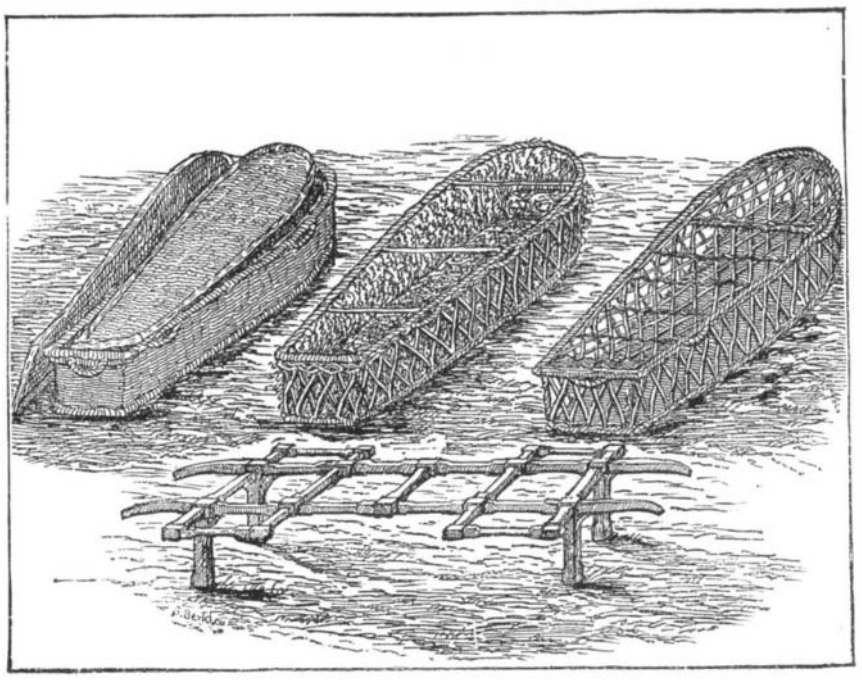
WICKER COFFINS.

A new use has been developed for the British Duke, a use upon which we are fain to congratulate the British inventor. From his prominent position as an integral portion of the noble and conservative element of the political system of England, the Duke of Sutherland now soars to a loftier hight, and takes rank with the daily journals, and the big hand bills, and the banners carried by small boys as a valuable advertising medium. He recently invited the nobility and gentry of London, to a garden party, not to regale them with the festivities peculiar to such gatherings, but to secure their attention to an improved system of wicker work coffins devised by Mr. Seymour Haden, an illustration of which is given herewith. During two days, everybody accepted His Grace's invitation with alacrity, for everybody does not often get invited to a ducal residence. Everybody read a neatly worded circular, setting forth the varied advantages of the invention, poked in his hand on passing the door, and then everybody, after entering the aristocratic precincts of Stafford House, was permitted to moralize *ad lib.* over a heap of oblong baskets displayed upon the grass.

We do not question for an instant that it is most laudable for the nobility of England to encourage the progress of invention. In so doing they simply follow the example of the rich and enlightened the world over; but it strikes us as extremely ridiculous that a device which in itself possesses but the merest shadow of novelty, and certainly involves no new discovery or principle, should thus be brought into a notoriety through the medium of ducal advertising, which on its merits it could not attain. Even *Punch* makes a little quiet fun out of the affair by putting the question of "Ah—have you seen the coffins yet?" in the mouth of an inane youth who at a party finds himself at a loss for something to say to his fair companion.



THE DUCAL WICKER COFFIN.

So far as basket burials *per se* are concerned, we fail to see any advantage in a basket packed with moss over a deal box with a few holes bored in it, such coffins as thousands of soldiers were buried in during our war or which now are frequently employed to contain the remains of the unfortunates inhumed in the Potter's Field. A simple perforated chest of some thin non-resinous wood, or, better still, of stout pasteboard unsized, would take very little if any longer than a willow basket to decompose, and certainly would be cheaper.

CASTING STEEL IN ONE TUN INGOTS.

