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MEANS FOR PREVENTING THE OVERFILLING OF
WARM EVAPORATORS FOR LIQUEFIED GASES
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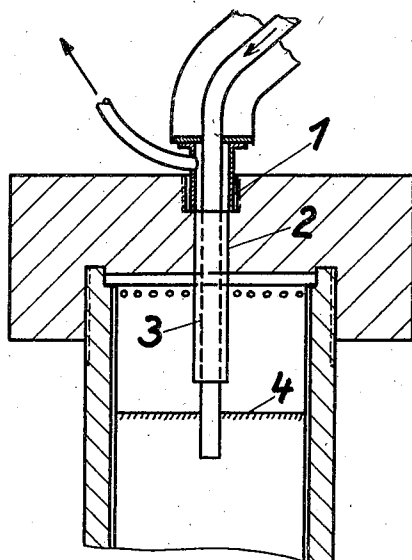


Fig. 1

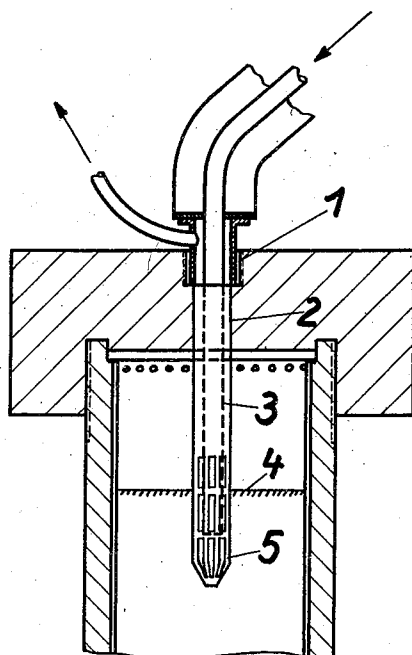


Fig. 2

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MEANS FOR PREVENTING THE OVERFILLING OF WARM EVAPORATORS FOR LIQUEFIED GASES

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3 Claims. (Cl. 226—119)

This invention relates to means or devices for preventing the overfilling of warm evaporators when filling the same with liquefied gases of low boiling point, for example, when filling evaporators or converters with liquid oxygen or the like and has for its object generally the provision of a simple and highly efficient device of the character indicated.

Heretofore floats have been used for indicating the liquid level of warm evaporators. Such floats have however the disadvantage that in consequence of the whirling movements of the liquid oxygen during filling they are moved to and fro, and consequently they become upset and jammed so that the indications can no longer be relied upon. The liquid container can then be easily overfilled and the liquid oxygen will flow through the holes arranged close to and around the upper edge of the liquid container into the space between the outer vessel and liquid container and accumulate on the bottom of this outer vessel. The continuous and uneven cooling of the outer vessel caused hereby will effect the setting up of strains due to the cold temperatures which have detrimental effect on the crystal structure of the metal.

Specifically it is an object of the present invention to avoid this disadvantage by allowing the filling tube to extend by a considerable amount underneath the circle of holes on the top part of the liquid container instead of stopping the filling tube in the filling opening of the evaporator cover.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing, in which:

Fig. 1 is a fragmentary sectional view showing the upper portion of a warm evaporator or converter having a filling device of the present invention; and

Fig. 2 is a similar view showing a warm evaporator or converter provided with a modified form of filling device of the present invention.

Referring now to the drawing and particularly to Fig. 1, 1 denotes a filling opening located in

the cover of an evaporator of the character commonly employed in vaporizing liquid oxygen. Such evaporator is seen to comprise a relatively thick-walled outer vessel commonly referred to as a "pressure vessel" and contains a relatively thin-walled inner vessel or "basket" supported in the outer vessel in a manner which provides a relatively narrow clearance space between the inner and outer vessels. The space within the inner vessel preferably communicates with the clearance space between the inner and outer vessels by means of a ring of holes disposed in the wall of the inner vessel below its upper edge. The device for preventing overfilling, and consequently the overflow of liquid into the clearance space, is shown inserted within the filling opening 1 and comprises a snugly fitted thin-walled cylindrical tube 2 in which a filling conduit or pipe 3 is concentrically disposed but out of contact with tube 2. The lower end of pipe 3 is made to depend into the pressure vessel a substantial distance below the liquid level intended to be maintained within the pressure vessel. The intended liquid level is indicated in the drawing by a line at 4 and the lower open end of the tube 2 is arranged to terminate a short distance above the liquid level 4. On the exterior of the pressure vessel above the cover, the filling conduit is connected in the usual manner with a supply of liquid oxygen, while the annular space about the filling conduit within the tube 2 is vented to the atmosphere.

