

Scientific American.

THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL, AND OTHER IMPROVEMENTS.

VOLUME XI.

NEW-YORK, DECEMBER 15, 1855.

NUMBER 14.

THE
Scientific American,

PUBLISHED WEEKLY

At 128 Fulton Street, N. Y. (Sun Buildings.)

BY MUNN & COMPANY.

O. D. MUNN, S. H. WALES, A. E. BEACH.

Agents.

Federhen & Co., Boston. Dexter & Bro., New York
A. Winch, Philadelphia. E. E. Fuller, Halifax, N. S.
A. G. Courtenay, Charleston. S. W. Pease, Cincinnati, O.
Avery, Bellford & Co., London. M. Gardisal & Co., Paris

Responsible Agents may also be found in all the principal cities and towns in the United States.

Single copies of the paper are on sale at all the periodical stores in this city, Brooklyn, and Jersey City.

TERMS—\$2 a year, —\$1 in advance and the remainder in six months.

Drilling and Boring Machine.

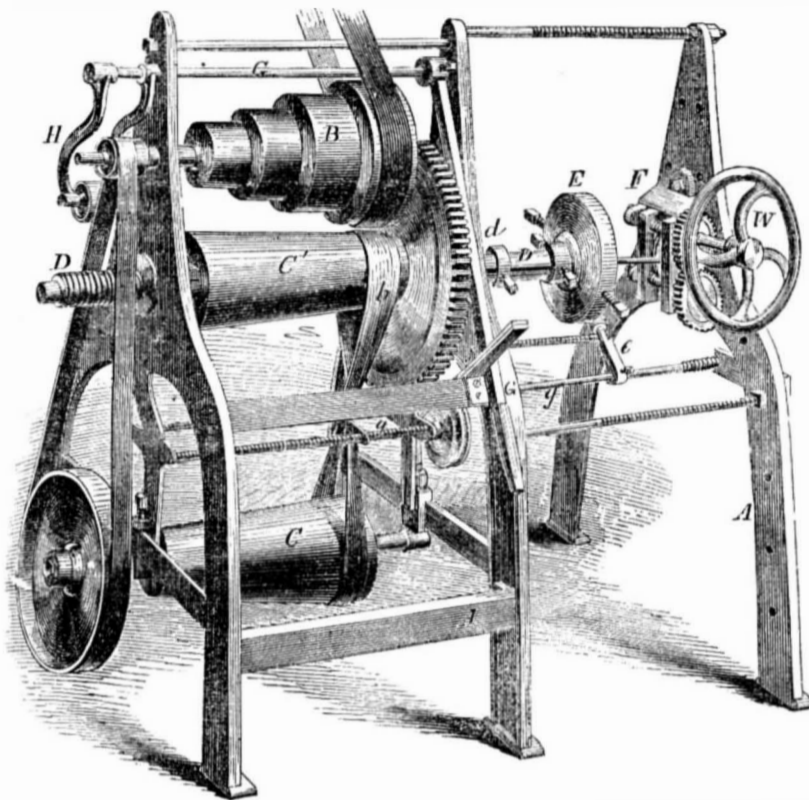
The annexed figure is a perspective view of the Universal Machine for Drilling, Screw Cutting, and Boring, for which a patent was granted to Joel P. Heacock, of Marlboro', Stark Co., Ohio, on the 27th ult., the claim of which was published in the last number of the SCIENTIFIC AMERICAN.

A represents the framing; B are the pulleys on the driving shaft; C' is a cone pulley, with an opening through the entire length of its center, through which passes the mandrel shaft, D; this shaft has a screw cut on part of its length, and works in the thread of a nut in the interior of pulley, C'; this pulley may be said to be the nut of the mandrel screw shaft, which is moved backward and forward, advancing in boring, drilling, &c., and then running it back without changing the direction of its motion. This is done as follows:—In the shaft, D, near the chuck, E, there is a groove; in this, behind ring *d*, is a feather (not seen) which keys said shaft with the large cog wheel. This cog wheel receives motion from the driving shaft by a pinion (not seen), and thus it moves the mandrel, but gives it the backing motion. The forward feed of the mandrel is obtained by the lower cone pulley, C, which drives the upper cone pulley, C', by the belt, *b*. The lower cone pulley is driven by a belt, I, passing over a small pulley on the outer end of the driving shaft, and over a large pulley on the outer end of the lower cone shaft. As the belt, *b*, passes over the larger end of the lower cone pulley, and the narrow end of the upper one, C', the latter receives a more rapid motion than the shaft, D, by the direct driving of the cog gear, consequently as its interior has a thread upon it, the screw shaft, D, of the mandrel must feed forward for drilling or boring, &c. To feed back the screw mandrel, the motion of the lower pulley, C, has only to be arrested, when the pulley, C', acts as a stationary nut, and by shaft D still revolving in the same direction, it feeds itself backwards.

The belt, I, is hung quite slack, and is rendered tight to drive the lower pulley by a tightening or hanging pulley, H, which is secured to the outer end of an oscillating shaft, G. To the inner end of this shaft (forming a continuous connection) there is attached a lever, G, which hangs down, as shown, when thrown out of action. By elevating the lower end of this lever, the tightening pulley, H, will be forced against the belt, I, thus making it taut and giving it motion, thereby driving the lower cone pulley, C, which gives motion to the upper cone, C', by the belt, *b*, and feeds the mandrel forward. By throwing down the lever, G, the tightening pulley, H, is pushed back from belt, I, and the motion of the lower cone, C, is stopped, also that of the upper cone, C', and the mandrel shaft, D, then feeds back by the pinion on the main shaft driving the cog wheel on the mandrel, D.

On the forward part of the frame there are vibrating shipping devices, to make the mandrel move backwards, after the tool has done its work. *g* is an arm or rod inserted in seats in the uprights, and connected with the catch or lock arm, *f*. On the front rod, *g*, is a small dog or trigger, *e*, which projects upwards and

DRILLING AND SCREW CUTTING MACHINE.