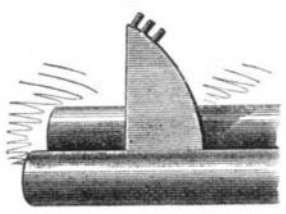
In an article on the progress of our steel industry, which recently appeared in these columns, we took occasion more especially to allude to the advance made in New York State since the exploitation of the Crown Point mine near Lake Champlain. Large quantities of the ore from this deposit, smelted into pig iron, together with iron from other localities, notably Port Henry, Fort Edward, and from the Lake Superior region, aggregating some 100,000 tuns per year, we stated, were shipped to the immense works of the Albany and Rensselaer Iron and Steel Company, in Troy, N. Y., where, by the Bessemer process, the metal is converted into steel, the major portion of which is rolled into rails. The finished material is sold at a price considerably below that of the steel produced by English makers imported hither, but nevertheless it yields to its manufacturers a fair profit. The process of making this steel, which is cast in ingots weighing over a tun each, is exceedingly interesting, both from the improved and novel mechanism employed, and from the scale of magnitude on which the various operations are conducted. A recent visit to the establishment above named afforded us an opportunity to witness the latter, and to gather the facts upon which the following description is based:

Three great cupola furnaces at the Albany and Rensselaer Works receive the masses of pig. Into each of the three fiery caverns fifteen tuns of material are thrown; and in the course of three quarters of an hour, five and a half tuns from each will be melted. For eighteen hours the furnaces are kept in blast. Near by are two reverberatory furnaces in which the spiegeleisen is prepared, ready to be added at the proper time. Leading from the outlets of these, as well as from those of the cupolas, are gutters which convey the liquid metal to the two converters, which are suspended side by side on the massive framework. One of the great vessels, as we enter the building, is swung over on its side with its bent neck just under the gutter; the other is slightly inclined, and workmen are busily putting in new tweers (cylindrical pieces of fire brick perforated with numerous holes and inserted in the bottom, the orifices serving as air passages), and luting about the bottom plate with a paste made of quartz, sand, and clay.

Some one shouts a warning, and we step aside to avoid the heat of a stream of molten metal which comes pouring down the gutter from one of the cupolas. Hissing and shooting forth sheets of flame, it falls into a huge ladle, where it is weighed, and then continues its downward rush between the banks of sand in the gutter, around the bends of the same, and finally tumbles, a miniature cataract, into the mouth of the converter. Over six tuns soon lie bubbling and seething on the deep side of the inclined vessel. Then a sullen roar and a shower of flame and sparks issuing from the open mouth of the latter announces that the blast is turned on, passing, however, only over the surface of the metal. The monster had eaten his fiery meal, but digestion had not yet begun; slowly, however, the huge caldron is turned upright, and then the torrent of flame, augmented, pours into the adjacent chimney. The twenty minutes or thereabouts occupied in the process, we devote to examining the surroundings.

At one end of the immense building is a platform on which is an assemblage of wheels and levers, managed by two or three men, one of whom we are informed is the "blower," the important person upon whom the success of the process depends, for his business it is to watch the flame from the converter and to determine when the blast shall be stopped. Just in front of the two caldrons is a huge crane carrying a ladle. Four other cranes, from the arms of which heavy hooks are suspended, are also located in the building. Each crane consists of an arm on which is a traveling carriage, attached to a vertical shaft some ten inches in diameter, which forms the piston of a large cylinder at the base. Into the various cylinders water is forced by two hydraulic pumps at a pressure of some 350 lbs. to the square inch, and is governed by valves controlled from the platform mentioned at the beginning of this paragraph. The interior of the valve used is so constructed that the water may be sent under the piston and then led from that point to an overflow pipe, so that in one case the piston is raised, and in the other it is allowed to descend. The sensitiveness of the immense crane, with its load, to the merest motion of the valve, and its celerity and certainty of action, are remarkable. From the same platform the converters are manipulated by similar means, water being conducted to sunken cylinders, the pistons of which carry racks, which engage with pinions on the trunnions of the vessels. The blast, which is controlled also from the same point, is supplied at a pressure of 25 pounds to the inch by two horizontal blowing engines, the air cylinders of which are 54 inches in diameter.

