

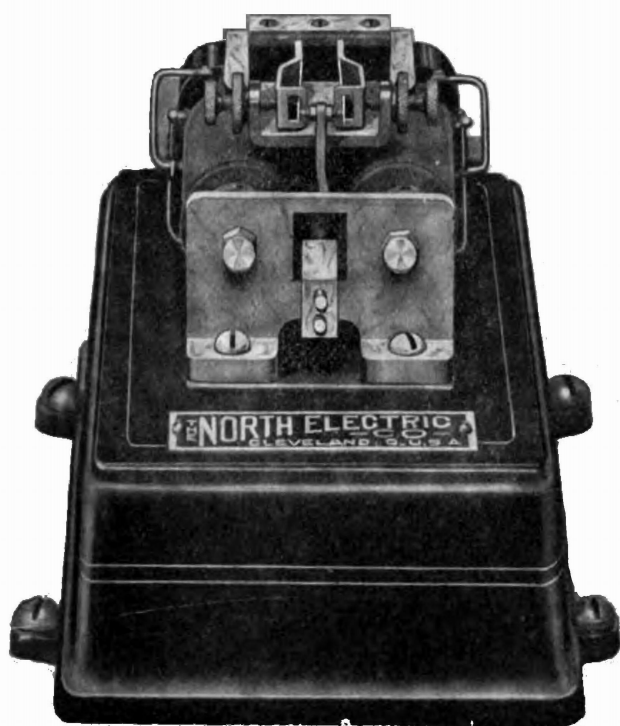
*NORTH SYNCHROMONIC SYSTEM.*

One of the most interesting exhibits shown at the Chicago convention, June 4, 5 and 6, was the North synchronmonic system shown by the North Electric Company, of Cleveland, Ohio. While this system bears some relation to the harmonic selective systems, with which the telephone public is more or less familiar, it is still fundamentally different from them in that the several frequencies employed for ringing do not bear a harmonic relation to each other, but on the other hand each of the frequencies employed is at discord with any other frequency. Aside from this the design of the apparatus is radically different from anything heretofore seen in the harmonic line.

In a synchronmonic four-party system, the frequencies used are 30, 42, 54 and 66 cycles per second, while in an harmonic system the standard frequencies are 16 2-3, 33 1-3, 50 and 66 2-3 cycles per second. Reduced to their lowest terms, it will be observed that the synchronmonic frequencies bear the relation to each other of 5, 7, 9 and 11, while the harmonic frequencies bear the relation to each other of 1,

the ratio both of octaves and fifths between the several frequencies and when a current of any given frequency is impressed on the line, it naturally follows that any ringer in synchronism with the ringing current will respond, and it also follows that any ringer in harmony with the impressed current will respond to a greater or less degree, depending upon the ratio of the coincidence. In order to overcome the difficulty due to these harmonic frequencies and consequent cross ringing, the factors of impedance, resistance, and capacity have been introduced, but the results have not been by any means satisfactory. It is also customary to employ different voltages for the different frequencies. Harmonic ringers are usually wound as follows: 16 cycle, 2,500 ohms; 33 cycle, 500 to 2,250 ohms; 50 cycle, and 66 2-3 cycle, 500 ohms each. In order to avoid cross ringing extremely accurate adjustment of the ringer is required, and in order to meet the demands in this direction, a micrometer adjustment is usually employed. It is also essential that the condensers used in series with the ringers are of uniform capacity.

In the case of the synchronmonic system it will be noticed, as stated above, that the frequencies employed bear the relation of discords to each other, and by using these frequencies, the element of sympathetic vibration is eliminated. All synchronmonic ringers are wound to a uniform resistance of 1,000 ohms, and a variation in condenser capacity is im-



Vibrator or Pole Changer.

2, 3 and 4. One of the chief difficulties heretofore encountered in the operation on the harmonic system has been due to the liability to cross ring. This tendency has been particularly noticeable between the 16 2-3 and 50-cycle ringers. Upon analyzing the waves to the various cycles, the reason for this interference is quite obvious.