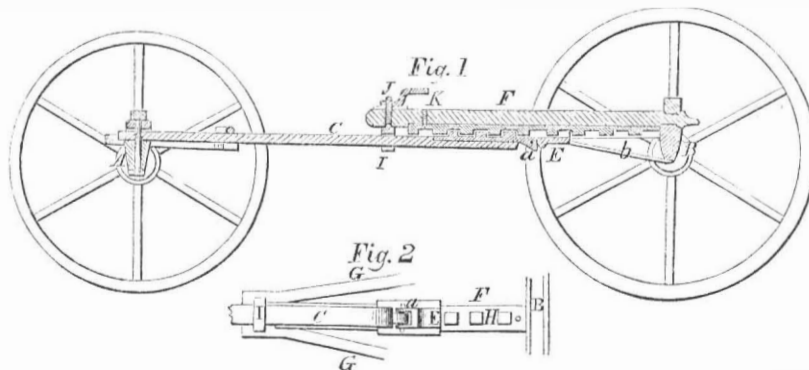
inwards so as to be pressed forwards by the chuck, E, when the latter has advanced to the required distance. The edge of the arm, *f*, has notches in it, and the lever, G, when raised, is set in one of these, and held there when the mandrel is set to feed forward. The tightening pulley, H, now gives motion to the lower cone pulley, C, and the mandrel, D, feeds forward, boring with a drill, cutting a thread with a tap in a nut, or on a bolt with a die. When the chuck, E, holding the tool, has advanced to the proper distance, it presses against the trigger, *e*, which tilts the clutch arm, *f*, and the end of lever G drops down, the tightening pulley, H, is then thrown out, and the motion of the lower pulley, C, ceases. As has been explained, the mandrel, still rotating in the same direction, feeds back of itself. The trigger, *e*, is set at any point, so as to reverse the mandrel for any desired length of feed. The belt, *b*, holds the cone pulley, C', firm, while the mandrel bar is feeding back. This belt can be set on the pulleys at any point, to give the mandrel more or less motion as it is moved from the center towards the end, thus giving the desired grade of feed. The ring, *d*, on the mandrel in the front, has a pointed screw pin, which projects into the slit or groove in the mandrel.—As the mandrel is fed back the pin presses against the feather in the groove which keys the cog wheel to the mandrel, forcing it against the shoulder of the cone pulley, C', thus acting like a friction coupling, and gives motion to the upper cone pulley, and as its motion

then becomes equal to that of the screw of the mandrel the latter ceases to feed backward. The ring, *d*, therefore regulates the back feed of the mandrel and the trigger, *e*, the forward feed, so as to feed the mandrel bar the required distance to execute any work the machine has to perform. These devices, and the way they are arranged and operate, exhibit a great deal of ingenuity.

F is the box or jaws for supporting the articles to be operated upon. It has two jaws, one on each side, through which pass two screws—each having a right and left hand screw cut in it. By turning the wheel, W, both of these jaws will advance together—parallel—and center and grip the article to be acted upon. A tap is now shown in the figure in the act of cutting a thread in a nut in the jaws of F. The lever, G, is shown as being just thrown out of catch with the arm, *f*, and the mandrel is beginning to back, after having completed its work. By turning the wheel, W, to the left, the jaws open and the nut may be taken out and another inserted. This machine is capable of doing all kinds of boring, from the smallest boring to the largest steam engine cylinders, fly wheels, car wheels, &c. Also drilling and screw cutting, which is performed without change or alteration of machinery, tools only excepted.

By letter addressed to Mr. Heacock, at his residence given above, more information about patent rights and the manufacture of these useful machines may be obtained.

PATENT CARRIAGE REACH.



On the 16th of October last a patent was granted to Edwin Wilson, of Prattsburgh, N. Y., for the extension Carriage Reach illustrated by fig. 1, a vertical longitudinal section, and

fig. 2 an inverted plan view of the accompanying engravings.

In fig. 1, A represents the front axle of a vehicle, and B the back axle. C is the reach, the front end of which is attached to the front axle in the usual manner. The back part of the reach has a cog bar attached to its upper surface, said bar having a slide, E, fig. 2, connected to its outer end by a hinge or joint, *a*. F represents the center piece of the hounds, G, which are attached to the back axle, B.—These hounds are constructed in the usual way; the back ends of the hounds, G, are fitted upon the upper edge of the back axle, and braces, *b*, are secured to the underside of the axle and to the under side of the hounds. The under side of the center piece, F, has a cogged bar attached to it. The sides of the cogged bar extend a short distance beyond each side of the cogs, as shown in fig. 2, and the slide, E, has recesses in its inner sides, in which recesses the sides or edges of the cogged bar, H, fit. I is a clasp, which has a screw rod, J, attached to its upper end, said screw rod passes through the end of the center piece, F, of the hounds, and has a nut, K, upon it above the center piece. The reach, C, passes through the clasp, I, and the cogs on one bar fit between the cogs on the other, the clasp, I, and slide, E, keeping the cogs geared or fitted into each other. By this arrangement it will be seen that the reach, C, cannot move horizontally from the center piece, F, of the hounds, in consequence of the cogged bars, and the cogs cannot become loosened or ungeared from each other in consequence of the clasp, I, and slide, E. In case the reach requires to be either extended or shortened, the center piece, F, is raised by unscrewing the nut, K, and the cogged bars are then ungeared, and the slide, E, may be moved outward or inward, on the center piece, F, to the desired point, and the clasp, I, again screwed up to the center piece, F. The joint, *a*, in the slide, E, allows the center piece, F, of the hounds to raise. This improvement is extremely simple, and the reach may be extended or shortened in a moment of time, and with the greatest facility. The reach also is strong, much more so than the ordinary one which are weakened by bolt holes made through it in order to render it capable of being extended. The back axle also is kept in proper position, and is not allowed to turn or cant inwards, as is the case with the ordinary reach, in consequence of the sagging or depression of the reach at its center, or where it is connected to the center piece of the hounds.

By letter addressed to J. R. Selover, Prattsburgh, Steuben Co., N. Y., more information respecting the sale of patent rights, &c., may be obtained.

Railway Telegraphs.

We believe there is only one railroad in the country which habitually and constantly employs the telegraph, and that is the New York and Erie, which, at its own expense has erected wires along its entire line. The expense of putting up this telegraph was some \$50,000, and the cost of operating it is about \$30,000 a year; yet the Superintendent, Mr. McCallum, states that the value of the services rendered by it is more than \$100,000 a year. By its means each Division Superintendent maintains a constant control over all the trains in his division, and it frequently happens that every train is running under special orders transmitted by the telegraph. Indeed, whenever any train is more than ten minutes out of time, the fact and cause of the delay are at once reported to the General Superintendent for his action. Thus every employee on the road is held to constant accountability for any delay occasioned by his fault.

Every railroad in our country should have its own telegraph.

[For the Scientific American.]
Improvements in Railroads.

The improvement of our railroads is a subject that not only affects the dearest interest of the companies but the whole people, and the best efforts of civil engineers should be directed to that branch of their business till the limit of speed depends upon the capacity of the engine.

