Correspondence

Preservation of Wood against Decay.

MESSRS. EDITORS:—In your issue of Sept. 15th I noticed an article containing, in a condensed form, the views of a correspondent in regard to the preservation of wood. This subject is so interesting and of such importance, that I regret that want of space prevented your publishing the communication in full.

In some respects I fully agree with your correspondent as to charring wood. The advantages of charring a post do not consist, as scientific men have supposed, in the capacity of charcoal to absorb the gases from decaying substances. But the application of heat to such an extent as to create charcoal on the outside of wood, will drive out the surface moisture and coagulate the albumen of the sap, and render it insoluble in water. While this treatment, as a seasoning process, is of great benefit, no one at this day will contend that it is essential to the preservation of wood. Neither Kyan, Burnett, Payne, Boucherie, Bethell nor Robbins, ever charred wood, in order to preserve it. Still, in my opinion, a certain degree of heat is necessary, if it be properly applied, and with it and through it vapors may be infused into wood, which will render it indestructible.

But your correspondent asserts that the microscope reveals the cause of decay in wood as due to parasites feeding upon albuminous substances, and he recommends the use of hot air or superheated steam as a means of destroying the parasitic germs or albuminoids which, he says, cause the decay of wood. There is something very new and original in this idea, and it raises several important questions for consideration.

First, Are the parasites the cause of decay in wood?

In botany we learn that a parasite is a plant without the proper organic means or instruments to enable it to draw its nourishment directly from the organized elements, but which derives its support from other plants to which it attaches itself. In entomology and zoölogy the parasite is represented as some insect or minute animal which lives on the superior forms of animated nature. According to Ehrenberg and other scientific authorities, while these creatures exist wherever organized matter is undergoing decomposition, it does not appear that the decomposing process is due to their presence. "Wherever organic matter exists in a decomposing state, there they abound, acting as scavengers in devouring, in the state of comminution and decay, those particles of decomposing matter which, if left to be diffused throughout the atmosphere, might be productive of the most pernicious malaria." [See Ehrenberg and Leeuwenhock; also Redfield's "Nature in Living Forms," p. 690.]

Brande, in his "Encyclopedia," says, It is not certain that dry rot is caused by parasites; on the contrary the terms are applied to "spontaneous decomposition without the presence of fungi;" or where these parasites appear long after the commencement of the disease in the wood. We doubtless mistake the effect for the cause when we assume that parasites produce the decay of vegetable and animal substances. It would rather seem that they are generated in and are a product of the process of decomposition, and they live but to consume and assimilate those elements which would render the earth and air unsuited to the essential conditions of health and life. To this end, according to Ehrenberg, they multiply at the rate of millions daily. If the parasites had any active or vital existence before the albumen of the wood was in a state of putrefaction, they might possibly be destroyed, to some extent, by the application of heat or some other means. But they are chiefly distinguishable after the process of decomposition has fairly commenced. They are only found in animal and vegetable infusions after the same have been kept a sufficient time to develop their existence in and through the decomposition of such substances. [Orr's "Circle of Science," vol. i. p. 87.] Parasites may, therefore, be regarded as a result, and not as the cause of decay in wood.

Second, Can these parasites be destroyed by the application of heat, as proposed?

We are assured by the best authorities that the polygastic infusoria are very tenacious of life; while they are injuriously affected by strong poisons, they are capable of enduring great extremes of heat and cold, and are found alike beneath the snows of the highest peaks of the Alps, and in the hot springs that perpetually boil from the heat of volcanic fires. [Redfield's "Zoölogical Science."]

But for the sake of argument let us suppose that the parasites, parasitic germs, or albuminoids may be destroyed by heat; will not the wood, after they have been destroyed, be again infested with new and similar formations which will be equally destructive? These germs exist in water and in the air, as well as in organized substances, and may be readily deposited on the surface and in the pores of the wood even after it has been subjected to superheated steam. If vegetable decomposition is due to the presence and action of the parasites, heat can protect the wood from their influence no longer than it is subjected to the temperature requisite for their destruction. As soon as it is exposed to air and moisture, at ordinary temperature, parasites may be again developed, and very rapidly; for, according to Ehrenberg, the *hydatina seta* increased in twelve days to sixteen millions, and another species, in four days to one hundred and seventy billions. Besides, scientific experiments have already fully established the fact that any infusion of vegetable or animal substance may be boiled for hours, and if subsequently exposed to the atmosphere, it will soon swarm with myriads of microscopic creatures. By placing the wood in an exhausted receiver and thus excluding the air and establishing a condition incompatible with the laws which determine their existence, this regeneration or re-formation of parasites may be prevented. So it might be prevented by the continued application of heat at its boiling point, or at a sufficiently destructive degree of temperature. It is very evident that wood which has been treated with heat only, when no longer under its influence and not protected by an exhausted receiver, may, by exposure to the oxygen and moisture of the atmosphere, be in a short time covered in surface and have its pores filled with infinitesimal germs and forms of life, which may cause it to decay [Orr's "Circle of the Sciences," vol. ii. p. 217.]

