many students are seriously handicapped in their work by remediable faults in their modes of reading. Within a day or two of the publication of this bibliography appeared No. 1 of vol. 24 of the University of Colorado Studies containing abstracts of 136 theses for higher degrees. An analysis of the subject headings of the theses affords further evidence of what might almost be called the rage for educational research prevalent in some American universities, for no fewer than 47 of the theses are devoted to research in this field.

Records of Bushman Art

THE Department of the Interior of the Union of South Africa and the Commission for the Preservation of the Natural and Historical Monuments, Relics and Antiquities of South Africa have issued an official circular inviting the co-operation and assistance of members of the public in recording and preserving examples of Bushman rock-painting and drawing. In asking observers to forward such records to Prof. C. van Riet Lowe, as director of the Bureau of Archæology at Johannesburg, the circular points out that although the existence of a large number of such examples of Bushman art is already known, it is certain that the list is by no means complete, while time, exposure to weather, as well as acts of vandalism are obliterating many of them year by year. In order that the records may be as complete as possible, the circular enumerates the data which are essential for the purpose of accurate record, as well as for archæological study, and gives instructions on the best methods of taking photographs and squeezes in varying conditions. The circular, as received, is accompanied by an excellent and extremely instructive map, showing the distribution of the known sites on which examples of the paintings and engravings have been recorded, as well as sites which have been proclaimed for preservation by the Commission for the Preservation of Natural and Historic Monuments.

Fire Precautions in Electrical Stations

SERIOUS fires from electrical plant in power stations are fortunately rare in Great Britain, but during the last few years there have been several disastrous fires both at home and abroad, and so the paper on fire precautions by F. C. Winfield read to the Institution of Electrical Engineers on February 11 is a useful one. In electrical supply it is recognized that the maintenance of this supply is the outstanding requirement. This is usually done by duplicating all the principal cables supplying the current, and also some of the plant. Since all electrical plant is subject to the two risks of fire and explosion, this provision does not secure the desired maintenance of the supply unless measures are taken to ensure that such duplicates cannot be simultaneously impaired. It is necessary therefore to provide physical separation of electrical duplicates by dividing them up in separate buildings or enclosures. Brick walls and reinforced concrete construction have excellent fire-resisting properties. Pitched roofs supported by steel trusses should be protected by a fire-resisting inner ceiling. All windows should be of wired glass and all internal doors of fireproof self-closing design. The development of the oil-less circuit and breaker on the Continent is a step in the right direction. An important factor in fighting an oil fire is the dense black smoke, which impedes or prohibits access to the seat of the fire. This is a very serious consideration in dealing with fires which occur in the inner regions of large power stations. For this reason it is recommended that all large transformers or heavy switch-gear should be mounted in separate buildings or in chambers opening to the outer air and sealed off from the inner side. Unfortunately, no practical method of routine testing has yet been devised by means of which the failures that produce fires can be anticipated.

Underwater Power and Telephone Cables

IN the course of developing underground cable networks, the engineer has sometimes to negotiate waterways and harbours. For large waterways three methods are used. The first is to make a special cable tunnel. But the expense of construction is heavy, and is only justified when a large block of main cables has to be taken across. Examples of this type are the crossings under the Thames at Barking, Deptford and Battersea and underneath the Tyne at Newcastle. The second method is to dredge a trench in the river bed in which the cables are laid directly, and the third method is to lay them in the bed of the waterway without recourse to dredging. The second method is, when practicable, preferable to the third method, especially in navigable waterways, where the ships' anchors damage them. In certain cases, owing to the width of the waterway or because the nature of its bed renders dredging impracticable, the third method is employed. In the Engineering Supplement to the *Siemens Magazine* of March, it is pointed out that when this is done in running or tidal waters, a new problem arises. No matter how carefully the cable is laid, it may at any time, due to the shifting of the bottom, be left suspended between two points. In this condition, it is subject to high-frequency vibrations set up by the current. These vibrations are very harmful to the lead as they rapidly produce inter-crystalline fracture and failure due to ingress of water. Messrs. Siemens have successfully combated this trouble by a special type of cable. A rubber hose protection is applied between the lead sheathing and the armouring. This damps out harmful frequency vibrations before they reach the lead.

