Feb. 6, 1951 C. S. SCHMUCKLER 2,540,492

DEHYDRATING AND REACTIVATING APPARATUS

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Fig. 1

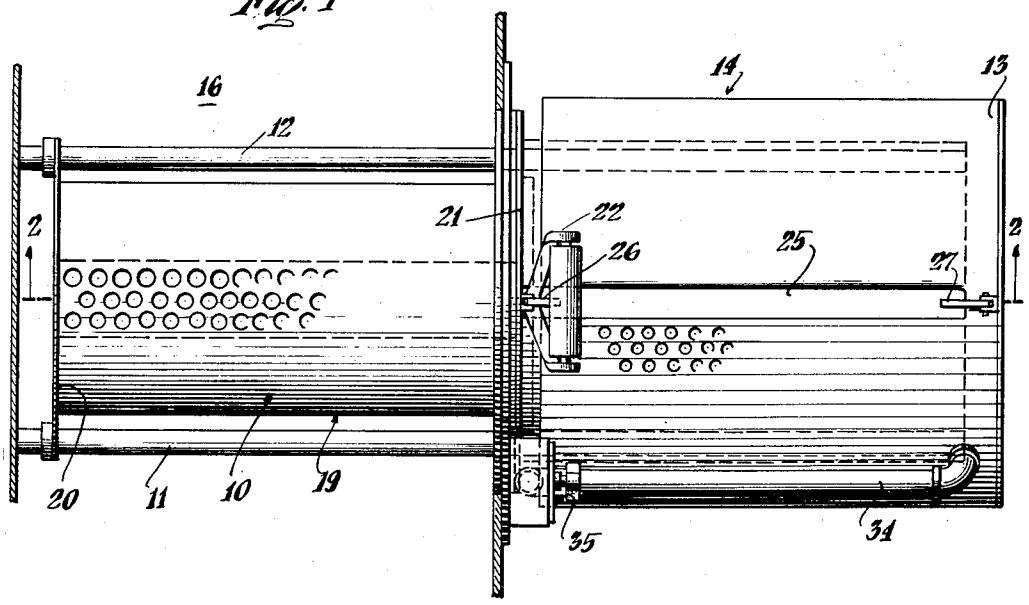

Fig. 2

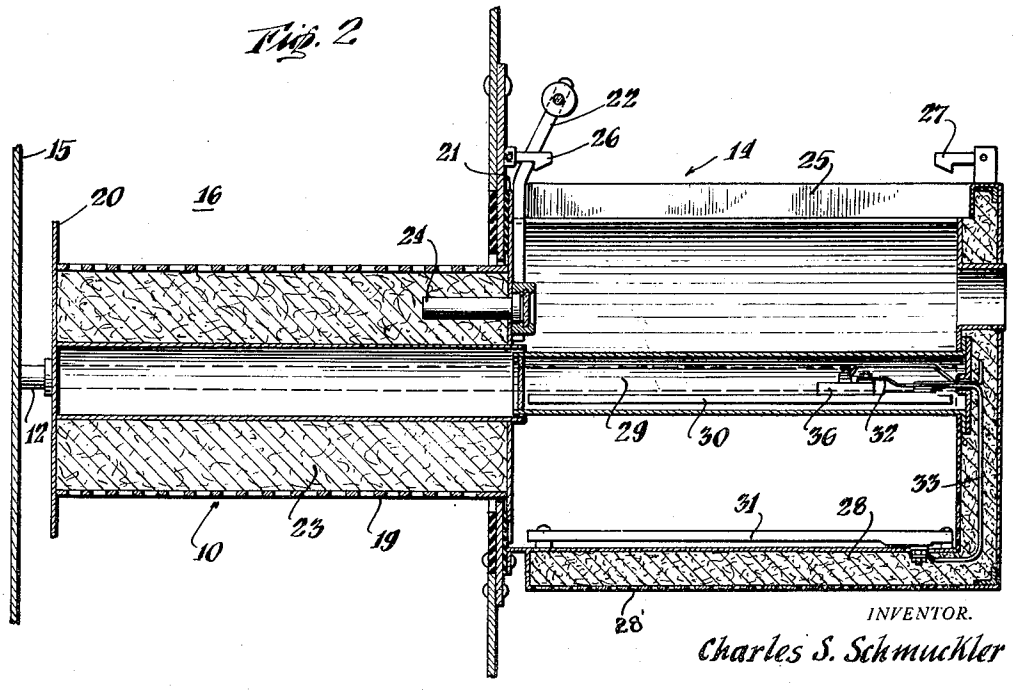

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Fig. 3

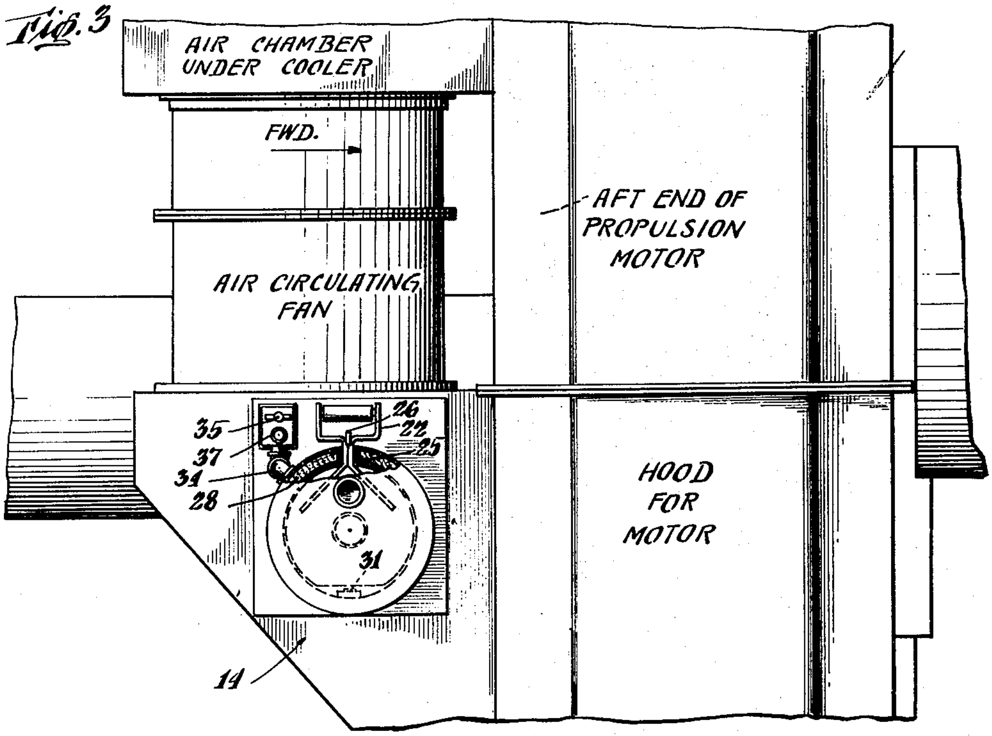


Fig. 4

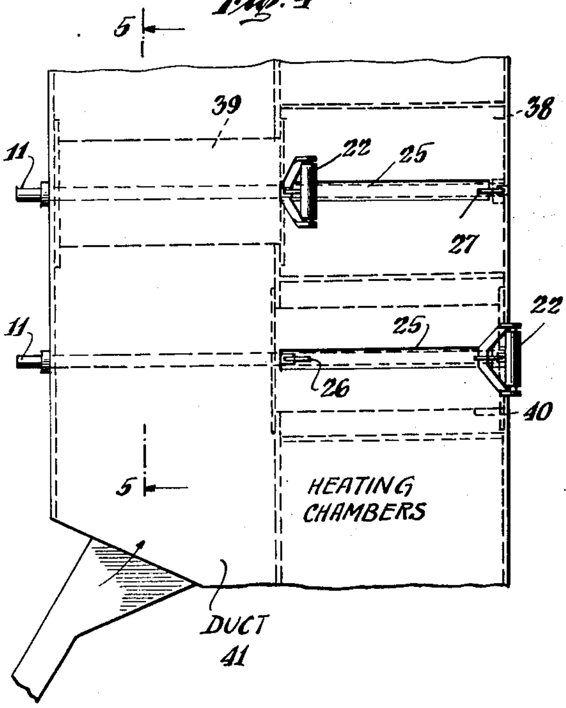
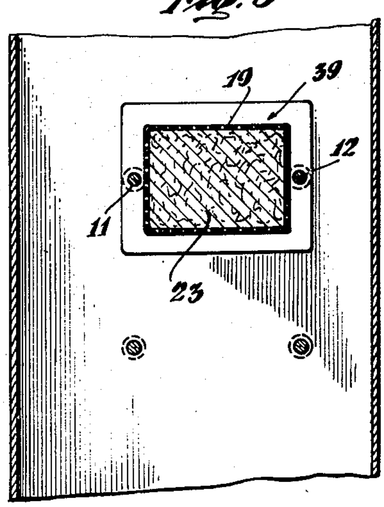


Fig. 5



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DEHYDRATING AND REACTIVATING APPARATUS

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Application October 18, 1946, Serial No. 703,991

7 Claims. (Cl. 183—4.6)

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This invention relates to dehydrating and reactivating apparatus and, more particularly, it relates to a device used in connection with sealed air circulating systems such as are used with main propulsion motors in ships or in closed ventilating systems in pharmaceutical, chemical or food industries and the like.

