Correspondence.

To Prevent Spreading of the Rails.

To the Editor of the SCIENTIFIC AMERICAN:

I have been very much interested in reading your account of the possible and probable causes of the recent wreck on the New Haven Railroad, and it seems to me that knowing the cause, it should not be hard to apply a remedy, so as to make a recurrence of such an accident impossible.

I am not a practical railroad man, but it seems to me that if braces of steel were provided say every 15 feet, running from one rail to the other and securely attached to said rails, it would be almost impossible for one rail to shift without pulling its mate with it, and thus the gage would be maintained.

This would naturally be expensive, but if accidents could be reduced in number, the appliance would soon pay for itself. H. A. SWENSON.

Brooklyn, July 29, 1908.

The Widening of the Suez Canal.

To the Editor of the SCIENTIFIC AMERICAN:

We note in your issue of the 25th of July your article on the widening of the Suez Canal. Under one of the illustrations you state manual labor and primitive transportation are much used in the work, and this point we desire to discuss with you.

If you will notice the photograph, you will see that the transport is done by means of portable track and dump cars which have been supplied by our company for the work on the Suez Canal. This method of portable track is the most modern for excavating and transportation. This fact has been recognized in the different parts of the world and is used everywhere on the globe where excavation work is done. Only in the United States this method is not entirely known by all contractors, and a great number of them are using wheelbarrows and scrapers instead.

We can assure you, and we are prepared to prove, that in the United States to a large extent much more primitive methods for excavating and transportation are used than at the Suez Canal.

ARTHUR KOPPEL COMPANY.

Pittsburg, Pa., August 1, 1908.

The Railroad Spike is Obsolete.

To the Editor of the SCIENTIFIC AMERICAN:

Anent the article published in the July 25 issue of your publication, entitled "The Wreck of the White Mountain Express," I wish to submit a few original ideas and suggestions for publication.

With the beginning of railroad construction in this country, a very crude, cheap, and quick method was adopted and used by all the different roads to connect and fasten the rails to the wooden ties.

This was a rough-cut, wrought-iron spike about ⅝ inch square by 5½ inches long, and with the most of the head formed on one side to overlap and hold the rail in position. This spike answered the purpose in the experimental stages of railroad construction, when the rolling stock was light and speed limited, the locomotives weighing from six to twenty tons, and the cars and other equipment in proportion; but now it seems as if the old-style spike has outlived its usefulness, and is being taxed beyond its capacity. Little or no improvement has been made in spikes to fit the changed conditions. The constant increase in weight, size, and speed in all equipment, locomotives, and other rolling stock has put the strain beyond the limit of safety, and what was formerly considered a good, safe, and cheap method of fastening for the rails, I now consider a very weak, insecure, and expensive method, if you take into account the many and serious wrecks that are caused directly by the spreading of the rails.

The principal reason why there are few wrecks in England and other foreign countries is because these countries have adopted better methods of rail fastening. Over fifty per cent of all wrecks are directly caused by this serious weakness in construction. Here are my views on the subject from the railroad point of view, both as to economy and safety.

By adopting some good, safe method that will hold the rails tight, it will not only eliminate the danger of the rails spreading, and all wrecks caused by that serious defect, but it would also add from one-quarter to one-third to the life of the wooden tie, as the cut spikes so soon pull or work loose, and let the water into the timber, hastening decay as well as letting the loose rail move and vibrate, thereby causing the tie to wear away under the rail. Some of the roads have been experimenting with the screw spikes that are used in England and France, with a view to using them extensively on their roads. There is one other point worth mentioning, and that is the kinds of tie plates some of the roads are now using. They evidently go upon the theory that the rougher they are made on the nether side, the better for the purpose. They try to make the plate help to hold the rails, making the under side rough and uneven, so as to sink into the top surface of the tie, but they let the rails work loose, and then the constant vibration of the rails causes these roughened projections on the bottom to cut into and wear down the wood, thereby helping to destroy the ties.

