salts can only be employed in very small doses, as recent experiments of Monsieur Marme have shown them to be violent poisons. The best antitode is the carbonate of soda and the white of an egg.

The following mixture burns with a brilliant white flame, surrounded by a magnificent blue border: Salpeter, 20 parts; sulphur, 5 parts; sulphide of cadmium, 4 parts; lamp black, 1 part.

This can be moistened and made up into balls or candles, and ignited after the manner of a fuse.

We have thus given the history and prominent applications of the rare metal, cadmium.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Improved Apparatus for Extinguishing Fire Wanted.

MESSRS. EDITORS:—I have read with interest your recent article regarding losses by fire from steam heating apparatus. Last winter we had a hot house, the property of Denn s Bowen, Esq., of this city, destroyed by fire. I gave it my opinion that the cause of it was from their heating pipes, which were directly under the wooden platform where the fire first appeared, but those who claim to be competent judges scouted the idea.

It seems to me that the sprinkler apparatus used in the woolen mills, alluded to in your paper, week before last, would be an excellent thing to use in our elevators in this city, which invariably burn up, when they catch fire, owing to the combustible material of which they are made, and the draft caused by the bins running from the top to the bottom of the elevator. I wish you would wake up some of the scientific men to making improvements in the manner and machinery of extinguishing fires, it seems to be the most neglected of all the branches of business. To be sure there has been considerable improvement made, such as the steam fire engines, fire alarm, telegraph, etc., etc. But don't you think that there is still further improvement to be made? It seems to me that a fire engine can be made which does not weigh over three thousand pounds, and still be as effective as the ones which are now used that weigh seven thousand pounds.

I have taken great pleasure in reading your valuable paper, and I hope it may long continue in its field of usefulness.

PETER C. DOYLE.

Buffalo, N. Y.

Purifying Drinking Water.

MESSRS. EDITORS:—Your correspondent in No. 9, present volume, suggests a very good remedy for keeping water pure; but it is at the cost of extra care, and manual labor, and expense of an air pump which requires close attention to operate successfully for any length of time.

My remedy is to use a pump that will give a slight agitation to the water every time the pump is used. I used in a large cistern a Joyce submerged pump, which consists of a semicircular cylinder, with arms extending out each side, and operating on a pivot to force the two plungers back and forth in the cylinder. These arms were connected by rods to a double handle at the top to give motion. This plunger with the two rods produced an agitation that kept the cistern water sweet for years. The pump was located a few inches from the bottom, and it never produced roiling.

As the pump was used from twenty to fifty times a day, I think it was more efficient than would be an air pump, with the great liability of neglect. There are similar pumps in use, but I can speak from experience of this one only.

Omaha, Nebraska. J. M. G.

Boiler Test Proposed.

MESSRS. EDITORS:—I would suggest through your valuable paper that at the coming exhibition of the American Institute this fall, a test of steam boilers should be made to ascertain what boiler will produce the most steam power with a given consumption of fuel.

The proper way to test them would be to have a tank full of water in which a propeller wheel of coarse pitch connected to a 40-horse power engine is arranged to work. The boiler that gets the greatest number of turns out of the wheel with least consumption of fuel should be pronounced the champion boiler.

If a test of this kind takes place, I, for one, will furnish a 40-horse power boiler of my patent.

HUGH LESLIE.

Jersey City, N. J.

[Our correspondent is perfectly safe in this challenge. The American Institute will not commit themselves, we understand, to any test of boilers this year; but if they would do so, they would scarcely permit so unscientific and unsatisfactory a method as our correspondent proposes. We have asserted and reasserted over and over again that the only reliable test of a boiler is its evaporative power compared with the fuel it consumes, and yet our readers will persist in complicating the problem by saddling some other condition upon it. As well might it be proposed to test a boiler by running an engine and a cotton mill with it as an engine and propeller wheel. Believe us, friends, an engine and boiler are two distinct animals. They don't belong even to the same genus, let alone species. To test the speed of a horse we do not tie an elephant to his tail and run the two together.—EDS.

AS FAR as man can go back in time, says Dumas, as far as man can reach by observation in space, the concrete elements of matter present the same character as Lavoisier's elements.

POOR TIME.---HOW TO DOCTOR DISABLED CLOCKS.

WRITTEN FOR THE SCIENTIFIC AMERICAN BY F. P. WARREN.

As the worm is to fruit, making it deformed and one-sided, so are poor timepieces to our lives, making them unsteady and irregular. We can plainly see that there is much loss of time in being too early, or too late for meals, for trains, and for engagements, or that the broken rest, taxing the mind with the rising hour, and standing in the cold waiting for the train, will affect the health; but we little realize the unconscious influence that living by a poor timepiece has in forming unsteady and irregular habits in a family. It is a secret enemy, and as such, should be conquered, and trained a trusty servant, or destroyed like the vermin of the house, or the weeds of the garden. And on every mantle, be it palace or mansion, cottage or hovel, should stand a clock that can be depended upon.

WHAT IS THE MATTER WITH THE OLD CLOCKS?

