

with ordinary spark gaps or with quenched sparks. In the latter case the quenching is better when an auxiliary ignition device is employed, because of the fact that the supply voltage e is low. It is to be noted also that since the spark frequency is determined by the auxiliary cir-

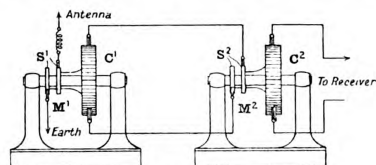


Fig. 18.

cuit the note of the signals is not changed by alteration of the supply voltage in the working circuit, as must usually happen with ordinary quenched sparks working. Moreover, the Morse key may be placed in the ignition circuit. When working on alternating current, it is advantageous to excite the ignition circuit by the same alternating-current supply with suitable phase displacement of the supply voltage.

A grave disability of the original quenched spark system is partially removed by ignition devices of this type. In quenched spark working there exists for every pair of circuits one or more critical degrees of coupling at which pure shock excitation occurs. These critical couplings are dependent on the length of the spark. When the sparks are very short the wear of the metallic surfaces rather rapidly produces irregularity in the antenna oscillations—e. g., double waves may suddenly appear. By means of auxiliary ignition circuits, much longer gaps may be used than formerly, and the wear of the electrodes thus rendered proportionately more insignificant, which tends to increase the certainty of operation. In fact, with ignition methods, the spark-gap, or series of spark-gaps, does not have to fulfil two functions, quenching and limiting the supply voltage; it only acts as a quenching resistance. It follows again that the strength of the signals transmitted may be varied when desired by varying only the supply voltage to the main circuit, whereas

formerly this variation had to be accompanied by a proportionate increase in the number of gaps.

RECEIVING APPARATUS.

Turning to the patents covering apparatus concerned

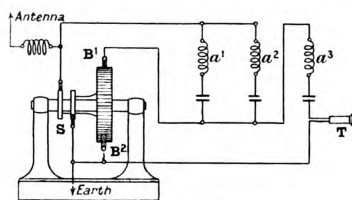


Fig. 19.

with the receipt of signals, we find a wide range of variety in the principles invoked.

R. Goldschmidt is granted patent No. 23,734, 1912, for a method of receiving signals, according to which the high-frequency current is transformed to medium and low frequency by means of an asynchronously rotating commutator or toothed disk. In order to explain the method it is best to start with the ideal case in which a commutator rotates synchronously with the oscillations. In Fig. 15 is shown a two-part commutator provided with slip-rings, so that the antenna and the earth wire are connected to segments 1 and 2 of the commutator. The brushes C and D, when properly adjusted, collect perfectly rectified current when the commutator rotates at synchronous speed, as indicated in Figs. 16A and 16B. Of course, it is very difficult to accomplish this process at the high frequencies of wireless telegraphy, for it is almost impossible to preserve synchronous speed and to maintain continuous accurate adjustment of the brushes. But when the commutator rotates either more slowly or more rapidly than the synchronous speed, the electro motive force at the brushes C, D has a serrated wave form as shown in Fig. 17A, with an overall periodicity equal to the primary periodicity multiplied by the ratio: (Synchronous speed—actual speed)/Synchronous speed.

The serrations can be largely removed by interposing choking coils or other tuning devices, but the membrane of the telephone will yield a note of the above periodicity without trouble being taken to apply smoothing-out processes. Similar results are achieved if instead of the

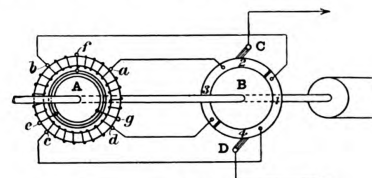


Fig. 20.

commutator a toothed wheel and a single brush are used, Fig. 17B.

When, for mechanical reasons, the transformation cannot be effected by one commutator apparatus, several may be connected in cascade. This is shown in Fig. 18 for two sets of apparatus M_1 and M_2 . S_1, S_2 are the slip-rings, C_1, C_2 the commutator-segments. The relative adjustment of the brushes must be very accurately made. Instead of connecting sets of apparatus in cascade, the lower frequency current may be repeatedly returned to the apparatus until the desired low frequency is obtained. In Fig. 19, the current from the antenna is led to brushes S at antenna frequency f_1 , is taken from the brushes B, B_1 , at frequency f_2 , and led through the circuit a_1 , which resonates at frequency f_1 ; is passed again through the transformer, reduced to frequency f_3 , and led through the circuit a_2 , which resonates at frequency f_2 ; is passed again through the transformer, reduced to frequency f_4 and delivered to the receiver T, whose circuit is tuned to frequency f_3 if desired. The inventor emphasizes the fact that the method he describes may be regarded as a limiting form of certain methods devised (by Leblanc, for instance) in heavy electrical engineering for the purpose of transforming alternating current into direct current and vice versa, Fig. 20.

(To be concluded.)

