

TELEPHONY.—1902.

BY ANGUS S. HIBBARD.

It is apparent to any one familiar with the subject that at the present time the telephone in the United States, both in a technical and a commercial sense, is advancing at top speed. in a course of development whose limitations no one will attempt to forecast.

Retarded originally by the then best known system of charging for service, the so-called flat rate which, in providing for patrons of the same class, one line, one telephone and unlimited service necessarily exacted as much from the smallest as from the largest user, the growth of exchanges throughout the country was comparatively slow. This may have been for the ultimate good of the service generally, for, during this period, it was possible to devise and test out the many combinations of operating appliances which have resulted in the standardized apparatus of 1902. Ten years ago no one conceived of the elaboration and comprehensiveness of the plant which makes the present day service possible. In hundreds of exchanges the present daily traffic could not, with the same number of lines and instruments, be carried on with the apparatus in use ten years ago.

Automatic signalling appliances, meaning the control by the subscriber with his telephone switch hook, of the operating signals necessary for call, recall or disconnection, and the central station or common battery used for all signalling or talking, have made possible the rapid and certain operations now essential to the service.

The long-distance lines, first developed around local centers, in this period were gradually pushed out until the ends met in every direction and the exchange, once local, became almost national in the extent of service possible to the user.

At this time it had been demonstrated that the most satisfactory and universally popular unit upon which to base charges for service in large exchanges was the message; and upon the introduction of that basis of charging, and especially by the arrangement of the patrons' apparatus so that payment might be made at the time service was rendered, exchanges in all the prominent cities in the country began to grow at a phenomenal rate. The telephone was no longer a luxury, limited to the service of a selected few, but, being made available to all classes of users, large and small, became an agency of greatly extended usefulness throughout the entire community.

Just as rapidly as it was possible to provide for the service to be rendered, classes of rates were made which were availed of by the public in ever-increasing numbers extending even so far, in some cases, as to the patron who may use the telephone not more than once a day.

It is needless to say that engineering and construction forces have been taxed to their utmost to keep pace with such a growth. Subway plans which had been considered sufficient for many years' future growth were, in some cities, doubled and trebled in extent. Permanent exchange buildings were erected and equipped with the greatest possible speed. Cable plants were increased in respect to the mileage of wire, in a number of cases more than one hundred per cent in one year.

The figures of the year 1901 present a remarkable study. In New York (Manhattan) the total number of telephones reached 69,361. In Chicago the net growth for the year in the number of telephones exceeded the total number operated at the beginning of the year 1898. In the San Francisco exchange, 30,214 telephones were in operation at the close of the year, being one for every 11.3 of population.

While such a large amount of work has been under way and such vast sums of money have been expended in the extension of the service, it is gratifying to note that engineers from other countries who have been devoting themselves to a study of the problems involved have agreed with the practice and plans of the so-called Bell companies in America and have adopted their methods.

Probably the most extended investigation of this nature ever made was that of the engineers of the British Post Office Department who, after months spent in study and travel in this and other countries, recommended as the basis of charge the pay-

ment for service by the message and, for small users, the payment for service at the time it is rendered, using coin receiving devices, or so-called slot machines, for that purpose. They also recommended for the rendering of the service the use of the relay multiple switchboard and trunk line switching machinery as designed and manufactured for the Bell companies in America.

While to the promoter, the manufacturer of apparatus and, especially, to the manipulator of securities, the extension of so-called "independent" telephone schemes has continued, in some localities, to seem attractive, there are many signs that the public is finding out, gradually, that these enterprises are designed for the immediate benefit of the few who are furthering them, rather than for the extended or lasting good of a community.

The Superintendent of the Department of Electricity for the City of Chicago has shown in a recent report on telephonic service and rates that in Cleveland, O., where the largest "independent" exchange has been in operation, the subscribers who have the telephones of both companies, could pay for those who have the opposition service only, the difference between their present rates and the highest rates charged for the same service by the Bell Company, and, by thus having all telephones connected with one exchange, secure all the benefits of their present service, be relieved from its disadvantages and save more than \$400,000 per year.

The present apparent merits or demerits of two or more telephone systems in a city or town, versus one embracing all users, are questions which do not seem to call for extended consideration in looking broadly at the future of telephony. It will be difficult to controvert the conclusion that telephone service, as nearly as possible standard in its efficiency and cost, will be of the greatest good to the greatest number when rendered by means of one comprehensive system national, or even international, in extent. To provide for the requirements of such a system will be a task which will engage the best efforts of telephone engineers throughout the world. If anyone thinks the subject a limited one, let him consider that present accomplishments mark what were only a few years ago considered extreme possibilities.

In the item of cable construction, ten years ago conservative engineers recommended fifty pairs of wires as the greatest number advisable to be contained in one cable. To-day many cables are in use containing 400 pairs, or 800 wires. Less than eight years ago electric lamps were first used for signalling purposes

on subscribers lines; to-day not less than 500,000 lamps are used for this purpose and light and flash many million times each day.

While the general lines of development seem now to be well-defined, the details necessarily involved in the performance of the service required, are almost unlimited in number and present to the engineering and executive forces involved problems of the greatest intricacy and interest. The introduction of the brilliant discovery of Dr. Pupin to general practice; the simplification of the apparatus used in every branch of operating work; the designing of trunk line plans and methods so that the greatest efficiency and economy may be accomplished; further development and improvement of plans for wire distribution; the designing of a satisfactory automatic message recorder, a simple and satisfactory composite or duplex telephone circuit and a practical telephone repeater; these are a few of the problems requiring the best efforts of our engineers