Resinous dust mixes with the oil on clock pivots and forms a wax, which, when thick enough, will stop the clock. As a grinding tool can be made with diamond dust embedded in brass, which will continue to cut till no brass remains to hold the dust; so sand and gritty dust is caught by oiled clock pivots and ground into the brass, where it remains embedded, even after the most thorough cleaning. The particles of grit, together with bits of steel, ground from the pivots, can be plainly seen with a good microscope. Grit grinds the pivots of clocks rough, and often grains of sand are embedded in flaws and rough places. Such pivots will soon cut out new bushing.

THE REMEDY.

Scrape the bearings and polish the pivots.

PIVOT POLISHING.

This may be done by means of a very simple lathe made of a piece of board, cut something like a boot-jack, the hole about two inches square, with a wood center or plug in one ear, holding one pivot, the other ear cut off even with the plug and notched to receive the pivot to be polished; a small bow, with a violin string, running on the pinion or arbor, turns the wheel, while a few strokes of the pivot file on the pivot, will polish like glass. It requires a little practice to get used to working the bow, and the pivot file, in opposite directions, at the same time, but, when familiar with the operation, pivots are easily and speedily polished. There should be two holes in the end of the plug, and two corresponding notches in the end of the short ear, to receive both large and small pivots. The plug should be held with a thumb screw so that it can be easily varied to suit the different lengthed arbors. A common wood screw, with the head altered, will answer.

This "board lathe" can be held upright in a vise, or otherwise conveniently fastened. The common "verge lathe," with wood centers, will work well with small wheels, but there is not swing enough for the large ones, which often need polishing the most.

TO MAKE A PIVOT FILE.

Grind a common flat file perfectly smooth, roughen with emery paper, and always use with oil.

TO BUSH.

Bend sheet brass into a tube with the hole the size of the pivot; ream the unworn side of the hole in the clock plate till the hole is round, then ream equally to the size of the tube, beveling the edges; swedge the tube in, and dress to the proper size.

The common way of bushing is to close the hole with a punch, but this, closing only near the edge, leaves a poor bearing. A better way is to cut a hole through the plate about one-eighth of an inch from the pivot hole, with a narrow chisel. The pivot hole will close as the chisel hole is enlarged, and can be reamed out to make a good bearing. The chisel should be about one-twelfth of an inch wide, gradually enlarging back from the edge.

CLEANING CLOCKS—HOW NOT TO CLEAN A CLOCK.

Forget to let the springs down; bend the escape wheel points awkwardly, working at the pin underneath; raise the upper plate a little, and the clock will come to pieces itself. Go around the room and pick up the wheels, not noticing the bent cogs and pivots, and lay them together, where the boys can play with them while you are cleaning. Wipe the plates with an old, greasy, sticky chamois skin or rag, clean the holes with a dirty string, and, if the boys' fingers are quite dirty (and what boys' are not who are always handling things?) let them hold and hand you the wheels, when you find a place for them. If the clock does not go together good, loose your temper and make it; if the wires are in the way, bend them out, and when the clock is together, bend them again to make it strike right. After handling the verge and touching the escape wheel points with your sticky fingers, oil the whole clock profusely—get your pay—and then, if it don't run till "taken home," or till you get "around the corner," tell the owner it is worn out and advise him to buy a new one.

HOW TO CLEAN A CLOCK.

Touch watch oil to the pivots, and run the wheels to loosen the dirt; too deep and too shallow gear notice, and mark the holes that need bushing; tie the springs with strong cord, loosen the click spring, and let them down steadily by the key turning in the palm of the hand. If the two largest wheels of the trains are alike, mark the strike side, that there may be no mistake in putting together. Wipe thoroughly every part of the works with a clean rag. Clean the cogs with a pack of cards riveted together. If the clock is old, scrape them with a sharp knife; polish the pivots if at all rough or worn, and clean with a fresh rag pressed well against the shoulder with the thumb nail. The pivot holes, if the pivots are worn rough, should be lightly scraped with a sharp reamer, and cleaned with a pine stick till they no longer blacken it.

PUTTING UP CLOCKS.

Always work slow, and pin as you go, using shoemakers zinc nails.

Time train wheels are always plain; the wheels of the striking train have something attached to them, either plates, pins, or wires.

If you bear in mind that larger wheels gear into the pinions of smaller, you can hardly place them wrong; but the strike wheels must so gear, that the wire with a poker crook will drop into its notch at the same instant of the bell hammer stroke, and the crank of the fly wheel, when at rest, should be opposite to the wire which catches it before striking. The drop of the escape wheel on the verge being lost power, they should be as near together as possible, and allow the sure escape of the teeth; but, as the escape wheel is held from the verge by the power, it should be pressed toward it during a trial of one revolution, or the teeth will catch whenever the power is slack, as on cold nights.

Oil freely, with the best watch oil, the different bearing parts of the verge; other parts will run longer and wear less without.

Wooden clocks can be made as good as new by returning the pivots and bushing the bearings with brass. The balance pivots of marine levers, when worn, should be returned and re-tempered.

A clock cannot be well regulated with the pendulum loose at the point of suspension.

Chemical Discovery in the Past Year.

