

## SHORT COMMUNICATIONS

### *Platinum and platinum-rhodium strip heaters*

PLATINUM and platinum-rhodium strip heaters have been described by Roberts and Morey, 1930, Cech, 1950, and Keith and Roy, 1954. In all the previous cases a single strip of platinum or platinum-rhodium alloy has been mounted between terminal blocks, usually water-cooled, to which a high-amperage, low-potential current has been applied, of a magnitude determined by the dimensions of the strip. The maximum temperatures in such uniform strips have been obtained in the middle of the strip and have shown a gradual decrease towards the terminal blocks. Various methods for obtaining a better heat distribution have been described, most of which have involved a bending of the strip into a U shape. Higher temperatures have been obtained using molybdenum and tungsten strips but as these are easily oxidized they must be used in vacuo or an inert atmosphere.

During a study of the formation of bubbles in droplets of aluminosilicate melts, the present authors have devised a method of sharply delineating a central uniform high-temperature zone in a strip heater, by cold-welding into the centre of the heater a section of smaller dimensions or higher specific resistance or both, thus creating a local resistance 'high' in the strip.

The incorporation of the central section into the strip heater has the following effects, compared with the previous type of strip heater: the current amperage needed for the same temperature is reduced, whilst the zone of uniform high temperature is retained or even increased in area.

The heaters devised by the authors consist of a central strip of platinum or platinum-40% rhodium foil (0.1 mm thick) cold-welded between two leads of thick platinum foil (0.2 mm thick), as shown in fig. 1. The leads are connected between the heater clamp blocks of an Edwards 'Speedivac'  $\frac{1}{2}$  lb capacity vacuum furnace, which has a power unit capable of producing 0 to 90 amps and 0 to 25 volts, controlled by means of a variable transformer (Variac).

The maximum temperature attainable with the heaters is limited only by the melting point of the central strip (1769° C Pt, 1900° C Pt/40% Rh) or the available output range of the power unit, in the case of

larger heaters. A typical power consumption for a heater, of 5 cm overall length with leads 0.95 cm wide and central strip of length 0.7 cm, width 0.6 cm, is 456 watts (76 amps 6 volts), at a temperature of 1870° C.

The temperature of the central section is measured by means of a disappearing filament pyrometer, recalibrated to correct for non-blackbody radiation from the strip. The recalibration was achieved by

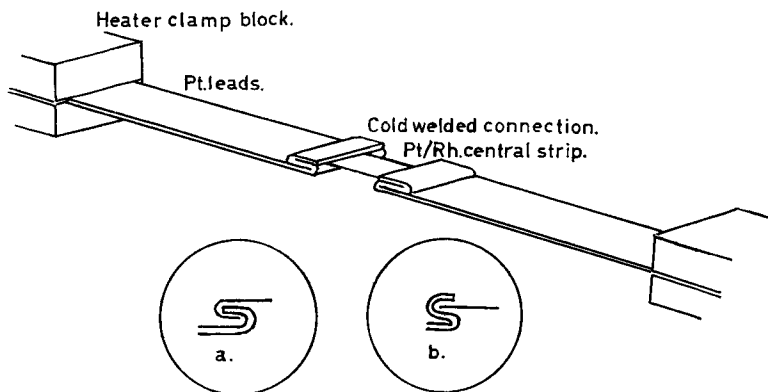


FIG. 1. Diagram of strip heater mounted for use. Insets *a* and *b* show alternative arrangements for the central strip connections before squeezing together to form a cold weld.

heating several central strips, of different materials, to their melting-points (Pt 1769° C, Pt/13 % Rh 1730° C, Pt/40 % Rh 1900° C, Fe wire 1535° C), which were then taken as fixed points on the pyrometer scale, keeping the pyrometer in a position of constant geometry with respect to the heater. It is found that the working temperature required is obtained within a few seconds and that the cooling time is less than this.

The heaters have been used mainly with the central portion in the form of a flat strip on which powdered glasses have been melted into hemispherical globules; larger quantities have been successfully retained within a platinum cylinder (0.25 cm radius, 0.1 cm depth) merely placed on the strip. The central section may also be bent into a U shape or the sides notched and the strip folded into a box shape. The glass samples are easily detached from the heater by slightly flexing the central strip.

In the present work the heaters have been used primarily for the preparatory treatment of glass samples, in both air and vacuo, by

modification of a piece of equipment already available. It is felt, however, that the principle of a central high-resistance portion, achieved by use of the cold-weld technique, could be advantageously applied in the design of similar devices incorporated into hot-stage microscopes.

The authors have also recently used the heaters for rapid vitrification of plagioclase feldspars for refractive index determinations.

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*References*

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*The use of epoxy resins in the preparation of  
petrographic thin sections*

THE current methods for the preparation of petrographic thin sections have been described by Weatherhead (1947), by Reed and Mergner (1953), who give a bibliography of 14 references, and by Lewis (1959). The sectioning of friable materials has been described by Catt and Robinson (1961) in a paper giving a bibliography of 29 references on this speciality; they suggest the use of epoxy resins as impregnating media. More recently Langford (1962), following Vincent (1957), has advocated the use of epoxy resins for mounting detached grains of minerals for optical study but suggested that such resins were not suitable for the preparation of standard petrographic thin sections. The writer's experience indicates that in some cases epoxy resins may be used advantageously as a mountant for thin sections.

During the examination of a series of dolerite dykes in the Scottish West Highlands it was found that the professionally prepared thin sections were of a consistently poor quality: a large number of sections were left with their feldspars showing a first order yellow and most sections were small, ragged, and full of holes. As large numbers of sections of higher quality were required it was necessary for some sectioning to be undertaken personally. It became apparent that the presence of a swelling mineral in the rock caused the section to lift from the Canada Balsam or Lakeside 70C mounting medium and break up during the final grinding. Paraffin rather than water was used in the