Fig. 2



The flame from the converter has been growing in intensity and size, until now dazzling in its brilliancy. The blower is watching it carefully. Suddenly it decreases in length, and becomes reddish, and at that instant the blast is stopped, for the decarbonization is complete. Then the caldron slowly turns on its side, and presently another stream of molten metal comes leaping down the gutter and into the open mouth. This is the spiegeleisen, which has meanwhile been measured and melted. It mixes at once with the liquid mass in the vessel. Now the mouth of the latter is turned still lower until it vomits forth a dazzling, blinding jet of liquid steel, into the enormous ladle which the crane has swung into position.

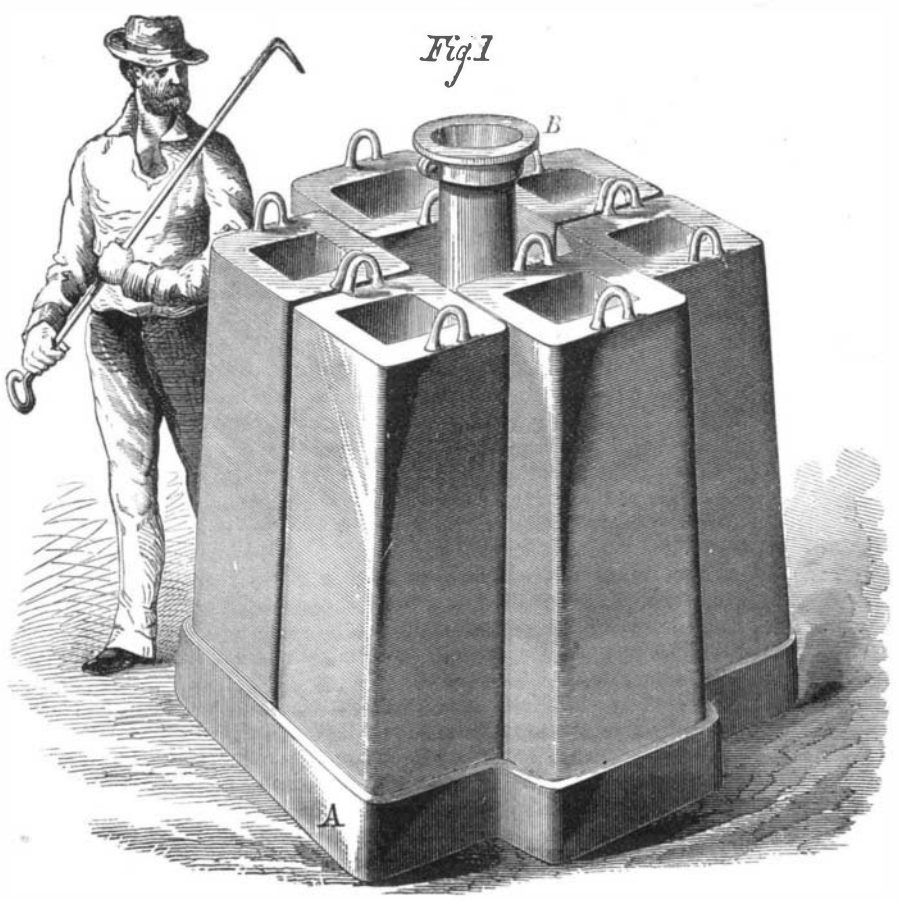
While the above has been in progress the workmen have been busily preparing the molds. Six one tun ingots are to be cast from the contents of the ladle. Each ingot will make three rails. The molds are of iron of the form, and arranged in a nest, as shown in the engraving, Fig. 1. The lower portion, A, consists of a deep platform lined with fire clay and having channels radiating from the center. B is a tube of iron placed over the central opening. Into this the steel is allowed to flow, so that it enters the grooves in the platform and then, escaping through the apertures, rises in the molds disposed above the latter. The tube, B, retains the cinder, and is therefore made somewhat higher than the molds.

