May 31, 1949. F. P. MORF 2,471,442

DESICCATOR CARTRIDGE

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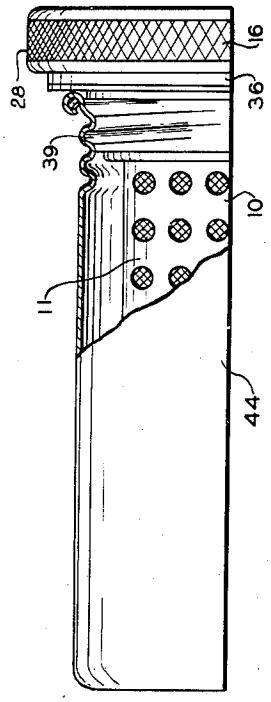


FIG. 3.

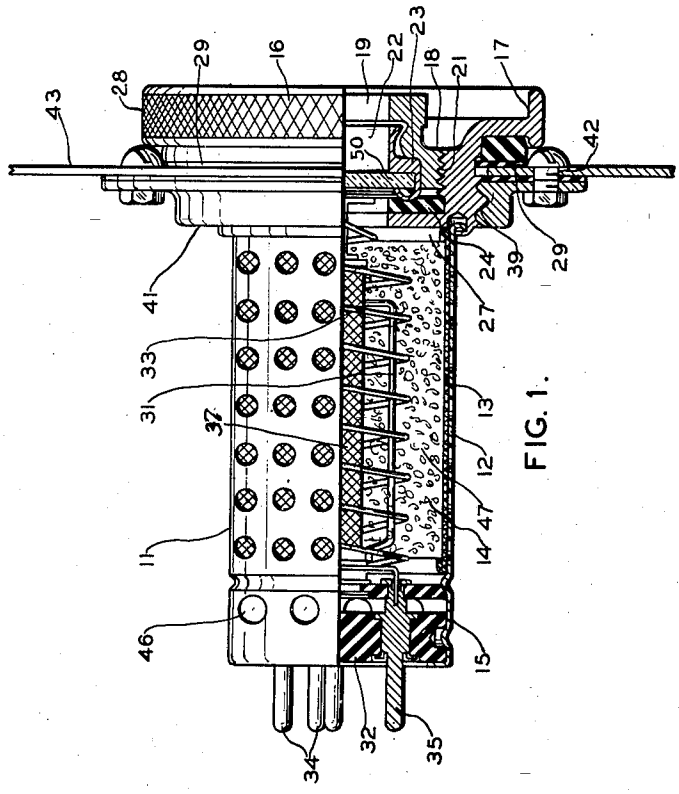


FIG. 1.

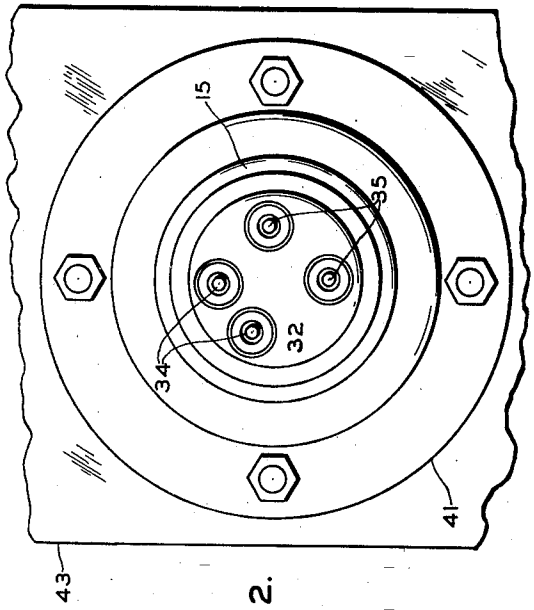


FIG. 2.

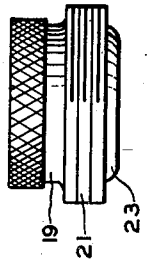


FIG. 4.



FIG. 5.

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DESICCATOR CARTRIDGE

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2 Claims. (Cl. 183—4.5)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

1

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to moisture-eliminating equipment and more particularly to desiccator cartridge units.

Devices have been previously employed for eliminating or reducing the moisture content in the chamber area of various types of equipment, the contents, parts or materials of which are detrimentally affected by adjacent atmospheres, when such have moisture in excess of a certain degree of humidity, or by the depositing of such, when conditions cause the air to become saturated and an excess of water produced. In a particular form such a device consists of a small hollow container of simple design which is goose-necked and piped, and externally attached to the equipment area to be kept free from moisture. The container is substantially filled with silica gel or other suitable hygroscopic material in a lumped mass and arranged so that the air from the area will have continuous access to the upper surface of the silica gel through the relatively small area afforded by the piping. However, in this form, the moisture-absorbing contents are usually discarded when it becomes saturated or aged, and replaced with new silica gel or whatever material is employed. This is considered acceptable practice, when the hygroscopic material is abundant and available, and it is cheap in cost.