But suppose it is true that the parasitic germs or albuminoids are co-existent with the wood, that they are the cause and not the result of decay, the next question of importance is, how can they be destroyed, and their re-formation and re-infestment prevented in the cheapest and most effectual manner?

The application of heat, simply, either in hot air or in superheated steam, may destroy them, as your correspondent claims, and it will also coagulate the albumen of the sap, etc., but it cannot protect the fiber against the effect of oxygen and moisture, nor can it prevent the regeneration or re-attachment of the parasites after the wood is again exposed to the air. Besides, this treatment will empty the pores to some extent and leave the ligneous fiber unprotected. The capillary tubes, being left open and exhausted of the vital elements of the living tree, will readily take up an increased quantity of water. This water will escape by evaporation when the wood is exposed to the action of the sun. And by the constant vicissitudes of temperature and the ever-varying degrees of moisture, the elasticity of the fiber will be diminished, and in time the integrity of the wood destroyed.

Hence it is that the celebrated Dr. Ure, in his dictionary of the arts, affirms that, "although the albumen contained in the sap of the wood is the most liable and the first to putrefy, yet the ligneous fiber itself, after it has been deprived of all sap, will, when exposed in a warm, damp situation, rot and crumble into dust. To preserve wood, therefore, that will be much exposed to the weather, it is not only necessary that the sap should be coagulated, but that the fibers should be protected from moisture." This necessity of further protecting the wood from atmospheric influence, after the albumen has been coagulated, becomes greater if, according to the theory of your correspondent, decay is caused by parasites, which the atmosphere furnishes so abundantly. Now the question recurs, and your correspondent has done well in raising it, what is the best means of driving out the surface moisture, of coagulating the albumen, of destroying the parasites, parasitic germs, or albuminoids, and of preventing all parasitic influence upon the wood thereafter?

In one of your issues of February I saw a very able article upon the process of preserving wood, invented by our American genius, Louis S. Robbins. According to my recollection, he proposes the use of coal tar and other oleaginous substances in vapor. It seems to me that these vapors will be found as hot as hot air or as superheated steam, that they will permeate the wood as readily, and more effectually destroy the parasites, parasitic germs, or the albuminoids referred to.

Now, coal tar is about thirty per cent creosote—which, as its very name imports, is an antiseptic, that is, preservative against putrefaction and decay. This creosote, in superheated vapor, will permeate the wood thoroughly, and destroy, not only by its heat but by its inherent poison, all the destructive parasites and other infusoria, and, at the same time, prevent putrefaction, and, besides, the wood, being thus saturated with a deadly poison, will be protected against any attack from the parasitic infusoria which might originate after the treatment.

Then, by the heavier oils eliminated by distillation, the wood is saturated and completely primed, and the fiber is thus protected from the oxygen and moisture of the atmosphere, as recommended by Dr. Ure. The ancients were accustomed to preserve both vegetable and animal forms and substances by a process that rendered them so far imperishable that many of them, in spite of parasites, have come down to us in a surprising state of preservation. Specimens may be found in museums of Egyptian and other antiquities, in which even three thousand years have neither obliterated the outlines of mortality, nor destroyed the cerements that inclose them. They employed bituminous substances in their embalming or preserving process, and, as we believe, in the shape of vapor, while others have vainly attempted the same results with metallic solutions. Bethell, of England, and Louis S. Robbins, the American inventor, are the only two who have resorted to the application of bituminous substances, Bethell using them in liquid form, while Robbins applies them more effectually in the shape of vapor.

So far as we are able to judge, the process of Mr. Robbins is the nearest approach to the treatment resorted to by the ancients. *

New York, Sept. 20, 1866.