The defects of the permanent way are very few, and most of them can be cheaply and speedily improved, and when the superstructure is built that is worthy to receive a rail, no doubt a rail will be found that shall not be a particle behind the structure in its perfection.

EARTHWORK—To commence at the foundation of the whole system, solidity is the great thing to be acquired, and upon that one idea is based the whole of the great results that have been, and are yet to be achieved.

Water is the great destroying element of all earthy structures, and its entire absence in the foundation of the road bed would soon place it beyond the action of frost or any perceivable deflection by the weight of the moving train.

As it cannot be prevented from falling upon the surface, the next best thing that can be done is to remove it as soon as possible. A drain should be dug from three to four feet below the surface and tile laid therein, which will ensure its speedy removal in the most retentive soils. The experiment has been tried by experience agriculturists with complete success; and soils that could not be drained by open drains have been made productive by the covered drain, and at less cost. A covered drain, of sixteen inch caliber, seems to draw as much water from a field in the same time as an open ditch of ten times that capacity, so that, without doubt, a pipe drain of small size would do more towards removing the water from the road bed than both of the open ditches at the sides.

But falling water is not the only source of annoyance; it is raised in the embankments by capillary attraction to a great height, but depending upon the character of the soil. In clay, loam, or sand, if water stands in the hill ditches it affects badly the permanency of the bank, no matter what its elevation may be, it reaches the surface of either of those soils, and completely saturates them, so that the ballast gradually sinks. The only method of preventing its rising to where it can affect the ballast is to cut it off with a drain; for if there is a free passage for the water where it can flow easily and quickly, it will surely find it, even if it is surrounded by compact clay. Circumstances will govern the number, size, and length of such drains, and the calculations are as easily made as for any other branch of railroad engineering.

Side ditches, however, should not be neglected. On the contrary, they should receive more attention than they ever have had. Water should not be permitted to stand in them on any account. The appearance, health of the country, and inconvenience of crossing, are not the only reasons for the abatement of the nuisance; they too often afford good watering places for the cattle at the crossings, besides a very tempting one for the neighboring farmer's stock. Thorough draining is the main thing needed to ensure the stability of the road-bed, and until that is effected, no great improvement need be looked for in the "permanent way."

BALLAST—Gravel which comes the nearest to broken stone in quality—that which is neither too coarse nor too fine, which will pack firmly, and at the same time afford an easy escape for falling water—should in all cases be preferred. Inferior kinds might possibly be used over a drain, but if too fine, it will hold too much water, if too coarse, it cannot be well packed around the ties; an even, uniform, medium quality is preferable, and for a term of years will pay the extra cost of transportation. Clean sand has been used to a great extent, but would be far better were there a drain beneath it. Water will run up a bank of sand to a great height if there is any in the ditches at the sides. In the drouth of 1854, six inches below the surface of a 10 feet embankment of clean sand, it was damp enough to pack into a ball.

The manner of using ballast is almost always left to the care of those having little or

no interest in its application—whose philosophical or mechanical knowledge is below the medium. The only idea with them has been to get it under the ties, so as to make a hollow between them, and such a thing as packing the gravel anywhere excepting there has never entered their heads.

To ballast a road with gravel like children's playing marbles is the height of folly, for the weight of the train causes the ballast to rise between the ties, and affords no permanency, yet this is the way most of the roads are ballasted. When ballast is placed upon the road-bed before the track is laid, it would be a grand plan to lay it about four inches thick, then go over it with a very heavy cast-iron roller, then another course of gravel and another rolling, and so on until the required depth was on; but if it is deferred until the track is laid, no very heavy trains should be allowed to move till the gravel is under and well rammed down. If this precaution be not taken, many of the rails will be bent, and will have to be replaced by straight ones, at great cost.

TIES—Durable timber, of good size, firm texture, and well seasoned, are the requisites of a good tie, and any one not answering this description should not be used. They ought to remain sound at least ten years, be large enough to give a good surface for the rail on one side, and a good bed upon the ballast on the other; firm enough to hold a spike well, and be well seasoned as a pre-requisite to soundness and firmness. A tie of soft wood (cedar, for instance,) gives beneath the rail, and if placed between two hard ones is as bad, practically, as though it was not well tamped up, for the train sags at that spot,—every wheel of the train sinking lower and lower. It is just as bad if the tie be small, for it cannot receive that support from the ballast that a large one does, neither can it give the bearing to the rail. If all the ties were equally firm on the ballast the smallest would not hold their faces equally well, for the concussions of a moving train tend to loosen them all, and the smallest must suffer first. As long as the jointed rail is used, more care will be required at this point than any other, unless a more perfect chair is introduced, or a short cross tie be found to answer more perfectly. Believing, however, that a perfect rail will be, if it has not already been invented, this imperfection, of course, will cease, and the ties will then have to be arranged in classes. They should first be selected as regards their firmness, and subdivided according to their size. If small, more of them should be used in the same space, and none but the best white oak should be used on a curve.

CURVES—The elevation of the outer rail is too often left to the judgment of the track repairer, who is just as apt to get it too high as to have it too low. In either case it is wrong. The elevation that will exactly overcome the centrifugal force of the moving train at a certain rate per hour should in all cases be known, and all trains that are above the rate of freight trains should be required to conform to the standard in going round these curves. The concussions will then be comparatively light, if the calculations are perfect.

Parabolic curves give in practice all that is claimed for them in theory, and would be one of the great improvements to be introduced as the rule and not the exception in this country. Other improvements, undoubtedly, will be suggested by those who have seen the defects of the system, for such I consider the above to be; but these are the main ones, and until they are radically improved or a new system substituted, we shall be content to move some thirty miles an hour.

H. DE L. S.

Pompey, N. Y.

Gun Cotton and Gunpowder.

Inquiries having been made of us lately as to the use of gun cotton, and whether it could take the place of gunpowder, we have obtained the following information on the subject from the Smithsonian Institution, viz.:—Gun cotton cannot be made with anything like the same uniformity in strength as gunpowder, and its explosive property diminishes on being kept for any length of time. It can be used with safety in the discharge of fire-arms, but not with as much safety as powder. Its cost, weight for weight, is a little more than gun-

powder, but owing to greater strength, force for force, it is cheaper. The Governments of France, Prussia, Austria, Russia, and England, have made a great number of experiments on the use of gun cotton in fire-arms, and in all cases the reports of the engineers engaged in making the experiments were against its adoption in the place of gunpowder. In blasting rocks it is used extensively. The objections to its use are the inequality of its action compared with gunpowder, the effect on the gun is greater, its projectile force varies with the compression of it in the gun, it attracts more moisture, alters slowly from loss of acid, explodes under some circumstances at 154 deg. [Washington Star.]

