

stroboscope, sees the gear wheels apparently stationary, and can thus readily detect any defects. Analytical balances will be shown which, it is claimed, will at least equal, if not surpass, the corresponding foreign balances which were widely used until a few years ago. In these balances the beam is made of an alloy having a negligible coefficient of expansion. One special balance has been designed for the estimation of moisture in tea, tobacco, flour and other materials.

Of the various instruments and apparatus used for instructional purposes in schools and colleges, mention may be made of the 'Simplex' ripple projector which throws on to a screen images of wave forms and motions, the ripples being produced in a glass

trough by means of an electro-magnetic vibrator. This instrument enables experiments to be made showing, for example, the effect of sound in rooms and halls of various shapes.

Of the numerous other exhibits that will be on view in the Scientific Instrument Section of the Fair we have space merely to mention the 'Stormoguide', an instrument designed to 'forecast' the weather, and two popular British-made cameras at low prices—one fitted with an anastigmat 3.5 lens at 75s., and the other a 3½ in. × 2¼ in. box camera at 6s. 6d.—the lowest priced camera, it is claimed, on the market.

Altogether, the visitor will find scientific exhibits of abundant interest at Olympia.

Prevention of Roof Falls in Mines

DURING the early years of the Safety in Mines Research Board in Great Britain, the staff recruited consisted almost exclusively of chemists with no actual mining experience. Their energies were directed towards chemical aspects of the safety problem, and in particular to the phenomena of explosions, a study which lends itself readily to laboratory investigation. Calamitous as gas or dust explosions may be, the reports of the Secretary for Mines show that they normally account for only about five per cent of the total fatal accidents occurring annually in the coal mines of Great Britain, whereas the fatalities caused by falls of roof or sides account for approximately fifty per cent. Thus whilst explosions create most public interest in the safety of mines, falls of roof and sides cause by far the most casualties.

The activities of the 'Safety in Mines' movement have now been extended to include a co-ordinated research on the causes of falls of roof and their prevention. In consequence of the great variation in mining conditions, these investigations are being carried out in all the important coalfields of Great Britain. They are under the direct supervision of committees consisting of leading mining engineers in the respective areas. Progress reports are circulated

periodically. The North of England Institute of Mining Engineers (Support of Workings in Mines Committee) has just issued a pamphlet, "Safety in Bord and Pillar Whole Workings", for free circulation among all concerned. The 'bord and pillar' method of mining, that is, dividing a coal seam into a system of large squares or blocks ('pillars') by first developing narrow roadways (called 'bords' and 'walls') and afterwards extracting the coal left in the 'pillars', is extensively adopted in the Northumberland and Durham coalfields. The factors involved in the movement of the overlying strata when driving the narrow roadways are discussed together with the best methods of controlling the roof movements. Measurements have shown that the rate of roof movement is greatest closely adjacent to the working face and, hence, the necessity of effectively supporting this critical area so as to reduce the danger of fracture of the roof with consequent falls is stressed by the Committee.

In addition to the circulation of this pamphlet a cinematographic film has been made showing a system of coal-getting at a Northumberland colliery where the methods of roof support advocated are now in use. This film is to be exhibited throughout the northern coalfield.

Fatigue Limit of Medium Carbon Steel

IT has been known for some time that iron undergoes several small changes at temperatures between that of the room and say, 350° C. These changes can be detected by variations in several physical properties and also appear to have some influence on the mechanical properties of the material. So far, however, no attempt has been made to investigate any effect of these change points on the fatigue limit of the metal. A paper by Mr. J. W. Cuthbertson, read before the September meeting of the Iron and Steel Institute, endeavours with considerable success to fill this gap in our knowledge. He has shown that the fatigue limit of a medium carbon steel rises as the temperature is increased to about 90° C. It then falls very rapidly, and at 120° C. or thereabouts, is less than at room temperature, to what degree, however, is still unsettled. As the temperature is still further increased the fatigue limit rises again very rapidly and at about 190° C. is some three tons per square inch higher than at room temperature. A second rapid drop then ensues, and a minimum occurs at about 220° C. followed by a further small

rise. In an atmosphere of nitrogen the increase is progressive up to at any rate 350° C., but in air the fatigue limit begins to fall when the temperature exceeds about 300° C. The marked depression around 120° C. particularly is an observation of very great interest.

The paper, further, is of importance in connexion with the general measurement of fatigue limits. One method which has been suggested for their rapid determination is to plot the load deflection curve which, at first a straight line, shows a change in direction when the fatigue limit is attained. The method, however, has not been deemed completely satisfactory since certain cases are known where the results have differed appreciably from those obtained in the normal long time tests.

Mr. Cuthbertson has gone far to show that if this method is so modified that the load is steadily applied and is not increased suddenly, the results obtained are far more satisfactory, and as a practical test at any rate the method would appear to have very valuable applications.