Progress in Marine Radio Communication

THE first practical application of radio provided communication with ships at sea over distances and under conditions which made all other forms of communication impossible. More than thirty-five years have elapsed since that first application, and marine radio still remains unique for this particular purpose, so important to commerce and so essential to safety. In no other field, except that of air trans-

port, is radio irreplaceable by other forms of communication. A general survey of the present state of the art of marine radio communication was given at a meeting of the Wireless Section of the Institution of Electrical Engineers on March 3, when Commander F. G. Loring and Messrs. W. L. McPherson and W. H. McAllister presented a paper entitled "A Survey of Marine Radio Progress, with Special Reference to R.M.S. *Queen Mary*". The first section of the paper comprised a short summary of progress during the last five years, with particular reference to the nature and volume of traffic, the types of communication involved, and the increasing use of direction-finding equipment by navigators. Next the types of equipment fitted in cargo vessels and the smaller class of passenger vessels were described. An account was then given of the radio problems encountered in the 'express steamer' class of vessel, and the paper concluded with a detailed description of the radio station of R.M.S. *Queen Mary*, the latest representative of its class. This installation comprises four transmitters and nine or ten receivers; the control room can handle four independent duplex circuits, and provision is made for high-speed transmission and reception, and simultaneous communication on both telegraphy and telephony with both sides of the Atlantic. The results of the experience obtained with this equipment have shown that in spite of the difficulties peculiar to ship installations of this character, by careful engineering, a good approach can be made to the operating efficiency of a large land station.

Use of Diesel Locomotives in Mines.

IN coal and metalliferous mines, as the working faces advance from the shafts, there is a desire to transport workmen to within easy reach of their working places and there is a large field of usefulness open to safe and convenient locomotives suitable for this purpose. Electric trolley, compressed air, storage battery, benzol and Diesel locomotives have been used, and it is interesting to note that tests have been carried out by the Ruhr Testing Station officials which show that Diesel locomotives are safe for use in mines. An investigation has been carried out by Messrs. George S. Rice and F. E. Harris of the United States Bureau of Mines, and a report has been published under the title of "Diesel Mine Locomotives —Development and Use in European Coal Mines" (a Publication of the Department of the Interior, United States Bureau of Mines, November, 1936). It is stated in this report that provided a reasonable amount of air is circulated along the roadways where these Diesel locomotives are in use, dangerous percentages of carbon monoxide do not occur if the machines are maintained in a good working order. These locomotives are being used in American mines, and they are being substituted for benzol locomotives in mines in Germany, Belgium and France. At a colliery in Scotland, a Diesel locomotive has been on trial since 1935. Another large colliery company in Yorkshire is contemplating using Diesel locomotives for carrying men from the pit bottom to points near the face, and the necessary investigations are at present being made. In Great Britain special permission is required to introduce internal combustion engines into mines by Section 58 of the Coal Mines Act, 1911, which prohibits the use of these engines in underground workings without permission.

Air Survey

THE Air Survey Committee grew from a suggestion of the Army Council in 1919, and now includes representatives of the War Office, Air Ministry, Admiralty, Ordnance Survey and Department of Scientific and Industrial Research. The Committee's second report (Report of the Air Survey Committee No. 2. H.M. Stationery Office. 4*s*. net) reviews at length the methods of air survey and the apparatus at present available. A useful appendix analyses the cost of air survey. Conditions, of course, vary, and the estimate is based on the existence of an air survey organization on a permanent basis undertaking operations on a large scale. It is assumed that the area is undeveloped and consequently difficult for land transport. Under these conditions the cost of the survey is estimated for an area of one million square miles which would entail six years work for completion of the air photography. For this, five aircraft in action and one in reserve would be required. This fleet could do 2,000 hours of photographic flying each year. The total cost, which of course includes the cost of photographic material, works out at twenty-three shillings per square mile, but considerably more if a smaller area is surveyed, rising to 180 shillings per square mile for an area of 500 square miles. These must be taken as average figures, and the cost would be much higher in urbanized areas. The production of the maps is additional to these costs.

Works of Charles Darwin in Russian

THE fiftieth anniversary in 1932 of Charles Darwin's death was marked with perhaps greater solemnity in the U.S.S.R. than elsewhere, since both Engels and Lenin adopted and popularized Darwin's evolutionary idea. Until that time, only more or less abbreviated translations of Darwin's works had been available to Russian readers, and most of them were out of print. It was therefore decided that a new translation should be published, which had to be the most complete of all editions of Darwin's works existing in any language. The preface to the first volume, published in 1935 by the State Publishing House for Biological and Medical Literature, Moscow and Leningrad, points out the necessity for such an edition, particularly at the present time when "the economic crisis and the political and spiritual reactions caused by it, not only call for a complete oblivion of Darwin, but when the bourgeoisie, in its futile struggle against darwinism, more and more often invokes the darwinism's decrepit antithesis—religious teachings on the creation of the world".

ACCORDING to the plan, the edition will comprise twelve volumes, and will include the translations of all books, and all papers by Darwin, except some