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C. E. GLESSNER

VACUUM DEHYDRATOR

Filed Feb. 3, 1920

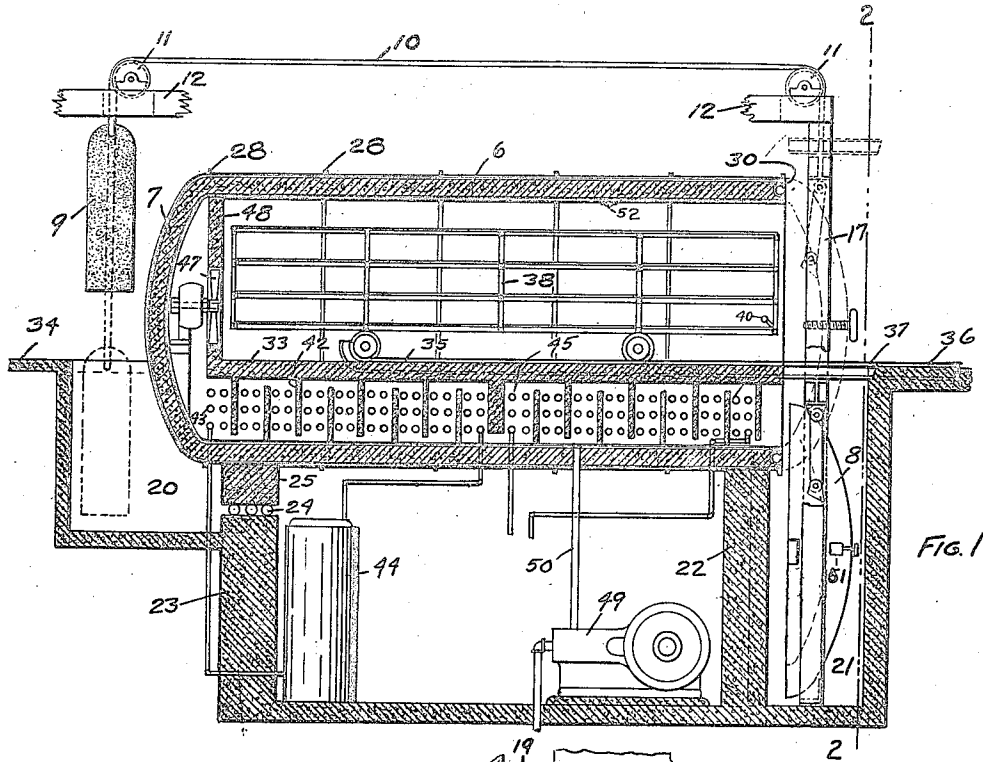


FIG. 1

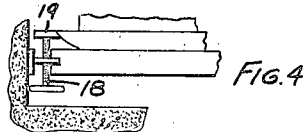


FIG. 4

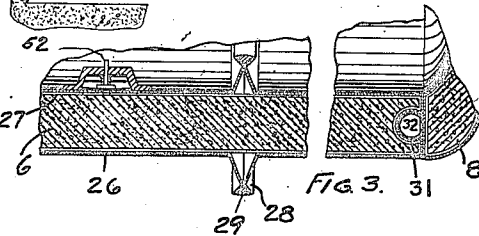


FIG. 3

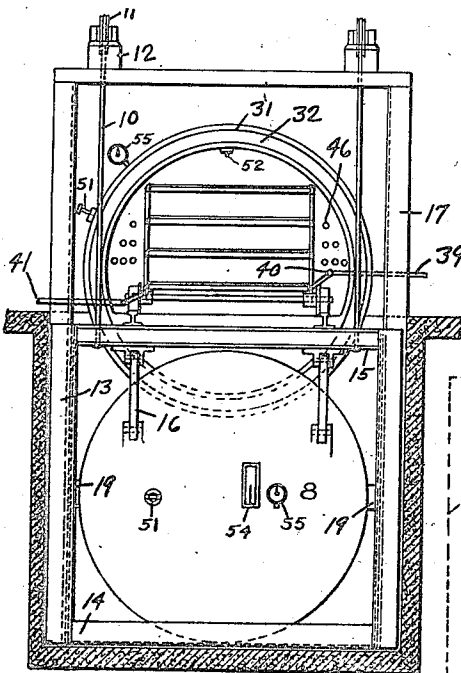


FIG. 2

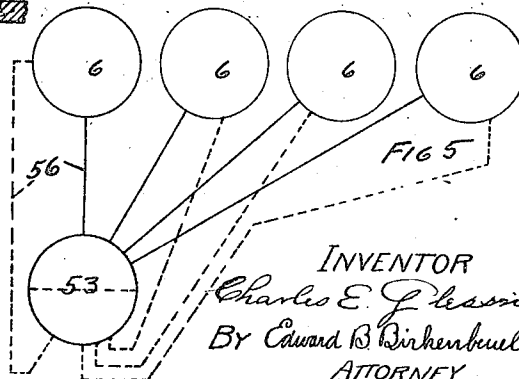


FIG. 5

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VACUUM DEHYDRATOR.

