Wireless for Railroad Trains

A New System Which Secures Uninterrupted Communication at All Times

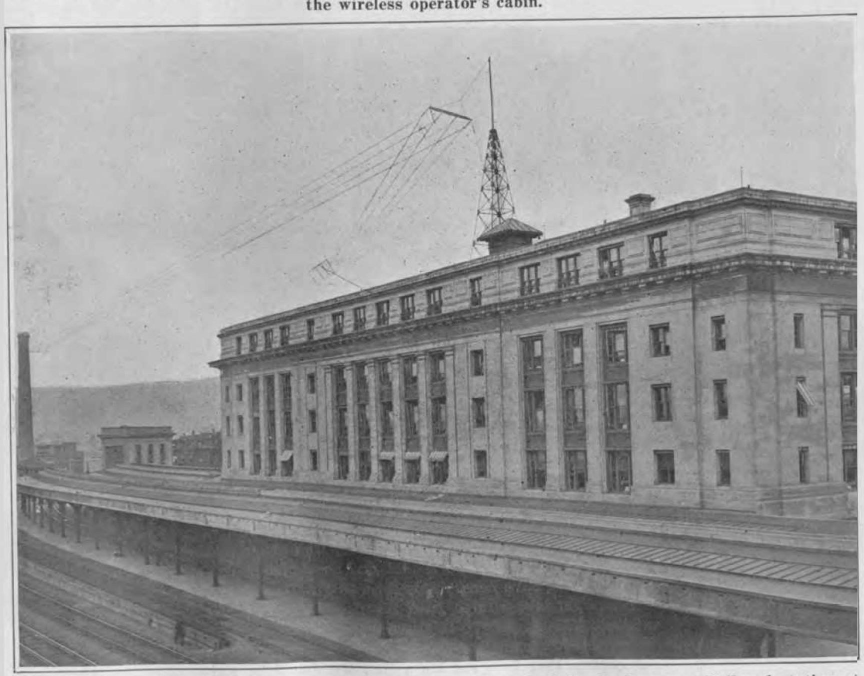
THE utility of the wireless telegraph in directing the movements of ships at sea, in communication to and from ships, and in calling for help in emergencies has been strikingly demonstrated, but it remained for an enterprising American railroad to apply wireless communication to and from moving trains. A test just made successfully on the Lackawanna Railroad on a regular express train running between New York city and Buffalo, though only a partial test in the experiments thus far conducted, has shown immense possibilities of safety and time saving by insuring that trains will always be in communication at any speed and at any distance from stations, regardless of "line breaks" from winter blizzards or from washouts, fog which obscures signals, and other extraordinary conditions.

In the ordinary wireless telegraph system messages are sent and received between stations equipped with antennæ or "aerials" supported on high towers. The Lackawanna Railroad has stations of this kind at Scranton, Pa., and Binghampton, N. Y., with a working radius of about 300 miles. But, of course, it is out of the question to place any structure such as an ordinary aerial on a railroad train which has to pass through tunnels and under bridges, and a prominent feature of these tests is the use of a highly special aerial for the train installation. Some very recent experiments, notably those conducted on November 21st and 23rd, have demonstrated that wireless communication can be maintained to and from a train equipped with a very low aerial, viz., a quadrangle of wire supported at a height of only eighteen inches above the roof of the car. The distance between Scranton and Binghampton is about 65 miles, and in the experiments just made it was found possible to maintain communication from a train running at 55 miles per hour, part of the time direct from the train to the fixed station away from which the train was speeding; and when the train had proceeded to a point too far away for its short aerial to force signals through to this first station direct, the signals were delivered to the station by being picked up at the second station and relayed back. At no time during the tests was the train out of communication with both stations in this way.

The arrangement used consists of four quadrangular aerials mounted on the roofs of four adjoining cars of the train, and only 18 inches above same, as stated. Each quadrangle is connected to its neighbors on the other cars by a special attaching plug. The wireless operator's station is installed in a booth in the third car of the group, so as to bring the lead from his apparatus to the fourfold aerial at a point at the middle of same. The regular Marconi system is employed, except that the power is furnished by a special motor-generator set driven from the regular train-lighting dynamo, and the ground connection is made to the rails by a wire to one of the car trucks. The aerial is of heavy copper wire, and is insulated for the high sending voltage (between 8,000 and 9,000 volts) by large porcelain insulators mounted on iron posts at the corners of the car.

The wireless telegraph installation.

Two of the cars of the wireless telegraph equipped train, showing the aerial above the car roofs and the wireless operator's cabin.



The 700-foot aerial of 300 miles working radius on the roof of the Lackawanna Railroad station at Scranton.

The special usefulness of the system was indicated the other day when the conductor of the train was taken ill, while his train was running at high speed, westbound. The next station at which a relief conductor could be obtained was Scranton, 30 miles away. Ordinarily a delay would have been unavoidable—either a stop in order to send a telegram by wire asking for a relief conductor or a wait at Scranton after arrival at that point. But thanks to the wireless telegraph equipment there was no need to take either of these measures. Instead, the conductor notified the wireless operator on the train and the latter sent a message direct to Scranton, with the result that a relief conductor was on hand to take charge when the train pulled in. In the same way an extra car, needed to provide accommodations for an unusual crowd of passengers, was ordered to be in readiness to be coupled on at Scranton, thus eliminating the delay that would ordinarily have been experienced in getting the car up from the yard.

Apart from this emergency value, however, a demonstration that the wireless telegraph can be depended upon for unfailing communication between running trains and fixed stations and between the trains themselves may mean a revolution in the operation of trains comparable to that which followed the introduction of the ordinary wire telegraph for this purpose. When railroads can install reliably tuned equipment whereby dispatchers and train conductors are able to keep in direct touch regardless of stops, it becomes possible to save no inconsiderable amount of time in *routine* train operation—possibly equivalent in some instances to the time saved by regradings, cut-offs, and other improvements on the right-of-way that require such large appropriation of capital.

Aerology in the Arctic

THE results of the sounding-balloon observations made by the Franco-Swedish expedition at Kiruna (68 degrees north latitude), in Swedish Lapland, during 1907, 1908, and 1909, have just been published by M. H. Maurice, chief assistant at the observatory of Trappes. Not the least remarkable fact in connection with these observations is that of 72 balloons sent up, 41 were recovered, with their meteorographs. The country about Kiruna is sparsely settled, and the inhabitants are rather primitive. Before the observations were begun, circulars in four languages—Swedish, Finnish, and two Lapp dialects—were widely distributed, announcing the nature and purpose of the undertaking and requesting the finders of balloons and apparatus to return the same intact to headquarters, in consideration of a reward of 15 crowns (about $4). Similar notices were attached to the balloons themselves. Most of the balloons were returned after a considerable lapse of time—in some cases several years. One balloon fell into a lake, where it was recovered after three years. The highest altitude recorded was 22,760 meters (over 14 miles). The height of the stratosphere was found to vary as in temperate latitudes; i. e., it is higher in summer than in winter, and higher over anticyclones than over cyclones.