A few points should be noted. The space inside the platinum tube should be well packed with small pieces of lead–glass, otherwise on melting there may not be enough glass available to fill the bottom of the platinum tube. If this happens, more pieces of glass should be added (without removing the seal from the mould), and the heating procedure repeated again. In our experience 0.16 cm dia for the lead wire holes is a very good size, because (1) it is easier to drill holes of this size compared to holes of smaller size, (2) larger size holes allow better circulation of air through them, thus minimizing chemical reduction of the platinum leads by impurities in graphite which results in brittleness of the leads, and (3) the hole size is still small enough for glass not to flow through.

It is advisable to anchor the leads at some suitable place to save them from direct strain, and while soldering these seals in place, avoid direct heat particularly at the end which contains glass.

We have used several of these seals in our low temperature calorimetry work with satisfaction. The seals made this way are reliable, leaktight in He II, and perform many times before failure. The platinum wire and platinum tube are recoverable and reusable, offsetting in part the high cost of these materials.

On low temperature indium seals

K. L. Agarwal and J. O. Betterton, Jr

Recently[1,2] useful designs have been suggested for making He II leak-tight indium seals for low temperature work. We describe the method that we have used with success to seal the copper can of our low temperature calorimeter without making a grove for the indium ring or gasket, or any other special preparation of any of the mating surfaces.

We have used both 1.6 mm dia indium wire and 0.4 mm thick gasket cut from indium foil, and brass screws, to make a seal between flat mating copper surfaces, as shown in Fig.1.

The two mating surfaces are cleaned with fine emery paper, polished with crocus cloth, and wiped clean with acetone. The indium wire is laid out in a circle with the two free ends crossed over each other on one surface and the mating part brought over with care not to disturb the lay-out of the indium wire. The risk of disturbing the lay-out is minimized when a gasket is used instead of a wire, and for this reason we prefer use of gasket over wire though it involves the extra labour of cutting the gasket from an indium sheet. The brass screws, twelve in number, are evenly and fully tightened. We find that the seal made this way holds at room temperature, liquid nitrogen temperature, and liquid helium temperature. We suggest providing two horizontal notches at the periphery of the mating surfaces for prying open the seal with a screwdriver after the experiment.

We have used this seal with success in our low temperature calorimeter work. We think that the success of the method lies in the following:-

1. Using brass screws since brass has larger coefficient of thermal expansion (contraction) than copper so the screws keep on tightening as the temperature is lowered.

2. Using twelve screws instead of six or eight to exert more and uniform pressure all around the seal.

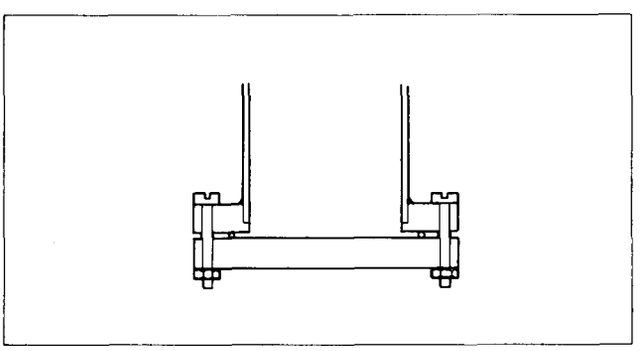

Fig.1 Method of constructing indium seal

3. Careful cleaning of the mating surfaces to ensure better bonding of indium to copper.

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