Correspondence.

To Prevent Drawbridge Accidents.

To the Editor of the SCIENTIFIC AMERICAN:

If the approach to the drawbridge in Norfolk had been protected by a derail, that sad accident would not have occurred which resulted in the death of eighty people. The derail could be so connected that when the draw swung off, it would open the derail and, at the same time, throw a semaphore signal to danger (also mechanically connected with the drawbridge), which, located at a proper distance away, would notify approaching trains the draw was open. In case a train disregarded this signal, the derail would let it off on to the ground, thus preventing what might be a bad accident.

F. H. SIDNEY.

Boston, Mass., August 30, 1905.

The Submarine Signal.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of September 9, on page 196, the last column, there was an article concerning submarine signaling, headed "An Improved Submarine Signal." We would like very much to correct the false impression which would be circulated by this article. The article as it stands contains facts which are perfectly true, except that this "fish" transmitter, as it is called, is an obsolete piece of apparatus which has not been in use by our company for a couple of years.

Mr. Mundy at that time was connected with the company, and in conjunction with the other engineers in this company at that time devised this "fish," the point being that the noise in the boat was so great that if the receiver were put in the boat itself it would drown the sound of the bell for which the hearers were listening. Improvements in the receiving apparatus have entirely overcome this and the fish has been discarded. It was an apparatus which possibly was a temporary help in overcoming a slight difficulty in the development of the system.

We hope that you can by this explanation clear up the impression which was created by your article.

SUBMARINE SIGNAL COMPANY.

Boston, September 16, 1905.

Chains Versus Cables on the Manhattan Bridge.

To the Editor of the SCIENTIFIC AMERICAN:

An editorial of September 9 makes a comparison between the new Elizabeth bridge at Buda-Pesth and the Manhattan bridge over the East River.

If the Buda-Pesth bridge represents the "advanced ideas of the leading bridge builders of the world," these ideas must necessarily refer only to the rocking towers as a novelty for large bridges, because, outside of this feature, the Buda-Pesth bridge is built on old and reliable principles, like many other suspension bridges, and represents no special new feature.

That the floor is suspended from eye-bar chains, in place of wire-cables, is a revival of an old construction and, in an economic sense, decidedly a retrograde step. The stiffening construction of the Buda-Pesth bridge is precisely the same kind and of the same proportions as in the Manhattan bridge in its present design.

The claim that this design is inferior to the chain-cable bridge, designed under the former administration, may be a matter of opinion, but that it will cost $2,000,000 more than the latter is a decided error.

The abolishment of the tower hinges is mentioned as one point of inferiority, but many engineers believe that this fact will make the bridge superior, though they all agree that it will make the towers more expensive. The present engineers of the bridge consider the advantages of a tower without hinge, in gaining a precise knowledge of the stresses and in giving greater stability to the bridge, fully worth the money it costs more.

In regard to a hinge in the floor beam, the matter is reversed, viz., floor beams with hinges will be more expensive, but they admit of a more accurate determination of the stresses. This matter is, however, a detail of secondary importance and cannot be taken as a criterion for the quality of the bridge as a whole.

The statement that the Manhattan bridge, on its present design, is costing $2,000,000 more than a chain-cable bridge would have cost, can easily be refuted as an impossibility.

The breaking strength of steel wire is known to be three times greater than that of nickel-steel eye-bars, hence a chain made of the latter will, under existing conditions, weigh 4.84 times more than a wire cable of equal strength.

The total weight of the wire cables, as calculated by the lowest bidder for the Manhattan bridge, is 6,328 tons, hence the nickel-steel chain would weigh 30,827 tons and would cost $5,654,000 at 9.23 cents per pound, given by the same bidder as unit price for nickel-steel, including the temporary working bridges.

The bid for wire cables, however, is only $1,848,000, showing that the eye-bar chain would cost $3,806,000 more. To this sum must be added other sums for the increased cost of anchorages and anchor chains, foundations, etc., which would make the total cost of the chain bridge about $4,750,000 more.

