to £1,530,093 or 62·6 per cent. o£ the net income, leaving a profit for the year of £914,216.

At the time of the formation of the various telephone companies the enterprises were regarded as speculative, and much of the capital was raised at a discount. The business subsequently proved profitable, good dividends were paid, and the securities for the most part commanded a premium in the market. After the consolidation of the companies in 1889-1890 the profits declined, patent rights had expired, material reductions were made in the rates for telephone services, and considerable replacements of plant became necessary, the cost of which was charged to revenue.

*Agreement of 1905.—*By this agreement the Postmaster-General agreed to purchase all plant, land and buildings of the National Telephone Company in use at the date of the agreement or con­structed after that date in accordance with the specification and rules contained in the agreement, subject to the right of the Post­master-General to object to take over any plant not suited to his requirements. The price is to be fixed by the Railway and Canal Commissioners as arbitrators on the basis of the “ then value,” exclusive of any allowance for past or future profits or any com­pensation for compulsory sale or other consideration. In those cases in which the company’s licence has been extended beyond 1911 (Glasgow to 1913, Swansea to 1926, Brighton to 1926 and Portsmouth to 1926) the Postmaster-General will buy the unex­pired licence with allowance for goodwill. The Postmaster-General agreed also to buy the private wire plant of the company at a value based upon three years’ purchase of the net profits on the average of the three years ending 31st of December 1911. The Postmaster-General also agreed to lay underground wires for the company at an annual rental of £1 per mile of double wire in any local area in which the company was operating, but not in areas in which the municipalities had established exchanges. Free inter- communication was established by the agreement between the subscribers of the company and those of the Post Office, and a scale of charges was adopted or arranged to be agreed as binding on both the Post Office and the company. The late Mr W. E. L. Gaine, general manager of the company, stated before the Select Committee that in the view of the directors the bargain was a hard one, because it gave no consideration in respect of the goodwill of the great business, with its gross income of over £2,000,000 per annum and its net revenue of over £750,000, which the company had built up. The company had had to pay for all the experiments and mistakes which are inherent in the launching and development of any new industry. It had paid the Post Office in royalties already £1,848,000, and the Post Office under the agreement would step into the business in 1911 by merely paying for the plant employed. The Association of Municipal Corporations and the London County Council, on the other hand, considered the terms of purchase to be too favourable to the company. The London County Council, according to the statement of its comptroller, was disturbed by the hope expressed by the manager of the company, that the holders of the company’s ordinary snares would obtain the par value of their shares in 1911. Inasmuch as the debenture stocks and pre­ference shares would have to be redeemed in 1911 at premiums ranging from 3 to 5 per cent., the state would have to pay the company £253,000 in excess of the total of the outstanding securities in order to enable the ordinary shares to receive par, and in the council’s view this payment would diminish the probability of the Post Office being able to afford a substantial reduction in the telephone charges.

*Post Office Telephones.—*The number of trunk wire centres open on the 31st of March 1907 was 533, and the total number of trunk circuits was 2043, containing about 73,000 m. of double wire. The capital expenditure on the purchase and development of the trunk wire system amounted to £3,376,252. The total number of con­versations which took place over the trunk wires during the year 1906-1907 was 19,803,300. The gross revenue derived from the trunk services was £480,658, being an average of 5∙82d. per conversation. The total number of subscribers to the Post Office provincial ex­changes on the 31st of March 1907 (excluding those in Glasgow and Brighton) was 10,010, and the number of telephones rented was 12,006. The Glasgow system included 11,103 subscribers’ lines with 12,964 telephones, and the Brighton system contained 1542 subscribers’ lines with 1884 telephones. The sum received by the Post Office as rental in respect of private wires was £183,000. The years' working of the whole telephone system of the Post Office showed a balance of £451,787 after payment of the working expenses, while the estimated amount required to provide for depreciation of plant and interest at 3 per cent. on the total expenditure of £7,252,000 was £432,726.

