

assistance is shown by the fact that of the 287 scholars who have been re-established, 202 are still within the university world. The Council has played an important part in this work, not only within Great Britain by raising during the past year £24,000 for temporary maintenance grants, but also on an international basis by organising a central information bureau. The Council announces that it hopes to continue its information service as long as possible, although it proposes to end its emergency financial grants by July, 1936. It hopes during the coming year to raise funds to create a limited number of research fellowships to retain in Great Britain the services of some of the most distinguished of the displaced scholars. The need for the continuation of the Council's work is evident. During the past two months, 50 more university teachers have been dismissed in Germany, and, as the report points out, "it is impossible for the exiled scholars to regard return to Germany as a possible alternative to further exile". We hope that the Council will receive sufficient financial support to continue its patient work, for it is making a historic contribution to the cause of free learning. Copies of the report may be obtained free on application to the General Secretary, Academic Assistance Council, Rooms of the Royal Society, Burlington House, London, W.1.

Flight Experiments with Compression-Ignition Engines

THE Air Ministry has ordered a number of "Culverin" 720 horse-power heavy oil engines from Messrs. D. Napier and Son, Ltd. It is understood that these are to be used for complete operational tests in large flying boats. Imperial Airways is also interested in the same problem for civil aircraft, and will doubtless be watching these results. The Napier engine is a horizontal water-cooled engine, built under licence from the German Junkers company. The Bristol Aeroplane Co., Ltd., has also developed a compression-ignition engine of the radial air-cooled type, which has actually gained the world's altitude record for aircraft powered with that type of engine. The Diesel type engine has a definite advantage in long-distance flight owing to its smaller oil consumption, but as it is structurally heavier than the petrol engine this advantage is outweighed on short flights. With modern design and performance of heavier-than-aircraft, there is no gain in using it for a flight of less than about eight hours duration. Another major point in its favour is the lessened risk of fire after a crash. Although the fuel oil used is not non-inflammable, its flash point is much lower than that of petrol, and the risk of ignition from flame or hot parts is less. A minor trouble to be dealt with is the lack of facilities for the distribution of this fuel oil at the present time. The oil distributing companies will need considerable additions to their plant before fuel oil will be available upon as world-wide a scale as is petrol.

Polarising Light Filters

THE Eastman Kodak Company, at the ninth International Congress of Photography recently held

in Paris, demonstrated a new kind of light polariser, known as the 'Pola filter'. This is made in sheets and may be used to produce effects similar to those obtained with a Nicol prism. Thus when used in pairs, any desired degree of extinction may be obtained by rotating one filter in relation to the other. In photography alone there are many very useful applications for these filters, such as the elimination of surface reflections from glass windows, water, coloured objects (with consequent increased saturation of the colours), the modulation of blue sky brightness without alteration of hue, etc. The comparative cheapness of these filters, and the possibility of manufacturing them in large sizes, opens up a great vista of applications, in which has been suggested their use to combat headlight glare with motor-cars.

Prehistoric India

A DISCOVERY which, if substantiated, holds out promise of great moment for prehistoric archaeology in the Near and Middle East, is announced from India. According to a dispatch from Karachi, which appears in *The Times* of July 19, remains of a city of an earlier date than Mohenjo-daro have been discovered alongside the bed of the Indus River at a site known as Kol Deja or Narujadaro in Khaipur State, Bombay. The discovery was made by Mr. Utam Thakur, a research scholar, in the course of survey work. It is stated that shell and earthenware bangles, decorated images and decorative pottery were found. If further investigation should afford ground for accepting the claim that this material represents an earlier stage of civilisation than that already known from the Indus valley, where the earliest city at Mohenjo-daro is dated at about 3300 B.C., it will have a crucial bearing on the problem of the relations of the early civilisations of Sumeria and India. The authorities of Khaipur State have taken measures for guarding the site, and Mr. Thakur is now engaged in seeking financial aid for carrying out systematic excavation in the coming season.

Equipment of a Photo-Elastic Laboratory

A PAPER of the greatest interest to all who contemplate the design and equipment of a photo-elastic laboratory, and indeed of interest to engineers generally, was read to the Junior Institution of Engineers by Prof. E. G. Coker and appears in full, with many illustrations, in the *Journal* of the Institution of April 1935. It was prepared with the view of giving an outline of the essential requirements of a photo-elastic laboratory when a start is being made from the beginning of things and not merely an adjunct to a larger laboratory already well supplied with much of the experimental apparatus and machinery, which can be utilised for photo-elastic work. For this purpose, the paper opens with a concise statement of the elements of photo-elasticity, a subject which might with advantage be taken up much more widely and at an earlier stage than at present, as the elastic properties of materials are of more or less importance to all engaged in technical

work, though of course in a much greater degree to engineers. By its means a considerable advance has been made in our knowledge of the distribution of stress intensities at discontinuities, where very little exact information was previously available. It is particularly useful in the stress analysis of fusion joints, in which it is, as a rule, a fallacy to assume that stress distributions can be determined by applying elementary methods. In this paper, Dr. Coker takes the connexion of two steel plates in line by means of a V fusion weld as a typical example of the incalculable stresses which can be determined by photo-elastic analysis. He describes the apparatus required and concludes with a description of a detached photo-elastic laboratory made by a small addition to a medium-sized house.