In ships of various construction, where propulsion motors and main generators are used, it is necessary to force air through the air ventilating and cooling systems connected to said motors or generators so as to prevent overheating of the insulation in the motors or generators. It is also necessary, in such systems, to reduce the amount of moisture or humidity in the air in these systems to a safety minimum in order to prevent arcing or short-circuiting of the wiring systems. Furthermore, in other systems where moisture control is of importance, it is necessary that the proper types of apparatus be used to reduce excess humidity and moisture in the system and such apparatus should be regenerated or reactivated with a minimum of expensive equipment.

With the above features in view, it is a general object of this invention to provide means for reducing the amount of water vapor in closed air circulating systems, and means for reactivating the first means.

It is a further object of this invention to provide a self-contained regenerative apparatus for use in connection with closed circulating systems and adapted to remove excess moisture from air circulated through the system.

It is another object of this invention to provide means mounted in a ventilating system in connection with the main driving unit of ships to reduce the percentage of water vapor in the system so as to increase the insulation life of the electrical wiring in said unit.

Still another object of the present invention is to provide apparatus including a slidable, moisture absorption unit adapted to be moved into a ventilating system of a propulsion motor and, when saturated with moisture, to be moved into a dehydrating or reactivating unit for regenerating the water removing unit.

One further object of this invention is to provide apparatus including a water removing unit in combination with an air ventilating system, heating and activating means therefor for holding the relative humidity at a comfortable margin of safety for ships, liners, etc.

In the drawings:

Fig. 1 is a plan view of a preferred embodiment of apparatus hereinafter described and

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used in sealed or closed air circulating systems;

Fig. 2 is a sectional view taken on lines 2—2 of Fig. 1;

Fig. 3 is a fragmentary elevation partly in section showing the embodiment of Figs. 1 and 2 in combination with the air circulating system of a propulsion motor used on ships;

Fig. 4 is a fragmentary, vertical sectional view of a ventilating system containing a modified embodiment of my invention; and

Fig. 5 is an elevation taken on lines 5—5 of Fig. 4.

Referring now to the drawings in which similar reference characters denote like parts throughout, a dehydrator or canister 10 is shown mounted on a pair of guide rods 11 and 12 extending from one end 13 of and through a heating chamber 14 into the opposed wall 15 of a ventilating duct 16. The construction of canister 10, shown in Figs. 1, 2 and 3, is of cylindrical or flat shape containing a perforated screen 19 enclosed at its opposed ends with flange members 20 and 21, respectively. The longitudinal center of canister 10 is hollow or not, as shown in Fig. 2, provided at end 21 with an upwardly extending handle 22 thereon for drawing the said canister 10 into the heating chamber 14. Canister 10 is filled with silica gel or similar dehydrating material 23 and is provided at its forward end 21 with a cylindrical tube constituting an indicating unit 24 containing silica gel and cobalt chloride. When the silica gel in the canister has been inserted into ventilating duct 16 and absorbs moisture from the circulating air and becomes wet, then the cobalt chloride in the indicator unit 24 becomes pink. Also, when the saturated silica gel is dehydrated in the reactivating or heating chamber 14, as will be hereinafter described, the cobalt chloride in indicator 24 turns blue.

Heating chamber 14 is coaxial with the canister 10 and is provided at its top portion, as shown in Figs. 1 and 2, with a slot 25 through which handle 22 extends so as to permit pulling of the canister 10 into chamber 14 by means of said handle 22. The chamber, furthermore, is provided above said slot 25 and preferably in line therewith, with a pair of opposed spaced pivotal hooks 26 and 27, respectively, functioning as locking members which are adapted to engage the handle 22 when in adjacent position with respect to said locking members depending on whether the cylinder is in the ventilating duct 16 or in heating chamber 14.

The heating chamber 14, as shown in Figs. 1 to 3, inclusive, is of cylindrical shape so as to

conform with the outline of the canister 10. This heating chamber or reactivator is insulated with glass wool or like material 28 adapted to retain the heat in the chamber. The bottom of chamber 14 is provided with vent holes 28' while the top is provided with the slot 25 as hereinbefore described. This facilitates circulation and convection of air from the holes up to and through slot 25. In the central longitudinal opening 29 of the chamber, there is provided an electrical heater element 30 which is in electrical connection with another heater 31 of similar construction disposed at the bottom of chamber 14 and bolted to the inside of said reactivating or heating chamber. It will be noted that the wiring 32 of heater means 30 and 31 is insulated by means of asbestos cable 33 which extends through a conduit 34 in any suitable manner to switch means 35 as shown in Figs. 1 and 3.