Chimney Drafts.

MESSRS. EDITORS:—Some facts in my experience compel me to believe that Prof. Horsford, as quoted in your issue of Sept. 8th, page 160, has not given the true reason for the diminished draft of chimneys in very hot weather. As foreman of mining claims in Grass Valley, in 1855, the question of fresh air for the workmen, often a serious one, involving heavy expense, compelled me to familiarize myself with the conditions on which increased or diminished draft depends. The air from our adit level, one-fifth of a mile long, was stopped off from the hoisting shaft, 120 feet deep, and conveyed in a large wooden pipe to the work, several hundred feet further under the hill, and 200 to 230 feet below the surface. In this way the hoisting shaft was made to act as a chimney; now what made it draw? The temperature in the "diggings" was nearly constant the year round. During the night (the nights are very cold in California), a candle held at the end of the pipe indicated a strong current of cold air flowing along the level back through the works and up the shaft. After sunrise the draft became less and less, and ceased entirely whenever the temperature outside was the same as that in the diggings. During the heat of the day a current flowed down the shaft and out at the level, and the hotter the day the stronger the current.

Our supply of fresh air was best when the thermometer indicated the greatest difference of temperature between the air in the diggings and on the outside; the draft being up the shaft when the air was coldest outside, and down when it was warmest.

The interior of the house is often cooler during the heat of the day than it is outside, hence a current naturally flows down the chimney and out under the door. This downward current often gives trouble when the fire is being started. If the "upward currents on the outside of the house, arising from the heated surface of the roof and walls, draw the air outward by friction through cracks, open doors, etc.," why do they not draw it out of the chimney also, thus increasing rather than diminishing the draft?

It seems to me that the diminished draft of chimneys in very hot weather is due, first, to the tendency of the air in contact with the cooler surfaces within the house, to flow out under the doors, thus creating a draft down the chimney; second, to the diminished relative difference between the specific gravity of the air outside and that of the rising column of hot air within the chimney—the force of the draft depending entirely on such difference. Just as, other things being equal, a balloon will rise with the greatest force when there is the greatest difference between the specific gravity of the inclosed gas and that of the outside atmosphere.

J. W. PIKE.

Windham Station, Ohio.

Fire and Sunshine Experiments.

MESSRS. EDITORS:—Our furnace No. 1 weighed 11 lbs., 6 oz. No. 2, 11 lbs., 10 oz. They were both of the same pattern and by the same maker. We dried in an oven 24 lbs. of charcoal, allowed 12 lbs. to each furnace, used 12 oz. of wood and shavings, and half an ounce of spirits of turpentine to each furnace for kindling. The furnaces were open on the top. We started the fires simultaneously at 11 o'clock, A. M.; thermometer 96 degs. in the shade; the day was calm. Furnace No. 1 was placed in the direct rays of the sun, and No. 2 in the shade. Both furnaces were placed on benches 14 inches from the ground.

No. 2 was re-weighed at 11 o'clock and 27 minutes. No. 1 at 11 o'clock and 29 minutes. No. 2 consumed 15 oz. more fuel in the shade in 27 minutes than No. 1 did in the direct rays of the sun in 29 minutes.

The next day being favorable, the experiments were reversed. Thermometer 96½ in the shade. No. 1 furnace was placed in the shade, and No. 2 in the direct rays of the sun, and the experiments were carefully repeated, with the same results.

We conclude, therefore, that the cause of the difference in the consumption of fuel arises from the rarefaction of the air, there being even less oxygen in a given bulk in the sunshine than in the shade. The electrical state of the air may have something to do with these experiments, but we have no facts at present to prove it.

It is often said that when the fire burns brightly the family of the house are cheerful and happy. These two effects are produced by one cause, viz., the density of the air. Our lungs are physical furnaces; and the health and natural heat of our bodies depend as much upon the consumption of oxygen, as they do upon the consumption of food. The lungs, therefore, receive more oxygen with every inspiration in cold weather, than in warm. When, therefore, the air is cold, dry, and dense, fires will burn brightly and freely, and man will feel cheerful, and be more genial in his conduct.

As you published Prof. Horsford's experiments on this subject, I am induced to beg the same favor, so that we may draw out similar facts from other experimentalists. JAMES QUARTERMAN.

