

engine. Moreover, the spirit, when refined, lacks the aromatic compounds which give to benzole its high 'anti-knock' value. The necessity for removing the unsaturated compounds is regrettable because they also possess 'anti-knock' qualities. Modern methods of refining benzole permit the retention of the unsaturated compounds while inhibiting their tendency to form gums. It is noteworthy that the spirit produced in the manufacture of coalite has given such satisfaction in use by a squadron of the Royal Air Force that, according to the *Times* of March 1, the Air Ministry has awarded a new contract for this spirit to cover the requirements of seven squadrons.

#### 24-Hour Time System

WE are glad that the subject of the 24-hour system of time reckoning has again been raised in the House of Commons. In a written reply on March 5 to a question asked by Sir Arnold Wilson, the Postmaster-General stated: "I understand that the British Broadcasting Corporation intend at an early date to adopt the 24-hour system of expressing time for general use and on an experimental basis. This will afford an opportunity for testing the attitude of public opinion, and I propose therefore to await the result of the experiment before coming to a decision."

#### University of Durham

THE Prime Minister announced in the House of Commons on March 6 that a Royal Commission has been appointed to inquire into the affairs of the University of Durham and its constituent colleges. Its terms of reference are:—"To inquire into the organization and work of the University and its three constituent colleges and into the relation of the University to these colleges, and to report in what respects the present organization can be improved and what changes, if any, are desirable in the constitutions, functions, and powers of the University and its three constituent colleges." The members of the Commission are Lord Moyne (chairman), Countess Grey, Sir Ross Barker, Major A. G. Church, Dr. H. R. Dean, the Rev. F. Homes Dudden, Dr. T. F. Sibly, and Mr. W. Spens.

#### Research in Engineering

IN his Friday evening discourse delivered at the Royal Institution on March 2, on "Some Current Research Problems in Engineering", Dr. H. J. Gough, superintendent of the Engineering Department of the National Physical Laboratory, described the main group of researches in progress in his department. As representative examples, researches on wind pressure on structures, impact forces between vehicles and the road and failure of metals in relation to crystalline structure were discussed and demonstrated. An investigation of the wind pressures acting on a shed, 100 ft. by 42 ft. by 33 ft., was described, air flow conditions being rendered visible by using a small wind tunnel and models of buildings in conjunction with an optical system employing the *Schlieren* method. An interesting feature of the investigation was the

existence of dangerous suction effects tending to lift off roofs and suck out leeward walls. The importance in engineering service of the particularly dangerous and insidious type of failure known as 'fatigue' was discussed; the problem is also one of considerable scientific interest as it affords a convenient line of attack upon the general problem of the cohesion of matter. The use of large metallic single crystals has opened up a new field of study on both the practical and scientific aspects of fatigue. Fatigue in ductile metals is closely bound up with the effects of plastic distortion, or 'slip', upon the crystalline structure of these metals. The normal form of metals—consisting of crystals of varying orientations each composed of definite arrangements of atoms—was briefly described and the general and particular mechanisms of slip were demonstrated, employing lattice and other models. The effect of slip upon the actual crystalline structure, as deduced from X-ray data, was discussed, reference being made to 'crystal break-up' and lattice distortion, in relation to hardening. A tentative explanation of the cause and location of the initiation of fatigue cracks was described.

IN addition to the demonstrations given during Dr. Gough's discourse, exhibits relating to other researches in progress in the Engineering Department of the National Physical Laboratory were on view in the Royal Institution Library. The effect of the conditions of the surface on such engineering components as wrought iron chain, springs for vehicles, etc., is often of considerable influence on the resistance to impact loading or to repeated cyclical loading. In investigating the latter effect, a machine for applying cycles of torsional stresses was shown at work; this machine also demonstrates that quasi-elasticity is exhibited by materials even when subjected to repetitions of a range of stress which will *not* lead to fracture. Characteristic examples of fatigue failure in engineering service were exhibited, and the first high speed machine for investigating the behaviour of metals under combined fatigue stresses was shown in operation. Another machine demonstrated the characteristics of film lubrication between surfaces undergoing relative reciprocating motion; the coefficient of friction is independent of load but varies with speed and temperature, hence the friction is not of the true boundary type but relates to a thicker film. The skidding characteristics of road vehicles were demonstrated by models showing that: (a) with locked rear wheels the vehicle turns round while, if the front wheels are locked, the path of the vehicle is straight; (b) the turning effect arising from locked back wheels is caused by lack of directional control at the rear of the vehicle; (c) 'steering into the skid' tends to preserve a straight path; also, that over-correcting or delay leads to a series of swerves; (d) equal breaking on all four wheels can result in rotation of the vehicle and may be dangerous.

#### Elements Old and New

THE historical development of the conceptions of 'atom' and 'element' were outlined by Prof. James