The disadvantages of this type of unit are:

(*a*) Absorbing action is restricted through the small area of the goose-neck connector, and is therefore relatively slow and inefficient;

(*b*) Access to lower layers of hygroscopic material is difficult;

(*c*) Reactivating of hygroscopic material is inconvenient;

(*d*) Takes up space outside of equipment being desiccated and is more or less in the way;

(*e*) Waste of material, if discarded.

In another form the container is of canister form, insertable in the equipment structure. It consists of a central cage containing silica gel, and held in back of wire screens on top and bottom of the canister. The screens allow air to get into contact with the material and absorb its moisture. Covers with bent rims and tight enough to stay on are used to cover the top and bottom surfaces of the canister when not in use. When the contents become moisture loaded, they are discarded as is the previous form, or the canister is placed in an oven and dried out and reactivated by heating from the exterior. This form is objectionable owing to the requirement of an oven—such ovens are usually cumbersome and require operational care, take up space, require fuel, and control; and personal attendance is necessary to prevent the hygroscopic material from being over-heated or "burned." It is usually a relatively long time process.

2

It is an object of the invention to provide a new and improved desiccator cartridge unit that will avoid one or more of the disadvantages or limitations of desiccators previously known in the prior art.

Another object of this invention is to provide a new and improved desiccator cartridge unit that can be reactivated readily without removing the hygroscopic material therefrom.

Still another object of the present invention is to provide a new and improved desiccator cartridge unit that will have a self-contained means for producing internal heating reactions sufficient to reactivate the hygroscopic material therein.

An additional object of this invention is to provide a new and improved desiccator cartridge unit that can be attached inside of the equipment, in the area that is to have its moisture eliminated or reduced.

A still further object of this invention is to provide a new and improved desiccator cartridge unit that will have a relatively large moisture absorbing surface for drying air in the equipment in which it is placed.

A further additional object of the present invention is to provide a new and improved desiccator cartridge unit that will have the cartridge arranged so that its hygroscopic material can be kept in activated condition for indefinite periods, when not in use.

In a particular form of this invention a desiccator unit cartridge comprises a housing means having a perforated closed-in wall adapted to hold hygroscopic material or contents therein. A heating element means is disposed within this housing and arranged to position itself adjacent to this hygroscopic material. The perforated wall of the housing is adapted to permit the free access of the surrounding air to and from all sides of the material. A casing for hermetically sealing up the housing with its hygroscopic material and heating means within it, is provided for use when the unit is to be stored away out of use.

It can be appreciated that the heating element means may be heated by any source of heating energy suitable for the means used, and that the term electrical energy is broad enough

to include any applicable form of electrical energy. Any structure required to hold the parts are included in this means. Also that the housing is comprehensive enough to include, lining screens, top flange, plug and other parts used in connection therewith and not included in the heating means and casing.

For a better understanding of the present invention, together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

Referring now to the drawing:

Figure 1 is a side view, partly in section, of a desiccator cartridge embodying this invention, as applied to the interior area of a cabinet;

Figure 2 is a bottom view of Fig. 1 looking upwardly;

Figure 3 is a side view, partly in section, of the desiccator cartridge unit unattached, and having a protector casing mounted thereon,

Figure 4 is a side view of the plug used in Fig. 1; and

Figure 5 is a detail of the under side flange shown in Fig. 1.

Similar reference characters refer to similar parts throughout the drawing.

In this particular form, a desiccator cartridge unit 10 consists of a cylindrical housing assembly 11 having a body with a perforated tubular wall 12, just inside of which a meshed screen lining 13 is mounted. The wall encloses a cylindrical space 14 which is arranged to be closed at the bottom section 15 by a heater block 32. The upper section of the housing assembly consists of a circular flanged head 16, having a dish-like upper surface 17 and centrally drilled and tapped to form a hole 18 to take a cylindrical plug 19 which is exteriorly screw-threaded at 21 to fit this hole 18. The plug 19 has a relatively large central passage 22 in which is tightly fitted, a frame 23 containing a window 50 of transparent glass or plastic. The under side of the head 16 is flanged inwardly and provided with a relatively large opening, centrally located therein. On this flange and internally within the head 16, gasket ring 24 of resilient material is set. The peripheral surface 28 of the flanged head 16 is preferably knurled to provide a suitable manipulating resistance during handling.

