COLD INSTALLATION DESIGNED MORE PARTICULARLY FOR STORAGE OF AMPULAE


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3 Claims. (Cl. 62—419)

This invention relates to cold installations designed more particularly for storage of ampulæ and similar containers for sperm, vaccine, serum and other substances.

Such installations are very important, for example for the efficient use of bull's sperm for artificial insemination purposes.

It is then necessary to have the disposal of a suitable device for freezing and prolonged storage of the sperm, which must frequently be transported over large distances, for example in planes, to areas where again a suitable storage installation must be present, from which the sperm is to be distributed to customers.

In this regard, one managed hitherto to manage with the use of carbonic-acid ice, which has a temperature of —79.5° C. However, it has been found that lower temperatures are desirable.

The present invention provides a cold installation which affords very important possibilities in this respect.

The installation according to the invention comprises one or more receptacles to be cooled, which are connected to one or more pipe lines leading to a cold head of a cold-gas refrigerator which co-acts with a blower adapted to lead air or gas cooled by the cold head to the receptacle or receptacles to be cooled.

Each installation preferably comprises two cold-gas refrigerators, so that one spare refrigerator is always at hand.

The term "cold-gas refrigerator" is to be understood to mean a refrigerator operating on the reverse hot-gas motor principle.

Such machines are adapted to achieve very low temperatures (for example of —190° C.) and it has been found that by means of such machines combined with a blower, it is possible to maintain the desired very low temperatures in a freezing or storage receptacle.

In one very important embodiment of the invention, the lines are designed for connection of a plurality of transportable cabinets which constitute the receptacles to be cooled and the dimensions of which are chosen for different numbers of ampulæ, the cabinets also being designed to be cooled during transport to another cold installation for example with liquid gas.

Such cabinets are preferably standardized in their dimensions so that a cabinet containing the desired number of ampulæ can be transported from one station to another and, upon arrival, can immediately be connected again to the pipeline system.

Further important possible structural details of the installation according to the invention will now be explained with reference to embodiments shown, by way of example, in the accompanying drawings, in which:

FIG. 1 is an elevation view, partially in longitudinal section, of one embodiment of an installation according to the invention;

FIG. 2 is a plan view of FIG. 1;

FIG. 3 is a cross-sectional view of the head of a cold-gas refrigerator and its surroundings, which head is also designed to supply liquid air.

Referring now to FIGURES 1 and 2, a cabinet 1 having heavily insulated walls is connected by means of cold air supply and discharge lines 2, 2' and 3, 3' respectively, to two cold-gas refrigerators 4 and 4' respectively, which are driven by electric motors 5 and 5', respectively.

The lines 2, 2' and 3, 3' include shutters 6, 6' and 7, 7', respectively.

The cabinet 1 may be divided into a portion 1a, which constitutes a receptacle 8 or enclosure to be cooled, and a cover portion 1b, which contains the lines or air channels.

Centrally in the cabinet 1, a shaft 9 can be rotated by means of an operating member 10: Seated on the shaft 9 is a cylinder 11, through which cooled working medium may be led from the supply lines 2, 2' below into the receptacle 8. Adjacent the bottom of receptacle 8 there may be provided guide blades to ensure proper distribution of the emerging flow of air over the section of the cabinet, it being possible for these blades to be such that a strong flow of gas passes along the upright wall of the cabinet, thus enveloping with good cooling effect the contents of the cabinet.

The cylinder 11 carries a member 12 which may have the form of radial arms, a honeycomb or a set of concentric rings (which may also serve as guides for the cold air) and which serves to suspend from it a large number of tubular or stocking-like members 13 in which a series of ampulæ or similar containers filled with sperm, vaccine, serum or similar substances are held.

Instead of using the tube or stocking, it is alternatively possible to utilize other elongated members for keeping together a series of ampulæ.

The portion 10 of the cover has an aperture 14 (see FIG. 2) which has the form of a radial slot and may be closed in a well-insulated manner by means of a lid.

The slot may alternatively have shapes other than that shown, for example that of a sector. By rotating the shaft 9, it is possible for each member 13 suspended in the receptacle 8 to be moved in front of the aperture 14 and taken out of the cabinet. An index 28 on the shaft 9 serves to indicate the position of the contents of the cabinet.

The index 28 co-acts with a scale 29.

Members 13 containing ampulæ may be moved through the aperture 14 into the receptacle 8.

One of the cold-gas refrigerators serves as a spare machine, so that it is always possible to clean or inspect one machine.

As is well-known, the cold-gas refrigerators during operation have a very cold head 15, which is provided with fins 16 for cooling air led along the head.

Arranged over the head 15 is a blower having a blower body 16, a blower shaft 17 and a driving motor 18.

Adjacent the cold head 15 there is also arranged a device 19 (FIG. 1) which serves to separate moisture from the air freshly supplied. The separator 19 may be of a type as described in our co-pending Dutch patent application No. 219,381 of applicants. Thus, in the example under consideration (see FIG. 3) a gauze cage 20 is shown, which is secured in a heat-conductive manner to a frame 21 arranged below in a collecting room 22 for liquid air which flows off the cold head 15 when the blower 16 is stopped.

The gauze 20 is then cooled thoroughly. A layer of snow deposits on it, which layer catches further moisture as snow from the air is supplied, as described in detail in the said Dutch patent application No. 219,381. Liquid air may thus be produced at will, when the blower 16 is stopped, since this results in the temperature of the cold head 15 decreasing further to a temperature at which air can condense on the head. Liquid air may be discharged from room 22 through an overflow tube 23 and a discharge pipe 26.
The liquid air is very useful especially in an installation according to the invention, since it may be used for cooling cabinets or vessels filled with ampoules from the storage cabinet and transported to other places. During the production of liquid air, the flow of air (see FIG. 3) is in accordance with the arrows drawn in full line (the lid 24 is in this case removed) and when the blower 16 is rotating and hence cold air is led to the receptacle 8, the flow of air is in accordance with the dotted lines in FIG. 3.

The intention is that at one station, where such an installation is present such standardized cabinets may be disconnected and dispatched to another station while cooling, for example with cooled air, and then at the other station, where a similar installation is present, are rapidly coupled again to pipe lines leading to cold-gas refrigerators.

The cabinets may alternatively have shapes other than the prismatic and, for example, may be cylindrical in shape. As a further alternative, they may be grouped in the form of a star.

What is claimed is:
1. A cold storage system for containers of sperm, vaccine and serum or other substances comprising: a cold gas refrigerator having a cold head and operating on a reversed Sterling cycle, a compartment surrounding said cold head and having a closable inlet for atmospheric air and an outlet for cooled air, an enclosure to be cooled, a conduit connecting said enclosure to said compartment, a blower located adjacent to said cold head and in said compartment for blowing said cooled air into said enclosure through said outlet and conduit, a radially extending closable opening in the top of said enclosure directly over said cooled space, said opening and said containers being displaceable relative to each other, a frame for said containers, said frame being rotatable relative to said opening, means suspending said containers at spaced locations from said rotatable frame whereby said containers are alternately inserted under said opening, and a trough and discharge pipe for collecting liquid air condensed on said cold head and discharging the same when said blower is inoperative.

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