In the inaugural address of Professor Stokes, President of the British Association, made at the opening of the annual meeting, held this year, at Exeter, England, he made the following remarks on the progress of chemical discoveries: In chemistry I do not believe that any great step has been made within the last year; but perhaps there is no science in which an earnest worker is so sure of being rewarded by making some substantial acquisition to our knowledge, though it may not be of the nature of one of those grand discoveries which from time to time stamp their impress on different branches of science. I may be permitted to refer to one or two discoveries which are exceedingly curious, and some of which may prove of considerable practical importance.

The Turaco, or plantain-eater of the Cape of Good Hope, is celebrated for its beautiful plumage. A portion of the wings is of a fine red color. This red coloring matter has been investigated by Professor Church, who finds it to contain nearly six per cent of copper, which cannot be distinguished by the ordinary tests, nor removed from the coloring matter without destroying it. The coloring matter is, in fact, a natural organic compound, of which copper is one of the essential constituents. Traces of this metal had previously been found in animals, for example, in oysters, to the cost of those who partook of them. But in these cases the presence of the copper was merely accidental; thus oysters that lived near the mouths of streams which came down from copper mines, assimilated a portion of the copper salt, without apparently its doing them either good or harm. But in the Turaco, the existence of the red coloring matter which belongs to their normal plumage, is dependent upon copper, which, obtained in minute quantities with the food, is stored up in this strange manner in the system of the animal. Thus in the very same feather, partly red and partly black, copper was found in abundance in the red parts, but none or only the merest trace in the black.

This example warns us against taking too utilitarian a view of the plan of creation. Here we have a chemical substance elaborated which is perfectly unique in its nature, and contains a metal the salts of which are ordinarily regarded as poisonous to animals; and the sole purpose to which, so far as we know, it is subservient in the animal economy is one of pure decoration. Thus a pair of the birds which were kept in captivity lost their fine red color in the course of a few days, in consequence of washing in the water which was left them to drink, the red coloring matter, which is soluble in water, being thus washed out; but except as to the loss of their beauty it does not appear that the birds were the worse for it.

A large part of the calicoes which are produced in this country in such enormous quantities are sent out into the market in the printed form. Although other substances are employed, the place which madder occupies among dye stuffs with the calico printer, is compared by Mr. Schunck, to that which iron occupies among metals with the engineer. It appears from the public returns that upwards of 10,000 tuns of madder are imported annually into the United Kingdom. The colors which madder yields to mordanted cloth, are due to two substances, alizarine, and purpurine, derived from the root. of these alizarine is deemed the more important, as producing faster colors, and yielding finer violets. In studying the transformations of alizarine under the action of chemical reagents, MM. Graebe and Liebermann were led to connect it with anthracene, one of the coal tar series of bodies, and to devise a mode of forming it artificially. The discovery is still too recent to allow us to judge of the cost with which it can be obtained by artificial formation, which must decide the question of its commercial employment. But assuming it to be thus obtained at a sufficiently cheap rate, what a remarkable example does the discovery afford of the way in which the philosopher quietly working in his laboratory may obtain results which revolutionize the industry of nations! To the calico printer, indeed, it may make no very important difference whether he continues to use madder, or replaces it by the artificial substance; but what a sweeping change is made in the madder-growing interest! What hundreds of acres hitherto employed in the madder cultivation are set free for

the production of human food, or of some other substance useful to man! Such changes can hardly be made without temporary inconvenience to those who are interested in the branches of industry affected; but we must not on that account attempt to stay the progress of discovery, which is conducive to the general weal.

How to Determine the Strength of Rough Castings.

It is not uncommon for the engineer and machinist, when ordering castings for a specified purpose, to give the proportions in which the mixture of pig shall be made, with a view to obtaining a given strength in the proposed casting. This course cannot be supposed to be an accurate guide to the determination of the casting when completed, since there are several causes which may reduce their strength during the melting, pouring, and cooling of the casting, and the dishonesty or carelessness of the founder may also defeat the end proposed.

When it is important that a given strength should be obtained, it is recommended by one of the highest engineering authorities, Professor Rankine, that the best course for the engineer to pursue is not to specify to the founder any particular kind or mixture of pig iron, but to specify a certain minimum strength which the iron should show when tested by experiment.

As to the appearance of good iron for castings, it should have on the outer surface a smooth, clear, and continuous skin, with regular faces and sharp angles. When broken, the surface of fracture should be of a light blueish-gray color and close-grained texture, with considerable metallic luster; both color and texture should be uniform, except that near the skin the color may be somewhat lighter and the grain closer; if the fractured surface is mottled, either with patches of darker or lighter iron, or with crystalline spots, the casting will be unsafe; and it will be still more unsafe if it contains air bubbles. The iron should be soft enough to be slightly indented by a blow of a hammer on an edge of the casting. When cut by tools of different kinds, the iron should show a smooth, compact, and bright surface, free from bubbles and other irregularities, of a uniform color, and capable of taking a good polish.

Castings are tested for air bubbles by ringing them with a hammer all over the surface.

Cast iron, like many other substances, when at or near the temperature of fusion, is a little more bulky for the same weight in the solid than in the liquid state, as is shown by the solid iron floating on the melted iron. This causes the iron as it solidifies to fill all parts of the mold completely, and to take a sharp and accurate figure. The solid iron contracts in cooling from the melting point down to the temperature of the atmosphere, by about one per cent in each of its linear dimensions, or one eighth of an inch in a foot nearly; and therefore patterns for castings are made larger in that proportion than the intended pieces of cast iron which they represent.