Adjusting the Number and Depth of Paddle-Wheel Blades.

It appears that something more may be said upon paddle-wheels; we will therefore remark, that so long as the common rectangular floats continue to be used, the number and depth of them should regulate each other upon the principle "that the right-angled resistance from the surface of one paddle at its central (or upper) edge, should pass below, and entirely clear of the paddle before it." It is upon this principle that we can account for the results of experiments where, sometimes, one-third of a steamer's blades have been removed from their upper edges without diminishing the speed, but rather improving it. In such cases the arms have been too numerous for the width of the blades. All the upper parts, which extended above a point, from which a line drawn at right angles to the arm would pass to, or below the lower edge of the blade before it, was disturbing the fluid to no good purpose, but rather loading the wheel with dead water, which, instead of pressing against the ocean, impinged upon the pre-dipping paddles. If an equable distribution of resistance shall continue to be approximately sought in the periphery of common paddle-wheels, by using a large number of blades, instead of seeking for it in the true form of propelling blades, let the depth or breadth of the floats be reduced, as above, and subsequent changes will be found unnecessary. How many wheels have become *water* instead of "paddle" wheels, by *guessing* at the proper number and depth of their blades!—[U. S. Nautical Magazine.]

Pennsylvania Soapstone.

An American in London, in a communication to the *London Mining Journal*, states that the same causes which contributed to the formation of soapstone in Cornwall, seem to have produced the same result in Pennsylvania. He says:—

"On the banks of the river Schuylkill, ten miles above Philadelphia, the gneiss which, alternating now and then with mica schist and porphyry, has prevailed for the whole of that distance, is succeeded by an extensive tract of serpentine. The gneiss is much invaded by veins of trap and granite; and, at the junction, a great dyke of granite shows itself crossing the river. It is at this precise spot that the soapstone, in massive, irregular deposits, is seen. Nodules of serpentine are included in the deposit. The citizens of Philadelphia have good reason to remember this soapstone, since for a long time the doorsteps of their houses were invariably made from it. The rock wore away more speedily than the serpentine, which protruded in hard, indestructible, rough balls, not very genial to the soles of one's shoes. It is now wholly replaced by marble for doorsteps; but, for lining furnaces, where great heat is to be encountered, the soapstone is still extensively quarried and applied. It occurs on both sides of the River Schuylkill, here 300 feet wide, and on the east side is not less than 40 feet thick.

A singular fact attending the occurrence of this deposit may also, be here mentioned. The soapstone is interspersed with little nodules of iron pyrites. The portion of the rock in which this is most abundant wears off into a sugary substance. On being analyzed by a young Philadelphian amateur chemist, Theo. Rand, this substance was found to contain 8 per cent. of epsom salts—(sulphate of magnesia.)"

Foolscap Paper.

Every body knows what "Foolscap paper" is, but would perhaps be puzzled to tell how it

came to bear that singular cognomen. Well, when Charles I. found his revenues short, he granted certain privileges amounting to monopolies, and among these was the manufacture of paper, the exclusive right of which was sold to certain parties who grew rich and enriched the government at the expense of those who were obliged to use paper. At this time all English paper bore in water marks the Royal Arms. The Parliament under Cromwell made jests and jeers at his law in every conceivable manner, and among other indignities to the memory of Charles, it was ordered that the Royal Arms be removed from the paper, and the fool's cap and bells be substituted. These also were removed when the Rump Parliament was prorogued, but paper of the size of the Parliament's Journals still bears the name of "Foolscap."

Iron Rigging for Ships.

Two lines of ships (of about 800 tons each) are running between Glasgow and Montreal, Canada. They are built of iron, and all their shrouds, stays, back stays, in fact, all their standing rigging is made of wire rope, with hemp centers, like that used on some inclined planes of railroads. This rigging looks very light, and is, in fact, lighter than hemp of equal strength. It holds less wind, and is not subject to stretch after being once set. Each shroud or stay terminates in a screw, by which it can be strained to any desired extent, and two men, in a couple of hours, can set up all the rigging, even in a storm. An improvement in the hanging of the yards is adopted in these ships, by which the yards are made to turn in their lifts, and roll up the sails upon them, from the deck, so that it is never necessary to go aloft to reef or furl them. These ships use the American steering apparatus, having a right and left handed screw upon the axis of the wheel, with rods from the screw boxes to a short tiller on each side of the rudder head, instead of the tiller rope.

Foot Prints of Reptiles in the Coal Strata of Pennsylvania.

At a recent meeting of the Boston Society of Natural History, Professor Wyman read an article on the foot-prints recently discovered by Professor Henry D. Rogers, in the Carboniferous Strata of Pennsylvania. He gave an analysis of the anatomical characters by which reptiles and fishes are distinguished from each other. He made comparisons between the form and structure of reptiles and the fins of fishes, showing that although they resemble each other as regards their functions, yet morphologically they are always distinct. There is no known fish, recent or fossil, the pectoral or ventral fins of which could produce a series of traces like those discovered in the coal strata of Pennsylvania by Prof. Rogers.

Prof. Wyman, therefore, thought that, in the present state of knowledge, there was no ground for denying that the quadruped tracks found in the coal formations were made by reptiles.

To City Subscribers.

So many complaints are made by our city patrons of the non-receipt of their paper by the carriers, that we would advise all who are about to commence taking the paper to call for it at the publication office, or obtain it at a periodical store in their neighborhood. One or two of the carriers serve the paper regularly; those the public, in their districts, know, and will continue to patronize; but others who serve it are so dilatory and unreliable that our subscribers are exceedingly annoyed by them, and blame us for an evil which is not in our power to remedy. Persons who will run their own risk in having the paper served them, may leave their names at our office, and they will be handed to a carrier, but we will not vouch for his faithful services, nor receive money for him.

The SCIENTIFIC AMERICAN can be found in all the periodical stores in this city, or Brooklyn, on the Thursday preceding the date of publication each week, or at the Office. Price 4 cents per copy.

Brilliant of Fahlun, so called, are made from 29 parts of tin and 19 parts of lead. They are a very fusible and brilliant alloy.

New Inventions.

Reports of Railroads.