New York City, July 18, 1866.

[From our own Correspondent.]

FOREIGN SCIENTIFIC NEWS.

LONDON, Aug. 18, 1866.

Scientific news during the past week has been at a minimum. The Nottingham meeting seems still to absorb public interest, and in the general paucity of such information we are anxiously looking forward to the Congress of the Social Science Association, to be held at Manchester in the early part of next month. Great preparations are being made for this meeting, and highly interesting proceedings are anticipated.

The complete success of the Atlantic cable has occasioned the formation of several rival companies, designed to break up this monopoly, as it is even now characterized by many. In addition to the projected line over Behring's Straits, and another from Spain to Florida, via the West Indies, both of which are owned by Americans exclusively, there is the new English enterprise of completing telegraphic communication by means of several short lengths of cable between Scotland, the Faroe Islands, Iceland, Greenland, and Labrador. The route has been thoroughly and efficiently surveyed, and a contract has been made for duplicate cables for the whole distance of nearly four thousand miles.

One of the results incident to the successful recovery of the lost cable, is the fact lately published that the *Great Eastern* is thereby entitled to a large amount of salvage money, so that at last even she may prove a profitable invention and enrich her stockholders.

It is stated that the directors of the cable company are about completing a contract for a term of years with the Associated Press whereby the American papers are to be furnished with a daily telegram of forty words, for which the neat little sum of $110,000 in gold is to be paid annually, that is, $350 is daily to be paid for what can easily be printed in five lines.

The project of Mr. Hawkshaw, for tunneling the channel—which plan, by the way, is nothing new, but has been regularly proposed at intervals for many years past—meets with a counter project in a proposed international railway bridge, composed of pontoons, reaching from Calais to Dover, a distance of twenty-two miles. The bridge is to have several draws to allow the passage of vessels, is to be two hundred and fourteen feet in width, and to be constructed at a cost not exceeding sixteen millions of pounds sterling.

The water supply of London justly occupies a large share of public attention, for it is a most important subject for public consideration. The most feasible plan for furnishing the city seems to be the one proposed by Mr. Fuller, an English engineer of note. By his plan water is to be conveyed from near the source of the river Wye, in North Wales. The area of water shed of this river is one hundred and eighty thousand acres, with an available rainfall of sixty inches per annum. Mr. Fuller estimates the total cost at seven millions of pounds sterling.

M. A. C.

An Opportunity for American Gun Makers.

From our foreign advices we learn that Victor Emanuel, having failed in obtaining the Prussian needle gun for his army, has decided to invite inventors and manufacturers of fire-arms throughout the world to present their systems and specimens for trial, whether they relate to an entirely new weapon, or the conversion of the present musket. A special commission is to be appointed to test, examine and report upon the models, and decide which shall be adopted.

This is certainly an excellent opportunity for our inventors to achieve a fortune for themselves and reflect credit upon American enterprise and ingenuity. This trial, in connection with the great French Exposition, will furnish a means of introducing to Europeans many of our improvements, and of giving us the position, as a mechanical and manufacturing people, which our progress deserves. Probably the details of the applications will soon be made public, and we hope to see our inventors and manufacturers improve the opportunity.

The Grasshopper Scourge.

The Kansas farmers in Brown county and the adjacent territory, appear to have been lately subjected to a plague similar to those inflicted on Pharaoh. The obstinate grasshoppers appeared in countless numbers, covering a track twelve miles in width, and consuming almost all vegetation. The Marysville *Enterprise* says:—

"They alighted upon fields, gardens, fruit trees, and everything green or eatable, and, like a march of two hundred and fifty army corps, devoured every thing they touched. This whole country has been taken by them, and the rear guard is still with us, guarding what vegetables and green leaves the army has left. Farmers are seriously alarmed lest the corn will be totally devoured. They seem to be passing in a southwest direction."

Notes & Queries

S. N. T., of Md.—The adhesion of the metal in electroplating, depends mostly on the careful cleaning of the matrix. Some electro-platers give the article to be plated a thin coating of quicksilver before immersion in the cyanide. For coating with quicksilver, the carefully cleaned article is immersed for a moment in a weak solution of nitrate of mercury, and is then well rinsed in water. Failures in plating are often due to a want of harmony between the strength of solution, intensity of the battery, etc.

