Exhibition of Physical Apparatus.

TIMES have changed since Lord Bacon had to complain that "the mechanic, little solicitous about the investigation of truth, neither directs his attention nor applies his hand to anything that is not of service to his business." The modern "interpreter of Nature" would contribute scantily to the advancement of learning were he bereft of the mechanic's services, and it is by a happy thought, therefore, that the Physical and Optical Societies bring together every year the manufacturers and users of scientific instruments. At their thirteenth annual exhibition, held at the Imperial College of Science on January 3 and 4, such a wealth of beautiful, and in many cases novel, apparatus was to be seen that we can only refer to a few of the particularly interesting exhibits, selected somewhat arbitrarily.

Of special interest to engineers was a micro-indicator (Cambridge and Paul, Ltd.) for high-speed engines, in which the dimensions of the parts eliminate inertiaerrors. A specially designed stylus cuts on celluloid à minute indicator-diagram which can be enlarged photographically or examined at once with a micro-The Elverson oscilloscope (Herbert Kennedy scope. and Co.) by intermittent illumination made a machine at 1500 revolutions appear to be either stationary or working at 150 revolutions, enabling faulty action to be detected and located. A fine adjustment for speeds derived from a phonic motor was shown in a strobometer (Tinsley and Co.), and comprises a friction gear providing an infinitely variable speed. A tapered drum driven from the phonic motor engages an axially movable friction wheel which carries contacts controlling the intermittent illumination of a stroboscopic disc or the like, the position of the wheel indicating the frequency of the illumination as a percentage of that of the tuning fork which governs the phonic motor.

Much interest was expressed in the new celluloid mirrors (Adam Hilger, Ltd.), the thickness of which is equal to a few wave-lengths of light. These were applied to vertical illumination in a microscope (an arc lamp failing to heat the celluloid on account of its thinness), to acoustic purposes in an optical sonometer, and to the transposition of colour combinations in patterns in the chromoscope (The Chromoscope Co.). In the latter apparatus each element of the design is prepared as a stencil for use in conjunction with a Wratten colour screen which can be changed at will, and by means of an optical device the various elements are viewed in superposition by transmitted light. Other novelties by Hilger were an interferometer attachment for calibrating microscope racks, indicating backlash, and checking the fit of the slide; and some ultra-violet spectrograms on the new Schumann plates which, with a minimum of gelatine and a fluorescent component in their emulsion, require a remarkably short exposure. The latest " Demonstrator's Lantern " (Newton and Co.) could be arranged at will for projecting ordinary slides, for opaque objects, for vertical projection, or for microscopic, polariscopic, or spectroscopic projection. Among microscope improvements might be noted a stand and sub-stage (R. and J. Beck, Ltd.) designed to prevent mechanical disturbances from causing the disappearance of objects from the field of view under high power. The enhanced resolving power obtained by the use of crossed Nicols was demonstrated with this instrument. A new saccharimeter (Bellingham and Stanley) exhibited several novel features. The polarising prism is constructed without the use of cement, the visible edge of the half-prism is a natural edge of the crystal, and the quartz plate, compounded of right- and left-handed quartz wedges, is within the size limit for which flawless crystals are obtainable.

An annual feature of the exhibition is the display of radium apparatus for medical and demonstration purposes by Mr. Harrison Glew. Every year it is a pleasure to see this pioneer, to whom suffering humanity owes no small debt. A radiological ionometer (Watson and Sons) comprised an ionisation chamber connected to an electroscope and arranged for measuring the precise X-ray dosage administered to a patient. Another medical instrument was that for estimating the carbon dioxide content of alveolar air (Cambridge and Paul). It employs a Shakespear katharometer, the thermal conductivity of a breath sample being compared electrically with that of pure moist air. The smoke nuisance received attention moist air. in Dr. E. A. Owen's automatic air filter and his jet apparatus (Casella and Co.). In the former, samples of air are strained through white filter paper at regular intervals, the dust content being estimated from the colour of the resulting deposit. In the jet apparatus, a jet of moist air impinging normally on a glass slip is found to deposit its dust, which can then be examined microscopically.

Of electrical testing apparatus there was an immense variety, from the high-frequency low-voltage Moullin voltmeter (Cambridge and Paul), which employs a triode valve so arranged as to preclude disturbance of the circuits to be measured, to the "Meg" insulation tester (Evershed and Vignoles, Ltd.), a remarkably light and cheap megger running to 10,000 mgo. which should prove a boon to linemen. A multiversal test set by Elliott Brothers claimed to measure milliamperes, kilovolts, capacities and much else, besides functioning in Varley and Murray loop tests. A novel relay for radio signals was that designed by Mr. Anson (Tinsley and Co.), in which a neon lamp in the anode circuit of a triode valve intensifies current variations on account of its negative characteristic.

Demonstrations of actual manufacturing processes were given by the Igranic Electric Co. (automatic winding of transformers) and Dallmeyer, Ltd. (lensmaking shown by kinematograph); and examples of the daily work of the National Physical Laboratory aroused much interest. Each day Mr. W. Gamble lectured on the "Reproduction of Colour by Photographic Processes," an outstanding feature of his lecture being the projection of slides made by the new Eurochrome process, recently acquired from Germany by the Austrian State Printing Office. The results of this process, the nature of which is somewhat obscure, mark a substantial advance in the art. Prof. E. G. Coker lectured on "Recent Photo-Elastic Researches on Engineering Problems," giving a beau-tiful demonstration of his method, in which the distribution of stress in transparent models is traced by means of polarised light. In this way he showed the effect of shape on stress-distribution in chain links, tensile and compressional test specimens, and gear and worm wheels in action. He also demonstrated the stresses set up during turning, planing, and milling, showing that the cutting edge is preceded by a region of compression and followed by one of tension, the shaving itself being free from stress in the neighbourhood of its point of attachment. With a burred edge the stresses were seen to oscillate.

Mr. F. E. Smith, who made the necessary arrangements, is much to be congratulated on the success of the exhibition which failed to furnish any experimental evidence for the unluckiness of its number. Some fifty-six exhibitors participated. C. W. H.

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