INTERESTING CORRESPONDENCE.

GUTTA-PERCHA THE BEST INSULATOR FOR SUBMARINE TELEGRAPHS.

MESSRS. EDITORS:—Allow me to correct a portion of the article published in your issue of the 18th ult. in regard to the cause of the failure of the Atlantic telegraph.

In your remarks you state that "several papers on the subject have been read before the British Association for the Advancement of Science, by some of the ablest and most experienced electricians in the kingdom, and it seems to be the general opinion that gutta-percha is absolutely worthless for this purpose, while india-rubber, from experiments extending over twenty years, promises to answer every requirement." This is a broad assertion; and in regard to any practical tests having been made, of a satisfactory character, with india-rubber as an insulator for submarine conductors, I would thank you, or any of the scientific contributors to the British Association, to name a single instance in which india-rubber has been used with success for a submarine telegraph line of any length, so as to warrant the statement, "from experiments extending over twenty years, that india-rubber *promises* to answer every requirement." On the contrary, it is known by those engaged in the manufacture of the article that sulphur, in combination with *metallic* bases, is necessarily used in the preparation of india-rubber, for the purpose of hardening and giving a proper consistency to the gum; this process is known as the vulcanizing or hardening process; therefore any material or compound having a *metallic* base must be a very imperfect insulation for submarine telegraph lines.

I am fully aware, however, that, in the preparation of india-rubber for telegraph lines, silex has been proposed to form a solid compound; this, however, is too imperfect an insulation for submarine lines, as it stands much higher as a conductor than other electrics used in the vulcanizing process, and which have been found defective, therefore the use of silex or ground glass will not improve the rubber insulation.

As to the use of gutta-percha as an insulation for submarine lines, we have the experience of the best electricians and telegraph engineers in this country and in Europe that there is no defect in *pure* gutta-percha, when properly prepared for the purpose, but that the defects in *long lines* are to be attributed, not to the insulation, but to the *wire* retaining or becoming saturated with the voltaic current during the working of the telegraph apparatus.

In regard to the *tests* made with gutta-percha, it is well known that within the last ten years gutta-percha has been universally used as the *only reliable insulator* for submarine telegraphs; therefore it is no longer an experiment, but a reality, as may be seen from the successful working of the following-named submarine lines: Dover to Calais, Danish Baltic Sea, Dover and Ostend, England and Holland, Holyhead and Liverpool, Irish Channel, Mediterranean, and other lines recently laid by Europeans; and if any better evidence of the perfect insulation of gutta-percha is required, I beg leave to refer you to the submarine line laid across the Black Sea by the British government during the Crimean war—the conductor used for the purpose being a small copper wire, 150 miles in length, covered with three coats of gutta-percha, and protected at the shore ends, from abrasion, by a covering of iron wire. This *tiny* strand was used, day and night, during the Crimean war, in transmitting the most important dispatches, involving the movements and safety of the armies and fleets of the allied powers in the Crimea; and I have yet to hear of a complaint being made against the working of that line—therefore I hold that the *practical use, for the last ten years*, of gutta-percha, clearly proves that it is the *only* material now known as suitable for insulating submarine telegraph wires.

Now, as you have quoted foreign electricians in the before-named article, permit me to refer to the same by making an extract from Bakewell's paper on the electric telegraph, published in London in 1859, in which he says:—"The use of gutta-percha as an insulating covering for wire has given rise to a new era in telegraphic communication. Gutta-percha is an excellent insulator, and wire covered with *two* coatings of that material, about one-sixteenth of an inch each, is so far protected that 100 miles of it, immersed in water, transmits an electric current from a powerful voltaic battery with very trifling loss. This perfection in insulation has greatly facilitated the establishment of telegraphic communication between England and the continent.

"The first attempt to establish a submarine circuit between Dover and Calais took place on the 28th of August, 1850. A single copper wire, about the thickness of a common bell wire, coated thickly with gutta-percha, was laid across the English channel experimentally, without any protection. It proved sufficient for the transmission of an electric current, and several messages were sent through it between Dover and Calais; but it was far too feeble to resist the action of the waves, and the following day it was cut through by friction against the rocks, and the communication was stopped.

"The plan afterwards adopted for a permanent submarine line was to enclose five similar wires in a hollow iron cable. The wires were first slightly twisted to prevent them from being broken when stretched. They were then covered with hemp yarn to protect the gutta-percha from attrition, and thus introduced into the hollow cable of twisted wire, of which they formed the core."

This cable was laid on the 17th of October, 1851, and has been in successful operation to the present time.

SAML. C. BISHOP.

181 Broadway, New York, Sept. 1, 1860.

We present the following letters from our correspondents, and shall be pleased to receive any practical suggestions which any of our readers may have to make in regard to any of the statements or inquiries contained in them. Correspondents sending such suggestions, however, will please to particularly comply with the request embodied in the note published at the head of our column of "Notes and Queries":—

PURIFYING NATURAL COAL OIL.

MESSRS. EDITORS:—Will you inform me what is the process used in refining the natural oils from the springs, in Pennsylvania or any other place, and what is the average cost per gallon; also the per-centage of waste, or the amount of refined oil derivable from a gallon of the crude material? How can the strong disagreeable odor be extracted from it? what would be the cost of an apparatus, sufficiently extensive to purify and refine about one thousands gallons per day? The process used in refining, at the oil wells in Canada, is simple distillation; but this does not in the least destroy the odor. I was told that the waste by distilling was only one-eighth.

