Correspondence.

Extraordinary Depression in the Bed of a Florida River.

To the Editor of the Scientific American:

The following information regarding a phenomenon to be seen in Southern Florida would perhaps be of interest to you and the readers of your paper.

While knocking about the Gulf coast of Florida during the months of January and February, 1890, in search of game, our party had occasion to verify the long-rumored existence of an extraordinary depression in the bed of the Myakka River, situated immediately below what is known as Myakka Lake. This river is shallow and slowly flows over a bed of sand and ooze, and was at the time that we saw it extremely low, having, in fact, no longer a connection with salt water. Ten miles distant from the coast, and near the above mentioned lake, we came across a dark circular pool of water filled with innumerable fish and turtles (writer counted at one time 56 head of leatherbacks appearing at once). Our attention was attracted by the blackness of the water, which was plainly due to the great depth and to no impurities held in solution. We sounded the pool with a primitive arrangement of fish lines and wooden floats, and found it to be 136 ft. Considering the shallowness of all other bodies of fresh water in Florida, this is phenomenal; what makes it more so is the strong indication of a tide, *i. e.*, a regular ebb and flow in the water of this depression corresponding to that of the sea, ten miles off, although there is not a trace of salt to be found in solution. Lead sinkers that went to the bottom came up coated with a jet black deposit. The shaft that descends to such a depth must have sides of stone or coral, as the sand that lines its shores would soon fill it to the top from its tendency to drift, were it otherwise.

Have any of the readers of the SCIENTIFIC AMERICAN information of a similar freak in the formation of the soil of Florida ?

As far as I know, our party may claim to have sounded and verified the greatest depth of fresh water in that State, exceeding, in fact, any depth to be found fifty miles off shore in Gulf of Mexico.

HENRY H. KOEHLER.

Louisville, Ky.

The Telephone Suggested in 1854.

To the Editor of the Electrician, London:

SIR: We are all familiar with the earlier telephonic experiments of Reis, which are given in the *Jahres Bericht des Physikalischen Vereins*, of Frankfort, for 1860-61, and which are regarded as the precursor of the telephone of Graham Bell. Prof. Bell read a paper on the subject before the Society of Telegraph Engineers on October 31, 1877; and at this lecture I called attention to a still earlier description of a telephone by Charles Bourseul, which is to be found in the second edition of the Comte Theodore du Moncel's *Exposé des Applications de l'Electricité*, published in Paris in 1857 (vol. iii., p. 110). Du Moncel does not give any reference to the original paper: but in the *Didaskalia*, a weekly paper published at Frankfort-on-Main, dated September 28, 1854, there is an interesting account of his invention, which I do not remember to have seen printed in England. I am indebted to Messrs. Siemens Brothers & Co. for making the translation which I inclose, and, if not hitherto published, it will, I am sure, interest your readers, as his description of the principle of the telephone is almost as clear as if it were written at the present date. If he had only put his ideas to the test of experiment, we should have had the telephone in 1854.

It would be interesting to find the original source from which Count du Moncel derived his account of Bourseul's telephone. Yours, etc.,

LATIMER CLARK.

6 Westminster Chambers, Victoria Street,
London, October 28, 1890.

Didaskalia, No. 322, Thursday, September 28, 1854.

ELECTRICAL TELEPHONY.

