

from a craft, such as that of the blacksmith, to something approaching modern capitalistic production.

In 1543 occurred a great event in the history of the industry—the founding of the first cast-iron gun at Buxted. The makers were Ralph Hogge and Peter Bawde. Hogge was the owner of the furnace, and Bawde one of the founders of bronze guns in the service of the king. The former knew how to work a furnace, and could furnish the molten iron; the latter was an expert gun-founder in bronze, and was learned in the proportions of the various pieces. The guns thus cast were very successful. As compared with bronze guns there was an enormous saving in cost, even after the founder had made a good profit and paid the carriage to London. The manufacture of these guns rapidly became a prominent feature in the Sussex trade. It seems to have been the first manufacturing industry in which the English distinguished themselves. During the reign of Elizabeth and onwards to the time of Charles II. English cast-iron guns were in demand all over the Continent. The historian Hume remarks: "Shipbuilding and the founding of iron cannon

were the sole 'arts' in which the English excelled. They seem, indeed, to have possessed alone the secret of the latter, and great complaints were made every Parliament against the exportation of English ordnance." Mr. Jenkins considers that the most likely explanation of this is that the Sussex men had invented some better and cheaper method of making the moulds than that which had been in use by the founders of bronze guns.

About the middle of the sixteenth century a public outcry against the consumption of wood by the iron works was raised, and in Parliament repeated objections were urged against the works both on this ground and on the impolicy of exporting ordnance.

Mr. Jenkins carries his survey down to the time of the Protectorate, from which it appears that in 1658 there were thirty-five furnaces and forty-five forges operating in the Weald, of which twenty-seven furnaces and forty-two forges were in Sussex. This appears to have been the culminating point of the iron trade of the Weald. Consideration of the further progress and decline of the industry in later years is reserved for another occasion.

Long-distance Telephony.

THE progress which is being made in long-distance telephony is exemplified in the interesting demonstration last week under the direction of Col. Carty in which conversations were carried on over a composite route of more than 5500 miles made up of a 115-mile section of submarine cable from Havana to Key West, overhead lines through Washington and New York, and right across the continent through San Francisco to Los Angeles, and, for the sake of completeness, including a 29-mile stretch of "wireless" to St. Catalina Island, in the Pacific.

There is, of course, nothing remarkable in the last-mentioned section in the point of distance, as wireless telephony is in some ways less handicapped by distance than line working; but the fact that the wireless apparatus was successfully linked up with so long a land line is noteworthy. The cable section, on the other hand, is of a length which has hitherto been beyond the limits of submarine telephony, for, as is well known, the capacity effects inseparable from such cables produce a distortion of the current waves which, when their amplitude is sufficient for audibility, renders articulation unrecognisable. The earlier telephone cables relied upon artificially introduced inductance to counteract this effect of capacity, but, in the circuit we are speaking of, the problem has been further solved by the use of thermionic repeaters, so that waves of much smaller amplitude can be employed in the cable. The *Times* points out that the Havana-Key West cable is of British manufacture, and is arranged to carry, in

addition to one telephone communication, four simultaneous telegraph messages.

The capacity effect of overhead land lines is also present, but is not nearly so serious as that of cables. Inductance coils, or Pupin coils, as they are called after their inventor, were employed in the New York-San Francisco line when American trans-continental telephony was first accomplished before the days of the thermionic valve; but it has now been found possible to remove them altogether by establishing repeater stations at 250-mile intervals along the line. The same method can be, and is being, applied to assist speech over the shorter underground cables used for trunk lines in England; but, even with such assistance, it is only by the use of overhead lines that distances of thousands of miles can be bridged over by line telephony.

The demonstrations show that there is nothing technically impossible in telephoning between England and India or the Cape, for example, where only short submarine connecting links are required; but whether it would be commercially possible, owing to the great expense and difficulty of patrolling and maintaining so long an overhead line passing through every kind of territory, is another matter.

The problem of transmitting speech over such long, uninterrupted lengths of cable as across the Atlantic is not yet solved, nor does its solution appear likely in the near future. The only possibilities in this direction are those of wireless telephony, which, in the case of communication between Europe and America, is already within

the range of physical, if not of commercial, practicability. Indeed, there are many fields where wireless telephony already rivals telephony over the metallic circuit, especially now that methods of linking up the two have been perfected, and we look forward with interest to the results of

the experiments now being made with the view of establishing a commercial wireless telephone service between London and Birmingham, and the competition which appears likely between cable and wireless telephony from England to Holland.