The number of telephones connected with the Post Office system in the metropolitan area on the 31st of March 1907 was 41,236, and additional subscribers were being connected at the rate of about 150 a week. There were 425 post office call-offices in the London area. The length of underground pipes which had been laid in the metropolitan area for telephone purposes was 2030 m. Cables containing 317,789 m. of wire had been laid, including 69,066 m. rented by the National Telephone Company. The average cost of constructing an exchange circuit in the metropolitan area (including the installation of telephone instruments and of exchange apparatus, but excluding the provision of spare plant) has been £33. Taking into account the whole system (including spare plant of all kinds), the capital expenditure per station (*i.e.* per telephone connected with an exchange) stands at less than £50.

*International Telephone Lines.—*The Anglo-French telephone service, which was opened between London and Paris in April 1891, was extended to the principal towns in England and France on the 11th of April 1904. The service has since been extended to certain other English provincial towns; and the Anglo-Belgian telephone service has similarly been extended. There are now four circuits between London and Paris, one between London and Lille, and two between London and Brussels, the last carrying an increasing amount of traffic. Experiments have been made in telephonic communication between London and Rome by way of Paris. It was found possible to exchange speech when the con­ditions were exceptionally favourable; but in spite of the partial success of the experiment, a public service between the two capitals is not at present practicable.

References.―*Reports of Select Committee on Telephone and Tele­graph Wires* (1885), of *Select Committee on Telegraph Bill* (1892), of *Joint Committee of the House of Lords and the House of Commons on Electric Powers (Protective Clauses)* (1893), of *Select Committee on Telephone Service* (1895), of *Select Committee on Telephones* (1898), and of *Select Committee on Post Office {Telephone) Agreement* (1905); *Treasury Minutes* (1892 and 1899); *Annual Reports of the Post­master-General; Report to the Treasury by Sheriff Andrew Jameson on Glasgow Telephone Enquiry* (1897); H. R. Meyer, *Public Owner­ship and the Telephone in Great Britain* (London, 1907); E. Garcke, *Manual of Electrical Undertakings* (1896-1908). (E. Ga.)

**TELESCOPE,** an optical instrument employed to view dis­tant objects. The term “ photographic telescope ” has been applied to instruments employed to record the appearance of celestial objects by photography. The word was coined by Demiscianus, a Greek scholar, at the request of Federigo Cesi, founder of the *Accademia dei Lincei,* from the Greek *τηλe,* far, and σκοπευν, to see. It was used by Galileo as early as 1612, and came into English use much later, when it supplanted *trunk* and *cylinder,* the terms hitherto used to denote the telescope.

History

The credit of the discovery of the telescope has been a fruit­ful subject of discussion. Thus, because Democritus announced that the Milky Way is composed of vast multitudes of stars, it has been maintained that he could only have been led to form such an opinion from actual examination of the heavens with a telescope. Other passages from the Greek and Latin authors have similarly been cited to prove that the telescope was known to the ancients. But, as has been remarked by Dr Robert Grant (*History of Physical Astronomy,* p. 515), we are no more warranted in drawing so important a conclusion from casual remarks, however sagacious, than we should be justified in stating that Seneca was in possession of the dis­coveries of Newton because he predicted that comets would one day be found to revolve in periodic orbits. William Molyneux, in his *Dioptrica Nova* (1692), p. 256, declares his opinion that Roger Bacon (who died *c.* 1294) “ did perfectly well understand all kinds of optic glasses, and knew likewise the method of combining them so as to compose some such instrument as our telescope.” He cites a passage from Bacon’s *Opus Majus,* p. 377 of Jebb’s edition, 1733, translated as follows:—

“ Greater things than these may be performed by refracted vision. For it is easy to understand by the canons above mentioned that the greatest objects may appear exceedingly small, and the contrary, also that the most remote objects may appear just at hand, and the converse; for we can give such figures to transparent bodies, and dispose them in such order with respect to the eye and the objects, that the rays shall be refracted and bent towards any place we please, so that we shall see the object near at hand or at any dis­tance under any angle we please. And thus from an incredible distance we may read the smallest letters, and may number the smallest particles of dust and sand, by reason of the greatness of the angle under which we see them. . . . Thus also the sun, moon and stars may be made to descend hither in appearance, and to be visible over the heads of our enemies, and many things of the like sort, which persons unacquainted with such things would refuse to believe.” Molyneux also cites from Bacon’s *Epistola ad Parisiensem,* “ Of the Secrets of Art and Nature,” chap. 5:—

“ Glasses or diaphanous bodies may be so formed that the most remote objects may appear just at hand, and the contrary, so that