to Dr. Smith's modification. Dr. Smith's modification of Prof. Wurtz's method for the resolution of minerals by the "lime process," has become quite celebrated, and is given in all its details by Prof. S. W. Johnson, in his admirable edition of "Fresenius' Quantitative Analysis." Either of the methods accomplishes the object and appears preferable to any hitherto proposed.

In August, 1864, Professor Wurtz published in the *American Gas Light Journal and Mining Reporter*, an article entitled: "A Neglected Source of Wealth," in which he called attention to the importance of economizing the alkali of the green sand marl. He says, "it may be assumed that the aver age of potash in washed green sand of a good quality will be at least seven per cent. This is equivalent to 157 lbs. of anhydrous potash, or 188 lbs. of pure hydrate of potash per tun of 2,240 lbs. Now the very best qualities of American potashes, worth at the present (1864) market rates $14 per cwt., contain not more than seventy per cent of pure hydrate; so that a simple calculation shows that one tun of washed green sand marl, which should be delivered in New York for probably $7 or $8, contains $37·60 worth of potash. The green sand could also be employed for making alum by heating it red hot, then acting upon it with dilute sulphuric acid, crystallizing the solution, adding to the mother liquors a small quantity of chloride of potassium, obtained by another method from the green sand itself, which converts the iron alum formed into common alum and crystallizing again. If only five of the seven per cent of potash present were thus obtained in the form of alum, the quantity of alum from a tun would be 1,120 lbs.; only ten per cent of the crystallized alum being potash."

The treatment of green sand and all feldspathetic rocks proposed by Professor Wurz does indeed contain the germ of neglected wealth. In view of the great amount of potash now accessible from the Stassfurt mines, it would hardly pay from a commercial point of view to work feldspar or green sand for that alkali, but there is another direction in which great benefit can be derived by the application of the method to the resolution of granitic rocks, greenstone, feldspar, basalt, green sand, hornblende, mica, scapolite, and other rocks and minerals for enriching our farming lands. It would hardly require any thing more complicated than a lime kiln for the fusion and subsequent leaching of these minerals. Many farmers already understand how to grind up bones and treat them with sulphuric acid to manufacture superphosphate. It would be just as simple an operation to heat the broken rocks and while still hot to project them into dilute sulphuric acid, and thus to disintegrate them or to fuse them, according to Dr. Wurtz's plan, with chloride of calcium or with carbonate of lime and sal ammoniac, after Dr. Lawrence Smith's method, or wanting all these substances, to heat the rocks red hot, then plunge them suddenly in cold water to render them friable, then grind them and mix with lime, and heat in a kiln, and afterwards leach out with water.

A practicable and simple method for economizing the potash of our common rocks would be a great boon to the country, and the solution of this question ought to command the attention of our men of science. An acre of ordinary wheat soil, ten inches deep, will weigh somewhere in the neighborhood of 1,000 tuns, and according to the estimate of skilled chemists, contains at any one time, of potash soluble in water, about seventy pounds. Two crops of wheat and hay would remove the whole of this, and the soil would be utterly exhausted unless some provision was made for supplying the waste. The natural source from which this waste is supplied is found in the rocks and minerals contained in the soil, and we have recently pointed out the newly discovered property of humic acid to dissolve silica, and thus help to decompose the rocks. Plowing, tilling, draining, all have their share in asserting the necessary decomposition, but these are at best but slow operations, and it would greatly facilitate matters to have a cheap supply of potash and phosphoric acid to add to the soil, in proportion to the removal of these substances by the crops.

Our works on agricultural chemistry contain full tables of the amount of mineral matter taken from the ground by every variety of crop. The wheat grains, the straw, the husks, the corn, everything has been analyzed, and the precise figures are given, so that a debit and credit account can be kept by the farmer with every field, and as the cattle are fed with food, so ought the ground to have returned to it all that it is deprived of by the crops, in this way an equilibrium can be established, and the farm can never be exhausted. In most instances the air, the water, and the rocks will furnish us all that we need if we only know how to manipulate them and make them do our bidding.

The saying of Benjamin Franklin is still true: "Everyman has a gold mine on his own farm, and that lies only plow deep."

Common-Sense Chairs.

The above quaint expression is used in the heading of a circular before us, advertising a class of old-fashioned easy chairs, manufactured on a large scale, by F. A. Sinclair, at Mottville, Onondaga Co., N. Y.

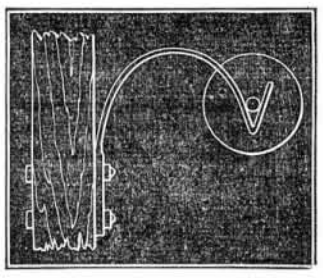
As applied, the title is most appropriate, for we have not seen, since the days of our grandmother, chairs combining so much strength and comfort as the articles to which it refers. The seats are composed of woven splints of ash, and the frames are made of hard wood, firmly secured together. A variety of patterns are made and sold under appropriate names, "Union Arm Chair," "Old Puritan," "Grandmothers' Rockers," etc. The largest size contains nearly as much timber as we have seen used by some speculators in constructing small houses in the vicinity of this city.

