Straightening Thin Tungsten Wires

W. C. Morgan

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Laboratory and Shop Notes

Straightening Thin Tungsten Wires

Considerable time is often spent in straightening the thin tungsten wires used as anodes in Geiger-Müller counters. Stretching an electrically heated wire beyond its elastic limit is helpful, but generally leaves some residual curvature. Very satisfactory wires can be quickly prepared if the wire is held twisted during this stretching. About three complete turns is sufficient for a 15 cm length of 200μ wire, combined with heating to redness and stretching about $\frac{1}{2}$ cm.

In a typical wire of this size the maximum variation from the straight was less than half the diameter of the wire.

W. C. MORGAN

The Clarendon Laboratory,
University Museum,
Oxford, England,
July 21, 1939.

Rapid Measurement of Glass-Capillary Diameters

We have compared three types of measurement of the diameter of glass-capillaries employed in the construction of McLeod gauges and have found that the use of standard twist drills is very rapid and of sufficient accuracy to warrant its application. Such drills are available in any shop and it is a simple procedure to insert a few drills until the right one is found. In one case (number 4) we decided that the diameter of the capillary should be intermediate between two drills. We measured the same capillaries by weighing a thread of mercury and by reading their diameter on a measuring microscope. The results are shown in Tables I and II.

The time per determination for the three methods is shown in Table III (all instruments and materials available).

TABLE I

CAPILLARY	DIAM. BY HG (MM)	DIAM. BY MICROSCOPE	% DIFFERENCE
1	0.623	0.631	+1.3
2	1.344	1.340	−0.3
3	1.695	1.720	+1.5
4	1.880	1.888	+0.4
5	2.255	2.242	−0.6

TABLE II

CAPILLARY	DIAM. BY HG (MM)	DRILL SIZE	DIAM. OF DRILL	% DIFF. FROM HG
1	0.623	72	0.635	+2.0
2	1.344	55	1.321	−1.7
3	1.695	51	1.702	+0.4
4	1.880	48½	1.892	+0.6
5	2.255	43	2.261	+0.3

TABLE III

METHOD	NO. OF READINGS	TIME (MIN.)
Reading microscope	9	12
Mercury thread	3*	10
Twist drills	1	1

*And one weighing.

GEORGE GLOCKLER
WILLIAM HORWITZ

University of Minnesota,
School of Chemistry,
Minneapolis, Minnesota,
June 26, 1939.

A Rubber-Lined Tapered Vacuum Joint

Tapered metal vacuum joints may be turned on the lathe and ground, so that when they have been greased with cock-grease they will be sufficiently vacuum tight for use in connection with gas x-ray tubes, electron diffraction apparatus, and similar apparatus. When such joints must be over four or five inches in diameter they must be turned from rather massive pieces of material in order to retain their shape, and because of the internal stresses relieved by the turning it is often difficult to make the tapers fit well enough even to begin grinding.

The sketch, Fig. 1, shows how a rubber-lined taper joint may be made, which does not require that the tapers fit well into each other, nor does it require that the tapered pieces be made of especially massive material. The tapers are turned in the usual way so as to make an approximate fit with each other. A gasket is then cut from a flat piece of $\frac{1}{16}$- or $\frac{1}{8}$-inch sheet rubber, greased with soft cock-grease and stretched over the male part of the joint. The dimensions for cutting the gasket are given in the figure. The cock-grease permits the gasket to slip and adjust itself when atmospheric pressure presses the joint together.

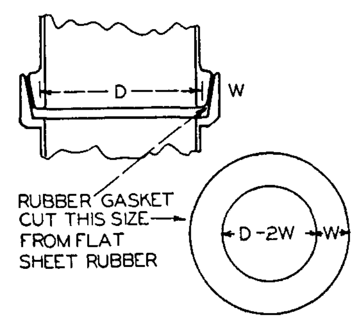

FIG. 1.

A joint 10 inches in diameter, turned so as to make a poor fit, was found to be satisfactory for the degree of vacuum used in a gas x-ray tube, after it had been lined with rubber as described above.

H. KERSTEN
ALLAN M. CHACE

Department of Physics,
University of Cincinnati,
Cincinnati, Ohio,
July 27, 1939.