The rate of linear expansion of cast iron between the freezing and boiling points of water is about ·00111.

A convenient instrument in making patterns for castings is a contraction rule; that is, a rule on which each division is longer in the proportion already mentioned than the true length to which it corresponds.

In designing patterns for castings, care must be taken to avoid all abrupt variations in the thickness of metal, lest parts of the casting near each other should be caused to cool and contract with unequal rapidity, and so to split asunder or overstrain the iron. It is advantageous also that castings, especially those for moving pieces in machinery, such as wheels, should be of symmetrical figures, or as nearly so as is consistent with their purposes, in order that they may have no tendency to become distorted while cooling.

Iron becomes more compact and sound by being cast under pressure; and hence cast-iron cylinders, pipes, columns, shafts, and the like, are stronger when cast in a vertical than in a horizontal position, and stronger still when provided with a head or additional column of iron, whose weight serves to compress the mass of iron in the mold below it. The air bubbles ascend and collect in the head, which is broken off when the casting is cool.

Care should be taken not to cut or remove the skin of a piece of cast-iron more than is absolutely necessary, at those points where the stress is intense. In order that this rule may be carried out in pieces (such as toothed wheels) which are shaped to an accurate figure by cutting or abrading tools, care should be taken to make them as nearly as practicable of the true figure by casting alone, so that the depth of skin to be cut away may be as small as possible.

Discovery of America by the Chinese.

Was Columbus the first discoverer of America, or did he only re-discover that continent after it had, in remote ages, been found, peopled, and forgotten by the Old World? A writer in the *Gentleman's Magazine* thinks it is curious that this question has not been more generally raised, for it is very clear that one of two things must be true: either the people whom Columbus found in America must have been descended from emigrants from the Old World, and therefore America was known to the Old World before Columbus' time, or else the aborigines of the Western Hemisphere were the result of spontaneous human generation, the development of man from a lower species of animal, or descended from a second Adam and Eve, whose origin would be equally puzzling. Unless we are prepared to cast aside Holy Writ, and all our general notions of the origin of the human race, we must believe that there was at one time communication between the Old World and the New. Probably this communication took place on the opposite side of the world to ours, between the eastern coast of Asia and the side of America most remote from Europe; and I believe it is quite possible that the inhabitants of Eastern Asia may have been aware of the existence of America, and kept up intercourse with it while our part of the Old World never dreamt of its existence. The impenetrable barrier the Chinese were always anxious to preserve between themselves and the rest of the nations of the Old World renders it quite possible that they should have kept their knowledge of America to themselves, or, at any rate, from Europe. The objection that the art of navigation in such remote times was not sufficiently advanced to enable the Chinese to cross the Pacific and land on the western shore of America is not conclusive, as we have now found that arts and sciences which were once generally supposed to be of quite modern origin, existed in China ages and ages before their discovery in Europe. The arts of paper-making and printing, among others, had been practiced in China long before Europeans had any idea of them. Why, then, should not the Chinese have been equally, or more, in advance of us in a navigation? The stately ruins of Baalbec, with gigantic arches across the streets, whose erection would puzzle our modern engineers, the Pyramids, and other such remains of stupendous works point to a state of civilization, and the existence of arts and sciences, in times of which European historians give no account.

One fact corroborative of the idea that the Old World, or at least some of the inhabitants of Asia were once aware of the existence of America before its discovery by Columbus is that many of the Arabian *ulema* with whom I have conversed on this subject, are fully convinced that the ancient Arabian geographers knew of America, and in support of this opinion point to passages in old works in which a country to the west of the Atlantic is spoken of. An Arab gentleman, a friend of mine, General Hussein Pasha, in a work he has just written on America, called *En-Nessr-Et-Tayir*, quotes from Djeldeki and other old writers to show this.

There is, however, amongst Chinese records not merely vague references to a country to the west of the Atlantic, but a circumstantial account of its discovery by the Chinese long before Columbus was born.

A competent authority on such matters, J. Haulay, the Chinese interpreter in San Francisco, has lately written an essay on this subject, from which we gather the following startling statements drawn from Chinese historians and geographers.

Fourteen hundred years ago even America had been discovered by the Chinese, and described by them. They stated that land to be about 20,000 Chinese miles distant from China. About 500 years after the birth of Christ, Buddhist priests repaired there, and brought back the news that they had met with Buddhist idols and religious writings in the country already. Their descriptions, in many respects, resemble those of the Spaniards a thousand years after. They called the country "Fusany," after a tree which grew there, whose leaves resemble those of the bamboo, whose bark the natives made clothes and paper out of, and whose fruit they ate. These particulars correspond exactly and remarkably with those given by the American historian, Prescott, about the maquay tree in Mexico. He states that the Aztecs prepared a pulp for paper-making out of the bark of this tree. Then, even its leaves were used for thatching; its fibers for making ropes; its roots yielded a nourishing food; and its sap, by means of fermentation, was made into an intoxicating drink. The accounts given by the Chinese and Spaniards, although a thousand years apart, agree in stating that the natives did not possess any iron, but only copper; that they made all their tools, for working in stone and metals, out of a mixture of copper and tin; and they, in comparison with the nations of Europe and Asia, thought but little of the worth of silver and gold. The religious customs and forms of worship presented the same characteristics to the Chinese fourteen hundred years ago as to the Spaniards four hundred years ago.