For watering-place hotels and piazzas in the country, we know of nothing so comfortable and appropriate as these chairs, but as to office use, for which the manufacturer recommends them, we disagree with him—they are too comfortable for business purposes.

Send to Mr. Sinclair as above for illustrated circulars, or call and see the articles, at 199 Fulton street, New York.

BALANCING CYLINDERS.

Our answer to C. E. M., of N. Y., on page 106, current volume, has called out a most valuable correspondence on the subject of balancing cylinders, of which we propose to give a summary in the present article. Our readers will recollect a letter from W. O. Jacobi, published on page 148, in which he stated that cylinders could be tested while running so as to balance them intelligently and perfectly. We expressed in a remark appended to that letter some doubt that this could be done. Since the appearance of the letter referred to we have been favored by a call from Mr. Jacobi, who has convinced us that cylinders can be tested as he proposes; and his method is so simple and ingenious that we gladly lay it before our readers.



The accompanying diagram shows the apparatus employed: A bent steel spring bar, having a V-shaped bearing, in which one of the journals of the cylinder to be balanced rests; the other end rests in a bearing adjustable vertically, so that the cylinder may be brought into a horizontal position. This being accomplished, the cylinder is set revolving at moderate speed by a belt and pulley on the end opposite the spring bar, and a piece of chalk is held so as to just touch it at the end resting in the bearing of the spring bar. If the end of the cylinder is out of balance it revolves around a center, which is not the center of the cylinder, and the chalk mark, clearly points out the place to add the counterpoising weight.

Mr. Jacobi states that in his establishment he has employed this method with perfect success in balancing the "fancys" in carding machines, these cylinders being long in proportion to diameter, and more difficult to balance than those short in proportion to diameter.

Mr. John Mitchell prefers balancing on pivots to using steel bars. He first balances the heads separately on the shaft, then marks the centers of the horizontal bars or "lags," suspends the cylinder on pivot centers, and balances by chiping or drilling. We tried this method in all its essential features some years since, but could never get so nice a balance as when we used steel bars. With the latter we never failed, but the cylinders we operated upon were very strong, and short in proportion to diameter. Mr. Mitchell would have added to the value of his communication by stating the character of the cylinders he has balanced in the method described, their size, and the speed at which they are run.

Another correspondent, who does not give his name, loosens the boxes allowing the cylinder room to jump, and marks with the sharp point of a file in the way prescribed by Mr. Jacobi with the chalk, operating on one bearing at a time. It seems impossible to reach the nicest adjustment in this way, and we should much prefer Mr. Jacobi's plan, the elasticity of the spring bar permitting motion from the slightest inaccuracy in balance.

This correspondent remarks that a crank shaft cannot be perfectly balanced, because the weight cannot be applied opposite the crank pin; but by suspending the bearings so as to allow the crank wheel to find its center of gravity, he has succeeded on a 20-pound crank wheel in balancing a 4-pound pitman rod, having a 5-inch stroke, running at a speed of 4,000 revolutions per minute.

Mr. G. Westinghener, of Schenectady, N. Y., balances cylinders from two to three feet in length, designed to run 1,500 revolutions per minute, as follows: The cylinders weigh about 200 pounds, and have a shell of wood. He uses small pointed pieces of iron rod, about an inch and one half in length as weights driving them partially in, so that they will not fly out when the cylinder is rapidly revolved. They are inserted one at each end, directly opposite each other. The cylinder is then set in motion to see whether it is more or less out of balance than before the insertion of the spikes, the positions of which are changed until the cylinder runs without shaking. He says this sometimes involves a number of experiments, but he always succeeds in getting them to run steady, and this he does on a bench that can be shaken easily by the hand

We have no doubt a cylinder can be balanced in this way, but it seems a very slow and unmechanical method. The revolving of the cylinder to see whether it has lost or gained in balance cannot be called a very scientific method of test, if indeed it deserves the name of test at all. Mr. Jacobi's method, on the contrary, not only determines that the cylinder is out of balance, but at once indicates the point to add weight in order to correct the inaccuracy, in accordance with scientific principles. The one is mere "cut and try," the other proceeds directly to the object in view.

Mr. Phillip Strickler, who claims to have had a long experience in balancing cylinders and runner millstones, uses the steel bars for balancing cylinders, balancing successively each head as it is put on the shaft. Then if it is to be lagged with staves of wood or metal, he centers each on the edges, and balances them endwise separately on pivot centers. Then he places them on the heads in exactly the order they are to remain, and balances the whole on the steel bars, distributing the counterpoising weight along the light side, not concentrating it at a single point.