The laws governing the vibration of synchronmonic and harmonic ringers, vibrators, or pole changers are the same as those governing the vibration of musical reeds or springs. It is well known that if a reed of any pitch or frequency is vibrated all other reeds in close proximity to it which are either in synchronism or harmony with the reed vibrated are caused to vibrate. This is called sympathetic vibration and is most pronounced between two synchronous reeds, as between these two reeds perfect harmony exists.

Next in matter of harmony is the octave, or where one reed vibrates twice as rapidly as the other, afterward follows the fifth with a ratio of 2 to 3. It will be observed by reference to the ordinary harmonic frequencies that we have



Synchronmonic Ringer.

material. In a four-party synchronmonic system the lowest frequency employed is that of 30 cycles, and the ringer adjusted to this frequency cannot be made to respond to the ringing from a hand generator, although this frequency is sufficiently low so that an ordinary alternating current ringer will respond to it. We illustrate herewith the synchronmonic vibrator or pole changer and ringer. By reference to the cut of the vibrator or pole changer, it will be noticed that it has but two make and break contacts, and these are in a position making them easy to adjust, and they can be readily replaced, should they become worn out. These pole changers are given a wide amplitude and the circuit is such that as the load upon any converter is increased, the amplitude of its vibrator is increased. This causes the primary circuit of the transformer to be closed an increased length of time, allowing the transformer more time in which to build up, and in consequence there is less drop in the voltage of the secondary current than in the case of a vibrator having a uniform amplitude. When these vibrators and transformers are working on no load the current consumption at 24 volts is approximately 1-10 ampere per vibrator.

By reference to the cut of the synchronmonic ringer, it will

be noticed that it is very massive and substantial in construction. The adjustment of the pole pieces is very easily and quickly accomplished by means of the eccentric shown, and the gong posts are adjusted in like manner. The vibrating reed is composed of steel piano wire which can be depended upon for uniformity in fiber and temper. These ringers can be applied to the magneto or common battery telephones of any manufacture. The simplicity of the apparatus makes it a very easy matter to install it, even by persons comparatively inexperienced.

#### A NEW PAY STATION.

The Graeber-Entrikin Manufacturing Company, of Philadelphia, which advertises a new pay station in this issue, has a paid-up capital of \$150,000. Frederick R. Graeber is president and treasurer; Clarence T. Entrikin, vice-president and engineer, and George W. Garman, secretary and general manager.



The executive offices of the company are conveniently located at 501-502 Keith's Theater building, 1116 Chestnut street, Philadelphia, Pa., and branch offices are to be opened from time to time throughout the country. The object of the company is to manufacture and deal in telephone apparatus, specializing on the "Invincible" register pay station, "Invincible" receiver holder, and from time to time bringing out new toll devices and the smaller ap-

paratus used in telephony. The company's factory is located in Philadelphia, and is equipped with modern machinery with every facility for producing only meritorious goods and in large quantities. Only a good grade of goods will be manufactured. The "Invincible" pay station is said to be the result of many years' experimental work, which it has cost thousands of dollars to produce. This machine registers nickels, dimes, and quarters, as they pass through the machine and gives the total amount of money in the machine. The register is concealed and can only be read by an authorized person. The coin and electrical mechanism is portable and the inspector working on this part of machine has no access to register or money. The money is in a separate compartment under a combination lock. The collector has access to money only. The machine is made of pressed steel. Each part is interchangeable and lifts out of case complete. The machine is of graceful design and can be used as a complete portable set, both with and without the stand, and on a wall set. It will fit any kind of standard equipment. Only good coins of the proper dimensions operate the machine. Only one coin can be placed in the machine at a time. Code signals are used. When the receiver is hung up, entire apparatus is locked out.