The number of miracles with which electricity has astonished us lately is said to have been increased by one which would not only cause a revolution in electrical telegraphy, but would add considerably to its utility. The invention in question is nothing less than the electrical transmission of the *spoken word*. The idea was conceived by an educated and modest young man named Charles Bourseul (now living in Paris), who was a private in the African army in 1848, where he brought himself under the notice of the Governor-General by a course of mathematical lectures which he gave to his comrades in the garrison of Algiers. Possibly Bourseul's scheme, of the practicability of which he is perfectly convinced, may be one of those which learned men will afterward declare very simple, and which, if troubled about, would have been brought out much sooner. The principle of electro-telegraphy, as is well known, is the following: An electric current passing through a metal wire surrounding a piece of soft iron transforms the latter into a magnet. The magnetic properties of the iron vanish when the electric current is discontinued. This magnet, called the electro-magnet, can, therefore, alternately attract or repel a movable plate, which by its forward and backward movements produces the conventional signals used in telegraphy. It is further known that all sounds are transmitted to the ear through the air vibrating; and that, therefore, sounds are virtually vibrations of the air, and that the infinite variety of sounds is solely dependent on the rapidity and strength of these vibrations. If it were possible to construct a metal plate sufficiently sensitive and flexible to admit of the reproduction of the vibration of sounds (like the air), and if this plate could be connected with an electric current in such a manner as to alternately interrupt and continue it according to the vibrations of the air to which it would be exposed, it would be equally possible to electrically affect a similar metal plate so as to repeat exactly and simultaneously the vibrations of the first plate. This would create the impression as if the speaker had spoken in immediate vicinity of the second plate, or, if put differently, the ear would be affected in a similar way as if it had received the sounds through the first metal plate. Electrical telegraphy, which was once academically declared to be almost an absurdity, is now almost universally established; and if we investigate this new idea of the young scientist on the principles of physics, we find that not only no objection could be raised against the soundness of his theory, but that its practicability is more probable than that of electrical telegraphy was only a short time ago. If the theory should prove a success, electrical telegraphy will attain a position of general usefulness. No special knowledge or apparatus will be required, except a galvanic battery, two suspended plates, and a metal wire. Without any other preparation one person will have to speak into one of the plates, while the other person places the second plate close to his ear, thus enabling them to converse as if in private.

The youthful inventor is confident of the success of his invention, and challenges scientists to prove the impracticability of his theory on scientific grounds. In the meantime the invention fully deserves the attention which will, no doubt, be bestowed on it. L.

When and Why Air Brakes Fail.

Mr. P. H. Griffin, President New York Car Wheel Works, in a letter to the New York *Tribune*, gives the following information and advice:

Without entering into a technical explanation of the subject, it may be said briefly that the brakes are applied through the medium of rod connections, levers, etc., operated by the air brake mechanism. When the brakes are applied, compressed air is admitted into the air cylinder under each car, the piston is moved forward by the pressure, the motion is communicated through the rods, levers, etc., forming the brake connections, until the brake shoes are applied to the wheels.

The air pressure used is about seventy pounds to the square inch. It is manifest that this power, subdivided and applied through eight or more brake shoes, would not be sufficient to stop a train under headway; the power is increased by means of levers in the usual mechanical manner, with the usual result that the movement at the outer ends of the rods and levers, *i. e.*, at the brake shoes, is very much less than it is at the point the power is applied, *i. e.*, the air cylinder.

Some years ago air cylinders were made twelve inches long, but lately this has been increased to fourteen inches; the greater number in use are twelve inches long. When the air pressure is applied to the cylinder, the piston head is moved twelve inches. To obtain the increase in power required to apply the brakes properly, as stated, this movement is decreased to one inch at the brake shoes; thus, when the piston moves twelve inches, the brake shoes move one inch.

If for any cause the piston movement or travel of twelve inches does not apply the brakes, they cannot be applied by the air brake mechanism. The latter may be in perfect order, the operation of applying the brakes be performed either by design or accident, and yet the brakes will not be applied if the piston travel is not properly and effectively communicated to the brake shoes. Under each car will be found from thirty to fifty feet of the rods, levers and connections referred to. They are under severe strain every time the brakes are applied, and are constantly giving and stretching a little in service.

The brake shoes are rapidly worn out through friction with the wheels when brakes are applied; to take up this wear means are provided for shortening the rods and levers. It is not possible to utilize the total movement of one inch at each shoe, for the reason that even that small space represents the total amount available between the maximum application and the greatest relaxation; three-quarters of an inch is about all that can safely be counted on for actual service.