I saw the result of such wear on a bridge equipped with some of this kind of plates on new sawed oak ties. After these were in use three years they had to be replaced by new ones, owing to deep wear these plates had occasioned. A better idea would be to make the plates perfectly smooth on the bottom, to protect the tie under the rail, and have the rail fastening sufficient to hold both the plate and the rail.

The United States Forest Service circular, Department of Agriculture, No. 146, gives some very interesting data in regard to experiments with screw spikes. It gives the holding power of screw spikes at from *two to four times* that of the old cut spike, consequently eliminating the wear and absorption of moisture in the body of the tie.

The first cost will of course be higher to install this system of securing the rails, but the increased life of the tie, the lower cost of repairing the track, and most important of all, the fewer wrecks caused by spreading rails, would very soon make up for extra cost in installing. DR. W. C. LANGMAN.

Cincinnati, Ohio, August 3, 1908.

Military Possibilities of Aeroplanes.

To the Editor of the SCIENTIFIC AMERICAN:

Your recent editorial upon the difficulties of waging modern war after the aeroplane has been perfected was excellent, and your arguments are practically indisputable. But while I entirely sympathize with your desire not to entertain revolutionary opinions, I think that a person might go much farther in the same direction and still be eminently conservative.

I do not at all agree with your editorial published some months ago upon the impracticability of attack by the use of high explosives dropped from flying machines. It seems to me that with the height and speed of the aeroplane and the direction and velocity of the wind known, all of which could readily be ascertained with fair accuracy, striking the target would be a simple calculation under the laws governing falling bodies. A telescopic sight would of course be used, and if the first shot missed, a slight adjustment would insure greater precision.

Suppose that every nation was provided with a fleet of airships, each capable of traveling sixty miles an hour and carrying five hundred pounds of high explosives, and you have a condition where war would be almost unthinkable.

If France and Germany, for instance, were to declare war, each would at once start its aeroplanes; and even if by mutual consent the cities were not harmed, every railroad bridge in either country would probably be speedily destroyed. It might be possible to construct cannon to fire vertically, but when you consider the height and speed of the flying machine and its small size, as well as its ability to see where its shell struck, the advantage of the uppermost combatant must be overwhelmingly apparent, and a bridge could hardly be protected. And without railroad transportation mobilization and subsistence of a modern army would be an exceedingly difficult problem.

But supposing this accomplished and the troops brought together into camps, what more vulnerable situation can be imagined? Each camp would at once become a target for thousands of pounds of high explosives coming at night out of the darkness, and without a possibility of an attempt at retaliation. Even if the casualties were not excessive, I very much doubt if any army would stand more than one night of such an attack without dispersing.

The fact that each nation could attack the army of the other in the same manner, with small chance of protecting its own, would be an additional deterrent to a declaration of war.

Then again there are the cities. Two nations like France and Germany might agree to spare each others' cities and keep the obligation, because each would have so much to lose. But if, as generally happens, a large nation had a controversy with a small one, the larger nation might fight at a great disadvantage, because it would have the most to be destroyed.

If the British government had known that the Boers had a fleet of airships laden with five million pounds of nitro-glycerine in Holland, ready to attack London as soon as war was declared, there would have been no war. Nations make war generally because their rulers expect to gain something thereby. But all the mining speculators in South Africa could not have repaid the English for the city of London.

There are many other social problems which stand a fair chance of being solved by aerial navigation. I do not see how the autocracy of Russia can survive. A nihilist at night on a flying machine might make it extremely unpleasant for the occupant of the Winter Palace.

I believe that our protective tariff is in similar danger. Custom houses exist because all commerce passes through narrow channels where tolls can be collected. But with the opening of the boundless air smuggling will speedily begin around all our borders. It would, of course, not pay to carry heavy materials in this way; but with the finer manufactured goods the profits should be very large and the risk of detection slight. And if smuggling in the more expensive commodities were extensively carried on, how long would the makers of similar articles in this country stand a tariff on raw materials?