We know this method will secure a good balance, but it is positively essential that everything should be complete before balancing, and no alteration made afterward. Mr. Strickler's method of balancing runner millstones will be found with diagrams in our next issue. We also publish another letter on the subject of balancing in our correspondence columns this week.

The subject is one of the highest practical importance, and its full discussion is very desirable.

FAIR OF THE AMERICAN INSTITUTE.

We found, at our last visit, that notwithstanding the Fair has been now opened three weeks, still active preparations for the opening were still in progress. The shafting is not all running, and there is not steam power enough furnished by the boilers to run such machinery as is ready to run at any proper degree of speed. We, however, give this week brief notices of such machines as were present, and of which we were able to get some information. There are only three inclosures of

MACHINISTS' TOOLS.

Lucius W. Pond, of 98 Liberty street, New York, shows a fine collection, consisting of one 22-inch lathe with compound rest and cross feed, very strong and powerful; one 32-inch planer—a four-tun machine; one 22-inch planer—1½-tun machine, and one upright drill press. Mr. Pond has, within the last two years, completely re-organized his establishment, and now uses entirely new patterns, which give greater power and simplicity to the well-known and highly-appreciated tools of his manufacture. The old Jersey City Locomotive Works have recently been re-fitted and supplied throughout with Mr. Pond's tools made after these new patterns. The patterns of his lathes have been changed so as to give increased size to the parts which receive strain, and they are in all respects excellent tools. The 32-inch planer is very heavy and powerful, and both it and the smaller one alluded to, run with great smoothness of action. By using a simple train of cut gears and racks to drive the tables of his planers, Mr. Pond does away with stud gears ordinarily used with single belts, and is enabled to increase backing speed at pleasure. This collection of tools will not fail to please all mechanics who examine them.

The New York Steam Engine Company, 126 and 128 Chambers street, New York, exhibit one 20-in. planer, one 32-in. lathe, two drill presses, one car wheel boring machine, a machine for turning nuts, one shaping machine, one slotting machine, and a punching press. These are all fine tools, but the punching press shown is perhaps the most noticeable feature of the collection.

George W. Moore, of Worcester, Mass., shows in connection with the tools in this inclosure, a simple and useful gage to turn bevels of gears to agree with the drawing.

The Union Vise Company, 80 Milk street, Boston, Mass., exhibit two beautiful milling machines of different sizes, evidently both excellent tools. They also show a universal head for milling machine or planer by which spur and bevel gears can be cut, or work held upon an arbor or chuck can be milled at any angle, and in almost any position. They also show a machine for cutting spirals, either straight or conical, right or left hand, and of almost any pitch, the changes being made by the ordinary gears of an engine lathe. They show lastly the James Ross Steam Permeator or oil and tallow cup for lubricating the valves and cylinders of steam engines. They are beautifully designed and finished, and rank among the best of this class of devices.

Cowin & Johnson, of Lambertville, N. J., exhibit a universal lathe chuck, of peculiar construction, in which a socket wrench applied to one end of a worm shaft causes the jaws to simultaneously and firmly grasp the work. The working parts of this chuck are all covered, so as to be out of the reach of dirt, chips, etc., which often interfere with the action of chucks of this class.

PUMPS AND BLOWERS.

Knowles & Sibley, of 126 Liberty street, New York, exhibit various sizes of the Knowles Patent Steam Pump. This pump has neither cranks nor fly wheels. The main steam valve of the pump is not a rotary valve, but is an ordinary flat slide valve. The slight rotary motion given the valve rod simply puts the valve in a position to be driven horizontally on its seat. The steam cylinders are fitted with spring ring packing, with screws and springs, for proper adjustment. The water cylinders are fitted with composition heads and rings, adjustable by screws, or with leather rings or a patent fibrous head, according to the nature of the work required. All the joints are ground to fit, and require no packing. The glands and piston rods are solid composition. The valve seats are composition, and the valves, either rubber or metal, are very durable, and are placed in the pump so as to be easily accessible, and in the larger sizes, for fire or marine purposes, are got at immediately without removing any nuts or bolts.

J. H. A. Gerricke, 169 Broadway, New York, exhibits a turbinate force pump. It consists of a wheel case containing a turbinate wheel secured to shaft, and having vanes or paddles of different lengths at its curved periphery, which are bent at their discharge ends, closely fitting the space between it and the case, within which it revolves without touching. In the end of the wheel is an anti-friction pin (used in the vertical pumps) which revolves in a female step, secured in the case. An upper chamber contains anti-friction partitions and a bottom plate which withholds the weight of the water from the wheel.