When the connections are adjusted with new brake shoes and everything in proper order, a piston travel of four inches will apply the brakes. As the shoes wear out or the connections give under strain or wear at the pivotal points, the piston travel must necessarily increase to effectively apply the brakes.

The wear of brake shoes is rapid, and the total effective travel of the piston is more than exhausted in the wearing out of one brake shoe. Constant attention must, therefore, be given to the connections to see that they are of proper length, and inspectors at certain points have this work in charge. As a rule the work cannot be done until trains are all made up and ready for departure; the air pressure is then applied, the travel of the piston watched, and if it is too great the connecting rods should be shortened in order that the brakes may be applied with less piston travel, and a margin of safety provided to allow for wear.

The very short time available for this work, the hurry and confusion incident to the departure of trains and the pressure to gain every moment of time in this age of minutes and seconds are serious obstacles to a proper performance of the work; unfortunately, it cannot be done at any other time unless every car is taken to some point provided with apparatus for making a test, a practice almost impossible when the great number of cars in service is considered, as well as the one that drawing room and sleeping cars are often in service constantly for months at a time.

The reports of the Michigan Central Railroad show that 2,316 cars passed Windsor, Ont., in the year 1889, with the pistons of air brake cylinders traveling twelve inches; on such cars absolutely no braking power was obtainable.

Nearly all of these were sleeping cars running through from distant points, the inspection and care of brake attachments being given by different railroad companies. In transferring the cars across the river from Detroit to Windsor and *vice versa*, time was afforded for testing the piston travel and a record taken with the above result. I do not know of any other railroad company making a systematic record of the kind.

During the last year the Michigan Central have equipped their cars with indicators, operating automatically, that show the exact condition of piston travel at all times. When the indicator is used the maximum travel of the piston is always shown, and the necessary alteration to take up wear can be made at any time. From a careful investigation of the subject on many of the leading railroads of the United States and Canada, I have no hesitation in saying that on one-quarter of all cars in service the braking power is so small as to be absolutely useless in case it is necessary to make a sudden stop, for the causes given above.

In every-day practice it can readily be seen that in making the usual stops an engineer can handle his train without difficulty; he knows perfectly the control he has over it, whether a moderate pressure will suffice or whether extra pressure must be used. The latter is always dangerous, through liability to stop and slide wheels, with entire loss of control. But when danger confronts him and he must strain everything to make an immediate and unexpected stop—well, we know they are not always made, and that the difference of a few hundred feet has a terrible result. Investigation follows; it is said that the "air brakes failed to work," and that is the end of it. I firmly believe if the attachments through which the air brake does its work were always in proper condition, accidents from this cause would be very rare.

The conditions of service above explained are in no way attributable to any feature of air brake construction or application. The manufacturers of air brakes have been indefatigable in their efforts to improve and perfect their devices. Without their labors it would be absolutely impossible to run trains at the speeds in practice to-day. It is only just to them, therefore, that accidents so commonly attributed to the failure of the air brakes should be located where they belong, and that every effort be made on the part of railroad managers to supplement the valuable appliances now obtainable with every safeguard that can be found for their effective use.

Oleo in Vermont.

The Vermont legislature has passed an act which will doubtless receive the approval of the governor. It prohibits the manufacture of "any article in imitation or semblance of natural butter or cheese" unless colored pink, and the use of oleo at any public eating house is also prohibited unless it is colored pink. Heavy penalties are imposed for violating the law. Butter is defined as "the product usually known by that name, and which is manufactured exclusively from milk or cream or both, and with or without salt or coloring matter."

It looks as if this new State law probably would be held to be unconstitutional and void. To say nothing of its interference with commerce, it is a prescription as to the manner of preparing an article of food, by which it is adulterated and contaminated. The legislature might as well enact that boiled eggs shall not be eaten in a public restaurant unless the shells are dyed green and the contents pickled in vinegar.