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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 499,

For the Week Ending July 25, 1885.

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THE LEAD BATH.

Melted lead for heating steel articles to be hardened has become quite common in shop use. There was a time when it was employed only for articles of varying thickness, so that the part to be hardened could be heated; while that to be left annealed need not be greatly warmed; but it has been proved that a more even heat can be obtained on articles of even size, as well as on those of varying dimensions, by the lead bath, and that the heating can also be done quicker than over a charcoal fire. There is another advantage in the lead bath heating, one of great convenience at times, and that is that the article to be heated may be kept an indefinite time in the hot lead without being burned; it will not get beyond the proper heat for hardening.

There is an improper use of the lead bath in the attempt to employ it for drawing to temper; the bath will do its absolute will, and as evenly and indiscriminately reduce the hardness as it heated the steel. This uniform drawing is not always desirable; there are tools and other pieces that require careful management and much humoring to bring them to their proper degrees of temper. This cannot be done in the evenly heating lead bath; the proper drawing is either over a clean charcoal fire or in a bath of heated sand. Whenever the last can be used, it is preferable on all accounts.

Of course, such drawing must be done to color, and this is one of the advantages of the lead bath for heating for hardening; the steel does not contract an oxide so thick or so discolored that the steel itself may not be seen. In heating for hardening in a fire the surface of the steel is burned, so that it contracts a coating that must be removed by direct abrasion, before the true surface of the steel can be seen. But in lead heating the lead appears to be a defense against the oxygen of the air, and the steel comes out clean. The writer has made tests that prove that the surface of machine polished steel coming from the lead bath, and being chilled in a pickle or in water, will show every gradation of color as to temper without being previously scoured or brightened.

The lead bath must be of pure lead. It will not do to use the sheet lead of old eaves, gutters, and the pipe of old drains from sinks, eaten half through with atmospheric acids and the worst corrosives of the kitchen; the lead must be chemically pure. Buy lead in pigs from the mines—the Galena brand is reliable—or buy the somewhat higher priced bar lead. Both are as nearly absolutely pure as is possible. Melt in a plumbago crucible or an iron pot. Heat the lead to a cherry red and keep it so. Cover the surface with charcoal dust. Suspend or immerse the articles to be heated in the bath until they are heated through. They need no attention until you are ready to harden them. No pewter, type metal, or junkshop stuff will do for a heating lead bath; the heat cannot be even, and the bath will not be clean.

There are exceptions to the objection of drawing in the lead bath. Sometimes there are portions of an article that require softening or annealing, while the remainder is left hard. In such a case the portion to be softened may be immersed in the bath and be annealed without affecting the other portions, as would be done by radiant heat.

A New Swedish Invention.

The Swedish civil engineer A. F. Westerlund, of Stockholm, has lately obtained letters patent of the U. S. for a very useful invention within the chemical and technical branches of science. It consists in the production of an almost incombustible coal, which stands between the graphite and the diamond, and is consequently named diamond coal. Its production is very simple and inexpensive, and the invention so important for both hygienic and technical purposes that it can almost be looked upon as the Columbian egg. This invention can be divided into two branches, one for hygienic and the other for technical purposes, which latter have not yet been fully compiled. The hygienic part is based principally upon the production of a coal in felt form, which through its antiseptic properties has created quite a sensation within the medical fraternity, both here and abroad. It is known under the name of carbon wadding. The highest testimonials of the first military surgeons of Sweden have been gladly given to the carbon wadding, and it has been introduced into the principal hospitals in London. It can be made from any vegetable substance, such as moss, hay, straw, cotton, paper, cork, wood shavings, etc.

Prof. Esmark, Surgeon-General of Germany, has given the invention the very best recommendations, and the carbon wadding is now in use in the English navy. A large shipment has gone to the Soudan. The Samaritan Society's most active member in London, Mr. Macleer, considers it one of the best dressings for external injuries, to be applied as the first bandage in any case of necessity, and says that no home should be without it. Every conductor, police officer, fireman, and traveler should always carry with him a pocket bandage, which is always ready for use, and does not occupy more room in the pocket than a small cigar case. In the United States the carbon wadding has met with favorable results, considering the short time it has been here. Prof. Lewis A. Sayre, Dr. Pihlgren, Dr. Hazelton, Dr Phelps, Dr. Theel, and others speak of it in the highest terms. For disinfectant purposes the diamond coal is said to stand alone, unrivaled.

