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The editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

PROTECT THE THIRD RAIL.

The New York public is beginning to realize the risks of severe injury and even of death which attend the present arrangement of the third rail on the Brooklyn and New York Elevated Railways. Already there have been several accidents, some of them fatal; and although we have no doubt that in the majority of cases these accidents have been due to carelessness or disobedience of warnings and instructions, the fact remains that the third rail, as at present arranged on these railroads, is a source of very real danger. How great and far-reaching is this danger, was suggested only the other day, when a fuse blew out on one of the Ninth Avenue trains in Manhattan, and practically the whole train load of people got out and walked down the tracks to the nearest station. It may be said that they should have kept their seats; but in these days, when time is so valuable and business calls are pressing, it is a fact that the public, rather than sit still under these circumstances, will get out, take chances and walk. Now, had any of these passengers stepped on the third rail and one of the track rails simultaneously, or slipped and fallen across them, the result might have been fatal. As at present arranged, the third rail is unprotected from above, and short-circuiting by a careless person may easily happen.

Is it possible for the company to protect these rails without interfering with the operation of the trains? It certainly is; and the best proof of this is the fact that the third-rail, high-speed electric railroad recently opened between Wilkesbarre and Hazleton, Pa., has a hooded rail, which not only safeguards the public, but is free from the difficulties due to sleet and ice in the winter, which recently so greatly disorganized the elevated railroads in this city. The engineer who designed this system is the electrical expert for the elevated railways; and we have no doubt that this change could be carried out on the elevated systems if the public authoritatively demanded it.

THE LODGE-MUIRHEAD RECEIVER.

The prominence of Prof. Lodge in theoretical discussions of the Hertzian waves, lends special interest to the new Lodge-Muirhead system of wireless telegraphy, which we describe on another page. A vital part of all systems of wireless telegraphy is the coherer or its equivalent receiving device. The Lodge-Muirhead system provides a receiver which, while not differing in fundamental principles from certain previously known types of receivers, at the same time embodies a number of important features which should greatly increase its efficiency. The principle of using a thin film of oil as an insulating medium between the mercury electrode and that of the rotating disk brings to mind Branly's idea of contacts separated by a thin film of oxide. In the Lodge-Muirhead system, however, the idea of rotating one of these electrodes is a good one, for it permits better adjustment and at the same time serves to automatically re-establish the imperfect contact. The normal resistance of a coherer employing metal filings is not a reliable quantity. With the cohered particles being constantly jarred apart, the air gaps between them are liable to vary greatly in size, number, and position. Similar variations will be noted in receivers based on the principle of an insulating film, the thickness of the film at different points, though varying by an immeasurably small amount, being sufficient to appreciably affect the telephone of the relay circuit. By employing a revolving disk for one of the electrodes, a moving film of oil is carried on the disk and through the mercury. Though this film may vary in thickness to just as great an extent as between stationary electrodes, the resultant of all these variations will be an average resistance that is approximately constant. The high efficiency of the Lodge-Muirhead coherer is proved by the fact that a sufficiently powerful current may be used in the local circuit to operate a siphon recorder, thereby affording a visible record of the message.

FATAL GUN ACCIDENT IN THE NAVY.

The recent terrible gun accident on board the battleship "Iowa," in which three men were killed and several injured, is the second fatal gun disaster that has occurred in the navy within the past few months. It was only recently that there was an explosion of the charge of an 8-inch gun on the "Massachusetts," which caused the death of eight of the gun crew. In that case the charge exploded when the breech was open, and the disaster is not chargeable to any fault in the construction of the gun. In the present case it is evident that the 12-inch shell exploded just before it left the gun, and the terrific energy of the bursting of the 850-pound projectile completely smashed the chase of the gun outside the turret, driving some of the fragments down through the forecastle deck and killing and wounding the crew who were at mess on the gun deck below. So powerful was the explosion that three of the broken sections of the gun passed also through the main deck and gun deck, and only fetched up on the steel protective deck below. It is probable that the explosion was due to the fact that the fuse plug in the base of the shell, being a little too slack, allowed the flame of the explosion to pass through. This was found to be the cause of the premature explosion of shells on our battleships which took place two or three years ago. It is evident that some better method of inserting the fuse plug must be found, one that will be absolutely flame-proof when the gun is fired.

THE SO-CALLED DANGERS OF WIRELESS TELEGRAPHY.

The more or less popular mistrust and fear of wireless telegraphy is spreading, it seems, even to the technical papers. Our esteemed contemporary, the Electrical Review, recently published a sensational article on the dangers of wireless telegraphy, and further indorsed this article by favorable editorial comment. The absurdity of the whole matter is apparent when one stops to consider that the electric surgings set up in the receiving antenna by the Hertzian waves, though of very high voltage, are, on the other hand, of such an infinitesimal quantity that the most delicate of instruments is required to detect them. The writer of the article referred to, argues that "a great disturbance must be made at the center of an imaginary sphere in space, in order that even the small electromotive forces necessary for signaling may be developed in an electrically-tuned conductor, forming a tangent to the sphere, of infinitesimal length compared to the sphere's radius;" and that this disturbance must be so great that "the electric radiation of power to work a coherer across the 3,000 miles of the Atlantic would be sufficient to develop visible sparks across an air gap in a receiving system located within three miles, or one one-thousandth of the distance, even though they be not in tune with each other. Then he goes on to say that a telegraph or telephone circuit within this three-mile radius, particularly if the wires were run vertically to the top of a modern skyscraper, would similarly respond to these oscillations; and if the circuit contained a spark gap, such as that of an open-spaced lightning arrester, "a narrow break in some open translating device, or a loose joint in the wiring," we would have "an opportunity for a fire whose origin would certainly be of the mysterious class whose cause it is the fashion to assign to defective electric wires. At any rate, there would be a possibility of grounding the circuit and rendering it inoperative."

