Correspondence.

A Rival of the Pecos Viaduct.

To the Editor of the SCIENTIFIC AMERICAN:

I noticed in your recent number of the SCIENTIFIC AMERICAN a reproduction of the Pecos viaduct, from all accounts one of the highest in America.

The Makohoine viaduct, of New Zealand, although it cannot be compared with the American structure, is considerably higher. The viaduct spans a gully 586 feet, and the height is 375 feet above the stream below. The viaduct is situated on the North Island Main Trunk Railway, and is one of several to be constructed on that line. C. E. TURNER.

Palmerston North, New Zealand, June 15, 1905.

The Lunar Rainbow Again.

To the Editor of the SCIENTIFIC AMERICAN:

The item in your issue of July 8 concerning "A Lunar Rainbow" brings up a subject in which I am especially interested. Some eleven years ago at Ypsilanti, Michigan, I observed a lunar bow that was very perfect. The moon was covered at the time with a haze and was surrounded by a complete circle in which all the usual rainbow colors were distinctly visible. During the school year 1895-6 at La Junta, Colorado, under practically similar conditions I saw another lunar bow which was just about as perfect. Again, during the school year 1901-2, at Weston, Oregon, on a night when there was no sign of haze, but when there were numerous light fleecy clouds in the sky, just as the moon was covered by one of these clouds, I noticed that it was surrounded by a bow that was more brilliant than those that I had seen before. The spectrum colors showed very distinctly in the primary bow and there was a well-defined secondary bow. Several times during the same year and at the same place I observed other lunar bows, but in no others did the colors show so plainly.

I am not quite sure that these phenomena that I have described are of the same character as the one noted in the item above referred to, which evidently describes a real rainbow. In all that I have seen the bow surrounded the moon and was not a rainbow, as there was no rain at the time. In conversing with people, I find very few that have ever observed a lunar bow exhibiting the rainbow colors. However, although the occurrence is somewhat rare, I am convinced that this is not so much from the rarity as from lack of observation.

Some authorities say that lunar bows of this kind are caused by the refraction of the moon's light through ice crystals. For myself I am not entirely satisfied that the ice crystals are always present, but I suppose that it is possible.

Detroit, Mich. HARRY CLIFFORD DOANE.

A Filipino Fire Maker.

To the Editor of the SCIENTIFIC AMERICAN:

An article in a recent issue of the SCIENTIFIC AMERICAN recalls to my mind a curious contrivance used by some of the natives of Northern Luzon, Philippine Islands, for the purpose of obtaining fire. This consists of a hardwood tube of about one centimeter internal diameter and six centimeters in length, and a piston of slightly less diameter and length. The tube is closed at one end by an air-tight plug or, instead, the piece of wood of which it is made is not bored completely through its entire length. The inside of the tube is smooth and highly polished. The piston has a handle and resembles the piston of the small boy's "popgun." The end of the piston is made to fit the tube air-tight by a wrapping of waxed thread, and directly in the end a shallow cavity is cut. Lint scraped from weather-beaten timber and well dried is used for tinder. A small bit of this lint is placed in the cavity at the end of the piston, the latter is inserted a half inch in the open end of the tube and then driven quickly home with a smart stroke of the palm. Upon withdrawing the piston the lint is found ignited, the sudden compression of air generating the necessary heat.

Of course there is nothing new in this to the student of physics, but I do not remember ever to have heard of the application of this principle by uncivilized tribes. The instrument is not in common use even in the district mentioned. I saw only one of the kind during a stay of over two years in the Philippines. E. A. DEAN,

Captain, Medical Department, U. S. Army.

Fort Riley, Kan., July 27, 1905.

The Artist and the Moving Horse.