It would be impossible in a small space to state all the particular advantages of this invention for technical purposes, but we shall mention a few of the principal ones. It is one of the best insulators for cold or heat, and has as such caused considerable attention both in Europe and here. For steam packings it is said to be without a rival, because it is an excellent nonconductor of heat, and is very light. It is stated to be the best filling for safes, refrigerators, etc., and for this purpose only it may be considered of inestimable value. For producing fireproof roof coverings, mortar, painting woodwork, railroad bridges, etc., to prevent them from destruction by fire or rot, the diamond coal has a very promising field.

Extensive experiments have been made with the diamond coal in the electrical field, and it has shown even here its real value, and promises, so we are told, to be the best material for the carbons in the electric light. Other uses for this invention are in the manufacture of dynamite and gunpowder, for, by a very simple chemical process, it can be completely converted into charcoal of the purest quality. Several other uses can be made of this coal, and it is alleged that Mr. Westerlund, by his invention, has given the world a new material, which will most forcibly make its headway into the different branches of industrial interests.

This invention has been shown and recommended by the principal chemists and physiologists, and such eminent men as Professor A. E. Nordenskiold, Professor Erick Edlund, of the Academy of Sciences, etc., Professor V. Eggerts, of the College for the Sciences of Mining, etc., Professor E. M. Edholm, Chief Surgeon of the Swedish Army and Physician in Ordinary to the King, etc., Surgeon-Major H. W. Hulphers, Physician to the King, and many others.

Patents have been obtained, besides the United States, in Sweden, France, England, Germany, Belgium, Austria, and Russia. Engineer Westerlund has associated himself with one of Stockholm's most prominent firms, Elfwing & Co., and one of the principals of this well known house, Mr. C. M. Ohrnell, is now here in New York, where he has opened an exhibition of this new invention at Cooper Institute, room 25.

Remarkable Race of Steam Yachts.

The second annual regatta of the American Yacht Club, on the 16th of July, over the course from Larchmont, N. Y., to New London, Conn., distance 92 miles, resulted in victory for the Stiletto. The day could scarcely have been more favorable, for not a breath of wind was stirring strong enough to ruffle the smooth waters of Long Island Sound. As was expected, the already famous little Stiletto was the center of attraction: she made the run over the course in 4h. 49m. 54s., coming in ahead of all competitors. Mr. Gould's well known yacht, the Atalanta, made the second best record, having taken but four minutes more than the Stiletto. Cramp's new yacht, No. 246, also did remarkably well, being only 13 minutes behind the Atalanta. Two prizes were awarded the Stiletto—the Commodore Cup for the best time over the course, and the Isherwood Cup for the best time in her class. Other cups were also won by boats in different classes. The Emery Cup in the first class was not won, as the Atalanta was the only eligible boat, and it required two starters to make a race. Seventeen steamers were entered, as follows:

Name.	Draught.	Owner.
Lagonda	118 ft.	J. C. Hoagland.
Radha	135 ft.	J. M. Seymour.
Promise	90 ft.	A. De Cordova.
Stiletto	91 ft.	John B. Herreshoff.
Lucille	63 ft. 9 in.	John B. Herreshoff.
Norma	131 ft.	Norman L. Munro.
Sophia	100 ft. 1 in.	C. H. Osgood.
Utowana	122 ft.	W. E. Connor.
Lucille	88 ft. 3 in.	Jas. N. Waterbury.
Rival	87 ft. 8 in.	J. A. Baker.
Skylark	74 ft. 3 in.	A. E. Bateman.
Aida	90 ft.	W. P. Douglas.
Atalanta	228 ft.	Jay Gould
Sphinx	52 ft.	Cyrus W. Field, Jr.
Cramp's	148 ft.	Cramp & Co.
Hornet	37 ft.	F. A. Mitchell.
Viola	52 ft. 9 in.	J. P. Kennedy.