Obituary.

BY the death at Cambridge, on April 9, of DR. RICHARD HENRY VERNON, at thirty-six years of age, the younger generation of chemists in this country has suffered a serious loss. The elder son of the late Hon. William Vernon, Dr. Vernon was educated abroad and took the degree of Ph.D. at the Zurich Polytechnic. At the close of his course at Zurich the war broke out, and although his health had always been delicate he hastened to offer his services and enlisted as a private, receiving later a commission in the Dorset Regiment. After having been invalided home, he worked for the Chemical Warfare Committee, first at the Imperial College of Science, and afterwards in the University Chemical Laboratory, Cambridge. He was then sent to the Shell Filling Factory at Chittening, where his health became seriously affected. After the armistice he returned to Cambridge, and was appointed to the official position of assistant to the professor of chemistry. Dr. Vernon possessed in a remarkable degree the special sense of the organic chemist, and his manipulative ability was quite exceptional. His work on tellurium, which led to the discovery of the isomeric dimethyltelluronium iodides, had an important bearing on the stereochemistry of elements of higher atomic weight and impressed all who had seen it with his powers. He had a personality of singular charm and attractiveness that rapidly won the friendship of all with whom he was brought into contact.

WE notice with much regret the announcement of the death, on April 13, of MR. HOWARD PAYN in his eighty-first year. In his early life Mr. Payn qualified as a barrister, but never practised. In middle life, after some years' service on a Sugar Commission, he became greatly interested in astronomy, and in 1899 entered Sir Norman Lockyer's laboratory at South Kensington as a volunteer worker. Mr. Payn took part in the eclipse expedition to Santa Pola, Spain, in 1900, and obtained a fine series of photographs of the corona and prominences with a lens of 16-ft. focal length. In 1905 he was with Sir

Norman Lockyer's eclipse party at Palma, Majorca, but the spectroscopic photographs which he had planned to take were only partially successful, on account of clouds. In collaboration with Prof. Fowler, he was among the first to investigate the vacuum arc spectra of metallic elements, and to show that enhanced lines are strongly developed under these conditions. Mr. Payn also rendered considerable assistance to Sir Norman Lockyer in his work on "Stone Circles." He died in a nursing home at Hounslow after a long illness, and will be greatly missed by his many friends.

THE sudden and unexpected death, from heart failure, of DR. HERBERT HAVILAND FIELD, at the age of fifty-two, is a great loss to scientific workers. Some thirty years ago Field, then an American student at Paris, left the path of biological research for the less inviting road of bibliography. His aim was to provide a bibliographic service by cards of standard size. Each card carried numbers according to a modification of the Dewey decimal system, enabling it to be sorted mechanically into place according to the classification desired. Later he became associated with the bibliographic section of *Zoologischer Anzeiger*, and eventually founded at Zurich the well-known Concilium Bibliographicum, which has had the support of the Swiss Government and of various American funds. There he died at his work. It is to be hoped, especially in the present circumstances of the International Catalogue, that the institution he founded will continue and expand.

WE much regret to announce the death, on Monday, April 11, at the age of seventy-seven years, of PROF. ARNOLD WILLIAM REINOLD, F.R.S., lately professor of physics in the Royal Naval College, Greenwich.

WE regret to record the death, on April 9, of MR. BERTRAM BLOUNT, the well-known chemist, at fifty-four years of age; and, on April 13, of MR. R. A. ROLFE, of the Royal Botanic Gardens, Kew, at sixty-five years of age.

Notes.

WITH the intention of saving the lives of numberless birds of bright plumage slaughtered in foreign lands for no better purpose than unnatural decoration, a "Bill to prohibit the importation of the plumage of birds and the sale or possession of plumage illegally imported" has again been introduced in the

House of Commons, and on April 13 passed the second reading by a majority of 143 votes against 25. The scope of the Bill is wide. As it stands, it prohibits the importation of all birds' plumes excepting those of African ostriches and eider-ducks, of birds imported alive, of birds ordinarily used in the United