To the Editor of the SCIENTIFIC AMERICAN:

I note in your last very striking number of your valuable paper, in the article in regard to the "Evolution of the Horse" that you say: "The traditional representations by artists of the trot and gallop are usually wrong." Will you allow me to take issue with you, and to express the opinion that the Muybridge instantaneous photos have worked a great wrong in the field of art, and have spread in a very marked degree the error, especially among illustrators, of representing action as it is, instead of as it appears. The latter only is the province of art. The most painful instances of this error appear in drawings showing the horse in rapid motion. Hardly an illustrator of the present day is free from the fault of putting his rapidly moving horses in such positions as would result in inevitable "croppers" if the limbs of the animal when in the position shown, were moving so slowly as to appear to the eye to be in such positions. Recovery in time to prevent the downfall of the moving body would be impossible, as any horseman knows who has observed for any length of time the actions of running or jumping horses. In addition to the fault of disseminating errors in showing the horse as he is, and not as he appears, which is all the eye can do for us—the beauty and the grace of swiftly moving horses truly shown in art for 1,000 years—has been by the modern draftsman totally eliminated. Lend your help to correct this fault, I beg of you.

R. E. SHAW, C.E.

Moundsville, W. Va., July 29, 1905.

Some Old Locomotives with Big Drivers.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of June 10, 1905, Mr. Herbert T. Walker writes interestingly of the "old high-speed locomotives," illustrating his remarks on the diameter, 8 feet 6 inches, of the driving wheels of the "Cornwall," built at the Northern Division works of the L. and N. W. Railway, Crewe, by Trevithick in 1847.

In 1854-5 the writer was engaged at the works of the southern division of the same company, Wolverton, J. E. McConnell, superintendent. At that date the standard diameter of driving wheel on this division was 7 feet 6 inches, and all the new engines were built by private firms.

There was, however, in the shops at Wolverton, a locomotive called the "Mangle" or "Mangel" (now whether that was only a shop name, not the true name of the engine, I am unable to state) with 9-foot 6-inch or 10-foot driving wheels, built to compete with the Great Western Railway locomotives and also with the Trevithick engines of the L. and N. W. Railway. There was as much rivalry between the two locomotive superintendents of the same company as there was between them both and the superintendent of the locomotive department of the Great Western Railway Company.

If my memory serves me there was some difficulty in getting the "Mangle" through the tunnels after the machine was first built. JOHN H. HARDEN.

Phœnixville, Pa., August 14, 1905.

Improvements Needed in Schooners.

To the Editor of the SCIENTIFIC AMERICAN:

During the last thirty years the schooner rig in American waters has driven out almost every other form. The multi-masted vessel with its fore-and-aft sails has enormous advantage over all other forms of sailing craft. The vessel is handled more easily, and her evolutions are quicker than with any system of square rigs. With the exception of the masts, the spars are smaller, and with the proper forms of hulls the schooners can sail closer to the wind, and this, with their quick evolutions, enables them to work to windward much more rapidly. But their important advantage is the vast reduction in the number of men employed. Five of the men above take the place of twenty-five. Two men on deck often handle a vessel that might with another rig require six or seven. The rig is not only simpler, but it is less costly.

As the multi-masted schooner has grown in size, steam power has been added, and with the five and six-masted vessels there is practically no manual labor required in handling anchors, sails, boats, and cargo. Even the single example of a seven-masted schooner shows advantages which are by no means unimportant. But there is one difficulty with which the schooner has to contend for which a remedy is greatly needed. Reefing is practically out of the question on account of the size and weight of the sails themselves. These are from 80 to 90 feet in height and the canvas is of course of great thickness and corresponding weight, and as stiff as the proverbial board and quite as unmanageable.

When we say reefing is out of the question, it simply means that the canvas is too heavy to be handled by manual labor. As far as the hull is concerned, the lowering of one or more sails answers every purpose. The hull is relieved from the strain of the wind and can be easily maneuvered under one or two sails, but the sail that remains is spread to its full area, and the strain on its masts, shrouds, and stays is not in the least lessened. The result of this is that as the sail becomes more lofty, the danger to the spars increases very rapidly. So great are the dangers of these lofty and heavy sails that the insurance companies do not look upon the larger schooners with any favor.

