

material under treatment and the solid fuel are kept apart, and the flame and hot gases from the burning fuel enter the furnace proper at one end and are deflected or beaten down on to the material on the hearth by the roof of the furnace. The earliest account of such a furnace was given by Theophilus the monk, who wrote in the eleventh century. It was used for making glass. Early in the sixteenth century reverberatory furnaces were used in Germany for melting bronze for guns, but Agricola in his "De re metallica" makes no mention of them. The earliest description in the English language of a reverberatory furnace was found in a work published in 1613 by John Rovenson, while the earliest drawing of any value of a coal-burning reverberatory furnace was given by the German metallurgist Schlüter in his "Gründlicher Unterricht von Huttenwerken" of 1738. During the seventeenth century the smelting of lead, copper and iron in reverberatory furnaces was attempted by various individuals at several places; the furnaces being generally without chimneys. An interesting point was when was it recognised that with a closed fireplace the air required for the combustion of the fuel could be drawn through by a chimney. The first record of the use of chimney draught is contained in Glauber's work of 1646 "Furni novi Philosophici", translated into English in 1651.

Petrie Portrait Fund

THE retirement of Sir Flinders Petrie from the Edwards professorship of Egyptology at University College, London, has seemed to many of his friends an appropriate occasion for an expression of appreciation of his lifelong services to archæology. It is thought that this might most appropriately take the form of his portrait, to be presented to the College with which he has so long been associated. An appeal for funds for this purpose has been issued over the names of Prof. J. H. Breasted, M. J. Capart, Dr. Howard Carter, Prof. F. Ll. Griffith, Sir George Hill, Sir Henry Lyons, Dr. Allan Mawer, Sir Robert Mond and Dr. Margaret Murray. In issuing the appeal, it is pointed out that it is now more than fifty years since Sir Flinders began work as an archæologist at Stonehenge, and soon afterwards carried out the first accurate survey of the Pyramids at Gizeh. Referring to his influence on archæological studies during his long career as an excavator, the committee states no more than the bare truth when it points to his insistence on accurate observation and recording, and the stress he has laid on the significance of smaller finds, equally with the larger, in an excavation, in developing knowledge of the social conditions of the past. The appeal also refers to his early recognition of the importance of correlation in studying the intercourse between the various peoples of the Near East from earliest times. Finally, in attributing to him in large measure the awakening of modern interest in archæology, mention is made of the great number of archæologists who have achieved distinction after receiving their training and inspiration from him as lecturer and excavator. Subscriptions towards the fund will be received by Sir Henry

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Infra-Red Photography as an Aid to Navigation

THE United States liner *Manhattan* has recently been fitted with a special look-out camera intended for an investigation of fog penetration with infra-red sensitive materials. Mechanism for the automatic developing and fixing of the photographs is included in the body of the camera itself, and the photographic record may be viewed one minute after the exposure has been made. The weather conditions encountered by the *Manhattan* since the new apparatus was installed have not been suitable for experimental work, so no records obtained under service conditions are yet available. The problem of fog penetration is not at all simple, and it remains to be seen whether the degree of penetration actually obtained by this method will be really helpful to navigators.

The Gases of the Atmosphere

IN his presidential address before the Royal Meteorological Society at its annual general meeting on January 17, Prof. S. Chapman discussed "The Gases of the Atmosphere". The permanent gases of the atmosphere (mainly nitrogen and oxygen) are known, from direct measurements in the stratosphere, to be in constant proportions up to the greatest heights yet attained by Piccard and his successors in stratospheric flight. Other constituents vary in their concentration, because of processes tending to produce and destroy or transfer them in the atmosphere: among such constituents are water, ozone and the newly discovered positrons, which enter the atmosphere from outside as cosmic rays. Experiments were suggested to determine the rate of large-scale transfer of such gases by turbulence, using some easily detectable gas, artificially introduced, as an 'indicator'. Such experiments might also be made using ozone as the indicator, which would throw light on the distribution of ozone, as recently estimated by Dobson, Götz and Meetham. The possibility of removing the atmospheric ozone above certain ground areas was also considered. The absorption of solar radiation by oxygen and ozone was discussed in the light of new experimental data, and in relation to the composition and temperature of the upper atmosphere.

London's Underground Railways

BY the formation of the London Passenger Transport Board last year, the unification of the underground train, bus, trolley-bus and tram systems of London has been accomplished. The British Electrical and Allied Manufacturers Association (Beama) has recently published a well-illustrated book giving an account of the part played by British manufacturers in providing machinery and equipment for this great transport service. The account given proves the sound administrative qualities of those who have made London's 'Underground' the foremost institution of its kind in the world. So far back as 1846, the prospectus which led to the foundation of the

Metropolitan Railway was issued, the object being to encircle the metropolis with a tunnel. The scheme, of which Mr. Charles Pearson, a city solicitor, was the author, was at first received with derision, and it was not until 1863 that the first section of the line, from Farringdon Street to Bishop's Road, was opened. The seven stations which formed this line have now increased to 226, and considerably more than a million passengers per day are carried. Every weekday, 2,800 trains pass through Charing Cross station. After forty years of steam, the Metropolitan and the District Railways were equipped for operation by electricity. The great extension of London's underground railways and the equipment for electrical operation of the older steam lines was started in 1902 by the formation of the Underground Electric Railways Co. of London, Ltd., the site for the generating station being in Lots Road, Chelsea. The great success of the undertaking is due to the recognition by the administration of the fact that the position is continually changing and that progress cannot be checked or thwarted in a living organisation.

