present method it will be evident that while the atomized liquid coming from the atomizer 3 will have a movement with, essentially, an outward and downward direction, the drying air coming from the pipe 2 has a movement of an inward and downward direction towards the center of the vessel. The result is that the main directions of these two currents will meet each other at a certain angle which can be adapted to suit the conditions, so that the particles of liquid, when they on abutting with the air change their direction of travel, will not immediately get a direction coinciding with that of the air, but will continue their travel relatively to the air surrounding the particles, whereby it is assured that the

air will more quickly cause the contents of liquid in the particles to evaporate as thereby the air can absorb more moisture within the same period of time.

5 For still further increasing this favourable effect an intermittently acting valve or the like may be interposed either in the outlet pipe 4 or in the supply pipe 2 so that the air within the vessel will be caused to vibrate
10 very violently and thereby the friction between the particles of liquid and the air increased.

The liquid may be supplied into the vessel either continuously or intermittently. It
15 has been found that an intermittent supply is of advantage with certain substances. This, for example, is the case in drying emulsions of oils and water when it is desirable to obtain a dried powder soluble in
20 oil. In such cases an intermittent supply of the oil will be the only means by which it can be made to settle on the outer side of the dried particles.

In the foregoing a constructional form has
25 been described which might chiefly be employed for the production of milk powder. The apparatus can also be employed in many other ways, for example, for drying mud, whilst products of combustion could be supplied, the same as the apparatus for the
30 actuation of the mud which, for the purpose of increasing its filtration, is necessary before the drying. Finally the apparatus may also be employed for cooling the air
35 from a saltpetre furnace, whereby the yield of saltpetre might be increased.

It might also be here mentioned that the apparatus could also be used for cracking, for
40 producing steam by spraying water into hot products of combustion, and for the production of nitric acid by letting the air, saturated with water pass an electric arc, as also for letting light rays act on the finely divided matter to produce vitamins in specially
45 prepared oils. In other words, by effecting an irradiation by means of light rays D-vitamins are activated.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—
50

Method for atomizing and drying liquids consisting in hurling out particles of liquid from an atomizer at the top of a vessel in a layer and pressing the particles in a downwardly extending spire with increasing radius of curvature, and simultaneously introducing drying air at the top of the vessel and adjacent the side of outgoing particles of liquid so that the air will pass through
60 the particles of the liquid in a spire with decreasing radius of curvature but with the same direction of movement as the particles of liquid.

In testimony whereof I affix my signature.
65

AAGE NYROP.