It is to be noted that, when the canister containing the dehydrating material is in the reactivating chamber 14 and the heating elements 30 and 31 are in operation, the moisture from the canister is forced outwardly through the top slot 25 by natural convection caused by air entering the vent holes 28' at the bottom of the chamber as shown in Figs. 1 and 2. The moisture in the center of the canister is forced outwardly to the surface of the canister by means of the centrally disposed heating element 30.

Heating element 30 in the center of the heating chamber 14 is connected in series to a thermostat control unit 36. Said thermostat 36, as shown, is set to maintain a temperature preferably of about 450° F. No temperature control of the bottom heating means 31 is necessary since there is sufficient air circulation around it because of said vent holes 28' in the bottom of the chamber. The heating strip means are controlled as indicated above by means of a switch 35 containing a pilot light 37 connected in parallel with the heaters 30 and 31.

In the construction shown in Figs. 4 and 5, it will be noted that there is provided a rectangular shaped heating chamber 38, and that the canisters 39 and 40 are mounted in pairs and operated alternately so that, when one canister 39 is in the ventilating duct system 41, the other canister 40 is in the heating chamber. The structural arrangement, as shown in this embodiment, is similar to that shown in Figs. 1 to 3 inclusive, except as to form.

In the operation of the invention, referring specifically to Figs. 1 to 3 inclusive, the canister 10 is pushed into the air ventilating duct or system 16 whereupon locking member 26 on the wall 18 of air duct is in engagement with the handle 22 of the canister 10. The moisture indicator unit 24, it will be noted, at the time the canister is inserted into the air system, will be blue because the silica gel 23 in the canister is dry. If, after the canister has remained in the air duct for some time, the silica gel in the indicator turns pink thus showing that the gel in the canister 10 is saturated with water vapor. The canister is then drawn from the air duct into the heating chamber 14 by means of handle 22 which is in locking engagement with member 27 and the canister is reactivated by means of the heat generated by means of members 30 and 31. It will be noted that the reactivating period of the silica gel in the canister is proportional to the amount of water contained therein. Upon the completion of the reactivation of the contents of the canister, as shown by the chloride in the indicator gel, the canister is then pushed into the air duct 16. In the case of the modifications shown in Figs. 4 and 5, the canisters can be alternately moved from the air duct and the heating chamber at given intervals of time depending upon the quantity of moisture absorbed from the air in the air duct, thereby insuring that a dehydrating unit is always present in the air circulating system.

It will be noted, from the foregoing description, that the invention can be used either singly, alternately, or in pairs. In connection with ships, for example, one set is ordinarily used for the starboard side and another for the port side of the air circulating systems for the propulsion motor. The apparatus, as disclosed herein, is compact, easy to manufacture, effective and economical to install, operate and maintain. The canister of the apparatus reduces the moisture vapor in the air stream in the ventilating circuit. Furthermore, the indicator gel can be readily noticed so that the canister can be withdrawn from the air circulating system into the heating chamber. The canister is so flanged, as shown in the drawings, that it completely seals the air duct in either the in or out position with respect to the air circulating system.

It will be noted that the forward face 21 of the canister 10 is provided with the handle 22 and comes into contact with the adjacent wall of the heating chamber or activating unit 14 thus permitting the canister to be dehydrated when in said chamber. Also, the rods 11 and 12 and handle 22 may be in any desired position.

The ease of operation and manipulation of the device, as described herein, eliminates the necessity of oiling, overhauling or maintenance for a considerable period of time.

It will be noted, furthermore, that the construction covering the present invention is described herein in connection with the ventilating systems of main propulsion motors or generators on ships. It will be understood, however, that this type of apparatus is applicable to all types of sealed air circulating and humidifying or dehumidifying systems and circuits such as are used in flour mills, in plants where confectionery, pharmaceuticals, cosmetics, perfumes and the like are manufactured where it is vital that the moisture content in the air be controlled. Furthermore, in this type of canister, as described herein, deodorants may be used so as to remove undesirable odors in sealed systems or circuits.

While preferred embodiments of the invention have been described herein and shown in the accompanying drawings, it will be noted that modifications as to form, arrangement of parts and usage of material may be made without departing from the spirit and scope of the invention as claimed herein.