The Rose-Growing Industry of Lyons*

THE famous rose gardens of Lyons owe their excellence largely to a light soil, an abundance of sunshine and the proper amount of moisture. From time immemorial, local rose-growers have taken advantage of these favorable conditions until skill and interest in the industry have made the roses of the Rhone valley known throughout the parks and gardens of the world. The ground where the roses are chiefly cultivated is on the outskirts of the city. It is flat, devoid of shade trees and protected only by high walls at the confines of the property. The rose plants are set out for commercial purposes in straight rows, sometimes 100 feet long, the smaller plants 6 inches apart with about 10 inches between rows, while the larger grafted or budded varieties are inserted 10 to 12 inches apart, with 18 inches between rows. The United States Consul at Lyons says that nearly all of the plants are out of doors. The green-houses for a rose garden of 15 acres do not number more than two, averaging 30 feet in length. It is only in exceptional winters that the plants have to be covered. Sometimes the tops of the older plants are rather loosely bound in straw. In every large commercial rose garden of Lyons hundreds of eglantine rose plants are kept to a single stalk for grafting. These are usually gathered by peasants in the woods, or on uncultivated land, and sold to the rose-growers. Roses grown in the alluvial plain near Lyons thrive often even more luxuriantly when transplanted in a heavier soil; but roses taken from such heavier earth, where they may have been grown exclusively, occasionally retrograde when set out in Lyons. An instance may be cited in the case of the "American Beauty," stated to be originally the "Madame Ferdinand Jamin," a French rose, but developed in America and rechristened there. This rose loses much of its acquired richness and size when set out on the land in Lyons. The common rambler, on the other hand, luxuriates on every trellis and pillar. The standard varieties flourish in the Lyons climate, so that nearly all of the best roses of other countries besides the Lyons varieties are grown by local nurserymen. Those whose sole occupation it is to grow roses on a large scale for profit have been known to bring out many new varieties in a year. The resulting roses, if not like the mother flower, may be diminutive in size and enlarged by grafting, but much of the work is experimental, and most of the new varieties are not found to be sufficiently interesting to perpetuate, so that in the end only a few choice ones of marked individuality are definitely

named and presented to the public through the catalogues. Some of the finest roses ever known have been grown within sight of the towers of the ancient city of Lyons. That it often takes a vast amount of patient study to develop a new rose may be gathered from the fact that years may elapse before the final bloom grown from seed is perfected and made ready for the trade through propagation by cuttings or otherwise. When success does come—and it comes often enough to make the effort worth the while of the rose-growers of Lyons—the reward is ample. During the present season an entire stock of 10,000 plants of a new rose of a rare coral tint was sold out as soon as offered.

South America as an Export Field

IN considering the trade possibilities of South America two facts stand out as of prime importance, first, that the continent presents a vast range of thinly populated and undeveloped land, which is apparently on the eve of a great era of exploitation, and second, that almost the whole continent must buy a great part of its supplies of manufactured articles from North America and Europe, and will probably continue to do so indefinitely. The keynote of national life in every country in South America is "development." Although explored and settled long before North America, the continent, with an area of 7,162,000 square miles, has a population of only 49,000,000, half that of the United States, and of these some 8,000,000 are Indians and 3,000,000 negroes. There are untouched resources of every kind of wealth—great expanses of grassy plains for feeding live stock, wide stretches of rich farming land, not only on the level savannas and selvas, but in the mountainous districts as well, mineral deposits of all kinds in an unknown amount, valuable forests of hardwoods and other kinds of timber, and in almost every section abundant waterfalls for power. All this awaits three factors especially, before it can be utilized—transportation, capital, and workingmen. Under the direction of foreign interests, particularly English and American, railroad building is going forward steadily in nearly all parts; capital, largely English and French, is being drawn from foreign countries as assurances of security are given, while in the south local capital is becoming prominent; but for the third requisite, good workingmen, there is still a wide field open, and the great cry of all the progressive nations is for more able-bodied and intelligent labor. Since the beginning of the twentieth century the advance of South America has been notable in almost every economic line, and although checked occasionally by financial or political crises,

droughts, etc., will undoubtedly continue at the same or greater rate in the next few decades as in the last one.

This expansion offers a peculiarly promising market to the manufacturing nations of the world, inasmuch as South America itself provides few of its own needs, except raw food products. In return for the output of its mines, forests, and soil it takes manufactured articles of all descriptions from Europe and North America. Industrial development has made a beginning in Argentina, Chile, and Brazil, and in time will probably rise to a position of considerable importance, as the latter countries have iron ore and excellent water-power facilities, and Chile has, in addition, deposits of coal of unknown extent. But the people of South America as a whole do not take readily to manufacturing, and they will continue for an indefinite period to look to over-sea nations for the bulk of their manufactured goods. This affords a fair field in which North America and Europe can strive for the trade, little checked by local competition, and one, moreover, in which a business once established will tend to grow of itself with the natural expansion of the countries.

Very much of this trade has been in lumber and other products, which have sold without great effort, and it is only in the last four or five years that American exporters have made much of an attempt to study the market seriously. Until recently a great part of the freight and nearly all the passenger traffic between the United States and Brazil and the River Platte went by way of Europe; but nearly all the freight is now sent direct, and the passenger boats which, a few years ago, were said to be running at a loss, have now found it desirable to offer excellently appointed vessels and frequent service. Commercial travelers are beginning to visit South American countries in increasing numbers, information as to markets is more eagerly sought, and there is more inclination to conform to trade requirements than ever before. Trade in recent years has accordingly begun to mount up, and American goods are seen in greater quantities and variety on South American markets. The figures given strikingly show the steady and regular growth in this trade since 1903, in which time there was an increase of over 250 per cent. Considering the advantages, however, of geographical location with reference especially to the north and west coasts, the proportion of the imports supplied by the United States is yet far from what it could be, and as Americans come to concentrate more and more on the market it will be certain to grow substantially.—From *Bulletin* published by the Department of Commerce and Labor.

* Journal of the Royal Society of Arts.