In other words, the object of the invention is to anticipate any weak points or trouble heretofore experienced and to eliminate them. The machine is pronounced simple in construction and, it is claimed, will reduce the cost of maintenance fifty per cent. A catalogue and price list of "Invincible" goods will be mailed, together with information covering the apparatus, upon request to the company. Mr. Graeber is a well known financial and business man who has been identified with many telephone enterprises in the east. Mr. Entrikin is an engineer of good standing and will handle the manufacturing end of the company.

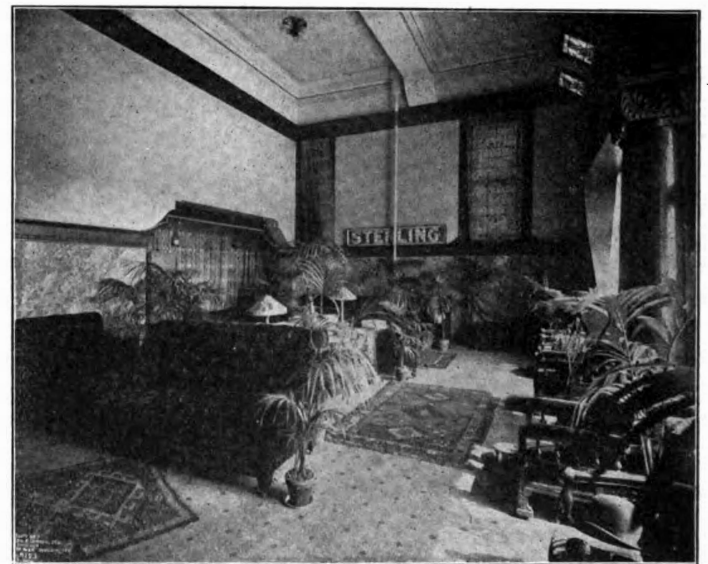
Mr. Garman is a telephone man of broad experience and good executive ability. The company will have the advantage of his many years of experience in the telephone field. An invitation is extended to everyone interested in telephone apparatus and a cordial welcome is assured them.

#### STERLING ELECTRIC EXHIBIT.

One of the most attractive exhibits at the International convention at Chicago in June was that of the Sterling Electric Company, of Lafayette, Ind. As the accompanying illustration shows, the Sterling occupied one of the reading rooms at the Auditorium, which was elaborately decorated for the comfort of the many visitors who called.

Usually at affairs of this kind the Sterling company has been content to exhibit apparatus, such as telephones, magneto, common battery and multiple switchboards, together with a full line of protective apparatus, but this year there was not a single piece of apparatus in the Sterling room, all samples being kept upstairs on the fourth floor, suite 422, to which visitors who wished to talk business were invited to go. This left the writing room free for entertainment only, and everybody was made welcome from 7 o'clock in the morning till 12 at night the entire three days, and the register shows that everyone who attended the convention visited Sterling headquarters, all of whom expressed their admiration and congratulations.

Steinbach's orchestra furnished music at the Sterling exhibit and proved a delightful feature of the entertainment. The following officers and employees of the Sterling Company represented the concern at the convention: W. E. Doolittle, president; W. R. Coffroth, secretary and treasurer; S. B. Fowler, electrical engineer; E. S. Shelby, sales manager; H. T. Doolittle, purchasing agent; H. W. Doolit-



Sterling Electric Company Exhibit.

tle, superintendent order department; A. K. Keller, factory superintendent; C. R. Brown, sales engineer; O. P. Reed, sales engineer; G. S. Skinner, chief draughtsman.

#### PEIRCE SPECIALTY COMPANY'S NEW OFFICES.

The Peirce Specialty Company announces the removal of its Chicago sales and purchasing office to room 508, 48 East Van Buren street, where it is always ready to welcome its many customers and friends. The company also announces that owing to the continued steady demand for its product by telephone and lighting companies in the south and southwest that it will shortly open up a St. Louis branch office under the supervision of its popular representative, Ralph Lane Crane. Suitable location is now being contracted for but until the establishment of same Mr. Crane will