All things considered, I do not think it at all wild to predict that we are upon the verge of as great an improvement in the condition of the human race as occurred when our ancestors first learned to navigate the water many thousand years ago.

PHILIP CRUTCHER.

Vicksburg, Miss., July 29, 1908.

To Change Existing Battleships to "Dreadnoughts."

To the Editor of the SCIENTIFIC AMERICAN:

Amid all the talk concerning the increase of our navy and its relation to Japan's now and what that relation will be in the near future, one point seems to me to have been overlooked. That is, of modernizing our battleships of 12,000 tons displacement and over, so that they may be able to take their place in line with the "Dreadnought" type. They cannot do so in their present condition.

In spite of all reports to the contrary, the United States will undoubtedly keep pace with Japan in the matter of building "Dreadnoughts." But Japan has gone a step further. All her battleships that were in the war with Russia, including those captured from Russia, have been and are being modernized. The "Mikasa," raised from the mud of Sasebo Harbor, in the course of her refitting, will have a part of her superstructure cut away and her secondary battery of sixteen 6-inch substituted by eight 6-inch and four 10-inch (the latter placed two in a turret in two turrets, one on each beam as in our "Georgia"). The same will be done with the "Asahi," "Shikishima," "Fuji," "Hizen," "Suwo" and "Sagami," the last three named being the former Russian "Retvizan," "Pobeida," and "Peresviet." In a recent article in the SCIENTIFIC AMERICAN your correspondent told what the Japanese did with the "Orel," now the "Owami." This improvement I speak of is on a greater scale than that, but has been confirmed by a Tokio official dispatch and when accomplished will make semi-"Dreadnoughts" out of vessels that would have been unable to stand in the first line of battle had it not been done. The 10-inch gun is now very powerful. This change in the Japanese ships will give Japan eight of these semi-"Dreadnoughts" and two new ones, the "Kashima" and "Katori." Add to this her six "Dreadnoughts," two second-class battleships, and thirteen armored cruisers and she has quite a formidable array. Now the question is, Can this be done with our vessels? It can be, and surely ought to be done. Admiral Evans has recommended the removal of our cumbersome flying bridges, military masts, and cranes, and the substitution of skeleton masts and booms. This lightening of weight would just about balance the increase in armament. In the "Connecticut" type eight 10-inch instead of eight 8-inch guns should occupy the four beam turrets, even if the turrets have to be changed, and the same should be done with the two beam turrets of the ships of the "Georgia" class, substituting four 10-inch for four 8-inch, but leaving the four superposed 8-inch as they are. The "Idaho" and "Mississippi" I would change in the same way as the "Connecticut" class, as they are already slow ships, and this increase of weight on their smaller displacement would not matter. In the "Maine" class, four 10-inch guns should take the place of ten of the sixteen 6-inch of her secondary battery as in the "Mikasa." The value of the 10-inch gun, its power, and its superiority over the 8-inch is unquestionable. If Japan can accomplish this change, we can. With this modernizing completed the United States would have 16 semi-"Dreadnoughts" against Japan's 10, 6 real "Dreadnoughts" against Japan's 6, 9 second-class battleships against Japan's 2, and 15 armored cruisers against Japan's 13. This would make a total of 22 first-line ships of the United States against Japan's 16, and 24 second-line ships against Japan's 15, an overwhelming majority. But as the countries stand now each has six first-line ships and are therefore equal, as it is the first-line ships that count. This equality is true in spite of the fact that we have, excluding the six "Dreadnoughts," *thirteen* more battleships than Japan. Only "Dreadnoughts" or semi-"Dreadnoughts" can take the brunt of battle in which "Dreadnoughts" are on both sides, and even our splendid "New Hampshire," now at Quebec, can not be considered in the same battle class with the British "Indomitable," alongside of which she is anchored.

HAROLD M. KENNARD.

Brooklyn, N. Y., July 23, 1908.