OIL.—The custom adopted by the New York and Erie, and the Great Central New York Railroad, of keeping a correct record of the work done by each locomotive, and the different items of expense, and publishing monthly reports, must do good, by showing the directors, superintendants, engineers, and all concerned in such accounts, where the greatest loss is caused, and where the greatest gain is obtained. The Report of the General Superintendent, C. Vibbard, Esq., of the New York Central Railroad, for September, shows the number of miles run by each engine, and the quantity of oil used. The average number of miles run to one pint of oil was 16 69-100—two miles more to the pint than in the previous month. The engine *W. W. Corcoran*, ran 50 65-100 miles to one pint of oil. This was the highest rate; the lowest only 6 13-100 miles, was by the locomotive *Syracuse*. It must have been sadly out of repair. What is the cause of the *W. W. Corcoran* performing so well? In the report for last month of Edward H. Jones, Master Mechanic of Albany & Utica division of the above railroad, we find that there was nearly two miles less run to the pint of oil than during the previous month. Has the maximum economy of oil been obtained on this railroad? We think not. We have no doubt but the engineers on this railroad will yet show a higher rate of duty done by the engines to one pint of oil than they yet have shown.

FUEL.—The monthly reports of General Superintendent D. C. McCallum, Esq., of the New York and Erie Railroad are more elaborate than those of the Central Railroad. They embrace the work done by each engine, and give all the expenses separately. In his report for the last month (October,) we find that the average number of miles run to one pint of oil was 16 4-100—nearly two miles more than the previous month.

The general average of miles run to one cord of wood was 27 29-100—about two miles more than the previous month—while the average cost was four cents more, thus showing a decrease in the expense, no doubt; but the increasing cost of this kind of fuel is a serious question. On the eastern branch of this railroad the wood costs \$5 71 cts. per cord—a very high price—while on the Buffalo division it costs only \$2 94 per cord, and yet the expense of fuel per mile for drawing a tun load on this branch is about as much as on the Eastern branch. The engines on it seem to have been but half as economical of fuel. There is room for improvement here, and the energetic Superintendent will soon stick a pin in that spot. Fuel is the largest single expense, the average being 13 22-100 cts. per mile run; the repairs of engines amounts to 6 5-100 cts. per mile; oil and tallow, 1 23-100 per mile. Every effort must be directed to economize the fuel. No less than 12,516 cords were consumed on this road during the month of October; this amounts to $(12,516 \times 8 + 5,280)$ 18 93-100 miles of cord wood, 4 feet high and four feet wide, and cost \$45,016 68. Such a destruction of forest, amounting to 236 miles of cord wood per annum on this single road, must soon render such fuel scarce, and consequently dear. Coal-burning engines or cheap coke are the remedies to which all our railroad managers and engineers should be directing intense attention.

Spontaneous Combustion.

A correspondent, speaking of the fire at the coal mine at Beaver Meadow, Pa., which, it had been supposed, originated from spontaneous combustion, states that such is not the fact; that the fire in the dirt heap or coal dust at that place was the result of carelessness on the part of the managers of the mine, who allow their firemen to wheel or cart the hot ashes from the engine furnace on to the "dirt heaps." There are now, says our correspondent, three veins of coal on fire, or perhaps the same vein in three different localities, in the anthracite coal fields of Pennsylvania, but they have all been ignited by the carelessness of the miners.

The first was set on fire at Coal Castle many years ago, and is still burning, like a slumbering volcano, having destroyed, probably, millions of tons of coal, as the vein is the celebrated "Jugular," which varies from 60 to 120 feet in thickness. The second was recently set on fire at Tamaqua by some miners who were digging their winter's coal at the outcropping of the vein; and the third is the sub-

ject of remark at Beaver Meadow.—[Philadelphia Ledger.

[Would it not pay to extinguish this fire by forcing steam and carbonic acid gas into the mines, as was accomplished a few years since by Goldsworthy Gurney, in England. The burning coal mine which he extinguished had been burning for a longer period than those in Pennsylvania.

WEBER'S PATENT FARM GATES.

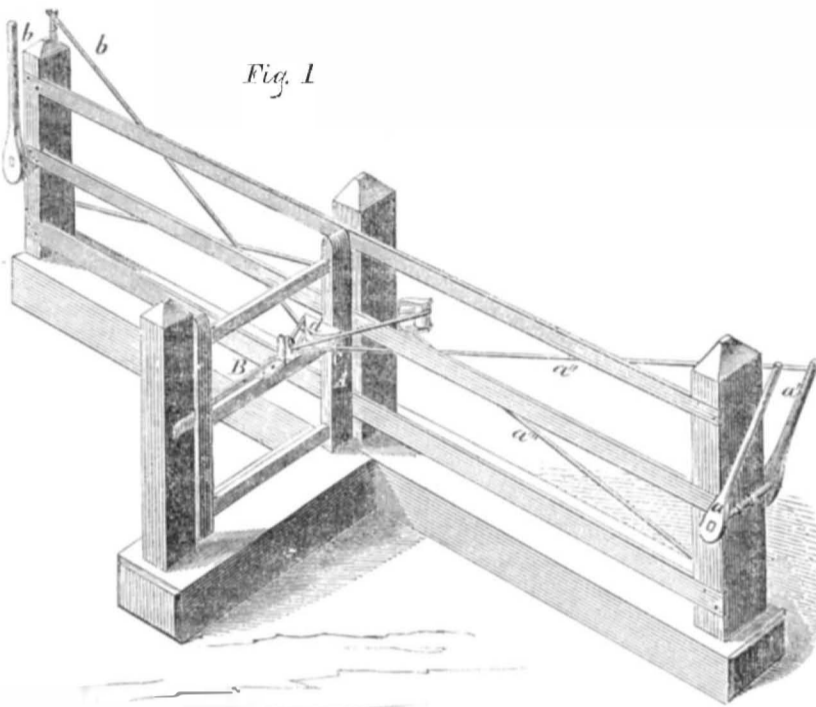
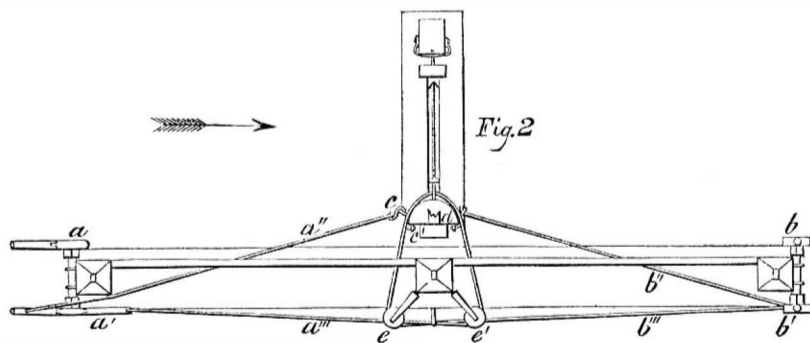


Fig. 1 of the accompanying engraving is a perspective view, and fig. 2 is a plan view of a method of operating gates for farms, for which a patent was granted to John K. Weber, of Seneca Falls, N. Y., on the 9th of October last.