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To all whom it may concern:

Be it known that I, CHARLES E. GLESSNER, a citizen of the United States, and resident of Portland, in the county of Multnomah and State of Oregon, have invented a new and useful Vacuum Dehydrator, of which the following is a specification.

My invention relates more particularly to a machine for removing the moisture from objects without subjecting same to a relatively high degree of temperature.

The object of my invention is to provide a dehydrating apparatus which will itself be simple and inexpensive in construction, efficient in operation, and capable of producing a very high grade of dehydrated food stuffs.

I attain these results in the manner set forth in the following specification and illustrated in the accompanying drawing, in which:

Figure 1 is a longitudinal cross section thru the apparatus showing only the parts actually necessary for the device. Figure 2 is a front elevation of Figure 1 along the line 2-2 in Figure 1. Figure 3 is an enlarged detail showing the expansion joints, pressure equalizing valves and sealing apparatus. Figure 4 is a partial plan showing the means for holding the closure in place until the internal pressure is reduced sufficiently to do so. Figure 5 is a diagrammatic view showing the manner of operating these machines as a battery.

Similar numbers of reference refer to the same or similar parts thruout the several views.

Referring in detail to the drawing, a concrete cylinder 6 of sufficient strength to withstand atmospheric pressure is constructed having an arched closed end 7 and an arched closure member 8 which is counterbalanced by the weights 9 to which it is attached by means of the cables 10 which pass over the sheaves 11 supported by the beams 12 in the most convenient manner.

The closure 8 is hung within a sliding frame which consists of the two vertical members 13, a lower cross tie 14 and an upper tie 15. To this upper tie are attached the two pendant links 16 from which hangs the closure 8. The position of the upper ends of the links 16 and their point of union to the closure member 8 tend to hold the clo-

sure member away from the entrance to the cylinder 6, for reasons which will be explained later.

Vertical guide members 17 engage the vertical members 13 of the closure containing frame and also act as a support for the forward ends of the beams 12 and a stop for the upward travel of the closure member 8. Hand wheel screws 18 in the members 17 are positioned in a manner to enable them to exert a pressure on the lateral lugs 19 of the closure 8 when it is in its uppermost position, thereby holding the same securely against the entrance of the cylinder 6.

A pit 20 is formed under the counterweight 9 to receive same when the closure 8 is raised, and a pit 21 is formed to receive said closure 8 when it is in its lowered position. The forward end of the cylinder 6 is supported by a pilaster 22 and the rearward end is supported on the wall 23 upon which are placed the rollers 24 and the pedestal 25.

It will be observed that the cylinder 6, the end 7, and the closure 8 are completely surrounded inside and out by a metallic lagging 26, which, however, does not touch the concrete itself but is separated therefrom by a suitable lining of felt or other heat insulating material 27. Expansion joints 28 are provided on the exterior and interior lagging, as illustrated in Figure 3, which are formed by bending the edges of the adjacent sheets, as shown, and filling the groove thus formed with solder 29.

The open end 30 of the cylinder 6 is provided with the annular groove 31 within which is placed a pneumatic gasket 32, which, owing to the shape of the groove 31, does not project beyond the open end 30 unless it is inflated. It will be seen that the inflation of this gasket, when the closure 8 is securely held in place by means of the screws 18, will seal perfectly the union between the end 30 of the cylinder 6 and the closure member 8 in spite of any irregularities which may exist in these parts.

Within the cylinder 6 is formed a floor 33 somewhat below the center of the cylinder and on a level with the floor line 34. Embedded in the floor 33 are the rails 35 which are of the same gauge as the rails 36 on the floor of the plant in which this device is used. A short section of track is formed by

the rails 37 which bridge the gap over the pit 21 when the closure member is lowered. This permits a car adapted to contain food stuffs, or other materials, to be rolled into the cylinder. The construction of this car is unique, its frame being formed from a system of heating pipes 38 to which a heating medium, preferably air, is admitted by means of the pipe 39 and the flexible coupling 40, which heating medium escapes thru the exhaust pipe 41. It will be understood that these, and other pipes to be mentioned, are provided with suitable valves for controlling the flow of their contents as may be required.

