winter. Accordingly, it may be anticipated that if the Oldebroek experiment is repeated at some time during the coming summer, more positive and therefore more interesting results will be obtained.

I should like to take this opportunity to thank all correspondents who kindly communicated their observations and also to express my appreciation of the trouble taken by the observers who manned all the microphone stations which were in operation.

A preliminary report on the observations made on the Continent has been circulated by Prof. H. Hergesell, president of the International Commission for the Investigation of the Free Atmosphere. Of the German stations provided with undographs close to the direct line from Oldebroek towards Lindenberg, those at distances of 105, 136, 155, 161, 170, 183, 190, 198, 201, 213 and 225 km. were successful in obtaining records of the air waves, as were the stations at Aachen, Arnsberg, Jever, Lindenberg, Göttingen and Potsdam. No waves could be recognised on the undograph records in Holland.

Observations of audibility show an abnormal zone which has, in Germany, a mean radius of 145 km. and a maximum of 215 km. This zone extends to eastern Belgium. The inner zone of normal audibility was narrow; there was some extension to the east, as was to be expected from the prevalence of west wind.

That the air waves were received at places to the east of Oldebroek and not at the principal English stations to the west is in accordance with expectation, as is the fact that there was abnormal audibility in the eastern part of Belgium (south of the source) but not in the western part (south-west of the source). The very small inner radius of the outer zone of reception of air waves, 105 km., is also typical of winter observations. The reception of air waves at Cambridge and other places in England was unexpected and therefore, if the evidence is accepted, all the more interesting.

It is understood that the experimental explosions which were to have taken place in Novaya Zemlya on the same morning as the Oldebroek ones had to be postponed.

Similar experiments, organised by Dr. Bruno Rolf, were to be inaugurated in Sweden on January 11 by the explosion of 300 kgm. of guncotton near Boden. Five undographs provided by the International Meteorological Association were to be used for the first time on this occasion.

British Industries Fair

Scientific Instrument Section

THE Scientific Instrument Section of the British Industries Fair will again be situated in the Grand Hall at Olympia. Of the 14,500 sq. ft. of space to be occupied by this section of exhibitors, nearly a quarter will be taken up by the composite exhibit of a group of British scientific instrument manufacturers who have co-operated for this purpose. The whole of the exhibits may roughly be divided into two categories, namely, (*a*) technical instruments and apparatus, such as are used for control and testing in works, for laboratory research or for the teaching of science in colleges and schools; (*b*) scientific instruments of a more or less domestic character, such as barometers and thermometers. A very wide field of scientific instruments will thus be covered, ranging from a simple pocket magnifying lens to the equipment required for the most refined micro-photographic work.

Among the new, improved, or adapted products of the instrument industry, about which advance information is available, the following may be mentioned. James Swift and Son, Ltd., will exhibit Nicol and other polarising prisms such as are used in the latest apparatus for television and picture transmission. A new model of the tintometer, very light and portable, and enabling rapid measurements to be made, will be shown by The Tintometer Ltd. This instrument enables the specification or definition of colour to be made in terms of reproducible units or standards, in the form of graduated and numbered glass slides. A stereo-prism binocular, with an extra wide field, a magnification of 7 diameters, and a 50 mm. object-glass, having a light-transmitting power very greatly in excess of that of any prism binocular previously made, will be one of the exhibits of Ross Ltd. Among other products, W. Watson and Sons, Ltd., will show a new low-power microscope for the rapid examination of specimens varying in thickness from 1 mm. to 6 in. This firm's exhibits will also include a special microscope 'for crime detection' and a new form of photometer for the measurement of the comparative densities of photographic plates and for the measurement of reflections from papers and other materials. This last instrument makes use of a photoelectric cell with a suitable magnifying system.

The Foster Instrument Company is exhibiting at the Birmingham Section and, besides a complete range of automatic temperature controllers, will show a 'Blackie Heat-Loss Gauge'. This last named instrument, it is claimed, is the only known instrument of its kind, and, since it is directly calibrated in B.T.U's / sq. ft. / H.R., it can be used even by unskilled operators.

Thermometers reading to an extremely high degree of precision—for example, to the nearest 0·005° C.—for use in research and industrial work will also be among the exhibits at Olympia.

Another noteworthy exhibit will be the projection microscope to be shown by Vickers. It is designed primarily for the purposes of metallography, and will deal with specimens up to 50 lb. in weight and enable magnifications varying from 3 to 5,000 diameters to be obtained. The apparatus will, as desired, provide for visual observations, or take photomicrographs or project the images on to a screen for demonstration purposes. The Cooke optical comparator is designed for the quick and accurate comparison of machine parts produced in quantities. It is intended to supersede the use of high and low limit gauges in works' inspection departments. A total magnification of 1,000 is achieved by means of a system of mechanical and optical levers, and a variation of 0·0001 in. from the standard can be detected. An instrument for observing the precise character of the movement of any rotating or oscillating part of a machine or apparatus is the 'Whidbourne' stroboscope. By means of this instrument—to take one example—gear wheels can be observed in motion without having to stop the machine. The observer, on looking through the

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 75*s.*, and the other a $3\frac{1}{4}$ in. × $2\frac{1}{4}$ in. box camera at 6*s.* 6*d.*—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.