The Valley Machine Company exhibit a bucket and plunger steam pump, being a vertical steam pump composed of the parts of a simple slide valve and eccentric steam engine attached in a novel and compact manner to a bucket and plunger pump that discharges water at both strokes of the piston. The water valves, which are of either metal or rubber, are placed in such position that access can be had to them by the simple removal of one bolt and without disturbing any of the pipes; the bearing surfaces subject to wear are either lined with Babbitt metal or fitted up with adjustable boxes, so that the wear can be taken up easily, or the bearings replaced at very little expense. These pumps are made by special machinery, and with uniformity of workmanship, which allows of any part being quickly and cheaply replaced when worn out or broken by accident.

The Woodward Steam Pump Manufacturing Company, 76, 78, and 80 Center street, New York, show a fine line of their pumps. These pumps are so widely known, and their reputation is so well established that we may pass them without further comment.

Charles B. Hardick, 23 Adams street, Brooklyn, exhibits several sizes of the Niagara Steam Pump. The valves of this pump may be removed by simply unscrewing a single nut, and any carpenter can make in a few minutes a set of valves for it of wood if the original ones should give out.

William D. Andrews & Brother, 44 Water street, New York, exhibit one central discharge centrifugal pump and one antifriction centrifugal pump. These pumps have long been before the American public, and are well known as most effective machines of their class.

George W. Nye, of Monmouth, Ill., exhibits a steam vacuum pump, the details of the construction of which we could not obtain.

The Rahway Manufacturing Co. exhibit one of Clark's Multiplying Pressure Fan Blowers. This powerful blower produces great intensity of blast with slow speed. Its construction is extremely simple, but comprises some nice scientific and mechanical principles. For full description and engraving of this blower, the reader is referred to page 183, Vol. XXII., of the SCIENTIFIC AMERICAN.

HOISTING MACHINES.

A number of these machines are on exhibition. Otis, Bros. & Co. show one of their hotel elevators by a working model of exquisite finish. In this elevator is comprised an automatic clutching apparatus, which prevents any descent of the car should the ropes break. Should a trunk projecting into the way of the elevator from any of the floors interfere with the descent of the car, brakes are automatically applied, and the steam is cut off; the car then stops, and the obstruction may be removed without damage.

Merrick & Son's improved hoisting apparatus, with Seller's attachment, is shown by Solon Farrar, 212 Grand street, New York. The platform of this elevator is secured from falling by gravity pawls which act automatically upon breakage of the ropes.

Wm. D. Andrews & Bro. exhibit a friction-grooved hoisting machine and portable engine combined. This is a fine powerful machine, running without noise, and the speed of which can be changed instantaneously.

F. P. Canfield, 71 Sudbury street, Boston, Mass., shows a self-hoisting machine, with a bell-crank lever brake operated by the hoisting rope.

Hinton & Furney Bros., 552, 554, and 556 West Twenty-seventh street, New York, show what they style the "Epicycloidal" hoisting machine, employing a peculiar mechanical movement by which, with a gear six inches in diameter, the same speed, and also, it is claimed, greater strength are attained than in the old method, with a gear eight feet in diameter. The machine does not recoil or run back, as in the old method. Hence safety pawls are dispensed with. The gears, which are only two in number, are covered from dirt and liability to accident, either to themselves or the workingmen. Pulley blocks are dispened with, as the proper speed is obtained by the gear without their use. Hence, stronger but shorter ropes are employed.

C. H. Delamater, foot of West Thirteenth street, New York, shows one of Bacon's hoisting engines. This machine was described on page 120, current volume.

WOOD-WORKING MACHINERY.

The display in this department, though fair, is not equal to that made last year.

John B. Schenck, 118 Liberty street, New York, exhibit one of his large "Schenck Woodworth" planers. This machine is so well known to our readers that we need not describe it.

R. Ball & Co., of Worcester, Mass., exhibit the Russ Monitor Molding Machine, a very fine machine, capable of doing a great variety of excellent work. They also show a very ingenious and excellent hub-mortising machine, a hand boring machine, and a blind-slat tenoning machine.

H. B. Smith, of Smithville, N. J., displays a molding machine, a combined molding, planing, and matching machine, very fine, a heavy resawing machine, also very fine, a self-operating blind-stile boring machine, and a mortising machine. All these machines will well repay inspection.

J. T. Plass, of 202 and 204 East Twenty-ninth street, New York, exhibits the safety band saw, illustrated and described on page 129, Vol., XXI., of the SCIENTIFIC AMERICAN. The breaking of the saw on this machine does not endanger the operator.

First & Pryibil, 452, 454, and 456 Tenth avenue, New York, show a splendid band-saw machine made to saw bevel as well as straight. This is effected by moving the upper wheel sideways, without even taking off the saw or stopping the machine. The table, which works on a slide, is perfectly level, and connected with a lever, which again is connected with the upper sideway slide, being a radius from the center of lower shaft; the whole is moved by a screw.