Baffle plates 42, opening alternately at the top and bottom, are placed underneath the floor 33, and the small compartments formed thereby contain heating coils 43 thruout the rearward half, which is the closed end of the device. Heat is supplied to these coils from a suitable boiler 44 in a manner which is common to the art. Similar pipes 45 are placed between the partitions 42 in the front half or open end of the device and carry a cooling medium, which may be supplied either from water or any convenient cooling apparatus. Additional heating radiation is supplied in the lateral pipes 46.

A motor driven fan 47 operating in an opening in the rear internal wall 48 is used to propel air warmed by the coils 43 thruout the length of the food containing car, whose compartment is also heated by radiation from the frame 38.

It will be understood that the atmospheric pressure within the cylinder 6 has previously been reduced by means of the pump 49 thru the pipe 50. It also acts as a drain for the system. The warm rarefied air surrounding the objects which are to be dehydrated carry off a portion of the moisture which is later condensed by the cooling pipes 45 as the moist air is returning to the fan 47 in its curved path around the baffle plate 42, after which it is again warmed by the pipes 43 before it reaches the fan for another journey around the circuit.

Those familiar with the dehydration processes of today are well aware that a very serious difficulty is met in the construction of a vacuum container of suitable size to make the operation possible on a commercial scale, owing to the enormous cost of constructing a container of metal which will withstand the terrific strains caused by the reduced internal pressure. This difficulty has long stood in the path to the construction of a successful commercial dehydrator, and it is by the use of an exceedingly strong and inexpensive frame which is covered by an air-tight elastic material, that I have overcome this difficulty.

It will be understood that every particle of concrete in the container and its closure

is hermetically sealed within the inner and outer lagging 26, and that it is possible by means of the vacuum pumps 51 to reduce the pressures within the container lagging and the closure lagging, thereby providing an excellent insulator for the apparatus. It is evident that should a leak occur in the outer lagging 26, the inner lagging 26 would collapse as the result, and I have therefore provided a check valve 52 which will prevent the pressure within the cylinder 6 from ever being lower than between the lagging 26.

I have indicated the cylindrical member 53 as being divided in two halves in the diagram, one-half of which corresponds with the condensing chamber and the other half with the rewarming chamber as shown in Figure 1. The full and dotted lines 56 indicate circulating pipes which carry the air from the dehydrating unit 6 to the condensing chamber from which it passes to the rewarming chamber and then back to the dehydrating unit: that is, any or all of the units which may be connected up with the apparatus 53 at the time.

In Figure 5 I have indicated this apparatus as a battery of dehydrating cylinders 6 having a common condensing and warming chamber 53. Thermostats 54 for maintaining a uniform temperature in the dehydrating chamber may be used in any of their forms which are common in the art.

I have provided pressure indicating gauges 55 on the outside of the container and closure laggings in order that a uniform vacuum may be maintained at both places.

While I have thus illustrated and described my invention it is not my desire to limit myself to this precise form or method of application, but intend that it shall cover all forms and modifications that fall fairly within the appended claims.

What I claim as new and desire to protect by Letters Patent of the United States, is:

1. In a vacuum dehydrator, the combination of a dehydrating apparatus with a tank and closure member having expansible metal coverings adapted to hermetically enclose the structure of said tank and closure member, a means for sealing the union of said tank member and said closure member, and air exhausting and gauge means adapted to control the pressure within said tank, an air exhausting and gauge means adapted to control the pressure within the structure enclosing portion of the expansible metal covering, and a check valve arranged to permit the passage of air from within the structure enclosing members to the central enclosure.

2. A process for dehydrating food at low temperatures consisting of progressively exposing the food to warm, dry, rarefied air, carrying away this air as it becomes moisture

laden, removing the moisture from said air, rewarming same, and again returning rarefied air to the food.

3. In a vacuum dehydrator, the combination of a dehydrating apparatus with a container consisting of a concrete tank of sufficient strength to withstand atmospheric pressure and enveloped by an air-tight covering supported internally by said tank, a combined heating and conveying apparatus consisting of a car having a frame and shelves adapted to support materials to be dehydrated, and a means for heating said portable frame within the tank.

4. In a vacuum dehydrator, the combination of a dehydrating apparatus with a tank and closure member having expansible metal coverings adapted to hermetically enclose the structure of said tank and closure mem-

ber, a means for sealing the union of said tank member and said closure member, and an air exhausting and gauge means adapted to control the pressure within said tank.

5. In a vacuum dehydrator, the combination of a dehydrating apparatus with a tank and closure member having expansible metal coverings adapted to hermetically enclose the structure of said tank and closure member, a means for sealing the union of said tank member and said closure member, an air exhausting and gauge means adapted to control the pressure within said tank, and an air exhausting and gauge means adapted to control the pressure within the structure enclosing portion of the expansible metal coverings.

CHARLES E. GLESSNER.