As soon as sufficient time has elapsed for cooling, the molds are lifted by a crane, leaving the ingots of steel standing upon the platform. These, still red hot, are at once raised, deposited on a car, and transported to the heating furnaces. Each furnace contains four ingots, which are thus brought to a yellow heat.

The rolls are some 34 inches between centers and are driven by the main engine. Each ingot passes through twenty-one times. The table upon which the work is conducted to the rolls consist of a number of cylinders rotated by suitable gearing driven by a separate small engine. A piece laid upon these cylinders is quickly moved forward. This table is adjustable vertically, and may be raised up or lowered to present the ingot according to the adjustment and position of the rolls. Between the cylinders and moving longitudinally are a number of fingers arranged as shown in Fig. 2. These are actuated by water power, and serve to turn the ingot over as it is drawn to and fro. A similar combination of mechanism is located on the opposite side of the rolls.

It will be observed that there is no hammering, to the absence of which the homogeneous nature of the steel, and also its uniform quality, may be ascribed. The ingot on entering is some thirteen inches square; on emerging from the rolls after one minute and thirty seconds drawing, it is reduced to about six inches. This entire work, formerly involving the labor of eighteen men, is now conducted with ease by a man and two boys.

Fig. 1



MOLDS FOR CASTING STEEL.—Fig. 1

Progress of the Centennial.

The exhibition buildings of the Centennial Exposition are now rapidly progressing; and if the funds requisite for the purpose be forthcoming, they will be completed by the first of next January. The granite work of Machinery Hall is nearly finished, and the roofs are being tinned. The plastering and laying of the floors will shortly be begun. The eastern and western wings of the main edifice are completed, and the entire structure, it is expected, will be up by the 1st of October. The glazing of Horticultural Hall is well under way, and nearly all the flooring is laid. Agricultural Hall will be begun as soon as the machinery building is finished. Laborers are now engaged in grading the grounds and digging out the declivity between the United States building and Machinery Hall in order to form a bed, some four acres in extent, for an artificial lake.

The wrought iron observatory to be erected by a Boston company (it is a pity we could not have had Clarke, Reeves, and Co.'s one thousand foot tower) is slowly rising. This will be 170 feet in hight and is located at Belmont, a point in Fairmount Park some 200 feet above the Schuylkill. The summit of the edifice will be about 100 feet above the highest spire of the Centennial buildings, over which and the city of Phila

delphia and surrounding country, it will afford a fine view. The foundation of the tower is Conshohocken stone, laid in cement and dressed with granite. On the bed plate are fastened ten columns, each seven feet high, and supporting a huge iron ring eight feet in diameter inside and weighing a tun and a half. To this ring the main central shaft is riveted. The top of the tower will be reached by an annular car encircling the shaft and moved upward from the base on the outside of the latter. The car will be made of iron and glass, and be hoisted by a 40 horse power engine. Outside the shaft there will be a truss work of wrought iron. The space at the top of the tower will be capable of accommodating 125 persons. About the base of the structure, an ornamental building is to be erected and used for reception rooms, offices, etc.

A separate building is to be erected for the exhibition of the contributions from the Executive Department of the United States government. The main structure will cover 100,000 square feet, in addition to which will be erected a side building containg 20,000 square feet for a field hospital, the whole covering an area of nearly three acres. The different departments will have especial sections allowed to them. The State Department will exhibit old letters and curious documents from its archives. The Interior Department will show the operation of the Patent Office, and the mode of taking the census, and will probably explain how the Indians are (not) taken care of. The War Department will contribute old and new war munitions, etc., also the United States Cadet Corps, who will encamp for a month or two in Fairmount Park. The Quartermaster's Bureau will furnish specimens of army equipments for transportation, hospital service, etc., and the Subsistence Bureau, specimens of rations and modes of cooking. The Navy Department will contribute the Constitution, or rather a reproduction of the once famous old Ironsides, as the now thoroughly rebuilt vessel does not contain a vestige of the original craft except some wood about the keelson and one of the topsail sheet bits: together with models of various other articles incident to marine warfare. A field hospital after the most approved plan of construction will be erected. Probably one of the most interesting collections contributed by the government will be that of the Smithsonian Institute.

