Note on the Specific Heat of Aluminium, added May 27, 1903.—A specimen of aluminium from the British Aluminium Company of an approximate purity of at least 99½ per cent., gave in three experiments 0·2194, 0·2185, 0·2194, mean 0·2191, as the specific heat between 20° and 100°.

"The Elasmometer, a New Interferential Form of Elasticity Apparatus." By A. E. H. TUTTON, F.R.S. Received May 12,—Read May 14, 1903.

(Abstract.)

Being desirous of extending the investigation of the physical characters of the crystals of isomorphous salts to the subject of their elasticity, the question arose as to the best form of apparatus to employ for the determination of the coefficient of elasticity. The most accurate form hitherto devised is that of Koch*. The amount of flexure of a thin plate of the crystal was determined by the interference method, sodium light being employed. The great convenience and high accuracy of the optical part of the interference dilatometer which the author has described to the Royal Society†, suggested the advantage of utilising it as interferometer for the measurement of the amount of the flexure of the plate, and many other possible improvements on the apparatus of Koch also suggested themselves. Eventually the instrument now described was devised. It has been constructed by Messrs. Troughton and Simms.

The observing telescope, with its auto-collimator and attached hydrogen Geissler tube, is exactly as used for the dilatometer, and its pedestal is mounted on a detachable plinth in front of the elasmometer. The rigid iron base on which the latter is mounted also accommodates, on its back portion, the pedestal of the vertical tube which carries the train of prisms to select the monochromatic C—or F—hydrogen light employed, and direct it on the interference apparatus. The interference chamber of the dilatometer is detached from the lower end of this tube, as the elasmometer carries its own interference tripod.

The elasmometer proper consists of the following seven essential parts:—

(1.) A pair of platinum-iridium wedges, arranged parallel to each other and with the knife-edges downwards, up against which the plate of the substance (not necessarily a crystal) is to be bent by a weight applied under its centre. They are carried by a pair of gunmetal

* 'Ann. der Phys.,' N.F., 1878, vol. 5, p. 251.
† 'Phil. Trans.,' A, vol. 191, p. 313.

blocks, which are adjustable as to their distance apart, and are suitably recessed at their inner ends to accommodate the wedges and the plate-supporting and weight-applying apparatus. They slide on a very rigid larger block of steel, mounted to the front and left of the centre of the iron base, and one of them is provided with fine adjustments for altitude and azimuth, to enable the knife-edges to be set exactly parallel.

(2.) A pair of mechanical "fingers," for supporting the plate and adjusting it in the proper position under the knife-edges, and for eventually pressing it up into just full contact with the latter. They are carried by a fitting to the left side of the steel block, and terminate in little spring tables each carrying a small gunmetal knife-edge above its inner side. They are adjustable for separation, height, and their position in or out of the recess.

(3.) A delicate balance, by Oertling, of special construction, at one end of whose beam the bending weight is applied through an upright agate point, the pressure-point, which is carried instead of a pan at this end. The balance is mounted to the right of the steel block on a strong base, which is movable by rack and pinion so that the pressure-point can be exactly centred under the plate, and a fine adjustment for azimuth is also provided in the mounting of the balance to aid in this object. A pan at the right-hand end of the beam receives the bending weight, which may amount to 500 grams., and a counterpoise for the weight of the pan is provided near the left end.

(4.) A transmitter, for conveying the bending movement of the centre of the plate to the interference apparatus. It takes the form of a T-piece, whose long stem is horizontal and is fitted with an agate wedge, by which it rests on an agate plate carried on the front block, and a counterpoise; the lower end of the vertical crosspiece rests with less than 1 gram. of pressure on the centre of the plate, while its upper end terminates in a black glass disc, which is adjustable above a metallic one so as to bring its polished surface truly horizontal. This surface is the lower one of the two which reflect the interfering light.

(5.) An interference tripod for supporting the large colourless glass disc whose under surface forms the upper of the two surfaces concerned in the interference. One screw is mounted on the back block, and two screws are carried on the front block; the stem of the transmitter passes between these latter, and the black glass surface is only separated from the colourless disc by a film of air of the necessary thickness to allow for its diminution, consequent on the bending of the plate, without contact of the surfaces.

(6.) A measuring microscope, wherewith to determine the dimensions of the plate and to find its centre. It is mounted to the left of the steel block, and its two rectangular measuring movements read to a thousandth of a millimetre by a novel direct method, involving the

use of a single screw in each case fitted with a special device to eliminate back-lash.

(7.) A control apparatus, to enable the observer to modify at will the rapidity with which the bending force is applied, so as to adequately retard the transit of the interference bands and permit of their easy counting. It depends on an exceedingly fine vertical screw, which carries under a bracket at its head an agate plate arranged above a platinum-iridium control-point, similar to the pressure-point, carried on a saddle of the beam midway between the latter and the central fulcrum wedge. The screw is rotated by a diminishing gear, so that a movement of the lever handle manipulated by the observer to the extent of 3 cm. corresponds to the transit of a single band.

To prevent flickering of the bands when the control is removed and the whole weight allowed to play, due to earth tremors or other disturbances, an aluminium disc is attached below the balance pan by a short rod and immersed in cedar oil, a platinised counterpoise being added to that for the pan already on the other side. The slight viscosity of this oil scarcely diminishes the sensibility of the balance, while its resistance to the vertical movement of the horizontal disc renders the bands absolutely steady for the determination of their position when the weight is fully operative.