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FLEXIBLE TRANSFER TUBE FOR LIQUID HYDROGEN

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February 1, 1955

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The flexible transfer tube shown in ^{Figs. 1, 2} the sketch was developed in order to simplify transferring liquid hydrogen from dewar flasks of the nitrogen-cooled type, and for use in situations where it was advisable to leave the transfer tube attached to the apparatus.

The tube itself is 3/16-inch o.d. x 0.016-inch wall stainless steel. The jackets at the ends are 1/2-inch o.d. stainless tubing to which are silver-soldered connections to take the 1/2-inch i.d. x 1-inch o.d. gum rubber hose which forms the flexible outer jacket. Teflon spacers on the inner tube center the rubber tube. A vacuum valve is installed in one of the hose connections to provide means of evacuating the space between the two tubes.

A sliding connection on the dewar end permits adjusting the transfer tube to suit the depth of the dewar. It is manufactured from a 1/2-inch copper soldering tee, one branch fitted with a stuffing box, the other with a connection for helium or hydrogen for pressuring the dewar. The lower end is swaged to suit the cone connection on the dewar, which replaces the original ring on it.

The other end of the transfer tube also is adjustable to allow varying the depth to which the tube must be inserted into the apparatus being filled.

Stainless steel flexible tubing 9/16-inch i.d. was first tried instead of the rubber tubing, but it was found not to have as much flexibility as rubber, and after it had been in use for a short time cracks would develop. Similar cracks developed when a flexible stainless steel inner tube was used in place of the 3/16-inch thin-wall stainless steel tube. The major advantage of this flexible transfer tube is its adaptability.

The dewar container does not need to be placed in any fixed location with respect to the apparatus. Within limits, the apparatus can be raised or lowered without moving the dewar. Nitrogen-cooled type dewar flasks, of 25 and 50 liter capacity, weigh 170 and 400 pounds, respectively. Handling is facilitated by placing the dewar flasks on dollies and using the transfer tube for transferring liquids.

It is possible, for the initial cooling of apparatus, to withdraw the transfer tube from the supply container until it is just above the surface of the hydrogen, and thus use the liberated hydrogen gas for precooling.

Stock parts are used for most of the transfer tube, and by unsoldering one joint at the junction of the inner and outer steel tubes one can remove the rubber tube for inspection or replacement. A number of these tubes have been in service for at least six months, however, and this has not yet been necessary.

This work was done under the auspices of the U. S. Atomic Energy Commission.

Legends for Figures

Fig. 1. Flexible tube in use for transferring liquid hydrogen.

Fig. 2. Details of flexible transfer tube.

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Fig. 1

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Fig. 2