Professor Baird, in connection with this department, will give an exhibition of the propagation of fish of many kinds. An arrangement has been made by which a stream of running water will be introduced, and the method will be shown of hatching the fish from the egg, and statistics will be furnished stating the increase of the fish of the United States by this means, and other facts which may be thought of interest in this connection. Proper means will be taken by the Smithsonian Institute to represent the leading features of the Indian races. Their habitations, manners, and customs will be represented by delegations from the different tribes. They will also exhibit a large collection of specimens of prehistoric remains, comprising stone, iron and copper implements and pottery, dug from the mound hills, the relics of the mound builders, who are supposed to have occupied this continent before the Indians. A complete collection of all the minerals of the United States, prepared under the superintendence of Professor Blake, will not be among the least of these valuable collections. In addition to all these and many others, there will be a zoölogical collection, the material for which is now being collected from all sections of the country.

Ground has been broken for laying the foundation of the English buildings. There will be two separate structures, each two stories high. The larger one, 90x60 feet, will be used for offices of the Canadian and other colonial exhibitors. The other, 60x20 feet, will be used as residence sfor attendants required in connection with the British display. The buildings are to be constructed of brick and timber. The architecture will be in the old English style, and the roof will be tiled.

The Japanese commissioners are also preparing to erect buildings after their own style of architecture, and structures will shortly be commenced for Sweden and Morocco.

The questions as regards duty on contributed goods from foreign countries, and also relative to the same being liable to seizure for possible debts of the Centennial commission, have been definitely settled. The Secretary of the Treasury has decided that New York, Boston, Portland, Burlington, Suspension Bridge, Detroit, Port Huron, Chicago, Baltimore, Philadelphia, Norfolk, New Orleans, and San Francisco constitute ports of entry at which goods intended for the exposition will be admitted free of duty. All articles properly marked be will forwarded without examination from the port of arrival to Philadelphia, there to be delivered to the collector of that port. Articles entered at the exhibition may at any time be withdrawn for sale on payment of the duties. The Attorney General of the United States and the Attorney General of Pennsylvania have both given the opinion that goods deposited and placed on exhibition are free from seizure, and are not liable for the debts of the person or corporation thus receiving them.

From the advanced state of the buildings, if from no other indication, the reader may conclude that the time for preparing goods is growing very brief. Several foreign nations have already refused to receive further applications, while the present intention is to close the door to further applications in the American department on September 1 next, since there are already on file requests for considerably more floor room than the area set apart. There is a sifting process to take place, however, by which probably a large number of useless and discreditable entries will be thrown out, so that opportunity may then be given for a few eleventh hour applicants to get their goods in. Those proposing to exhibit should lose no time in filing their applications at once.

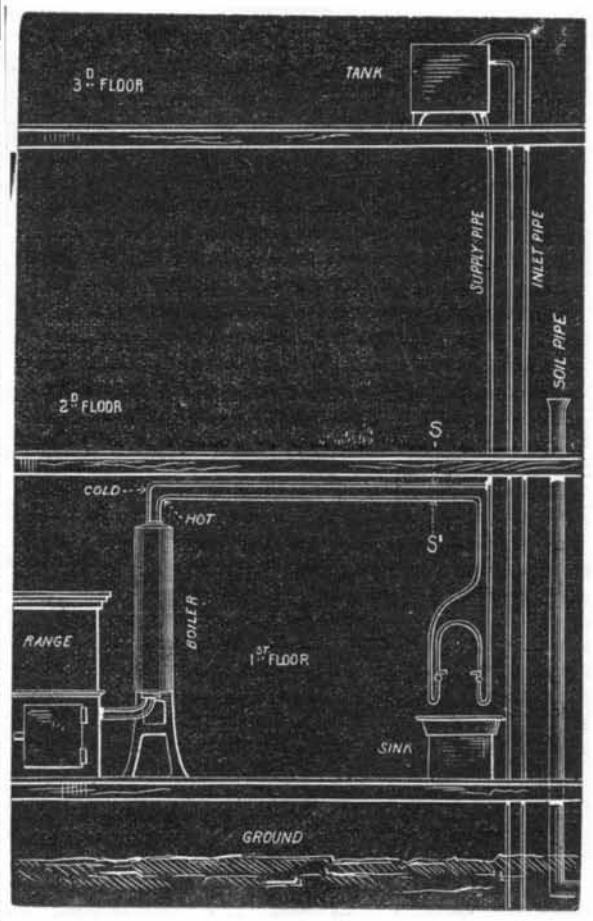
Correspondence.