Granting all the minor economic advantages claimed for the eye-bar design and making liberal allowances for them, it still follows from the above given figures that the Manhattan bridge, on its present design, will, instead of $2,000,000 more, at the very least, cost $4,000,000 less than the eye-bar bridge would have cost.

WILHELM HILDENBRAND.

New York, September 13, 1905.

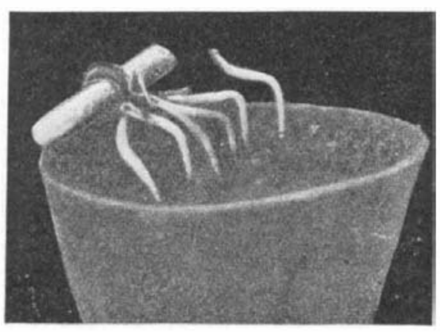
[That the chain cable is "old" is not disputed. The "advanced ideas" are those which are shown in the use of nickel-steel, the rigid attachment of the chains to the towers, the hinged footing of the towers, the hinged floor beams, and, in the Manhattan chain design, the trussing of the cables. We note that our correspondent admits that throwing out the hinged construction in the towers has incurred greater expense. In this connection it may be mentioned that the rejection of the hinged towers—a feature which the expert board had specially commended—has added 4,100 tons to the weight of the towers. This is 299 tons more than the total weight, 3,801 tons, of the whole suspended structure of the Buda-Pesth bridge. The question of the relative cost of the eye-bar and wire cable designs is discussed in our editorial columns.—EDITOR.]

HELIOTROPISM INDUCED BY RADIUM.

Most plants seek the light, and if it does not fall directly upon them, bend and grow toward it. This is called positive heliotropism, while the peculiarity of other plants, which avoid light, is known as negative heliotropism.

The question suggests itself whether this influence is exerted upon plants only by luminous rays or also by rays not perceptible by the eye. The question may be decided by the employment of radium, for the radium rays possess, of themselves, very little luminosity, while the phosphorescence of which they are the indirect cause is very bright.

Malisch (Berichte der Deutschen Botanischen Gesellschaft, 1905, vol. 1) therefore exposed seedlings of various plants (lentils, peas, vetches) to radium rays. Not the slightest effect could be detected; but when the radium was mixed with zinc blende, which under these conditions becomes strongly phosphorescent, the seedlings turned and grew toward the light. The illustration shows, on the left, the little glass tube containing the mixture of radium and zinc blende. The seedlings have bent at right angles and are growing toward the tube.



HELIOTROPISM INDUCED BY RADIUM.

Radium, therefore, exerts only an indirect heliotropic effect on plants.—Umschau.

Recent Long-Distance Trips with Electric Vehicles in France.

A most amusing comedy has just been enacted in connection with electric vehicle contests. It may be remembered that the Automobile Club de France originally intended to organize a trial for electric vehicles to consist of a run from Paris to Trouville—a distance of 130 miles—with a stop at Evreux for charging up. It was intended to run the competition in two days, the first day Paris to Evreux, and the second day Evreux to Trouville. For some reason or other this competition was never carried out, much to the regret of some of the manufacturers. In view of this the journal Les Sports organized a run from Paris to Trouville on behalf of M. Védrine, and we have already described this event. At the time M. Kriéger, the well-known manufacturer of electric carriages, was on his holiday, but as soon as he heard of it he posted back to Paris and with the assistance of the Auto organized a demonstration on his own account, which took place on September 1, and in which he covered the two stages of the journey in a much shorter time than Védrine, starting from Saint Germain with an electric cab carrying two passengers, and a landau carrying four passengers, at 6:02 for the cab and 6:07 for the landau, and arriving at Evreux, the cab at 7:53 and the landau at 7:59. At Evreux a stop was made for recharging, which was done in two hours and a half, and the vehicles set out again, the cab at 11:04 and the landau at 11:06, to arrive at Trouville at 1:23 and 1:34 respectively. The average, therefore, made by the two cars was over twenty-eight miles per hour for the cab and more than twenty-seven miles per hour for the landau, which established an undoubted record in the matter of speed.