C. B. Rogers & Co., of Norwich, Conn., also exhibit a very compact and strong band-sawing machine.

A very fine and simple jig-saw is shown by Thos. Connell, Birmingham, Conn. The saw is strained between two leather straps which run over two small pulleys. The ends of the straps remote from the saw are connected by straining wires to another strap which runs over another tightening pulley at the side of the machine. No cross-heads are employed, and the saw has a positive motion. It runs very rapidly, and some excellent specimens of work performed on it may be seen, which will reward the examination of the curious.

Close beside the latter machine stands Beach's Scroll Saw, illustrated and described on page 63, current volume of this journal. It is hard to say which of these saws is the superior one, and we shall leave it for the judges to decide this question. They are both well worth the examination of all who are interested in wood working.

A circular wood-working machine, shown by A. Wood, of Far Rockaway, N. Y., is a hand machine of great power, but which may be driven by other power if desired. It is designed to supply joiners and cabinet-makers with a cheap and effective machine that could be economically employed in expeditiously sawing boards, and in rabbeting, grooving, sash-sticking, etc.

An ingenious machine for shaving barrel hoops is shown by A. McAlpine, of Pittston, Pa. It will shave either straight or crooked hoops with great rapidity and uniformity. The machine is exceedingly simple, and well worth an examination from visitors.

Danger from Tobacco.

A writer in the London *Spectator* has taken some pains to point out what he believes to be "the true danger of tobacco." After adverting to the general use of this weed, which might, he alleges, be considered a harmless luxury but for one exceptional fact, he asks: "Has not tobacco a property belonging to very few substances, which makes its use exceptionally dangerous—the property, when administered in an overdose, of effecting some permanent change, probably in the spinal cord, which renders the victim forever after liable to injury from the minutest dose?"

Three cases are quoted from Dr. Druben's work on tobacco as pointing to the real danger arising from its use. The first case was that of a lawyer, thirty years of age, of athletic frame, who for five years had shown symptoms of a spinal affection, which had resisted all remedies. On the recommendation of Dr. Druben this person gave up the use of tobacco, in which he had indulged to excess. The result was that all the symptoms disappeared, as if by enchantment, and at the end of one month the cure was complete." The restoration to health lasted for some time, and until one day, dining with the doctor, he indulged himself, contrary to the earnest remonstrance of the former, in a cigar. No sooner had he finished the second one than he felt that all his old sensations had returned. Warned by this decisive intimation, the gentleman henceforth entirely gave up his cigar, took tonics for a month, and has ever since enjoyed excellent health.

The second case was that of a person who felt his energies declining, lost his appetite, and only found comfort in smoking very strong cigars. He complained of acute pain in the region of his stomach every afternoon, which only ceased at night, trembling of the limbs, palpitation, and sometimes sickness. On his relinquishing the use of tobacco for one month all the symptoms disappeared; but preferring the pleasure from tobacco to health, he resumed its use, and had in return a renewal of all his pains.

In the third case the patient, aged forty-five years, extremely sober and very regular in all his habits, was troubled by the premonitory symptoms of melancholy mania. He was perfectly aware of his hallucinations, but could not escape them. After two or three weeks' medical treatment, during which he felt no desire to use tobacco, these symptoms passed away, but they returned as soon as he resumed his cigar. Admonished by this experience he renounced tobacco entirely, and from that day has had no recurrence of the symptoms.

Other cases of a similar character are brought under the notice of physicians. The most determined devotee of tobacco who takes an overdose, or uses a much larger quantity than usual, will suffer more or less severely, and not only at the time, but at intervals afterwards, if the effects of the common dose be not carried off as rapidly as usual.

A more enlarged view of the deleterious effects of tobacco on the human system would lead to a great extension of the list of what the London writer chooses to call exceptional cases. It would be found that the stomach, the heart, and the lungs and the different senses are all made to suffer, and to become sadly deranged in their allotted offices by the pro longed and not always by the excessive use of tobacco. In minor degree the cases of interference with good and pleasant feelings from the constant use of tobacco are legion, and should make us modify not a little the word "harmless luxury," as applied to the general use of this weed. It is indeed a luxury, but it is a luxury for which the indulger has to pay very high taxes in addition to those levied by the internal revenue laws.

The writer in the *Spectator* is disposed to lay down as an axiom that men of highly strung, sensitive, nervous organizations, and men who habitually eat little, are better without tobacco. He adds the wholesome advice to all sufferers from tobacco that "there is no remedy whatever except total abstinence. If the mischief has once been done, one cigar or one pinch of snuff is as bad as a hundred."

Some persons can give up the practice at once, as we have known in the case of a printer, who, on being assured by hi physician that he would be better without his quid, took it out of his mouth, and exclaiming, "There it goes!" threw it in the fire. Years passed on, and this man persisted in his abstinence, much, as he alleged, to his gain in increased strength and readiness to work. In other cases we have known men of strong religious convictions, and who, from the injury done to their health, conscientiously believed it to be their duty to desist from the use of tobacco, struggle long and hard before they triumphed over the enslaving habit.