I claim:

1. Apparatus for reducing the moisture content in an air circulating system for the main propulsion motors of ships and the like, comprising a perforated dehydrator containing silica gel adapted to absorb moisture in said system, a drying chamber for said dehydrator in connection with the system and containing a longitudinally slotted opening extending substantially the length of the chamber, means in the chamber heating the interior and exterior of the dehydrator, manually operable means in connection with the dehydrator protruding from said slotted opening to permit sliding the dehydrator from the system to the drying chamber, an indicator dis-

posed in the dehydrator containing silica gel and a coloring for showing the presence of moisture in the dehydrator by a change in color of said agent, thermostatic means for controlling the heating of the chamber, and guide means extending from the drying chamber into the system adapted to permit random sliding of the dehydrator from the system into the drying chamber.

2. Apparatus for connection with air ventilating ducts of the main propulsion motors of ships and the like, comprising a perforated movable unit containing silica gel, a vented insulated chamber in connection with the duct provided with thermostatically controlled operable heating means to regulate the heat in said chamber to dehydrate the silica gel, said chamber having a longitudinal slot extending through the top of the chamber, means protruding from the unit through the slot adapted to pass along the slot when the unit is drawn from the duct into the chamber, a plurality of guide means extending from the chamber into the duct to guide the movement of the unit from the duct into the chamber and vice versa, means in the unit consisting of cobalt chloride and silica gel adapted to show the presence and absence of moisture in the gel in the unit while in use, and flange means extending from opposite ends of the unit adapted to form an alternate seal with the duct and the heating chamber when used in said duct and chamber.

3. Apparatus for reducing the moisture content in an air circulating system for the main propulsion motors of ships and the like, comprising a perforated, cylindrical canister containing material adapted to absorb moisture from air passed therethrough in the system, enclosure means disposed outside the system adapted to contain the canister and heat said canister when removed from said system, guiding means extending from said enclosure means into the circulating system adapted to support the canister when moved relatively of the system, and a unit disposed in the canister adapted to indicate by its color whether the contents of the canister are dry or wet, so as to permit removal from the system and reactivation of the water absorbing contents of the canister.

4. Apparatus for reducing the moisture content in an air circulating system for the main propulsion motors of ships and the like, comprising a moisture absorbing canister adapted to remove moisture from air passing therethrough while disposed in the system, electrically operable means adapted to heat said canister when removed from said system and drive off moisture from the canister, guiding means extending from said means into the ventilating system adapted for slidably supporting the canister when moved relatively of the system, and a unit disposed in the canister adapted to indicate by its color whether the contents of the canister are dry or wet.

5. Apparatus for reducing the moisture content in an air circulating system for the main propulsion motors of ships and the like, comprising a dehydrator adapted to absorb moisture in said system, a drying chamber for said dehydrator in connection with the circulating system, means in the chamber for heating the same, manually operable means for moving the dehydrator from the system to the drying chamber, an indicator disposed in the dehydrator adapted to change color and show the presence of moisture in the dehydrator, thermostatic means for controlling the heating of the chamber, and guide means extending from the drying chamber into the air system, adapted to permit sliding of the dehydrator from the system into the drying chamber, said dehydrator having opposed terminal flange extensions adapted to close the heating chamber from the air circulating system when the dehydrator is disposed in the system or in the chamber.

6. Apparatus for reducing the moisture content in an air circulating system for marine propulsion units and the like, comprising an insulated reactivating chamber in connection with the system, having a longitudinal slot across the top thereof and vents in the bottom thereof, thermostatically controlled electrically heated means, guide means extending from the chamber into the air system, a perforated cylindrical water absorbing unit mounted on said guide means adapted to be moved from the system into the chamber to be dehydrated, said unit having a hollow center adapted, when disposed in the chamber, to accommodate the heating means in the chamber, and means extending from the unit through the slot of the chamber to permit movement of the unit on the guide means, said unit having flanged means at opposed ends adapted to form alternately air tight fitting with the system and the chamber.

7. Apparatus in connection with sealed air circulating system for main propulsion motors of ships and the like, comprising a cylindrical moisture adsorbing unit through which air is passed, heating chamber means for drying said unit said means being adapted to extend into the unit and heat the interior and exterior of said unit, guide means adapted to permit random sliding of the unit from the air circulating system to the heating means, indicator means in the unit adapted to show whether or not the contents of the unit are saturated with moisture, and means disposed on the heating means adapted to lock the adsorbing unit in the heating unit while the moisture is being driven off from said adsorbing unit.

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