Remarkable Electric Phenomenon.

To the Editor of the Scientific American:

An electric phenomenon has recently been observed, which I am unable to account for, and I would be grateful if you will help me to an understanding of it.

A house, built of limestone, stands upon a solid bed of the same material. Water is brought to it from a spring on the side of a neighboring hill, across an intervening valley, and poured into a tank on the third floor. An overflow pipe leads from the tank to the barn. The pipe that supplies the kitchen leads from near the bottom of the tank, and is connected to the range and boiler in the usual manner, as shown in the accompanying engraving. All the pipes are in contact with the wall, and are quite near each other. The hot and cold



water pipes are connected at the boiler, and also between the cocks; but of course the pipe is plugged at this point with solder, as usual. During every thunderstorm of any magnitude, frequent and violent electrical discharges are noticed passing from one pipe to the other, at the points marked S S'. The pipes are all iron, except at the connections to boiler and cocks, where lead is used. I would ascribe the excitement to thermal difference in the pipes, but they are so intimately connected that I cannot see how it is possible. Your opinion would be thankfully received.

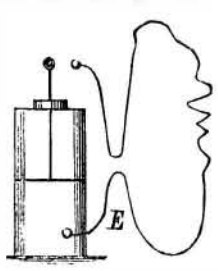
THOMAS P. CONARD.

30th and Chestnut streets, Philadelphia, Pa.

Messrs. Munn & Co.:

In reference to the very interesting observation of Mr. Conard, on which you have asked my opinion, I would say that it is a striking illustration of a well known principle of electricity, to which I have before had occasion to refer in your pages. There was at one time a very general impression that, if two routes of different facility were offered to an electric discharge, it would flow entirely by the better one. This, though (I think) still to be found stated in some text books, is entirely untrue. On the contrary, the fact is that, if two or a hundred routes, differing in facility or conducting power, or, to use a technical expression, "of unequal resistances," are offered to the passage of an electric current or discharge, it will divide itself between them all, in direct proportion to their facility or conducting power.

Among other illustrations of this, I find in Ferguson's "Electricity," 1866, page 63, the following: "A Leyden jar being charged, we have a wire bent, as shown in the engraving, and armed with balls at the ends. One end of this being held against the outside of the jar and the other brought within striking distance of the knob, a spark will pass at E, where the two parts of the wire should be, say, one eighth of an inch apart.



"This evidently is because, while the wire is a far better conductor than the air, yet some of the discharge will even pass through the worst conductor; and the wire being long and the air path short, the difference is not so great but that the fraction passing through the air is an appreciable quantity."

The general principle above stated is one which lies at the foundation of the whole subject of electrical measurements, in which such wonderful results have been reached of late years. Those of our readers who may wish for fuller information on this last subject, we would refer to the article by the present writer on "Electricity," in Johnson's "Encyclopedia," or to Sabine's or Culley's works on the electric telegraph.

After what we have said above, it is hardly necessary to make any personal application to the case before us. No doubt Mr. Conard's tank is near his lightning rod, or in some other way is plentifully supplied with electricity during a thunderstorm. This finds its way to the earth by countless routes, by the walls of the house to a very slight degree, by the various pipes in proportion to their conducting power; and, in the particular case noticed, it finds the hot water pipe so far a desirable road to the copper boiler, and thence to the ground, that part of the current which enters the cold water pipe takes that route. I think it likely that there are some joints on the cold water pipe, between the spark plate, S, and the boiler, cemented with red lead, which is an excellent insulator, or other like body. This would not, however, be essential.