J. M. G.

Port Huron, Mich., August 21, 1860.

[By corresponding with Mr. Joseph E. Holmes, of Newark, Ohio, our correspondent will obtain information respecting the price of oil-refining apparatuses. We have been informed that 82 per cent of beautiful oil (for illumination) is obtained from the natural coal oil of Pennsylvania, and it only undergoes one distillation. The peculiar odor of coal oil cannot be destroyed without changing its character. Caustic alkali removes its disagreeable odor in a measure, but it impairs its durable illuminating qualities. A skillful chemist should always be employed to superintend the process of oil distillation and refining.—EDS.

THE POROSITY OF GLASS.

MESSRS. EDITORS:—I have had quite an argument with some persons of this place, in regard to the porous properties of glass. A gentleman asserted that if you "take a glass bottle and cork it, wire down the cork, seal it with wax, lower the bottle down into the ocean and let it remain for a little time, the bottle will, on being hauled up, be found filled with salt water." To give a "clincher" to his argument, he said he had performed the experiment scores of times. Now will you have the kindness to inform me as to the truth of such a statement. I simply want an "official" corroboration one side or the other.

J. F. Jr.

Columbus, Ga., August 21, 1860.

[On page 269, Vol. IV. (old series) SCIENTIFIC AMERICAN, was published an account of a series of experiments conducted by Dr. Nelson, on board the ship *Tarolinta*, on her voyage to California in 1849, to determine the porosity of glass, by sinking a tube to great depths in the ocean. When the tube was corked and sealed with wax, salt water universally passed through the pores of the wax, but when the tube was hermetically sealed by fusing the glass with a spirit lamp, not a drop of water found its way into the tube, even when sunk to a depth of 89 fathoms. However, there is no doubt that glass, as well as all other substances, *is* porous. Water has been pressed through solid gold; appearing as a fine dew on the other side. Indeed, it is now generally admitted that the particles of matter do not touch each other at all. If a solid brass ball (heated) is placed upon a ring which is a very little too small to allow the ball to drop through, and the ball be afterwards cooled, it will drop through the ring, showing that the ball had become smaller. It is said that, if the particles of the ball touched each other at the first trial, they could not have been brought any closer together, and consequently the ball could not have been made any smaller by being cooled. To our mind, the inference never seemed to follow with strict necessity from the premises. If we knew the particles of matter to be globular, the conclusion would indeed be inevitable that after they were once brought in actual contact, the body composed of them could never become any smaller. But, if the particles are cylindrical, or of any shape other than the globular, they might be in contact in certain angles or positions, and still the body which was composed of them might be reduced in bulk by a change in these positions or angles. Most of our great intellects, however, including such men as Sir John Herschel, regard it as demonstrated that, in the most solid substances, the particles do not touch each other.—EDS.

GALVANIZED IRON VERSUS LEAD FOR PIPES.

MESSRS. EDITORS:—Among the answers to correspondents in your paper of July 28th, I notice one which speaks unfavorably of galvanized iron pipe for domestic purposes. I have been using it nearly five years for conducting water underground and a suction pipe to pumps, but have never observed any deleterious effects from its use. I have found it an excellent substitute for lead pipe in several instances, one of which I will mention. Several years ago, I put a lead suction pipe to a pump in a well belonging to one of McKeen & Quinn's cotton factories; after it had been in use nearly three years, I found it necessary to remove it, when it was found eaten through in several places. I then put in a galvanized iron pipe, which at the present time is apparently as good as when first put in, nearly three years since. I have found that when lead pipe is used to convey limestone water, it will in a short time be eaten through, while the galvanized iron pipe will not. Will you be so kind as to let me know through the columns of your paper what are the objections to its use?

W. Y.

Easton, Pa., August 25, 1860.

[In the answer published in our "Notes and Queries" of July 28th, the deletirous nature of lead or zinc was not alluded to at all. The answer was given with reference to the use of galvanized wrought pipe as a substitute for lead when laid under the ground. We had seen galvanized iron pipe become rusty and useless in a very short period, when placed under the ground, when lead pipe had endured for a great many years. The information which our correspondent furnishes respecting the corrosive action of lime-water on lead pipe is very important, because the prevailing opinion is that such water soon forms a crust in lead pipe, that *prevents* its corrosion and decay.—EDS.

CONSTRUCTION OF CIDER FILTERS.

MESSRS. EDITORS:—I want to know how to cheaply make a capacious cider filter. I have a cider mill and numerous neighbors desire to have great quantities of cider filtered.

A. W.

North White Creek, N. Y. August 25, 1860.

[Take a square or round wooden box made of one-inch pine plank, well braced, three feet in diameter and one foot four inches deep. Make it with a bottom perforated with numerous one-quarter inch auger holes, over which should be laid coarse hemp bagging. Now fill in the box for eight inches, with pieces of charcoal (animal charcoal is the best, but it is expensive) about nut size, and on the top of this place a four-inch layer of clean washed sand, and over all with a coarse hemp bagging, and you have a cheap and good filter. Any number of such filters may be used according to the quantity of cider to be operated upon, and the top cloth can be frequently washed, without disturbing the sand and charcoal. Before running any cider through, pass a stream of clear water into the filter for fifteen minutes, so as to remove any fine loose particles of the charcoal that otherwise would be mixed with the cider.—EDS.