The nature of the invention consists in the peculiar mode of opening and closing gates, which are so hung as to be opened and shut both ways, and a person riding in a vehicle or on horseback can, without dismounting, open the gate, and close it after he has passed through.

The gate *A*, is hung upon pivot or swivel hinges, so as to swing freely both ways, and is fastened by the spring bolt *B*. On either side of the gate there is a set of levers and cords so arranged and connected with the gate and spring bolt as to open the gate in a direction from and in front of the person passing through. The two sets are alike in arrangement and operation, and a description of one will answer for both. The lever, *a*, is worked by the hand

lever, *a*, as shown in fig. 1. The cord, *a2*, is attached by one end to the top of lever *a*, and by the other end at *c*, fig. 2, to the semi-cylindrical segment, *d*, which is firmly fixed to the gate. The cord, *a3*, is attached by one end to the lower part of lever *a*, and after passing over guide pulley *e*, fig. 2, and around the periphery of the segment, is attached by its other end to the segment at *c*, fig. 2. It will now be seen that if the lever *a* is pushed forward by a person riding in the direction of the arrow, the upper end of *a* is carried forward, and its lower end backward, and that the action of the cord, *a3*, will be to open the gate in the direction of the arrow, and that the reverse motion of the lever, *a*, would shut the gate by means of the cord, *a2*. The cords, *b2* *b3*, from the upper and lower ends of lever *b*, are arranged and operate similarly to cords *a2* *a3*, except that they operate to open and shut the gate in a different direction. The cords, *a3* *b3*, pass through a loop to keep them in place on the



pulleys, *e* *e'*. It will be readily seen that a gate of this description must be fastened when closed, or it could be opened by the wind or by cattle in either direction, and in order to fasten the gate and control the fastening by means of the levers, *a* and *b*, the cords, *a3* and *b3*, pass through a loop on one end of the spring bolt, *B*, and as these cords alternately slacken and are drawn tight by the alternating motions of the levers, the spring bolt will be withdrawn and allowed to return to its place.

The gate is shown with a fence on one side; and it will be understood that when it is opened as described, by a person advancing in the direction of the arrow and putting up the lever, that it remains open until he passes through and closes it in the same way on the other side. The claim is for the arrangement of the levers, *a* *a'*, *b* *b'*, cords *a2* *a3*, *b2* *b3*, in combination with the spring bolt, *B*, for opening and closing the gates both ways, in the manner set forth.

By addressing communications to Mr. Weber, at Seneca Falls, more information respecting rights, &c., may be obtained.

Who'll take the Prizes?

Competitors for the large prizes to be distributed by us on the first of January, are reminded that the time for them to act is short. Fifteen will win, while others must suffer disappointment. The question is, who will be the fortunate ones? The answer is, those who have exerted themselves the most, and obtained the largest number of subscribers. To some who have entered the arena of competition, the addition of a few more names to their lists, perhaps a single one, will save them the mortification of defeat. Think of that fact, and act accordingly.

The Hiltotype Again.

The Rondout (N. Y.) *Courier* announces that the Rev. L. L. Hill has at last completed his invention of the Hiltotype, and "has received

an offer of \$30,000 provided he will go to Europe and obtain patents. This he does not deem a sufficient consideration for so brilliant a discovery." What a conscience. It is also stated that "he has recently made a great addition to his invention by reproducing the colors of nature on collodionized glass, and has relieved himself of the difficulty of using silverized plates."

Awards to American Exhibitors at the French Exhibition.

We publish herewith a list of the principal awards made to American Exhibitors at the French Exhibition,—nearly every article sent from the United States either received a medal or was honorably mentioned by the International Jury. We have not room for the whole list.

GRAND MEDALS OF HONOR.

C. H. McCormick, Chicago, Reaping Machine
Chas. Goodyear, New York, India Rubber Goods.

MEDALS OF HONOR.

J. A. Pitts, Buffalo, Grain Separating Machine.
Bache & Saxton, Washington, Weights and Measures.
Lieut. Maury, Wind and Current Charts

MEDALS OF THE FIRST CLASS.

Tousley & Reed, New York, Steam Engine.
J. H. Manny, Rockford, Reaping Machine.
M. Allston, South Carolina, Rice Samples.
Thos. Blanchard, Boston, Wood Bending Machine.
E. Richmond, Boston, Metal Cutting Machine.
I. M. Singer & Co., New York, Sewing Machine.
David King, Albany, N. Y., Model of Steamboat.

Secretary of the Navy, Model of a Vessel
S. Colt, Hartford, Ct., Revolvers.
Merriam, Brewer & Co., Boston, Cotton Goods.
W. S. Seabrook, South Carolina, Cotton Samples.
A. W. Ladd, Boston, Pianoforte.
A. Mirmont, New York, Violins.
C. B. Stuart, New York, Dock and Steam boat Model.

MEDALS OF THE SECOND CLASS.

Z. Thompson, Vermont, Specimens of Forest Wood.
John S. Wright, Chicago, Harvesting Machine.
Wethered Brothers, Baltimore, Steam Engine (super-heating).
John Harraday, New York, Machine for Cutting Clothes.
Sanborn & Carter, Portland, Me., Book Backing Machine.
F. & A. Wollé, Bethlehem, Pa., Paper Bag Machine.
Grover & Baker, New York, Sewing Machine.
Wheeler, Wilson & Co., New York, Sewing Machine.
J. Seymour, Newark, N. J., Sewing Machine.
Fowler & Preterre, New York, Dentistry.
J. Gurney, New York, Daguerreotypes.
G. Gemunder, New York, Violins.

HONORABLE MENTIONS.

Vergennes Scale Co., Vermont, Platform Scale.
Backus & Peaslee, New York, Machine for Washing Rags.
Nelson Barlow, New York, Planing Machine.
C. Kline, New York, Chronometers.
Storms Brothers, Nyack, N. Y., Wooden Ware.
N. W. Kingsley, New York, Dentistry.
Benj. Moore, New York, Sawing Machine.
J. T. King, New York, Steam Washing Machine.
Meade Brothers, New York, Daguerreotypes.
Thos. Maskell, Franklin, La., Sliding Keel.
N. Thompson, Jr., New York, Life Preserving Seat.
Madame Delpit, New Orleans, Snuff,—besides many others.
W. J. Valentine, President of the American Commission, residing in Paris; Marshall Woods, of Providence, R. I., Member of the Jury, and Alexander Vattemare, for services rendered in the American Department, were created by the Emperor, Chevaliers of the Legion of Honor.