Assuming a difference in the tension of the pipes, S and S', through a difference of their ground connections, induction would exaggerate the same, and aid in this production of the spark; but while this and other actions may no doubt conspire to the effect, the first cause which we have described is, we believe, the main one. HENRY MORTON.

Stevens Institute of Technology, Hoboken, N. J.

Exit from Public Buildings and Railway Cars.

To the Editor of the Scientific American:

As one of our common humanity, I was pleased to see the attention of the public called to the much needed improvement in the means of effecting an escape from churches and public buildings, in case of fire, accident, or sudden emergency, referring as instances to the Holyoke French church disaster, and the accident at a New York church of a few weeks ago; in fact, almost every paper brings an account of some such horrifying occurrence, with the sacrifice of a greater or less number of human lives.

This brings to mind the frequency of accidents and loss of life in railway cars from a similar cause, as instanced in the Roanoke disaster on the Great Western Railway of Canada of last year; in which, during the burning of a car, the passengers, in their frenzy and haste to escape, jammed the door shut, and could not get it reopened, and several were burned to death, some saving themselves by jumping out of the windows.

These accidents will not become less frequent until some important changes are made to prevent them. As your correspondent of July 3 remarks: "Provision can be made, and it should be compelled to be." There has been in force for some years, in the Dominion of Canada, a law compelling the doors of all churches and public buildings to be opened outwards; and so great was the necessity felt for this that the enactment of the statute was accepted as a great boon, and at once universally complied with.

The same feeling is prevalent, requiring statutory enactment compelling the opening outwards of railway car doors, evinced by the fact that, at each of the two last sessions of the Dominion Legislature, a bill was brought forward with this object in view.

As a late resident of the Old Bay State, I am surprised to learn that you are so far behind in such an important matter; and for the welfare of those who are wont to congregate in our churches, and gather in public assemblies, and the ever constant stream of railway travelers, let us hope that those who have assumed the responsibility with the positions they have accepted, as our lawgivers and legislators, will, at the earliest possible moment, do away with these wholesale man traps.

The facts of the case certainly and practically suggest the remedy: Open the doors of all public buildings and railway cars outwards. This is really what must be accomplished, and the wonder will be that it was not done long since.

W. T. SMITHERS, D.D.

Formerly Rector of Christ Church, Boston, Mass.

Lindsay, Ont.

The Iron Horse.

To the Editor of the Scientific American:

Most of your correspondents, when writing on the application of steam to street cars, seem to take it for granted that the power used must be either horse or locomotive, with no alternative. If by locomotive they mean cylinders connected to the car wheels, or to the wheels of a separate vehicle or machine, I must dissent, and agree with you that the horse is to draw these cars awhile longer; for there are some very important things about drawing a street car that locomotives cannot do practically. For instance, a large truck broke down on a track, and the several cars passing each minute were promptly drawn off the track and around the obstruction on the ordinary Belgian pavement, preventing a serious blockade; and this is not uncommon. However effective locomotives may be on a clear track with good rails, they are worth little off it, and on most street railways they would be off too often.

We think the case demands, not a locomotive, but literally an iron horse, that can, like any horse, be readily attached to and detached from the front of any car, with which it can be drawn off from or on to the track at pleasure, and need not be stopped by ice or mud. The first machine would undoubtedly cost the $3,000 estimated by Mr. Woodward (page 52, current volume); but if any of the great lines ordered machinery enough to draw all their cars, they could probably be furnished for $1,500 each. Of course, no company will do this until some one actually brings out the said iron horse, and fully demonstrates his trotting capabilities; for corporations (unlike the Hon. Mortgage Bond) are not so famous for taking "chances," however "big" they may appear.

There is a growing demand for a machine of this kind,