Nails for Out-door Work.

Every one is familiar, says the *American Builder*, with the fact that a piece of rusty iron, wrapped in cotton or linen cloth, soon destroys the texture of the fabric. A rusty nail, for example, if laid upon a few rags, will soon produce large holes in them, or it will, at least, render every point it touches so rotten that the cloth will readily fall to pieces at these points, and holes will be produced by the slightest hard usage.

Iron, during the process of rusting, tends to destroy any vegetable fiber with which it may be in contact. This explains, to a certain extent, the rapid destruction of the wood that surrounds the nails used in out-door work, whereby the nail is soon left in a hole much larger than itself, and all power of adhesion is lost. Part of this effect is, no doubt, due to the action of air and water, which creep along the surface of the nail by capillary attraction, and tend to produce rottenness in the wood as well as oxidation in the nail. But when we compare an old nail hole with a similar hole that has been exposed during an equal time, but filled with a wooden pin instead of an iron nail, we find the wood surrounding the wooden pin has suffered least, and we may, therefore, fairly attribute a destructive action to the rusting of the iron. It might, at first sight, be supposed that, as the oxide of iron is more bulky than the pure iron, the hole would be filled more tightly and the nail held more firmly to its place. But, although this effect is produced in the first instance, yet the destruction of the woody fiber and the pulverization of the oxide soon overbalance it, and the nail becomes loose. Of course, the iron itself is also destroyed, its strength being diminished, and we have, therefore, a double incentive for preventing or diminishing the action we have described.

The only way to prevent this action is to cover the nail with some substance that will prevent oxidation. This might be done by tinning, as is common with carpet-tacks. Coating them with oil or tallow would be efficient if the act of driving did not remove protecting matter entirely from a large portion of the surface. But, even then, it will be found that the oil or fat is stripped off the point, and gathered about the head in such a way as to prevent the entrance of air and moisture into the hole. The most efficient way to coat nails with grease is to heat them to a point sufficient to cause the grease to smoke, and then pour the grease over them, stirring them about in a pot or other vessel. When the nails are hot, the melted grease will attach itself to them more firmly than it would have done if they were cold—indeed, so firmly that it will require actual abrasion of the metal to separate it.

In erecting fences, laying plank or board sidewalks, and the like, it becomes an important matter to secure the nails against the influence we have mentioned, and yet the work must be done rapidly and cheaply. Nails may be readily prepared as described, or they may be simply dipped in oil or paint at the moment when they are driven in. In cases where it is not advisable to paint the whole fence, it is a good plan to touch the head of every nail with a brush dipped in oil or paint of the same color as of old wood.

Nils Ericsson.

It is with great regret we notice an announcement of the death of Nils Ericsson, the greatest engineer Sweden ever possessed. Nils Ericsson, who was born in the year 1802, was the son of Olaf Ericsson, an ironmaster of Langbanshyttan, and he was the elder brother of Captain John Ericsson, the celebrated engineer, who has achieved so great a name on both sides of the Atlantic. During his lifetime Nils Ericsson received many honors at the hands of his Government; but it is not for them, but for his executed works, and his labors to promote the prosperity of his country, that his name will be remembered by the people of Sweden. It was to his skill and energy that the construction of the system of State railways in Sweden was mainly due, and among the many important works carried out by him we may mention the reconstruction of the celebrated Trollhätte canal, the docks at Stockholm, and the canal between Saimen and the Gulf of Finland.—*Engineering.*

New Machinery.

In one of the mills in Lowell, where the new system of cotton picking is said to have been reduced to less than 1¼ mills per pound on the amount of cloth produced, and the work at the same time very much improved. This improvement is being introduced into Lowell, Fall River, and other places. By actual test two of these machines will take the place of one Creighton opener and four English lappers of two beaters each, taking out more dirt than the five machines combined, and leaves the cotton in better condition. For small mills that are now using an opener and two lappers of the ordinary kind (breaker and finisher), one of these machines, it is said, will do the work of the three in a much better manner. The laps when finished (ready for the card) are so even that they only vary a quarter of an ounce to the yard. Cotton manufacturers and insurance agents will do well to investigate this system, of which R. Kitson, of Lowell, is the patentee.—*Commercial Bulletin.*

Arrangement and Maintenance of Batteries.

The quantity of electricity which exists in the form of a current upon a given length, size, and quality of wire, is proportional to the number of cells in the battery; for, while the quantity of electricity produced by a battery is proportional to the amount of zinc decomposed in each cell, and is no greater in a battery of one hundred cells than in any one single element of that one hundred cells, the electro-motive force which is required to overcome the resistance of the conductors, or to force the quantity generated by a single cell through the wire, increases with every additional cell.