At the last annual meeting of the Sturtevant Mill Company, Mr. E. C. Huxley, of Boston, was elected president, and has assumed the general management of the business. Mr. T. L. Sturtevant was re-elected treasurer. Their machines for crushing and grinding ores, phosphates, etc., are the first ever constructed where the material crushes and grinds itself, and recent testimonials from various parties using them for several months are very gratifying to the company. The offices of the company are at 89 Mason Building, Boston.

Carriage by Electric Wire.

This is a wire line for carrying freight or passengers by electricity through the air. The wires or cables in double line, and about eight feet above the other, are borne upon stout posts about the same as the electric light cables are, and the cars or crates for carrying passengers or freight are suspended from the upper cable and supported or borne upon and guided by the under cable as if it was a rail. The lines are adapted to loads of a few hundred pounds each up to a ton weight, including the car, and, as in the case first mentioned, the cars are designed to be sent with great frequency and in any desired number. The driving power is electricity, supplied by steam engines and dynamos at the termini of the line, the carrying cables serving as conductors, just as telegraph wires or cables do, the current being passed by means of the car wheel axles and intervening wires through an electrical motor, which operates under or at the side of the car and travels along with it. We have seen a model of this in operation, the model being large enough to carry a load of about one hundredweight over a line of about one hundred feet in length. The electrical motor used to work this model was an Edgerton of the size employed to drive a sewing machine. So far as smooth movement and speed are concerned, and to all other appearance, the device works in a satisfactory way; but in this as in all other matters of the kind, as the readers of the *Ledger* have been frequently advised, no safe judgment can be made until the machine has been in actual operation for a fair length of time, doing its work day in and day out.—*Phila. Ledger.*

Climatology of the Puget Sound Country.

The inland waters of Washington Territory, Puget Sound, and its tributaries are frequently called the Mediterranean of the Pacific Coast, and justly so, for they are equally exempt from equinoctial storms. Since the Weather Bureau was established on this coast, the highest wind has reached a speed of only about forty miles an hour. During an observation of thirty-one years, the lowest temperature ever recorded was 10° above zero. The highest for the same length of time was below 90°. But in the interior and nearer the mountains, even but a little above the sea level, there are greater extremes of heat and cold.

On this northwestern coast there are no extremes of cold in winter or of heat in summer.

The "Kurosewo" are Japanese currents that set over to the northeast from Japan as they pass to the south of the Aleutian Islands, and strike the coast of Alaska about 60° north latitude, are deflected, or turned to the south-southeast along the coast of Alaska, British Columbia, the United States, and Southern California, to Cape St. Lucas in latitude 22° N. This body of water has a current along the coast of one mile an hour. It is nearly five hundred miles off the coast and nearly one thousand fathoms deep. The year round this body of water is one-half a degree warmer off the coast of Sitka, Alaska, 57° N., than it is off the coast of Cape St. Lucas, which is 22° N.

This body of water all along this coast has a temperature of 55°, and does not vary from these figures more than 3° the year round; but increases some 10° as it passes to the westward.

Now, this body of water has lost one-half of one degree in traversing three thousand miles to the south—quite one-half the distance from the North Pole to the equator. Probably the true cause of our mild winters is this vast body of water giving up its specific heat, and the aqueous vapor of the atmosphere giving up its latent heat by condensation, and *vice versa* for the summer months.

From Oct. 15 to April 15 the prevailing winds of this northern coast are southerly, bringing air from a warm, tropical climate into a colder one, making the rainfall, as you go north, about one and a half inches more to every degree of latitude. This southerly wind causing rain, and a damp atmosphere, and together with the warm current of water flowing along the coast, may be another cause for our mild winters.

From April 15 to Oct. 15 the prevailing air currents are from north to northwest. The atmosphere has given up its moisture by condensation in a cold climate. On its passage to the south it is dry and constantly picking up or restoring the aqueous vapor and heat as it moves toward the south. The dryness of the atmosphere is the probable cause of our cool nights during the summer months, which in Seattle, for example (about 47° north latitude), never varies much from 60° Fahr. at night, when at midday the thermometer has run up to 84°. A fall of 24° in two or three hours is not uncommon.