THE Lots Road Station is situated on the bank of the Thames at Chelsea and is well known to Londoners. The amount of power generated per square foot of engine room area is six kilowatts, which is the highest figure for Great Britain. The Neasden power station near Wembley Park supplies nearly 100,000 kilowatts, which is a third of that supplied by Lots Road. The original plant was designed to operate with a steam pressure of 180 lb. per sq. in. and a temperature of 550° F.; the present plant operates at a pressure of 265 lb. per sq. in. and 750° F. To supply the condensers with the necessary water, four artesian wells were sunk to depths varying between 400 ft. and 600 ft. and these yield about 18,000 gallons per hour. After passing through the condensers, the water is cooled in wooden towers and utilised over again. The electric transmission of energy is on the three-phase system at 11,000 volts, and many hundreds of miles of three-core cable at this pressure are used. The distribution voltage on the track is 630 direct current, the alternating current being converted to direct current either by rotary converters or mercury arc rectifiers. The first escalator was installed at Earl's Court Station in 1911, and wherever escalators have been installed there has been a notable increase in the traffic. In the event of any interruption to the train service, precautions are taken that there will be no delay in the issue of instructions to all sections concerned. At such points a loud speaker is installed and emergency messages are received from a central microphone in the control room at Leicester Square station.

International Congress of Anthropology and Ethnology

ARRANGEMENTS are now well advanced for the first session of the International Congress of Anthropological and Ethnological Sciences, which will be held under royal patronage in London on July 30–August 4 next. The proposal to hold a congress of this nature was first made in 1912, when the International Congress of Americanists met in London,

but the meeting in 1916, for which arrangements were then made, had to be postponed indefinitely owing to the War. In future the Congress will be held every fourth year, alternating with the International Congress of Archaeological and Proto-historic Sciences, which will be held in the second of the intervening years. The Anthropological Congress will coincide with the meeting in Europe of the International Congress of Americanists, which this year is to be held at Seville. The sessions of the Congress will be held at University College, Gower Street, and at the Wellcome Historical Medical Museum. The president is Lord Onslow and the chairman of the executive committee, Capt. T. A. Joyce. Prof. J. L. Myres and Mr. A. H. Brodrick are the joint honorary secretaries and Mr. H. G. Beasley the treasurer. Presidents of sections are Prof. G. Elliot Smith (Anatomy and Physical Anthropology), Mr. F. C. Bartlett (Psychology), Prof. C. B. Fawcett (Demography), Dr. A. C. Haddon (Ethnography), the Rev. E. Smith, president of the Royal Anthropological Institute (Subsection of African Ethnography), Mr. H. Balfour (Technology), Prof. C. G. Seligman (Sociology), Prof. E. O. James (Religions) and Dr. Alan H. Gardiner (Languages and Writing). Among the vice-presidents are the Archbishop of Canterbury, the Lord Mayor of London, the High Commissioners of India and South Africa, Sir James Frazer, and the presidents of the Societies of Antiquaries, the Folklore Society and the Royal Asiatic Society. Particulars of the Congress may be obtained from the Royal Anthropological Institute, 52 Upper Bedford Place, W.C.1.

Archæology and Unemployment in the United States

IN the United States advantage is being taken of the funds available for the relief of unemployment to carry out certain archæological investigations which hitherto, although considered of great importance, have been regarded as too costly for the resources of the Smithsonian Institution, Washington. The funds are to be provided by the Civil Works Administration and about one thousand men of the local unemployed will be engaged for the work of excavation. According to an announcement issued by the Smithsonian Institution, six Indian mound sites, each considered to be key positions in an archæologically unknown area, are to be explored. In each case the work will be carried out under the direction of an official of the Bureau of American Ethnology. Three sites in Florida will be in charge of Mr. Matthew W. Stirling, chief of the Bureau, one of these being an extensive system of pre-Seminole mounds and earthworks near Lake Okechobee which was discovered in 1931; Dr. F. H. H. Roberts, Jr., will excavate a group of mounds in the Shiloh National Military Park at Pittsburg Landing, Tennessee; and Dr. W. F. Strong will be in charge of the exploration of a large mound six miles from Taft, Kern County, California, one of the key sites of Californian prehistory, which is known to have been abandoned soon after the first Spaniards reached the country. At Macon, Georgia, a mound thought to be the site of an ancient Hitchi village