Letters to the Editor.

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Microstructure of Mercury.

IN the course of investigations on dental alloys and amalgams, which we have carried out at the National Physical Laboratory on behalf of the Dental Investigation Committee, Department of Scientific and Industrial Research, we have thought it necessary, for the full study of the constitution of the amalgams, to undertake their microscopic examination. As mercury, and the amalgams rich in mercury, must be completely solidified for this purpose, it has been necessary to devise means for the preparation, etching, and photo-micrography of specimens at very low temperatures. Most of the work has been done by means of a paste of carbon dioxide snow and acetone.

FIG. 1.—Microstructure of pure mercury. Magnification: ×100.

Surfaces suitable for microscopic study have been prepared by allowing the metal to solidify in contact with glass, and such surfaces have been successfully etched by electrolysis in hydrochloric acid (sp. gr. 1·12 at 15° C.). It has also proved possible to polish the frozen specimens, but so far it has *not* been found possible to etch surfaces prepared in that way.

Special devices have been used for keeping the lenses of the microscope, etc., free from deposits of frost during examination and photography. Fig. 1 is a reproduction of a photograph showing the typical microstructure of solid mercury under a magnification of 100 diameters; we believe that this is the first time that such a structure has been recorded.

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The Damping of Pendulous Jets.

IN a previous letter to NATURE (April 11, 1925, p. 530) the behaviour of liquid jets from a moving source was discussed theoretically, and supporting experimental data were presented. Dr. Julius Hartmann reviewed the subject in the issue of NATURE of June 6, 1925, p. 872, and arrived at confirmatory conclusions, though adopting a different mode of attack and manner of statement. Both of these communications treated the particles constituting the jet as though in free flight. The possibility of their being subject to viscous constraints while in flight was alluded to in the former paper, but Dr. Hartmann detected no such damping effects under his conditions of observation. Lately, Mr. Walter Thompson and I have examined the damping effect, and as the conclusions admit of concise statement they are presented herewith.

To recall the experimental conditions it may be stated that we have under consideration a jet of liquid issuing vertically downward, and that the container is subject to a linear, horizontal, oscillatory motion, and, in a particular case, a simple harmonic motion. The problem is the description of the horizontal motion of the jet at lower levels. It may be very simply shown that if the particles of the jet are acted upon during their fall by no force except gravity, and if the time of fall to the level considered is T, then the displacement of the jet from an arbitrary initial position will be $X = s + T\,ds/dt$. In this equation s represents the displacement of the container from its initial position at the instant of release of the particle observed. If damping forces, such as might be supplied by viscosity, are present, the particle, and hence the jet, will fall short of the displacement X defined above.

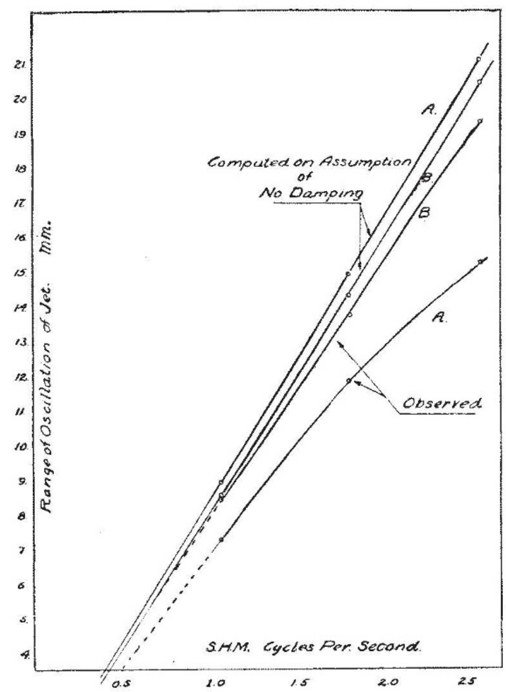

FIG. 1.—Effects of frequency and viscosity in diminishing the range of oscillation of jets. B curves are for a viscosity of 0·75 poises; A for 6·4 poises. Times of fall, about 0·75 seconds.

We experimented with six different oil mixtures, varying in viscosity from 0·75 to 6·45 poises, but otherwise physically similar. The specimen studied