The quantity of electricity existing in the form of a current upon a telegraph wire from a given number of battery cells, is inversely proportional to the resistance of the wire, relays, and battery. To summarize: The electro-motive force being constant, the quantity of electricity which flows through any circuit is inversely proportional to the resistance.

The resistance being constant, the quantity of electricity which flows through any circuit is directly proportional to the electro-motive force.

It is evident from the above considerations that the number of cells employed in a battery for working a telegraph wire should be strictly proportional to the resistance of the wire and relays. If a battery of a certain number of cells is employed to work several wires, the resistances of all the circuits should be approximately the same; for if a wire one hundred miles long is attached to a battery which supplies another wire of twice the length, the shorter wire will have twice the quantity of current that the longer wire receives. If, therefore, the electro-motive force of the battery is sufficient to work the longer wire, it is twice as great as the shorter wire requires, and the surplus strength is wasted. In estimating the length of a wire, of course the resistances of the relays must be included, and the size and condition of the wire, or its conductivity, properly considered.

Applying the foregoing principles, the strength of current upon each of the following wires when supplied from separate batteries of 50 cells each, will be found as stated in the eighth column. When all the wires are supplied from one battery of 50 cells the strength of current upon each will be as stated in the ninth column.

Number of Line.	Resistance of Line.	Resistance of Relays.	Resistance of Line and Relays.	Resistance of Line and Relays increased by 50=Battery.	Conductivity of Wires.	Conductivity of Wires, each increased by 50 Ohms.	Strength of Current when supplied by separate batteries of 50 cells each.	Strength of Current when supplied from one battery of 50 cells.
1	3000	7600	10600	10650	·00009433	·00009389	4,694	4,108
2	3000	6800	9800	9850	·00010204	·00010152	5,076	4,443
3	3000	5800	8800	8850	·00011363	·00011299	5,649	4,948
4	3000	4800	7800	7850	·00012820	·00012734	6,367	5,582
5	3000	3600	6600	6650	·00015151	·00015037	7,518	6,597
6	1700	2800	4500	4550	·00022222	·00021978	10,989	9,677
	3400	1400	4800	4850	·00020833	·00020618	10,309	9,072
8	2000	2600	4600	4650	·00021739	·00021505	10,752	9,466
9	2000	1000	3000	3050	·00033333	·00032786	16,393	14,515
10	2000	600	2600	2650	·00038461	·00037735	18,867	16,748
11	3000	450	3450	3500	·00029411	·00028985	14,492	12,807
12	1000	450	1450	1500	·00071428	·00068965	34,482	31,104

The problem of working the twelve wires from one battery is a case of branch circuits, and the question is, What is the joint or combined resistance of the twelve branches? This will readily be found to be R=337,384. If now we add to this the common resistance of the battery R=50, the total resistance of the circuit will be R+R=387,384, and the strength of current flowing through the battery, or generated by it, will be $S=\frac{50\,00\,00}{387384}=129{\cdot}0709$. Now, this strength of current divides itself among the twelve branches in proportion to their several conductivities, as exhibited in the sixth column (conductivity is reciprocal of resistance, thus $\frac{1}{10650}$ =·00009433).

If the resistance of the battery were less than 50, the strengths of current in the last column would approach more nearly to those in the eighth column; but, on the contrary, were the resistance of the battery more than 50, the strengths of current upon the wires supplied from a common battery would depart more widely from those supplied by separate batteries of the same electro-motive force.—*George B. Prescott in the Journal of the Telegraph.*

Use for Blast Furnace Slags.

We have published several articles on this subject, giving an account of the manufacture of chemical salts, cements, pavements, and the like, from what has always been a waste material, and now hear of the proposition to cast the cinder from the furnaces into slabs, garden rollers, posts, pillars, and so forth. In certain metallurgical operations these articles can be made to resemble porphyry. In some parts of Germany the slag is cast in molds, and is at first used by the workmen for cooking and heating purposes, and afterwards for building houses and walls. The prospect is fair of furnace slags becoming valuable for many purposes.

Professor Huxley's Address Before the British Association.

Our readers will find in another column a portion of Professor Huxley's inaugural address before the British Association for the Advancement of Science. As a discussion of the origin of life and the various hypotheses in regard to this interesting subject, and as a clear expression of the views of one of the greatest biologists of the age, it will be found worthy of the most careful perusal. We shall conclude the address in our next issue,

Steel Types for Typographical Use.—By an ingenious mechanical contrivance, not unlike that in use for making nails, previously softened steel wire is converted into types which are afterwards hardened. With a single machine and a one-horse power steam engine it is said in an English journal 35,000 types can be made in twelve hours, while the types thus made are of a superior finish, and cheaper, also, on account of the less expense of the steel as compared with the ordinary type metal (usually an alloy of antimony and lead, in the proportion of one part of antimony to four of lead, with a very small quantity of copper, the latter being usually present in sufficient quantity in what is termed hard lead).