The World's Greatest Highway

THE Inter-American Highway from Alaska and Canada in the north to Chile, the Argentine and Brazil in the south, is now, according to an article in *Roads and Road Construction* of February, having its gaps filled in on the maps and plans of engineers. At present, 4,500 miles of its length are passable by motor-cars in all weathers. The finished sections are in Canada, the United States, Mexico and Panama, and parts of all-weather roads are completed in Alaska, Costa Rica, Salvador, Guatemala, Colombia and Brazil. Highways passable in dry weather cover the greater part of the international highway route. The South American portion of the highway offers a great variety of scenery. There are the jungles of Colombia and Brazil, the sea coasts of Peru and Chile, the magnificent heights of the Andes and the broad expanse of the Argentine pampas. A thousand miles of this highway will be at elevations of 5,000–10,000 ft. The international project is to open up a through route for the highway tourist between North and South America. It will be of special value to citizens of the United States living in the Panama zone. The 250 miles of improved road in Panama have already been largely patronised by the residents of the Canal Zone for recreational travel, and a through highway to the north would be very attractive to them. The Central American section makes it possible to open up large areas for agricultural and commercial development and so promote their economic welfare. At present, access is mainly by steamer to the ports and thence by rail, highway or aeroplane. Pan-American Airways provides a service throughout the length of Central America, paralleling the future line of the Inter-American Highway on the Pacific slope of the divide.

Post Office Publicity

THE present-day policy of the Post Office is based on a recognition of the fact that the Post Office is not only a Government Department, but is also one of the largest businesses in Great Britain. In pursuance of this recognition, recent developments have included the establishment of a Public Relations Department, with an organisation for employing all the most modern methods of publicity at its

disposal. An interesting account of the policy being followed by this department is given in a recently published pamphlet entitled, "Post Office Publicity". This pamphlet is the eighth of a series of Post Office Green Papers (London: H.M. Stationery Office, 6d. net), previous issues of which have dealt with the air mail service and with various aspects of telegraph and telephone communication. The text of the pamphlet has been adapted from a lecture recently given by Sir Stephen Tallents, Public Relations Officer of the General Post Office, and it is illustrated by a selection of photographs and reproductions of posters and pamphlets already issued by the Post Office. This pamphlet shows how recent advances in the arts of press advertising and exhibition display and the arrival of new forms of communication in films and broadcasting have coincided with the growth of the new need of correctly-balanced publicity. The methods by which the Post Office is pursuing these purposes are clearly described. These include press advertising, the supply of posters of high artistic quality for public display and for use in schools, and the participation in public exhibitions of various kinds, and the temporary leasing of shops in important centres for the display of Post Office activities and equipment. Finally, the G.P.O. Film Unit produces and circulates films which illustrate vividly the great variety of Post Office work.

Canalisation of the Upper Mississippi

AN article in the *Scientific American* of February by Mr. S. G. Roberts describes the important work now being done under the United States Army engineers for the improvement of the navigation of the Upper Mississippi River. Some years back it was considered that a channel six feet deep at low water could be maintained by dredging and contraction works, but this proved to be impracticable. In 1931, therefore, it was decided to canalise the whole length of the river between St. Louis and the 'twin-cities' of Minneapolis and St. Paul, a distance of about 650 miles, so as to give a minimum depth of 9 feet. For this purpose, 27 dams are being built, each having locks 110 feet wide and 600 feet long. The dams are provided with spillways and roller gates suitable for contending with fields or floes of ice, which sometimes attain a thickness of 2 feet. The object of the scheme is to provide for the direct shipment of cargoes from Minneapolis and other places direct to New Orleans by means of flotillas of barges which will carry as much as 14,000 tons, and will be towed through the locks without changing formation. The work was begun about three years ago and is expected to be completed in 1938 at a cost of 124,000,000 dollars. "There is every reason to believe," says Mr. Roberts, "that the work now under way will give to the Mississippi valley a trunk-line water route that will mean to the vast region served by it what the Rhine has long been to Central Europe. From Minneapolis to the sea, the Mississippi has a length of 1,950 miles; and the run from Minneapolis to New Orleans is 1,840 miles.