Prof. Tyndall relates an instance in one of his ascents of Mt. Blanc where the heat of the sun was oppressive while traveling over snow and ice, and by getting under the shelving bench of rocks the cold was severe. This he attributed to the dryness of the atmosphere at this altitude. He also says: "If it were not for latent heat that is stored up in the aqueous vapor of our atmosphere, a single night would leave us in a frigid zone that would freeze vegetation from the face of the earth."

This phenomenon frequently presents itself here. The cirrus or upper clouds will be moving from the north to the south, when the cumulus are moving in an opposite direction. This shows that the summer winds are much more local, or are land breezes.

Another feature of the winters on this coast is the "Chinook," or hot wind, which is a brisk breeze of thirty or more miles an hour. It will cut and melt eighteen inches of snow from the earth's surface probably quicker than a tropical sun.

It is not uncommon along the coast of California and Southern Oregon for three inches of water to precipitate in twenty-four hours, and this with a driving south wind. The large amount of latent heat that is stored up in the aqueous vapors becomes specific by condensation in the warm or "Chinook" winds.

These copious rains of California are a thousand miles south from Seattle, but the "Chinook" winds reach us unaccompanied by rain in twenty-four hours. In these "Chinook" winds the cumulus or lower clouds are passing very high in our atmosphere. Probably a large amount of the snow is wafted by these winds to British Columbia and Alaska, to be again precipitated in copious rains in the vicinity of our last named neighbors. These winds are not of a local nature; they extend over a vast area of the northwest on both sides of the Cascade Mountains, over Oregon, Idaho, Washington Territory, and British Columbia. Their temperature in the vicinity of Seattle is nearly 70°.

CONSTANT READER.

Iron as Fire Resisting.

Some interesting and instructive experiments have been lately undertaken by Professor Bauschinger, of Munich, in reference to the safety of cast iron columns when exposed to the action of great heat. The Professor, having arranged some cast and wrought iron columns heavily weighted, exactly as they would be if supporting a building, had them gradually heated, first to three hundred degrees, next to six hundred degrees, and finally to red heat; then suddenly cooled them by a jet of water, just as might happen when water is applied to extinguish a fire. The experiments showed that the cast iron columns, although they were bent by the red heat, and exhibited transverse cracks when the cold water was applied, yet they supported the weight resting on them; while the wrought iron columns were bent before arriving at the state of red heat, and were afterward so much distorted by the water, that restraightening of them was out of the question. In fact, if supporting a real building, they would have utterly collapsed under the weight they had to sustain. The Professor therefore concludes, as the result of his experiments, that cast iron columns, notwithstanding cracks and bends, would continue to support the weights imposed upon them; while wrought iron columns would not. In experimenting on pillars of stone, brick, and cement concrete, the last was found to be the best. Cement concrete pillars withstood the fierce action of the fire for periods varying from one to three hours; brick pillars, as well as those of clinkers set in cement mortar, displayed great resistance; while natural stone—granite, limestone, and sandstone—were not fireproof. It would therefore appear that, of the several materials for pillars supporting weights, the best for fire resisting purposes were the cast iron and cement concrete.

Crazy Quilt Architecture.

The following from the pen of Bill Nye, in the Chattanooga *Times, The American Architect and Building News* thinks, contains more truth than fiction:

It may be premature, perhaps, but I desire to suggest to any one who may be contemplating the erection of a summer residence for me, as a slight testimonial of his high regard for my sterling worth and symmetrical escutcheon—a testimonial more suggestive of earnest admiration and warm personal friendship than of great intrinsic value, etc.—that I hope he will not construct it on the modern plan of mental hallucination and morbid delirium tremens peculiar to recent architecture.

Of course a man ought not to look a gift house in the gable end, but if my friends don't know me any better than to build me a summer house, and throw in odd windows that nobody else wanted, and then daub it up with colors they have bought at auction, and applied to the house after dark with a shotgun, I think it is time that we had a better understanding.

Such a structure does not come within either of the three classes of Renaissance. It is neither Florentine, Roman, nor Venetian. Any man can originate a style of architecture if he will drink the right kind of whisky long enough, and then describe his feelings to an amanuensis. Imagine the sensation that one of these modern, sawed-off cottages would create a hundred years from now, if it should survive. But that is impossible. The only cheering feature of the whole matter is that these creatures of a disordered imagination must soon pass away, and the bright sunlight of hard horse-sense shine in through the shattered dormers and gables of gnawed off architecture of the average summer resort. A friend of mine, a few days ago, showed me his new house with much pride. He ask me what I thought of it. I told him I liked it first rate. Then I went home and wept all night. It was my first falsehood.