If during the filling of the evaporator the intended level has been reached, upon the filling being continued liquid will rise and escape through the space between the filling tube and the smooth cylinder which tells the attendant that the normal liquid level has already been exceeded. The inflow of the liquid is then turned off whereby any appreciable loss is avoided.

The modified form of device shown in Fig. 2 consists of a thin walled cylinder 2 inserted into the filling opening 1 of the evaporator. The cylinder 2 has a pierced part 5 with a sufficient amount of openings for allowing an escape of the gases which are developed during filling. The filling tube 3 projects into this pierced part of the inserted cylinder to such an extent that the outflow of the gases takes place without any liquid from the entering jet being forced out by and along with said gas. If then however the liquid begins to rise this free sectional area of the pierced part decreases as the level rises until the escaping stream of gas takes liquid from the level and forces it out into the atmosphere. The

normal filling level rises so that it will be in close proximity to this point.

In case perhaps by carelessness of the attendant the inflow of the liquid is not stopped after the normal level has been reached, increased quantities of liquid are forced along by the outflowing gas as the liquid level is rising, and in the moment the liquid level reaches the blank part of the cylinder, the whole of the further added liquid is at once thrown out into the atmosphere, and it is no longer possible to retain additional quantities of liquid in the container of the evaporator. When now the further inflow of liquid is stopped, the injection of the liquid does not cease at once, but the part which is now still filled in excess is forced out until the gas above the liquid level has found again sufficient sectional area in the pierced part of the cylinder so that an excess filling beyond the normal liquid level in the liquid container of the evaporator is possible only up to this point. The possible overcharge is therefore restricted to quite a definite and reliable measure.

The bottom of the pierced part is also constricted and serves the purpose to prevent small parts of the installation, such as nuts, small spanners and the like, from falling into the liquid container and to prevent it from being damaged thereby.

I claim as my invention:

1. A device for preventing the overfilling of warm converters when filling the same with liquefied gases, comprising the combination with an outer wall of such converter having a filling opening, of a thin-walled tube vented to the atmosphere snugly fitted into said opening and depending into said converter to a point short of the desired liquid level, and a filling conduit disposed within said snugly fitted tube and out of contact therewith and extending into said converter to a

point below the desired liquid level and adapted to communicate exteriorly of said converter with means for supplying liquid.

2. A device for preventing the overfilling of warm converters for liquefied gases having a pressure vessel, comprising the combination with a wall of said pressure vessel having a filling opening, of a thin-walled cylindrical tube vented to the atmosphere snugly fitted into said opening and depending into said pressure vessel, said tube being arranged to communicate with the space in the warm converter above the intended liquid level, and a filling conduit disposed concentrically within but out of contact with said snugly fitted tube and extending into said pressure vessel to a point below the intended liquid level and adapted to be connected with means on the exterior of said pressure vessel for supplying liquid.

3. A device for preventing overflow into the space between the basket and pressure vessel of warm converters when filling the same with liquefied gases, comprising the combination with a wall of the pressure vessel having a filling opening, of a thin-walled tube snugly fitted within said filling opening depending into said pressure vessel and formed with a pierced portion at its lower end communicating with the interior of said pressure vessel at a point above the intended liquid level, said snugly fitted tube being provided with connections on the exterior of said pressure vessel for venting the same to the atmosphere, and a filling conduit disposed within but out of contact with said snugly fitted tube and spaced away from the walls thereof and depending into said pressure vessel to a point below the intended liquid level, said pierced portion being constricted about said filling conduit for preventing the entry by way thereof of extraneous objects into said pressure vessel.

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