The whole discussion illustrates the recklessness with which some writers launch forth on an elaborate argument not based on facts or figures. The writer in question evidently overlooked the quantity of current set up at a transatlantic or even a local receiving station, overlooked the power generated at a Marconi receiving station, and above all overlooked the laws governing the radiation of Hertzian waves. According to his argument, Hertzian waves radiate in all directions, filling an imaginary sphere. Their energy would, therefore, vary inversely as the square of the distance, or, in other words, the energy at a distance of three miles would be one million times that at a distance of three thousand miles. As a matter of fact, Hertzian waves as set up by an oscillator travel out in a plane at right angles to the antenna, so that, roughly, their intensity is inversely proportional to the actual distance, and the efficiency at the three-mile station would be only one thousand times greater than that at the three-thousand-mile station. His deductions lead to the supposition that Mr. Marconi's "powerful thunder stations," as he calls them, must generate a quantity of electricity equivalent to that of lightning in order to cause visible sparking at a distance of three miles. Now, as a matter of fact, only 7 kilowatts were used in transmitting President Roosevelt's message to King Edward across the Atlantic. Furthermore, we are informed that Mr. Marconi's experiments are constantly leading toward a reduction rather than an increase of power. The writer of the article certainly overestimates the quantity of current generated in the receiving antenna, for, even within the three-mile limit, the quantity is immeasurably small. Even at the sending station the current must be reduced to an infinitely small fraction of an ampere in order to obtain the best results. In fact, we have held a piece of paper in a spark which was capable of affecting a coherer 50 miles distant. The paper was punctured, but not ignited, because, though the heat was very intense, the quantity generated in the spark was very small. What dangers of fire could ever arise from such cold sparks as these, to say nothing of the minute sparks set up in surrounding air gaps, which represent so small a fraction of the energy in the transmitting spark? As for the dangers of grounding a circuit by means of open-space lightning arresters, we can safely say that no spark of sufficient length to accomplish such a result can be generated within a short distance of the most powerful transmitter in use, even with the circuits perfectly in tune with the sending antenna.

WASTE OF CITY WATER SUPPLY.

The Commissioner of the Department of Water Supply, Gas, and Electricity, has given out some figures of the results obtained in his investigation of the question of the waste of water in this city. By dividing the city into districts, and by means of meters, supplemented by investigation, it has been possible to determine the amount of water served to each district daily, and also to determine what use is made of it. One method of calculating the waste is to examine the flow of water in the sewers during the early morning, when the consumption is lowest. A number of men are then sent through the buildings in the particular district under consideration, to measur the amount of water that is running to waste from leaky faucets, and similar fixtures. These measurements however, do not include water that is running to waste from overflowing tanks, nor does it take account of waste that occurs when the water is allowed to run on cold nights to prevent freezing; nor does it include underground leaks and leaks in the mains. As a result of this investigation, the conclusion is reached from the work already accomplished that 32,000,000 gallons, to 12 per cent of the Croton water, is running to waste every day from leaky fixtures, this percentage representing merely the waste in buildings from defective plumbing, which is a constant waste, and continues steadily throughout the dry weather, when the supply is scanty. It is estimated that this amount of water, if it were metered, would bring to the city $1,500,000 a year, and evidently it would be well worth while to recover the value of this water for its own sake, to say nothing of its value considered as forming a part of an already inadequate supply for the city, and the possibility that unless the source of supply be multiplied, we may have to face a water famine before many years have gone by. Commissioner Monroe is of the opinion that the most effective remedy for water waste is the extension of the meter system. His bill before the Legislature provides that all buildings shall be metered where steam is used for power purposes, and also all buildings that are over five stories in height. As the city will pay for the meters, the installation will not be hard upon the consumers, while the expense to the city will be light compared to the saving due to the prevention of water waste. Everyone who has the interests of the city at heart, and is disposed to look at this subeject from a broad-minded standpoint, will agree that it is of vital importance to the city of New York that water waste should be prevented, and everything possible done, whether by metering or some other method, to conserve its already inadequate supply.

ANNUAL REPORT OF THE UNITED STATES STEEL TRUST.

What is probably the most complete and circumstantial report ever issued by any great American corporation is the annual report of the United States Steel Trust, which has just been made public. The magnitude of the operations of this concern is shown by the following figures, which are taken from the report. The value of the properties owned and operated by the several companies that make up the trust is $1,325,000,000. Other assets, among which are included cash to the extent of $50,000,000, bring up the total assets to the sum of $1,547,000,000. It may be mentioned that the single item of $50,000,000 cash is equal to the amount voted by Congress at the outbreak of the Spanish war. The liabilities consist of $508,000,000 of common, and $510,000,000 of preferred capital stock. To this is to be added $361,000,000 of bonded and debenture debt, $50,000,000 of current liabilities, $25,000,000 sinking and reserve funds, and $78,000,000 undivided surplus of the United States Steel Corporation and subsidiary companies, which, with other items, brings up the total liabilities to $1,547,000,000.

The volume of business done by all the companies during the year, including sales between the companies and the gross receipts from transportation and miscellaneous properties, reached the total sum of $561,000,-