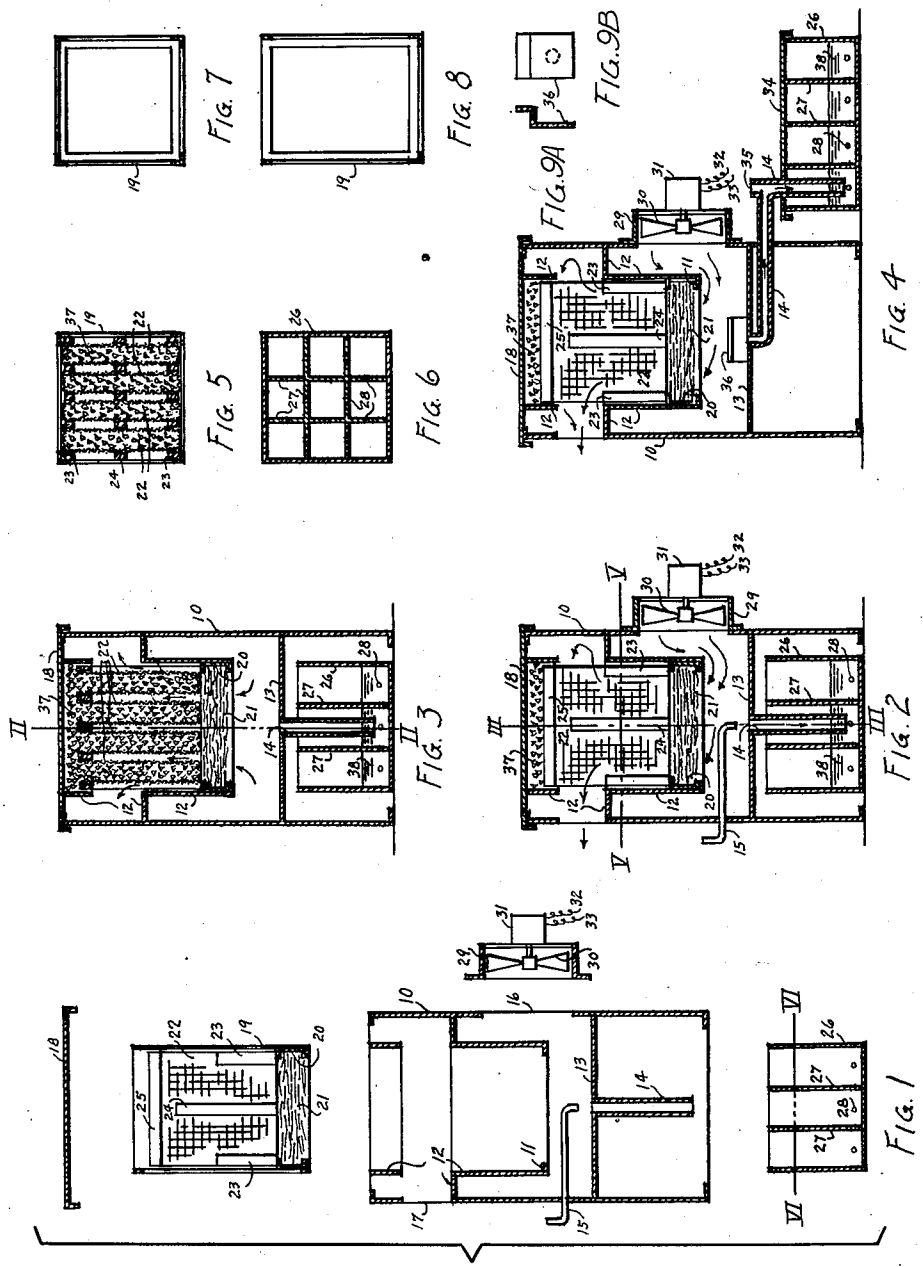
Feb. 12, 1952 H. J. KAUFMAN 2,585,787

PORTABLE CABINET FOR DEHYDRATING AIR

Filed Jan. 29, 1945



INVENTOR.