There is, moreover, a remarkable resemblance between the religion of the Aztecs and the Buddhism of the Chinese, as well as between the manners and customs of the Aztecs and those of the people of China. There is also a great similarity between the features of the Indian tribes of Middle and South America, and those of the Chinese, and, as Haulay, the Chinese interpreter of whom we spoke above, states, between the accent and most of the monosyllabic words of the Chinese and Indian languages. Indeed, this writer gives a list of words which point to a close relationship; and infers therefrom that there must have been emigration from China to the American continent at a most early period indeed, as the official accounts of Buddhist priests fourteen hundred years ago notice these things as existing already. Perhaps, now, old records may be recovered in China which may furnish full particulars of this question. It is, at any rate, remarkable and confirmative of the idea of emigration from China to America at some remote period, that at the time of the discovery of America by the Spaniards, the Indian tribes on the coast of the Pacific, opposite to China, for the most part, enjoyed a state of culture of ancient growth, while the inhabitants of the Atlantic shore were found by Europeans in a state of original barbarism. If the idea of America having been discovered before the time of Columbus be correct, it only goes to prove that there is nothing new under the sun; and that Shelley was right in his bold but beautiful lines: "Thou canst not find one spot whereon no city stood." Admitting this, who can tell whether civilization did not exist in America when we were plunged in barbarism? and, stranger still, whether the endless march of ages, in rolling over our present cultivation, may not obliterate it, and sever the two hemispheres once again from each other's cognizance? Possibly, man is destined, in striving after civilization, to be like Sisyphus, always engaged in rolling up a stone which ever falls down.

Effects of Hashish.

This drug, the *Cannabis Indica* of the U. S. Pharmacopœia, the resinous product of hemp, grown in the East Indies, and other parts of Asia, is used in those countries to a large extent for its intoxicating properties, and is doubtless used in this country for the same purpose to a limited extent. Its effects, although perhaps similar in some respects upon all who take it, yet vary considerably according to the constitution of the individual, condition of mind and body, etc., at the time of its administration. A writer in *Appleton's Journal* gives his personal experience of its effects as follows:

"I have often taken the drug, rather for curiosity to discover what its attractions might be, than for aught of pleasurable excitement I ever experienced. The taste of the potion is exactly what a mixture of milk, sugar, pounded black pepper, and a few spices would produce. The first result is a contraction of the nerves of the throat, which is anything but agreeable. Presently the brain becomes affected; you feel an extraordinary lightness of head, as it were; your sight settles upon one object, obstinately refusing to abandon it; your other senses become unusually acute—uncomfortably sensible—and you feel a tingling which shoots like an electric shock down your limbs till it voids itself through the extremities. You may stand in the burning sunshine without being conscious of heat, and every sharp pain is instantly dulled. Your cautiousness and your reflective organs are painfully stimulated; you fear everything and everybody, even the man who shared the cup with you, and the servant who prepared it; you suspect treachery everywhere, and in the simplest action detect objects the most complexedly villainous. Your thoughts become wild and incoherent, your fancy runs frantic. If you happen to exceed a little, the confusion of your ideas and the disorder of your imagination will become intense. I recollect on one occasion being persuaded that my leg was revolving upon its knee as an axis, and could distinctly feel as well as hear it strike against and pass through the shoulder during each revolution. Any one may make you suffer agony by simply remarking that a particular limb must be in great pain, and you catch at every hint thrown out to you, nurse it and cherish it with a fixed and morbid eagerness that savors strongly of insanity. This state is a very dangerous one, especially to a novice; madness and catalepsy being by no means uncommon terminations to it. If an assembly are under the influence of the drug, and a single individual happen to cough or laugh, the rest, no matter how many, are sure to follow his example. The generally used restoratives are a wineglassful of pure lemon-juice, half a dozen cucumbers eaten raw, and a few puffs of the hookah; you may conceive the state of your unhappy stomach after the reception of these remedies. Even without them you generally suffer from severe indigestion, for, during the intoxication, the natural hunger which the hashish produces excites you to eat a supper sufficient for two days with ordinary circumstances.

How to Make Paper Transparent.

Artists, architects, land surveyors, and all who have occasion to make use of tracing paper in their professional duties will be glad to know that any paper capable of the transfer of a drawing in ordinary ink, pencil, or water colors, and that even a stout drawing paper, can be made as transparent as the thin yellowish paper at present used for tracing purposes. The liquid used is benzine. If the paper be damped with pure and fresh distilled benzine it at once assumes a transparency, and permits of the tracing being made, and of ink or water colors being used on its surface without any "running." The paper resumes its opacity as the benzine evaporates, and if the drawing is not then completed, the requsite portion of the paper must be again damped with the benzine. The transparent calico, on which indestructible tracings can be made, was a most valuable invention, and this new discovery of the properties of benzine will prove of further service to many branches of the art profession, in allowing the use of stiff paper where formerly only a slight tissue could be used.