Scientific American.

NEW-YORK, DECEMBER 15, 1855.

Protection of Designs for Articles of Manufacture.

We learn from a recent number of the Philadelphia Ledger that petitions are now in circulation in that city to obtain signatures, requesting Congress to extend the laws of copyright to all original designs to be printed on paper or cloth, or woven with other fabrics, and all original designs of forms or for ornamenting any article of manufacture, so that the author or proprietor of such original design shall be entitled to an exclusive property therein for a term not less than three years. The Ledger takes occasion to commend this movement as a very proper one for the protection of persons engaged in the business of originating and preparing designs for articles of manufacture. It says:—

“Without such protection it is in vain to look for that improvement in manufactures which will enable our manufacturers to compete with the most expert and skillful of other nations. Those who expend money in improving their productions ought to have the benefits of such improvement. If they may be seized and used by others, without compensation, the moment they are perfected and made public, the inducement to persevere in such inventions is destroyed, and our manufacturers will be content, therefore, to be the servile copyists of others, and always be behind them in originality and skill. Designs are just as much the result of labor, of money, and mind, as books and machines, both of which enjoy the benefit of legislative protection for definite periods of time, and the effect has been to stimulate, in a high degree, both of these departments of intellectual labor.”

The remarks of the Ledger exhibit a true sympathetic spirit with inventors, but such a movement in the city of Philadelphia, rather surprises us. Such a law as the petitioners referred to pray for, is now in existence, and every new and original design can be protected by it, not for three years merely, but for seven years. This law was passed on the 29th of August, 1852. Section third of the Act says:

“A citizen or citizens, who, by his, her, or their own industry, genius, efforts, and expense, may have invented, or produced any new and original design for a manufacture, whether of metal or other material, or materials, or any new and original design for the printing of woolen, silk, cotton, or other fabrics, or any new and original design for a bust, statue, or bas-relief, or composition in alto or basso-relievo, or any new and original impression or ornament, to be placed on any article of manufacture; or any new and useful pattern, or print, or picture, either worked on, or printed, or painted, or cast, or otherwise affixed on any article of manufacture,” &c., “on application for a patent to the Commissioner of Patents, on due proceeding had he may grant a patent therefore,” &c.

This law fully covers all articles of design and ornament, and grants the authors of such, protection in their invention for seven years. The people of Philadelphia do not require any new law to protect the class of objects named by the Ledger, as the present law is very full and complete, embracing the marks adopted by tradesmen to distinguish their own manufactures, as well as all designs of artists.

The present law, however, might be amended so as to reduce the patent fee from \$15 to a smaller sum, such as \$5, or even one dollar. Very few artists or manufacturers (excepting those engaged in the stove business, who thus exhibit great spirit,) take advantage of the law for protecting patterns, or articles of design; and we think it must be owing to their want of knowledge regarding the existence and provisions of such a law, or else it must be owing to the fee (\$15) being too high. We have no doubt but far more articles of design would be patented, if the fee were reduced to five dollars. As this sum would be sufficient to cover all the expenses of the Patent Office, in registering designs, it would be an act of national policy to reduce the fee to this standard. We have been informed that most of the designs or patterns used in our calico, oil cloth,

and paper print-works, are mere copies from the French, and simply for the reasons assigned by the Ledger, namely, that it will not pay to expend much money in getting up new designs, because they are seized upon and made use of by others in the same line of business, whenever they are made public. Now, while the fee of \$15 for a patent on a good design, can offer no excuse for a manufacturer not protecting every beautiful new pattern or design, we also believe that a cheaper means of protecting designs would promote a spirit to get up more original ones, and thus improve the national taste—transforming our pattern artists into original designers, instead of mere copyists of foreign patterns and designs. Our people have a fine taste for the beautiful; of this they have given samples to the world in the persons of West, Stewart, Alston, Cole, and a host of other distinguished painters; and in the persons of Powers, Greenough, Crawford, and other sculptors.

We go for the encouragement of improvements in all things—in articles of taste as well as utility. If by reducing the patent fees for designs from fifteen to five dollars, will be the means of encouraging a taste for getting up beautiful original designs for machines such as lathes, frames of steam engines, &c., calico patterns, &c., and even handsome labels for parcels, we go for it, with all our heart: “progress and improve,” is our watchword.

The Manufacture of Coke.—Railroad Fuel.

The substance named “coke” is simply coal charcoal. It is but little known in our country except in cities where gas is made from bituminous coal, and in those localities where iron is manufactured in the neighborhood of our bituminous coal fields. In England it is manufactured on a most extensive scale in all the coal mining districts, and is used extensively for smelting iron, copper, and other ores. It is employed in all the brass and iron foundries there, and is the only fuel used on locomotives. The manufacture of it, therefore, is an important business in that country, and why not in ours? We have bituminous coal fields of an area so large that those of England, in comparison to them, are like mere onion beds to extensive plantations; and yet we have been informed that the quality of our coal is unsuited to the manufacture of coke, and in this respect is inferior to English coal, especially for locomotive fuel. We do not believe this; we are confident that as good coke for fuel can be made from some kinds of American coals as from English coals. If so, would it not be well to manufacture it, and use it on railroads as a substitute for wood fuel? The price of wood is continually rising in the Eastern States, and the railroad companies must soon be driven to adopt some other kind of fuel. Thus, on the Western or Boston and Albany Railroad, the bill for fuel last year exceeded that of the previous one by \$50,000, and that of the previous year exceeded that of 1852 by \$50,000. The increasing expense for wood on this railroad has greatly exceeded the natural increase of business, and the Directors of it are deeply impressed with the necessity of obtaining a cheaper substitute. If coal-burning locomotives can be made to run more economically, and can be as easily managed as those which now use wood, then nothing more is wanted, for assuredly, it must be more economical to use anthracite coal for fuel than to use cooked coal, (coke) or wood. But if good coke can be obtained cheap, there is no difficulty in the method of using it for locomotive fuel, like that which has hitherto been experienced in the caking of anthracite coal in the fire-boxes of these engines. We apprehend that the coke which has been tried and condemned on several railroad experiments was not well made. We know that in some experiments made on the Hudson River Railroad with the coke obtained from our city gas works and some from Pennsylvania, the former proved to be far superior, and for the simple reason, we believe, that the coal from which it was made was subjected to a much higher heat in the retort than the Pennsylvania coal, which was coked in ovens. There is a manifest advantage in subjecting bituminous coal to a very high heat in coking it. The longer and higher the heat to which it is exposed the more it contracts, and consequently the more dense it becomes. We are of

the opinion that our coke burners do not subject their coal to such a high degree of heat, nor do they maintain the heat so long as they should do in their coke ovens. These defects in the manufacture of coke, rather than the quality of our bituminous coal, we are of the opinion, have been the cause which produced the defective coke that was experimented with and condemned on several of our railroads.