Arithmetical.—Any number of figures you may wish to multiply by 5 will give the same result if divided by 2—a much quicker operation; but you must remember to annex a cipher to the answer when there is no remainder, and when there is a remainder, whatever it may be, annex a 5 to the answer. Multiply 464 by 5, and the answer will be 2,320; divide the same by 2, and you have 232, and as there is no remainder, you add a cipher. Now take 359—multiply by 5, the answer is 1,795; on dividing this by 2 there is 179 and a remainder; you therefore place a 5 at the end of the line, and the result is again 1,795.

It is stated that an average Egyptian can see nothing distinctly at a distance of more than 500 yards, and has no acuteness in detecting an object within as many feet. A recent traveler says that when the railway was constructed the utmost difficulty was found in procuring men capable of seeing or recognizing the difference between signals only a hundred yards off. Many candidates came, but few passed the test. One man was nearly passed, but the engineer was not quite satisfied that the fellow had not been "making good shots" at the colors. So he held up his hat at 150 yards, and the hapless signalman pronounced it to be "the red flag."

The Hoosac Tunnel, during last month, advanced 150 feet at the east end, and 112 at the west. The central shaft reached the grade of the tunnel August 13, and a force was employed during the remainder of the month in trimming pouches of rock and putting in new timbers and machinery.

We are indebted to James R. Smedburg, C. E., of the San Francisco (Cal.) Gas Works, for a copy of the Engineers' Index to the *London Journal of Gas Lighting*, covering the first seventeen volumes of that valuable publication. This Index will be of great value to all who are interested in the science and laws of gas engineering.

Two thousand of Krupp's workmen are said to have enlisted in the German army. Krupp's guns are also in the same army, and are giving good reports.

NEW BOOKS AND PUBLICATIONS.

A Practical Treatise on Soluble or Water Glass, Silicates of Soda, and Potash for Silicifying Stones, Mortar, Concrete, and Hydraulic Lime, Rendering Wood and Timber Fire and Dry Rot Proof, etc., with Hundreds of Recipes for Soap, Cements, Paints, and Whitewashes, Railroad Sleepers Wooden Pavements, Shingles, etc. By Dr. Lewis Feuchtwanger, Chemist, and Mineralogist. Concluded with various Essays on the Origin and Functions of Carbonic Acid, Limestones, Alkalies, and Silica; and a Complete Guide for Manufacturing Plain and Colored Glass. With several Wood-cuts. New York: Published by L. and J. W. Feuchtwanger, 55 Cedar street.

It will be seen by this title that a great variety of practical subjects are discussed by the author, who is well known as a man thoroughly posted in these and cognate matters, and also as the author of a valuable treatise on gems. The author was the first to introduce the use of soluble glass to the American public, and has devoted much time in experiments with it. Whoever reads the book will not be disappointed in finding much information on points not generally well understood in this country. An extract from the work will be found in another column.

The Canadian Illustrated News.

This excellent weekly periodical, which is about the size of the Scientific American and other current illustrated papers, now comes to us greatly improved in its style of illustrations. Our Canadian cotemporary has from the first exhibited a commendable spirit of enterprise in the production of all its engravings by the photographic process, and now, by the recent introduction of improved steam presses, it is enabled to print its photographic pictures as quickly and in almost as good style, as the ordinary hand-cut wood engravings. We have seen some admirable specimens of printed photographs from nature done by the same method as that employed for the illustrations of the *Canadian News*, namely, Leggo's process, of Montreal. The publisher of the *Canadian Illustrated News* is Mr. George E. Desbarats, a practical printer of much experience, ability, and enterprise. The credit of establishing a weekly newspaper, profusely and regularly illustrated by photographic plates, belongs to Canada. There is no other paper like it in the world, that we know of. The Leggo process above alluded to, was some time ago fully described in the Scientific American.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,431.—Looms and Shuttles.—H. E. Towle, New York city. May, 18, 1870.

2,051.—Toilet and other Mirrors.—G. H. Chinnock and E. P. Williams, New York city. July 20, 1870.

2,324.—Printing Presses.—W. Braidwood, New York city. August 24, 1870.

2,330.—Printing Machinery.—R. M. Hoe, New York city. August 24, 1870.

2,333.—Liquid Meters.—J. F. De Navarro, New York city. August 25, 1870.

2,340.—Tramways and Road Surfaces.—S. D. Tillman, Jersey City, N.J. August 25, 1870.

2,353.—Tunneling.—W. Sykes, Toronto, Canada. August 27, 1870.

2,358.—Sewing Machine Attachment.—G. H. Collins, New York city. August 27, 1870.

2,359.—Tacks and Nails.—H. W. Wright Taunton Mass. August 27 1870.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notice exceed Four Lines, One Dollar and a Half per Line will be chaaged.