Annual Exhibition of the Montgomery County and East Pennsylvania Aggricultural and Mechanical Society.

The annual exhibition of this association is announced. It will be held on the grounds of the society, near Norristown, Pa., on Thursday, Friday, and Saturday, September 23d, 24th, and 25th, 1869. The book of entries will be open at the office in Norristown, on and after Tuesday, the 11th day of September. Exhibitors must have their articles and animals entered on the Secretary's book, on or before Thursday evening, September 23d. Where partners or firms exhibit as such, each member of the firm who attends as an exhibitor, must have an exhibitor's ticket.

Communications may be addressed to A. S. Hallman, corresponding secretary, Norristown, Pa.

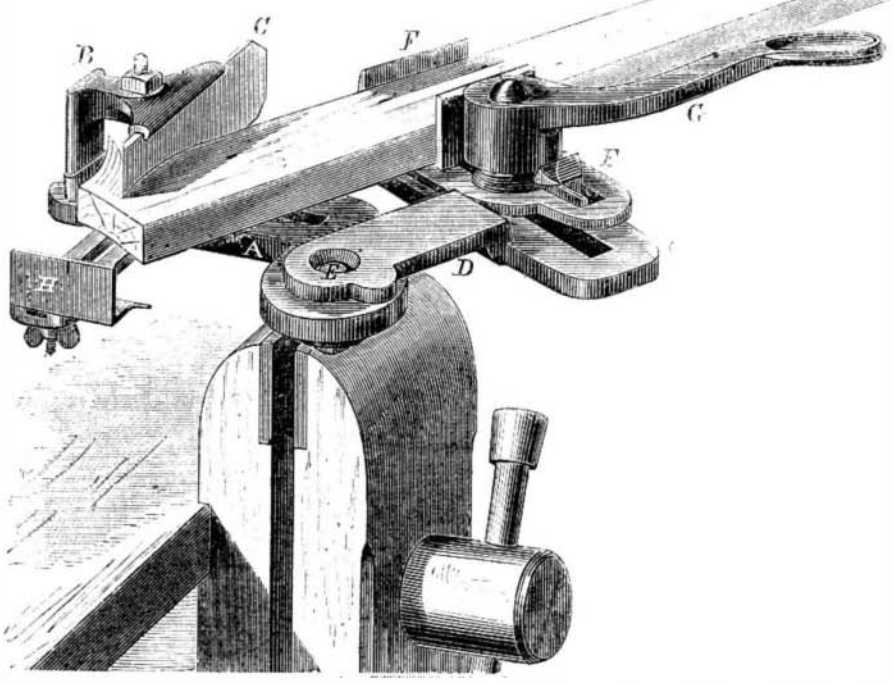
FIXING COLORS ON TEXTILE FABRICS.—Solutions of iron, copper, manganese, or chromium, either pure, singly, or mixed together, or in conjunction with coloring matters, are by this process employed for printing on textile fabrics, which consist of wool and cotton, wool and thread, goat's-hair and cotton, etc., and on all other tissues composed of a mixture of textile, vegetable, and animal matters, either by means of the cylinder printing machine or otherwise, the process being the same as that for printing thread tissues, thread and cotton, or cotton. The fabrics are allowed to oxidize after the application; the oxidation being completed by subjecting them to an alkaline or bichromate bath. The advantages of the application of this system to the tissues named, is that the colors or tints obtained are unchangeable either by the action of light or washing.

Improved Picket-Pointing Machine.

The object of this invention is to point the ends of pickets or fence-palings, and to cut circular sides or edges on other wood-work; and it is one of the most simple and perfect working devices lately brought to our notice. It not only does its work rapidly but in the most perfect manner, and in the adaptation of ends to means, displays much more ingenuity than is commonly met with in machines of a similar character.

It consists in attaching an ordinary carpenters' plane-bit to an iron frame, on which is pivoted an arm for holding the picket, or other article of wood, in such a manner, that by turning the said arm on its pivot with the picket, the plane-bit shall cut one side near the end in an arc of a circle at one movement. By this means pickets may be pointed or dressed to shape at the ends with great expedition and accuracy, and with a saving of much of the labor expended in the ordinary manner of performing this kind of work.

Fig. 1



JOHNSON'S PICKET-POINTING MACHINE.

The machine is held firmly by a lug either in a vice as shown in Fig. 1, or wedged in a notch on a bench. The lug is attached to, and supports the bed-plate, A, Fig. 1. On one side of the bed-plate, A, is secured an adjustable clamp, B, in which is held a plane-bit, C, having its edge in a vertical position; and on the opposite side of the bed plate a swinging arm, D, is pivoted at E, to turn horizontally, with a sliding and adjustable clamp, F, operated by an eccentric lever, G, for holding pickets of different sizes, placed in the clamp as shown. In front of the plane bit, C, is placed an adjustable slide or gage, H, against which the end of the picket is placed while it lies in the clamp, F, to regulate the pointing or cutting of the plane bit.