The gasket ring 24 is resiliently impressed by the frame 23 and provides an airtight coupling between the said frame 23 and the head 16.

A heater base block 32 of insulating material is mounted in the bottom section 15 and securely held thereto. This block serves as a support for the low and high voltage heating elements 31 and 33 which are electrically connected with prongs 34, 35 respectively for external plugging. The heating elements are fed through these prongs. The elements are preferably of flat strip material formed into a helical shape. A central narrow tubular screen 37 passes up through the middle of the housing as indicated. The lower exterior of the housing head 16 is provided with a rolled screw-thread 39, on which is threadedly mounted a removable internally threaded flanged piece 41. This flanged piece is provided with holes 42 for the insertion of rivets or bolts for attaching same to the side wall 43 of a cabinet. One or more annular gaskets 29 may be used between said wall 43 and the head 16 and the flanged piece 41 for a tight fit. This cabinet belongs to any suitable equipment and holds the materials and

apparatus and has a space from which the moisture is to be eliminated by the unit cartridge. A casing 44 of tubular cup form and sufficient size is screwed on to the screw-threads 39 when the cartridge is removed from the cabinet so its hygroscopic material will be protected.

A suitable hygroscopic material such as a silica gel, activated alumina and other known substances of this nature, is poured into the housing and shaken into it so as to fill in the space between the screen lining 13 and the screen 37. This is done by pouring it through the hole 18 in the flanged head 16 after the plug 19 is removed. This settles the silica gel around the elements 31 and 33 and against the screens 13 and 37. After it has been suitably filled, the plug 19 is replaced and screwed on tight against the gasket 24. The cartridge is then screwed into its flange piece 41 and bolted to the cabinet and is ready for operation. However, should it be desirable to store the cartridge for the time being and keep it in condition for instant use, the casing 44 is screwed on to the flanged head 16 and brought tight against the resilient ring gasket 36.

When it is desired to reactivate the contents, consisting of silica gel or other hygroscopic material used, the operator couples the selected prong connections 34 or 35 through a cable to a plug tied into any source of electrical current that is available, selecting the prongs and heating element capable of withstanding its voltage. The current is then switched on and left on until the element is heated hot enough and long enough to dry out the silica gel. In this instance the silica gel is of the indicating type and turns to the color, to show what state of activation it is in. Blue for activated; light pink for saturated with moisture.

The purpose of this desiccator cartridge is to keep the contents in activated condition at all times, or ready for expeditious activation. By having plural heating elements, various voltages may be employed. A battery of automobile voltage (6 to 12 v.) can be used; or coupling can be made to a regular service voltage, (110 v.) whichever is available or convenient to use. After the desiccator cartridge is in position in the cabinet to be de-moistured, the surrounding air having access to the hygroscopic material through the perforations in the outside peripheral wall, or through the central tubular wall is attracted and dried by it. In the last case the openings 46 in the lower section of the housing give entrance in to the tube and afford the necessary access. This provides a surface extending over the greater length of the housing and its exterior and internal surfaces. The plug used for coupling the plug of the device to external service, can be of usual conventional type for heating the silica gel 47. It therefore affords a very efficient moisture absorbing action. When the casing 44 is placed on the cartridge, to complete the unit, it prevents the air from getting to the hygroscopic material or its connecting prongs to wet or deteriorate same. This is put on when the desiccator cartridge is removed from the equipment. It is valuable in such a device to be able in a convenient and self-contained way, to reactivate the hygroscopic material in a safe, quick and effective manner, by the simple effort of attaching the unit cartridge to a battery or electric service that is usually available nearby, and at the same time have visible indications to tell the operator when the proper condition of activation has been reached. The various parts are held in place to the struc-

ture in usual conventional manner, which are well known to those skilled in the art. The temperature to which the heating elements are raised can be controlled so it will not harm the hygroscopic material.

While there has been described what is at present considered to be a preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention or the principles thereof, and it is therefore aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A desiccator unit cartridge comprising a perforated cylindrical outer body closed at one end, a cylindrical screen within said outer body and in contact with the latter throughout its length, an inner coaxial cylindrical screen spaced from said first named screen to provide therebetween an annular space for hygroscopic material, electrical heating means in said annular space for reactivating the hygroscopic material, a flanged head at the other end of said body, said flanged head including means for attaching said cartridge to a body to be desiccated.

2. A desiccator unit cartridge as claimed in claim 1, said flanged head being provided with a window for observing the condition of hygroscopic material.

FREDERICK P. MORF.

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