The house taken as a whole looked to me like a skating rink that had started out to make money, and then suddenly changed its mind, and resolved to become a tannery. Then ten feet higher it had lost all self-respect, and blossomed into a full-blown "drunk and disorderly," surmounted by the smoke stack of a foundry, and with the bright future of thirty days ahead with the chain gang. That's the way it looked to me.

The roofs were made of little odds and ends of misfit rafters and distorted shingles that somebody had purchased at sheriff's sale, and the rooms and stairs were giddy in the extreme. I went in and rambled around among the cross-eyed staircases and other nightmares till reason tottered on her throne. Then I came out and stood on the architectural wart called the side porch, to get fresh air. This porch was painted a dull red, and it had wooden rosettes at the corners that looked like a brand new carbuncle on the nose of a social wreck. Farther up on the demoralized lumber pile I saw now and then places where the workman's mind had wandered, and he had nailed on his clapboards wrong side up, and then painted them with the Paris green that he had intended to use on something else. It was an odd-looking structure indeed. If my friend got all the materials for nothing from people who had fragments of paint and lumber left over after they failed, and then if the workmen constructed it nights for mental relaxation and intellectual repose, without charge, of course the scheme was a financial success, but architecturally the house is a gross violation of the statutes in such cases made and provided, and against the peace and dignity of the State.

There is a look of extreme poverty about the structure which a man might struggle for years to acquire and then fail. No one could look upon it without feeling a heartache for the man who built that house, and probably struggled on year after year, building a little of it at a time as he could steal the lumber, getting a new workman each year, building a knob here and a protuberance there, putting in a three cornered window at one point and a yellow tile or a wad of broken glass or other debris at another, patiently filling in around the ranch with any old rubbish that other people had got through with, and painting it as he went along, taking what was left in the bottom of the pot after his neighbors had painted their bob sleds or their tree boxes—little favors thankfully received—and then surmounting the whole pile with a potpourri of roof, a grand farewell incubus of bumps and hollows for the rain to wander through and seek out the different cells where the lunatics live who inhabit it.

I did tell my friend of one thing that I thought would improve the looks of his house. He asked me eagerly what it could be. I said it would take a man of great courage to do it for him. He said he didn't care for that. He would do it himself. If it only needed one thing, he would never rest until he had it, whatever that might be. Then I told him that if he had a friend—one that he could trust—who would steal in there some night when the family were away, and scratch a match on the leg of his breeches, or on the breeches of any other gentleman that was present, and hold it where it would ignite the alleged house, and then remain to see that the fire department did not meddle with it, he would confer a great favor on one who would cheerfully retaliate in kind at call.

Motive Power for Tricycles.

Several attempts have been made to utilize electrical energy through the medium of secondary batteries for propelling tricycles and light vehicles, but so far we have not seen anything beyond the experimental stage. Many inventors have also striven, with more or less success, to produce a mechanical motor depending for its movement upon the explosion of a gaseous mixture composed of petroleum and compressed air. The most practical of these is, we think, that of Mr. Eteve, which was introduced last year into this country, but of which we now hear nothing. This principle, says the *Electrical Review*, has been applied to the propulsion of tricycles, and such a vehicle may be seen in the Inventions Exhibition. It is stated that by the consumption of from three to five pints of common petroleum oil per hour, in the "velocycle," as it is called, sufficient power is generated to give to the vehicle with its rider a speed of from 10 to 15 miles per hour. The generator contains a supply of petroleum, enough for a run of three or four hours, from which is evolved, by the aid of two small compressing pumps, the gaseous mixture for consumption in the two engines, in combination with the compressing pumps affixed to the frame of the vehicle in front of the driving wheels and seat. The ignition necessary for the expansion of the gaseous mixture is effected by means of sparks from a tiny electric machine, as in the Eteve engine, at the early part of the outgoing strokes of the pistons in connection with cranks on driving wheels shaft.