While Kriéger was on his way from Saint Germain to Trouville he was quite unconscious that the rival journal, Les Sports, wanting to take the wind out of his sails, had secretly organized another contest for Védrine, who was to start after Kriéger and beat him, doing the same course with a covered cab in which were seated the driver, M. Van Lanker; M. Bary, engineer; M. Max Richard, the official timekeeper of the A. C. F., and Georges Prade, the editor of Les Sports. This vehicle started from Saint Germain just after the two Kriéger cars had left, and made the journey direct to Trouville without stopping to charge the batteries on the way. Although the average speed of Védrine's car was much less than that of the two Kriéger cars, he arrived in Trouville long before Kriéger, as, of course, he had not stopped to charge up. But the matter did not finish here, for Kriéger, on hearing of Védrine's performance, determined to make the return journey with two cars from Trouville to Saint Germain without stopping to charge up also. He accordingly started out on Friday, the cab at 9:05 and the landau at 9:08, and both cars arrived safely at Saint Germain at 2:03 and 2:19 respectively, beating Védrine's time by 1 hour 35 minutes, and constituting a veritable triumph, for not only did the Krieger cars succeed in covering the distance with one charge, but they then proceeded to the Place de la Concorde, made several calls in Paris and returned to the Kriéger garage with still a reserve of electricity in their batteries.—The Car.

Engineering Notes.

Lubricants are used not only to obviate friction, but to prevent heating of the wearing surfaces. It is best to employ tar-grease or tallow where there is considerable pressure with low velocity, fat and oil lubricants where there is lower pressure and higher velocity. For lubricating the cogs of toothed wheels we recommend green (barrel) soap mixed with filtered oil-dripping from the bearings, also mutton grease (in preference to pig's grease). For lubricating axles use Booth's axle lubricant, composed of ¼ kilogramme of soda dissolved in 4 liters of water, mixed with 1½ kilogrammes of tallow and 3 kilogrammes palm oil; the whole heated to 95 deg. C., and constantly stirred. With the addition of some sulphur, this mixture will be found an excellent preventive against heating of the wearing surfaces, especially with rapidly revolving pins. A little mineral oil (petroleum) may be added with advantage to vegetable or animal lubricants to prevent them from thickening or becoming resinous. Mineral oil has lately been almost universally employed in place of the above-mentioned somewhat expensive lubricants. It is sold in varying grades of purity under the name of spindle oil, cylinder oil, etc.—Der Metallarbeiter.

The following stages in the temperature of the wearing surfaces of parts of machinery are distinguished: 1. Cold; when the temperature of the parts is the same as that of the air. 2. Tepid; when the parts are sensibly hotter than the air, but can be touched by the hand without discomfort. 3. Warm; when they are painful to the touch, but there is as yet no disturbance in the working of the machinery. 4. Hot; when the wearing surfaces have suffered from the heat, and the bearings require regulating (unscrewing of the caps, cleaning of the oil-holes, polishing of the slides, etc.) before running smoothly. The "tepid" stage is always harmless if the temperature remains constant. If, however, it continues to rise, the ensuing "warm" stage must be promptly prevented to avoid danger. If thick oil is used, the friction is always greater when the machine is first started than later during the working; hence the axles will always be tepid, which, however, need not give rise to any anxiety. In fact, the friction diminishes as the heated oil or grease becomes more fluid. It should also be ascertained whether the heat of the machinery is not perhaps due to the rays of the sun or the neighborhood of furnaces, etc. The causes of the "hot" stage are: 1, careless lubricating; 2, screwing on the caps too tightly; 3, badly made wearing surfaces; 4, impurities, such as sand or dust, getting into the oil or grease; 5, stopping up of the oil conduits and bad distribution of the oil on the slides. The latter is very liable to occur on the slide of eccentric straps. If the heat is so great as to cause anxiety and cannot be diminished by lubricating, sprinkling with flowers of sulphur or water, etc., the machinery must be stopped and thoroughly overhauled. —Werkmeister Zeitung.

Death of Capt. Wiggins.

Capt. James Wiggins, the man who opened the northeastern passage, died on September 15. Capt. Wiggins made the first voyage through Kara Sea. He was a Fellow of the Royal Geographical Society and a life member of the Russian Imperial Geographical Society.