Hiram Joseph Kaufman

Patented Feb. 12, 1952

2,585,787

UNITED STATES PATENT OFFICE

2,585,787

PORTABLE CABINET FOR DEHYDRATING AIR

Hiram Joseph Kaufman, Detroit, Mich.

Application January 29, 1945, Serial No. 575,152

1 Claim. (Cl. 183—4.3)

1

This invention relates to a portable cabinet for dehydrating air in which calcium chloride, magnesium chloride or other suitable hygroscopic material can be effectively used for producing dry air conditions within enclosures.

One object of the invention is to provide apparatus for dehydrating the air of enclosures where drainage is not available and for temporarily storing the waste hygroscopic solution within the enclosure without evaporating water from the waste hygroscopic solution back into the air of the enclosure.

Another object of the invention is to provide apparatus for dehydrating air in an assembly of demountable and interchangeable parts for easy access through manholes of tanks, tunnels and marine compartments and for interchanging or replacing the separate parts as may be required.

Another object of the invention is to provide apparatus for dehydrating air for use in marine vessels and transportation cars in which the waste hygroscopic solution can be temporarily stored without slopping or spilling due to sudden movement or tilting of the apparatus in any direction.

A further object of the invention is to provide apparatus for dehydrating air in which the small particles of hygroscopic solid material will not clog the drain outlet when filling the apparatus with fresh hygroscopic solid material.

Referring to the drawings:

Figure 1 is an exploded view of the separate parts of the assembly before being assembled.

Figure 2 is a vertical section of the assembled parts on the line II—II of Figure 3.

Figure 3 is a vertical section of the assembled parts on the line III—III of Figure 2.

Figure 4 is a modification of the assembly in which the waste hygroscopic solution tank is outside of the cabinet.

Figure 5 is a horizontal section on the line V—V of Figure 2.

Figure 6 is a horizontal section on the line VI—VI of Figure 1.

Figure 7 is a horizontal section of the removable frame 19.

Figure 8 is a vertical section of the removable frame 19.

Figure 9A is a section and Figure 9B is a plan of the baffle 36 shown in Figure 4.

Referring to Figures 1 to 8; the case 10 has the supports 11, the baffles 12, the horizontal partition 13, the drain pipe 14, the liquid seal supply pipe 15, the air inlet 16, the air outlet 17 and the cover 18.

2

The frame 19 is carried on the supports 11 and carries the sub-frame 20 which holds the porous material 21 and also supports the wire screen or perforated material baskets 22, having the spacing members 23, 24 and 25, which also direct the air flow between the said wire screen baskets.

The waste hygroscopic solution tank 26 is divided into vertical compartments by the partitions 27, having the holes 28 for equalizing the levels of the waste solution in the separate compartments.

The fan section 29 has the fan 30, driven by the motor 31 and is supplied with electric current through the wires 32 and 33.

Figure 4 shows an alternate arrangement of the apparatus with the waste hygroscopic solution storage tank outside of the cabinet, the tank having the air tight cover 34 which is made removable for emptying the tank. The drain pipe 14 has the opening 35 for supplying a liquid seal to the said drain pipe. The entrance to the drain pipe is protected by the baffle 36 against clogging due to small particles of hygroscopic solid material falling into the entrance to the drain pipe when filling the wire screen baskets with hygroscopic solid material.

The operation is as follows; the baskets 22 are filled with or slightly more than filled with hygroscopic solid material such as calcium chloride or magnesium chloride in flake or granulated form 37, air is moved by the fan 30 driven by the motor 31 through the air inlet 16, upward through the porous material 21 in contact with hygroscopic solution from the melted hygroscopic solid material 37 in the baskets 22, then vertically and then horizontally between the baskets 22 and around the ends of the said baskets and outward through the air outlet 17. The air flow is upward by mechanical means and the hygroscopic solution flow is downward by gravity and the two flows are in counter direction to each other. The waste hygroscopic solution 38 flows by gravity down the drain pipe 14 into the waste hygroscopic solution storage tank 26 and equal levels in the separate compartments are maintained by means of the holes 28 in the partitions 27 regardless of the tilting of the apparatus, also slopping or spilling of the waste solution is prevented by the said partitions 27 during sudden starting or stopping of the movement of the apparatus. When starting operations, sufficient waste solution should be left in the tank 26 to seal the outlet of the drain pipe 14. The waste hygroscopic solution in the tank 26 is sealed from contact with the outside air by means of being