M. C. B., of Ill.—Shellac will probably prove to be the best cement for your purpose. If you can use it without dissolving, the joint will be more perfect.

S. M. H., of N. Y.—The substitute for nitric acid in Grove's battery, to which you refer, is a strong solution of bi-chromate of potash to which has been added sulphuric acid.

W. S. P., of N. Y.—First, We prefer to express no opinion in regard to the reliability of the paper to which you refer. Second, Brass, if burnished after polishing, will retain its luster better than if only polished. Still, it will tarnish in time, however close the particles of the surface. Third, Eight ounces of madder, four of fustic, and three ounces of logwood infused in one gallon of water applied hot; then an infusion of two ounces of nutgalls in one quart of water, after the first application is dry, will stain an imitation of black walnut. The proportions may be varied at will. Fourth, A dealer in metals could furnish you the number of the thinnest steel of commerce

———, of N. Y.—Send to Henry Carey Baird, 406, Walnut street, Philadelphia, stating the sort of mechanical books you need, and he will furnish you with what you want.

T. M. R., of Ala.—A vessel filled with hydrogen gas is heavier than one whose interior is a perfect vacuum.

R. C. N., of Ky.—Coal oil, or petroleum, is totally unfit for a hair dressing. By reference to page 397, Vol. XIV, current series, you will find a reply to a similar query.

A. V., of Pa.—We know of no depilatory preparation that is not injurious to the skin. Sulphuret of arsenic, a rank poison, is sometimes used, and so is lime, perfumed. Both are hurtful.

G. A. A., of Mass.—If you wish to convey steam 175 feet under ground, protect your pipe with hair felt and inclose the whole in a board box, packing the pipe in spent tan, saw-dust, straw, or fine charcoal.

R. E. C., of vt.—The advertisement you refer to appears to be a catch-penny affair. Send to H. C. Baird, 406 Walnut street, Philadelphia, for catalogue of books.

W. E. S., of Conn.—In our issue of Sept. 15th, we gave all the information we possessed in relation to the "Zopissairon cement." At present its ingredients are a secret.

NEW INVENTIONS.

The following are some of the most prominent of the patents issued this week, with the names of the patentees:—

CARD CASE.—F. A. LAMONTAGNE, Montreal, Canada.—This invention consists in the construction of card cases with a combination of springs and slides for the discharge of a card at a time without opening the lid, by simply pressing a slide on the top with the finger. It is designed for the use of ladies especially.

MACHINERY FOR WASHING WOOL.—JOHN PETRIE, Rochdale, Eng., and JAMES TEAL, Towerby, Eng.—This invention relates to that class of machines for washing wool and other fibrous materials, in which the said materials are placed upon a feed apron by which they are delivered into a vat or other vessel and are agitated therein, at the same time being moved forward to the other end of the said vessel, where they are lifted out of the fluid by a drum, armed with movable prongs, which at the proper moment retreat so as to deliver the material unto an endless apron, from whence they are taken by a pair of squeezing rollers.

CPIHERING MACHINE.—SAMUEL J. KELSO, Detroit, Mich.—This invention relates to a machine which can be used for adding, subtracting and multiplying figures of any desired magnitude, with the greatest ease and facility.

PUMP.—LOUIS DRESCHER, Matanzas, Cuba.—The object of this invention is to construct a pump which can be used in a very deep well, and which is so arranged that it is not liable to burst from the high pressure to which it will be exposed, and that it does not become choked by stones or other material dropping down in it. It is also so constructed that it can readily be raised out of the pump, and that easy access can be had to its valves.

ARTIFICIAL LIMB.—JOSHUA MONROE, New York City.—This invention consists in the arrangement of elastic straps in combination with an artificial leg or arm, to be secured to a stump below the knee or elbow joint in such a manner that the side irons can be dispensed with, and thereby the weight of the limb is reduced, and furthermore said straps can be readily so adjusted that the limb is drawn uptight in any position to which the joint is brought.

BORING ATTACHMENT TO TURNING LATHES.—C. E. MCBETH' Hamilton, Ohio.—This invention is an improvement in boring attachment to turning lathes, by means of which holes can be made round, smooth and straight. And it consists in combining a thimble, bush, and cap with each other, with the hollow spindle, and with the mandrel of the lathe.

MANGER.—JONATHAN JOHNSON, Kent, Ind.—This invention has for its object to furnish an improved manger, which may be kept