What is needed imperatively is some means of reefing the sails so that the strain on the masts, etc., can be relieved at will. This, of course, must be done by power. Some rolling device worked by the donkey engine would answer. When this is accomplished, the six and seven-masted schooners will be as advantageous for foreign voyages as for the coastwise trade. This invention, once perfected, will be extremely profitable, for it will be widely adopted.

All of the larger schooners carry power, and are often fitted with dynamos for furnishing light and distributing power to the hoists and for handling sails. None of them, however, have successfully used their engines for driving a screw, although the power carried is ample for moving the vessel. The reason that a screw is not used is because of the greatly increased power necessary for screw propulsion over that actually needed for driving the vessel through the water. Most of the large schooners carry sufficient power, if applied in towing, to handle them readily in calm and light winds. By putting a motor into one of their largest boats and connecting the dynamo with it, through the towing cable, they would be able to obtain a speed of three or four miles an hour in calm weather. The same power applied to a screw in their own hulls would fail to give them a forward motion.

These two fields for invention and improvement are most promising and apparently successful inventions along these lines would remove all the objections to the unlimited use of the schooner rig. It would seem as if some form of electric motor could be utilized in the management of the sails, supplied with current from a central generator, which in turn could be operated by a gas engine. A storage battery could also be used to energize the motors in emergencies.

F. C. P.

Engineering Notes.

One of the largest items of annual expense in the city hotel or club house is that of cleaning draperies, rugs, and furnishings, and of redecorating walls and ceilings. A great part of this is directly chargeable to coal smoke. The presence of more or less sulphur in the soot renders it a corrosive as well as a discoloring agent and greatly increases the damage done. Trees and shrubs suffer in such an atmosphere and are frequently killed outright by the presence of sulphurous smoke. The effect on human beings has not been definitely determined, but the deposition of soot on the delicate tissues of the respiratory organs can hardly be beneficial.

From 1850 to 1865 the interest in superheating revived considerably, and a moderate degree of superheat was quite extensively employed toward the latter part of that period. Hirn, in 1857, published the results of experiments made by him at Colmar, which were the most carefully conducted tests that had, up to that time, been carried out, and showed that, on a simple engine, working with a boiler pressure of 55 pounds, economies of 20 to 47 per cent could be obtained with superheat of 100 to 190 deg. F. In 1859, John Penn read a paper before the Institution of Mechanical Engineers describing several applications to steamships, the superheater consisting of a number of tubes about 2 inches diameter placed in the uptake just as it left the boiler, through which the steam passed on its way to the engine. The superheating surface was about 15 per cent of the boiler heating surface, and with a boiler pressure of 20 pounds on a condensing engine, about 20 per cent saving on fuel was obtained with a superheat of 100 deg. F. John Ryder, in 1860, in a paper before the same society described the Parson & Pilgrim superheater, which consisted of two horseshoe-shaped pipes placed in the internal flue of the boiler over the fire grate, and the Partridge, which was a cylinder filled with tubes through which the gases passed, the steam being around them. Both of these systems were stated to have given good results, which may appear rather questionable in the case of the former, but a total of 5,000 horse-power had then been equipped. The superheating surface employed was 2½ to 2¾ square feet per nominal horse-power, or about the same as that described by Penn, and the economies obtained were practically equal. Sundry other systems were in more or less extensive use about this time, such as the Crossland, Wethered, etc., and extensive experiments were carried out by Isherwood, in the American navy, which confirmed the good results obtained abroad.

Peary's Progress.

The following cablegram from Commander R. E. Peary was received by the Arctic Club:

"Domino Run, Labrador, July 29, 1905. Arrived this evening. Cross to the Greenland coast from here. All well. PEARY."

This indicates that the "Roosevelt" and "Erik" have made a record run from Sidney, where they were reported July 26, three days before the date of this dispatch, and unless unexpected obstacles were met in Melville Bay the expedition is now at Etah, Greenland, or Cape Sabine, Grinnell Land.

Commander Peary probably will not send his summer ship, the "Erik," back this year until September, as he has mapped out considerable work for her which still remains to be done.