NOTES AND NEWS

AN ELECTRICALLY HEATED PLATINUM WIRE FOR USE IN THE MINERALOGICAL LABORATORY*

CHARLES MILTON AND H. CECIL SPICER

An electrically heated platinum wire has many advantages over the customary blowpipe-heated wire—in particular, facility in handling very minute particles, microscopic observation of the reactions employed, and easily-controlled temperatures exceeding those obtained by gas flames. The construction of such an apparatus is described.

Over fifty years ago Joly[1] described an apparatus he had invented and termed "Meldometer." It consisted essentially of a thin ribbon of platinum, about 1.2 mm. wide, through which an electric current, generated by a battery, was made to pass: the consequent heating of the ribbon caused mineral powders placed on it to melt, and by use of a microscope conveniently placed, the melting phenomena could be directly observed. Furthermore, by observing the measured thermal expansion of the ribbon, previously calibrated against the known melting points of substances such as potassium nitrate, silver chloride, silver sulfate, silver, gold, palladium, etc., Joly determined the melting points of many minerals. This was apparently Joly's chief concern, but part of his paper is devoted to discussing other uses of the instrument in determinative mineralogy—in particular, the formation of characteristic sublimates and the use of the ribbon, or preferably a coiled wire loop, with microcosmic salt or sodium carbonate as a flux to perform bead tests. The use of the instrument for melting point determinations was criticized unfavorably by Day and Allen[2] as involving subjective factors in measurement; however, they observe that "Its value for qualitative study, and in cases where only a very minute quantity of a substance is available is unquestioned."

Joly's paper was followed a few years later by one by Cusack,[3] in which the instrument as manufactured by a Dublin firm of instrument makers is described and pictured. The paper gives a large number of melting-point determinations. The appearance of the instrument, as illustrated, is rather formidable, and, as above mentioned the results obtained were ad-

* Published by permission of the Director, Geological Survey, United States Department of the Interior.

[1] Joly, J., On the determination of the melting points of minerals. Part I, The uses of the meldometer: *Proc. Royal Irish Acad.*, **3,** 38 (1891).

[2] Day, Arthur L., and Allen, E. T., The isomorphism and thermal properties of the feldspars: *Carnegie Institution* (pp. 18–19), Washington, D. C. (**1905**).

[3] Cusack, Ralph, On the melting points of minerals: *Proc. Royal Irish Acad.*, 3d Series, **IV,** 399–413. Dublin (1896).

versely criticized. Possibly for these reasons the underlying idea of the apparatus seems to have passed into oblivion among mineralogists; however, the undoubted advantage of a controlled source of heat, highly localized and varied at will, with temperatures obtainable exceeding those by the blowpipe, and, not the least, the facility of microscopic observa-

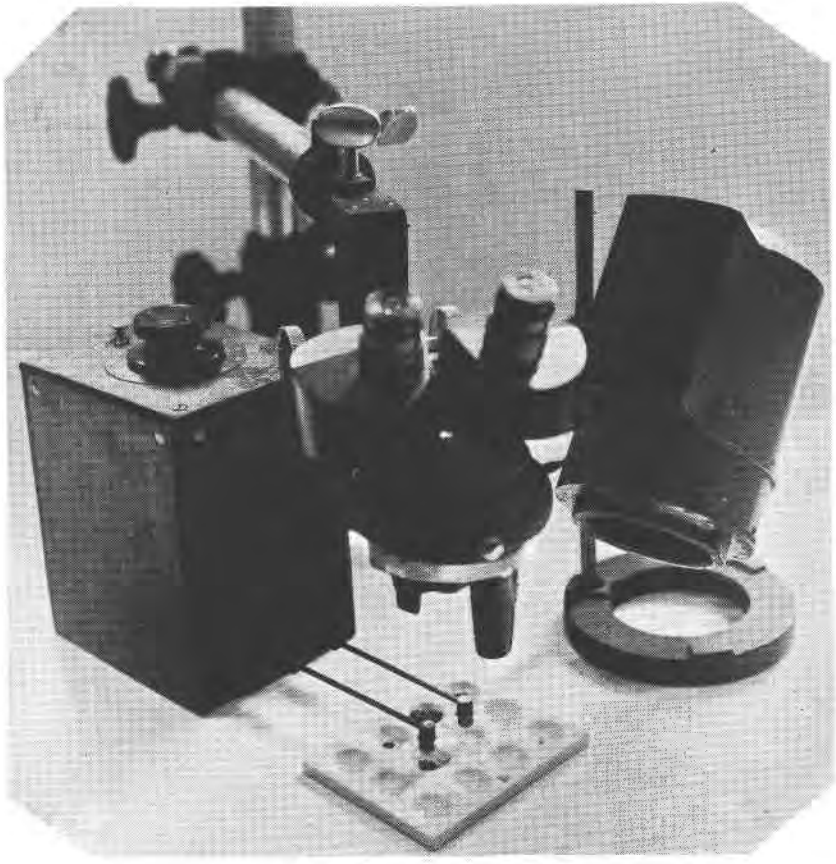

FIG. 1. Electrically-heated platinum wire in use.

tion of tests on extremely minute particles, seem to have been unwarrantably neglected.

With these considerations in mind, a modernized version of Joly's apparatus has been designed and constructed (by H. C. S.) and found to be of definite value in the mineralogical work of the Geological Survey. Its simplicity and cheapness (not exceeding $20.00), and convenience (employing ordinary 110 volt alternating current) suggest that it may be

widely used, once its advantages are appreciated.

The details of construction are shown in the accompanying diagram, with a photograph of the apparatus, as set up in use.

The essential components are: a switch, a variable transformer (or rheostat), step-down transformer, plug-in type electrodes for holding the platinum wire, and a suitable box for mounting the parts. The step-down transformer is the most important item, and should have ample output

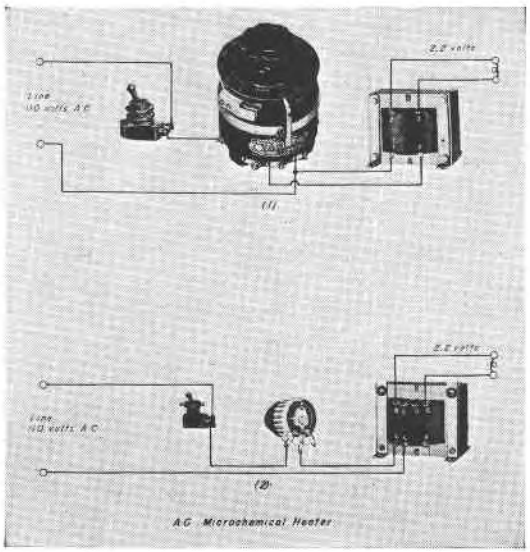

FIG. 2. Upper—Diagram of electrical connections. Lower—alternative set-up. using rheostat in place of variable transformer.

current in order to heat the wire to incandescence. The transformer for the original apparatus was reconstructed from one salvaged from an old radio A-B power supply which had a primary input of 120 volt-amperes. The secondary was rewound with the proper number of turns of No. 10 B & S gauge copper wire to give approximately 2.2 volts at full load current of 45 amperes.

The primary input is controlled by a Variac type 200-B variable transformer and gives smooth, uniform control of the current output and the wire temperature. A rheostat of ample capacity would also be satisfactory as would a Varitran variable transformer. The secondary of the step-down transformer is connected to the self-supporting binding posts for holding the heater wire through banana jacks and plugs and No. 10 hard brass rod. Connections and other details will be apparent from the figures.