When the picket is thus placed in position as shown, it is held tight in the clamp, F, by the lever and eccentric, G, and then by drawing the outer end of the picket, which now acts as a lever, towards him, the operator swings it around with the arm, D, on the pivot, E, so that the side of the picket near the end, is brought against the edge of the plane bit, and cut in the arc of a circle. The operation being repeated with the other side of the picket, the work is accomplished.

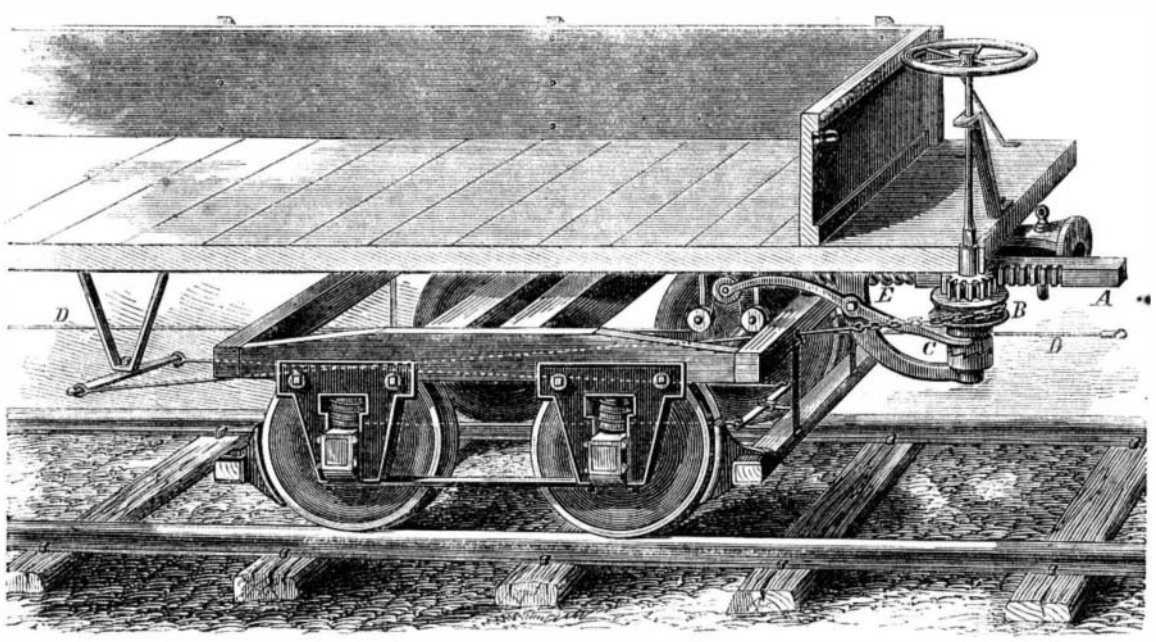
Figs. 1 and 2, respectively, exhibit applications of lumber cut in this form to fences and eaves. Patented Jan. 14, 1868, through the Scientific American Patent Agency. For particulars address W.W. Johnson, Nashville, Tenn., who will sell the right for all the States except Georgia and Tennessee.

Automatic Car Brake.

The object of this invention is to place the whole line of brakes throughout a railway train at the disposal of the engineer, and to employ the reverse motion of the engine in case of emergency, or its resistance to the onward motion of the train when slowing up, to operate the brakes at the will of the engineer. At the same time it is not proposed to dispense with brakemen on fast trains, or to do more than to add to the safety of such trains by securing prompt and efficient action of all the brakes in times of peril.

The apparatus is simple and cheap, does not demand any change in the present construction of cars or locomotives, and is controlled by the engineer through the medium of a small cord running from the locomotive back under the entire train.

Its construction and operation will be readily comprehended by referring to the accompanying engraving. A is a bar of iron lying parallel to the longitudinal axis of the car, with a rack upon one side, which engages with a stout pinion attached to the break wheel shaft. The chain pulley, B, has a clutch attached to its under side, which clutch is operated by a collar and the lever, C. The end of the lever C remote from the clutch bar has a small pulley attached to it over which the cord, D, runs. The cord also passes under two fixed pulleys as shown in the engraving, so that when drawn tight it depresses the end of the lever C, and raises the clutch out of gear. In this position the brakes do not operate and the train may be backed. In going ahead the clutch is dropped into gear and the breaks operate as follows: When the engine is checked in its onward motion, the first car to the rear presses the end of the bar, A, against the rear of the tender. The bar yields to the pressure, and imparts motion through the pinion to the brake wheel shaft, the chain is wound up, and the brakes are put on. This car being thus checked in its motion, the next in order approaches it, and the same operation is repeated with it, and so on successively throughout the entire train. As soon as the engine increases its speed, the pressure on A, is relieved, a coiled spring, E, thrusts out the bar, A, to its original position, when the speed of the car to which it is attached increases and throws off the brakes on the car behind it, and so on successively throughout the train. The apparatus acts entirely independent of the buffers, and is simple and strong. It would seem to supply a means for breaking up a train with certainty and rapidity. Patented by Inglis Walker, 7 Congress street, Lynn, Mass., to whom communications may be addressed.



AUTOMATIC CAR BRAKE.

The Fourth Louisiana State Grand Fair.