enclosed within the cabinet 10 in one case and by the cover 34 in the other case. The waste solution in the drain pipe 14 is sealed from contact with the air in the upper portion of the pipe by means of a liquid seal of oil or other liquid through the pipe 15 or through the opening 35. This liquid seal must have a specific gravity less than the waste solution and should not be soluble in the waste solution. The purpose of the porous material 21 is to retard the flow of hygroscopic solution and to provide surfaces for contacting the upward flow of air with the downward flow of hygroscopic solution and can be made of spun glass, plastic screen, exploded mica cubes or other material with continuous air passages upward through the material, held in place with screen or perforated racks, supported in the subframe 20.

The purpose of building the demountable and interchangeable sections is so that the separate parts can be made separately in different shops and so that replacements can be made separately. This also provides for easy access through small passages.

Marine compartments, leased freight cars, tanks and many basements do not have drainage and when dehydrating the air by this means the waste solution must be temporarily stored within the enclosure being dehydrated. Air dehydrating apparatus using calcium chloride or a similar dehydrating agent, when properly designed, will produce a waste hygroscopic solution with a vapor pressure practically in equilibrium with that of the air entering the apparatus. At the beginning of the operation of dehydrating the air of the enclosure, the air and the waste hygroscopic solution will have a comparatively high vapor pressure. At any stage of the dehydrating operation the vapor pressure of the accumulated waste solution will be an average between that at the beginning and that at the ending of the particular stage and higher than that of the air of the enclosure. If the waste solution is left exposed to the air of the enclosure, water will be evaporated from the waste solution back into the air of the enclosure. This evaporation of water from the solution back into the air of the enclosure can be prevented by sealing the major portion of the waste solution and by sealing the minor portion of the waste solution from contact with the air of the enclosure.

What I claim as my invention is:

A chemical air dehydrating cabinet characterized by its freedom of caking of the dehydrating material such as would interfere with replenishment of the chemical and the separation of the entering air from the chemical solution in storage, said cabinet comprising an upper section, an intermediate section and a lower section, openings defined in the walls of said cabinet in the upper and intermediate sections thereof through which air to be dehydrated enters the intermediate section and after being dehydrated is exhausted from said upper section, an open top container for hygroscopic solid material extending from said intermediate section into said upper section to a point adjacent the top of said cabinet, a baffle extending from the lower part of said upper section into said intermediate section and embracing the lower portion of said container to define a vertical air path surrounding the lower portion of said container, a cover at the top of said cabinet for replenishment of solid material in said container, a second baffle embracing the upper end of said container and coacting with said cover to define a dead air chamber at the upper end of said container, means defining a passageway for air at the lower portion of said container to connect the opening in the said intermediate section with the said vertical air path through said container as defined by said first baffle, a lateral opening defined between said upper and lower baffles to bring said vertical air path into communication with the exhaust opening in said upper section, and a solution storage structure in said lower section having a baffle located between said lower and intermediate sections with a restricted outlet through which the solution from said container is discharged into said storage.

HIRAM JOSEPH KAUFMAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
Re. 17,983	Walker	Feb. 24, 1931
551,950	Flint	Dec. 24, 1895
637,488	Steinbart et al.	Nov. 21, 1899
834,698	Williams	Oct. 30, 1906
1,067,693	Van Calcar et al.	July 15, 1913
1,147,754	Schultz	July 27, 1915
2,027,094	Downs	Jan. 7, 1936
2,174,186	Downs et al.	Sept. 26, 1939
2,175,469	Kaufman	Oct. 10, 1939
2,279,326	Kaufman	Apr. 14, 1942
2,325,380	Edwards, Jr.	July 27, 1943
2,349,787	Haswell	May 23, 1944
2,363,262	Robinson	Nov. 21, 1944
2,420,707	Hinger	May 20, 1947

FOREIGN PATENTS

Number	Country	Date
23,073	Great Britain	Nov. 20, 1899
220,858	Great Britain	Aug. 28, 1924