protected by fixed signals here, but I know of four accidents which happened within the limits of fixed signals on one railroad in this country. Yet it is supposed the signals were working perfectly. Foreign railroad managers operate their roads entirely differently so far as the rules for moving trains are concerned. There trains cannot move without signals; here they cannot move without train orders, which are never used in Europe. Here the signal is only auxiliary. It will be absolutely necessary to revise our rules for the movement of trains before we can expect to get any benefit whatever from any possible combinations of signals, except the automatic stopping device, and the sooner the people are made aware of the fact the sooner will this reform take place."

The Scientific American in a recent article on this subject under the appropriate heading, "How much, then, is a man better than a sheep?" makes a comparison of the death lists of the two countries, and says:—"We have to confess that, so far from there being any mitigating circumstances, the more we look into the question the more inexcusable does our own shocking death list appear; and for the following reasons: First, the total number of passengers carried is greater in Great Britain; second, this greater number is handled upon one-eighth as many miles of track—24,000 miles in Great Britain as against 200,000 miles in the United States; and, thirdly, the average speed and the frequency of the trains is greater there. So that the slaughter that is going on is actually less excusable than the mere figures—and Heaven knows they are bad enough—would show. For with a smaller total number of passengers and trains, and in spite of the fact that they are spread over eight times as many miles of track, we kill 77 in 15 days while they kill one in 15 months. But why this appalling difference; and what, if any, shall be the remedy? Perhaps the trouble is that we have not as yet arrived at a proper estimate as to by how much a man is better than a sheep." The writer then goes on to show how the habitual disobedience of orders by engineers who are too ready "to take chances" in running past signals, could be effectually dealt with if the companies made the saving of life their purpose.

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ELECTRIC SMELTING.

P. Heroult, of La Praz, France, discoverer of the electric process of manufacturing aluminum, and inventor of an electrolytic process of steel making, recently visited Canada, and is reported to be interesting himself in the development of his process in iron and steel making in this country. He recognizes the advantages Canada possesses in having great powers within transmissible distance of iron and other mineral deposits, and we may look for an electric smelting plant on a commercial scale at an early date. Dr. Haanel, of the mines department of the Geological Survey, with whom Mr. Heroult had a conference, is reported as making the following statement on the subject: The application of electricity to the smelting of ores promises important results for Canada. So far as magnetic iron ore is concerned, there is little doubt of the superiority of the electric over the blast furnace. For the treatment of refractory ores, which abound in Canada, the blast furnace does not yield sufficient heat, probably not more than 2,000 degrees. By means of electricity 3,000 and more degrees of heat are developed. Electricity is also indispensable for the extraction of titanium and phosphorus and sulphur from the ores. Furthermore, the electric current can be regulated to a nicety and kept under control. Wherever water power exists electricity can be economically generated, and costs less in the smelting of ores than fuel. Steel can be produced by the electric process for $12 a ton, and perhaps less. At this rate it can easily undersell steel from the blast furnace.

An estimate, for instance, has been made that the cost of electricity from the Chats Rapids on the Ottawa River would be only $4.50 per horse-power per annum. Within easy access are the Bristol iron mines. There are, of course, many other situations equally favorable for the electric reduction of ores in different provinces, and Canada ought to lead the world in the new metallurgy.

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—In our Sept. issue it was mentioned that the St. Clair Tunnel Co., which operates the Sarnia tunnel for the Grand Trunk Railway, were investigating the question of introducing electric locomotives for hauling trains through the tunnel. The necessity for such an investigation was demonstrated in a tragic way before October was half out, for on Sunday, the 9th ult., a freight train parted while being taken through, and in the endeavor to clear the tracks six men perished from the fumes of coal gas. The night was foggy, and the heavy air gave no draught through the tunnel, and but for the heroism of one of the rescue party more lives would have been lost. The lowest part of the tunnel being under the river, the problem of ventilation is a difficult one. Carbonic acid gas (carbon dioxide) settles always in the lowest parts of a confined space, such as a mine or tunnel, and where, as in this case, direct overhead ventilation cannot be obtained, the use of coal burning locomotives will always present grave dangers to passengers and railway employees. For years past the special suitability of the electric locomotive for just such situations as this has been demonstrated on three or four continents and if the St. Clair Tunnel Company had been as anxious to save lives as to earn dividends it could have settled this question long ago without any expensive enquiries. The coroner's jury never called any witness to demonstrate that other means of haulage could have been adopted, and its verdict that if the company had "had better equipment for ventilation it would, in a measure, have prevented the accidents that have occurred since the opening of the tunnel for traffic," is rather a lame conclusion to so important an enquiry. If electricity were used there would be practically no need for ventilation, as there would be no carbonic acid gas generated. The Railway Commission has called the company's attention to the necessity for a change in the method of operating trains and has sent its experts, Messrs. Mountain and Duval to report. These gentlemen will