This Fair will be held in the city of New Orleans, in 1870, commencing on Saturday the 23d day of April, and will continue nine days. The aim of the directors, is to afford facilities for the display of all products of industry and ingenuity, and they express the determination to make this fair as popular as any ever held in this country.

Those who are desirous of giving special premiums, must notify the Secretary, Luther Homes, Esq., office of Mechanics Institute, New Orleans, as soon as possible, and not later than the 1st day of November, 1869, so that their names and premiums offered may be published in the premium catalogue which is to be printed and ready for distribution by the 1st day of December next. This exhibition will doubtless be one at which a large proportion of American industry will be represented.

Fig. 2

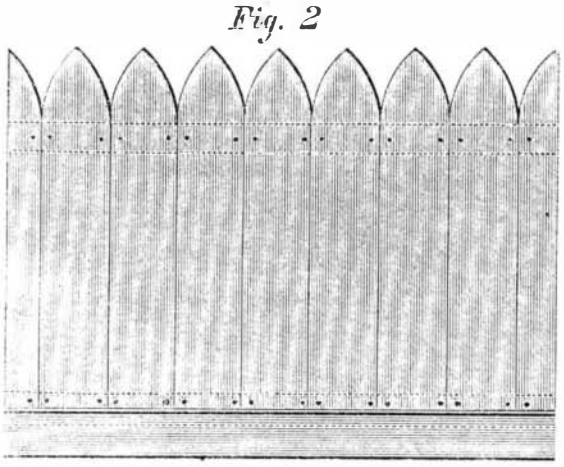
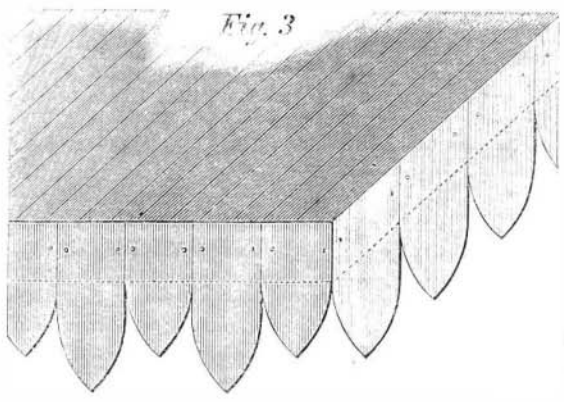


Fig. 3



Exeter-Change.--A Spice of English Humor.

Exeter Change is the name of a humorous take-off on the British Association which meets this year at Exeter. As the scientific journals and the *savans* take the joke in good part and are enjoying a general side-shaking over the many capital hits made, we may as well also enjoy our quiet laugh over the following extract from a paper "On the Alcoholic Compound termed Punch," by John T—n d—ll, LL.D., F, R. S.—It has a capital imitation of the style of a certain eminent lecturer and physicist. Let us content ourselves with the last two paragraphs—

"Experiment has proved that the juice of three or four lemons, and three quarters of a pound of loaf-sugar dissolved in about three pints of boiling water, give saporous waves which strike the palate at such intervals that the thrilling acidity of the lemon-juice and the cloying sweetness of the sugar are no longer distinguishable. We have, in fact, a harmony of saporific notes. The pitch, however, is too low, and to highten it, we infuse in the boiling water the fragrant yellow rind of one lemon. Here we might pause, if the soul of man craved no higher result than lemonade. But to obtain the culminating saporosity of punch, we must dash into the bowl, at least, a pint of rum and nearly the same volume of brandy. The molecules of alcohol, sugar, and citric acid collide, and an entirely new series of vibrations are produced—tremors to which the dullest palate is attuned.

"In Punch, then, we have rhythm within rhythm, and all that philosophy can do is to take kindly to its subtile harmonies. It will depend in some measure upon previous habits whether the punch when mixed will be taken in excess or in moderation. It may become a dangerous ally of gravity and bring a sentient being to the gutter. But, on the other hand, it may become the potent inner stimulus of a noble outward life."

Steel.

A piece of good steel is an almost priceless treasure, because tools are an indispensable requirement. Yet make steel as carefully as possible, you cannot always rely upon its uniform quality throughout the same piece. Outer indications are often unreliable, and even breakage revelations refer but to the point of fracture. In forging steel the secret is the temperature. Too high or too low will ruin all; and this temperature must vary with the kind of steel required. Therefore cheapness should never be sought as the chief good. Blistered and shear steel want more heat than cast steel; the greater the amount of carbon, the lower must be the heat at working, and yet the harder is the labor. Good forging is as important as good material. After cooling, the hammering should be very light, or internal fracture will be set up, not homogeneity. Let the blows fall in one direction; certainly not at right angles to each other, so as to destroy the grain. Burned steel may be brought round by heating hot and quenching in water repeatedly. In tempering, great care is needed. Forging tempers, and a less heat will then suffice. This hammering is better as a commencement, than hardening direct from the annealing oven.

AT the International Pharmaceutical Congress, to be held in Vienna in September, one of the topics for discussion will be the formation of a universal *Pharmacopœia;* the object being to put an end to the inconveniences which sometimes arise from compounding prescriptions in a foreign country with medicines prepared according to a *Pharmacopœia* different from that in use in the country of the physician by whom the prescription was written.