It may be said that coke can never be manufactured cheap enough at our great bituminous coal fields in the valley of the Ohio, so as to be carried to the East and used for fuel; it having more bulk than anthracite coal, its carriage must be more expensive, therefore it is much wiser to exert every energy to incite every faculty of inventors to produce perfect anthracite coal-burning locomotives. These reflections are indeed worthy of being acted upon; they touch the very root of the matter, but at the same time they should also excite the owners of mines in our bituminous coal fields to greater exertions in the manufacture of good coke. All the volatile products of coke ovens have hitherto been allowed to escape into the atmosphere, no attempt has been made to save them. Now we believe that it might be found profitable to manufacture a superior kind of coke, save the volatile products, and employ them for useful purposes, especially the ammonia contained in them, which might be saved and converted into valuable salts for agricultural purposes.

We have received communications from time to time, from various correspondents engaged in the iron manufacture in different parts of Pennsylvania, Virginia, and Ohio, requesting information respecting the removal of sulphur from coal in making coke. We remember the tenor of one received about three years since, which ran thus:—“Do you know any method of removing the sulphur from coal in the manufacture of coke, which I use in smelting my iron? I believe it is the principal cause of making inferior iron, and if it were entirely removed a very improved quality would be the result.” We could not then give him the desired information, but now we have something to say on this very point. At the late meeting of the British Association of Science, Prof. Calvert read a paper on the iron manufacture, in which he stated that by mixing about half a bushel of common salt with every tun of coal in the coke-oven the coke so made gave off no sulphurous fumes, and when used in a cupola in smelting, it produced iron much closer in grain, and 20 per cent. stronger than that made from common coke. This coke was also superior for locomotive use. This information may be of importance to some of our iron manufacturers, who might also try the effects of salt in their blast furnaces, as Prof. Calvert stated, that when thus used it improved the iron, though not to such a degree as by using the purified coke.

Hints on the Value of Patents.

We are informed that a sale of a portion of the right to Wood's Patent Shingle Machine has lately been made at Albany, N. Y., for the sum of \$35,000. It is a good invention, and the purchasers will probably quadruple their investment in a short time.

It is understood that the Messrs. Jerome, of New Haven, Conn., the celebrated clock makers, have recently purchased a portion of the right to Robertson's patent Sewing Machine for the sum of \$30,000. This sewing machine is said to be a remarkable novelty. In size it is scarcely larger than the little sewing birds used by the ladies, and may easily be carried in the pocket. In external appearance it is highly ornamental. Its construction is so simple that a child of five years can operate it with success. For the use of families and individuals the invention appears to be admirable. We are told that a seamstress with the aid of one of these machines, will be able to do in one day the ordinary hand labor of an entire week. The Messrs. Jerome are at present engaged in constructing machinery for the manufacture of this improvement on a large scale, and in January next will be ready to fill orders. Retail price of the machine, \$10. The best sewing machines of the other makers cost from \$100 to \$140.

Speaking of sewing machines reminds us of the profit on Howe's Patent. The income of

this inventor from licenses to use his shuttle, is said to be over \$50,000 a year. Messrs. Singer & Co. are said to be making money at the rate of \$75,000 a year from their sewing machines. The Wheeler and Wilson Sewing Machine Co. are understood to make \$30,000 per annum. We might speak of a number of other very successful inventors and manufacturers in this line of business, but it is unnecessary.

Rights for Sandford's Patent Hand Corn Planter, we are informed, have been sold to the amount of \$30,000. Wakefield's Patent Hand Corn Planter has been sold for a still larger sum; a single manufacturer of this invention at New Haven, Conn., is said to have realized a profit on the same of \$40,000 during the past year.

Wm. Mount Storm's Patent Cloud Engine is reported to have been sold to a company of wealthy gentlemen in this city. Capital stock paid in, \$500,000, of which a large proportion was received by the inventor.

D. W. Clark, of Bridgeport, Conn., is understood to have received \$30,000 for his Patent Pump.

One half of a certain patent Curtain Fixture contrivance, which permits the curtain to be raised or lowered from the top, is said to have sold for \$4,000.

A small portion of the right to Smith & Fenwick's Patent Apple Paring Machine lately brought \$2,000.

Creamer's Patent Car Brake is said to have been purchased by a company for \$250,000.

A single right to use Winter's Patent Wood Sawing Machine has been sold to a certain railroad company in this vicinity, we are told, for \$2,000.

A single right to use Kitson's Patent Cotton Picker, sold to a certain factory, brought the inventor, if our information is correct, the sum of \$2,300.

We could fill our paper with facts like the above, if we were to take time for their collection. They are of use and interest as illustrating the value of all kinds of patent property; they are likewise encouraging and stimulating to inventors. It is chiefly for this latter reason that we have presented them. At the present moment we think of no class of individuals who enjoy such golden opportunities of success as those whom Providence has favored with a genius for mechanics. We are not surprised that this country so abounds with new inventions; the only wonder is, that there are not ten patents where one now exists. The demand is far greater than the supply.

The long evenings of winter present ample time for thought, and should be constantly improved. Those who have tried to invent, but failed, should try again. If effort be earnest and continued, the light will at last break through.

Persons who invent, or become interested in inventions should remember one thing: no discovery is of much pecuniary value in this country until it is patented. The first step, therefore, after an invention has been thought out, is to secure its advantages, by law, as soon as possible. A neglect of this simple duty has, in many instances, been the means of dashing from the lips of the inventor, the cup of happiness which he was about to quaff. It is an old maxim that tells us “Delays are dangerous.” In regard to the obtaining of patents this is emphatically true.

Woodworth Patent Remonstrances.

At the request of several of our subscribers, we have had printed a large number of petitions against the extension of the Woodworth Patent, which we are anxious to have distributed as soon as possible. They ought now to be put in active circulation for signatures: let this be done without delay, and there is not much fear of the result. Upon the receipt of two three-cent postage stamps, we will forward a petition and pre-pay the postage. Send in your orders as fast as possible.

Australian Expedition.

An expedition has been fitted out in Australia to explore the Victoria river. The party is composed of eighteen persons, and will be absent three years. It is believed they will bring back much to add to the treasury of natural and geological knowledge.

The factory of Mr. Kellogg, in Skeneateles, N. Y. is lighted with the Benzole light.

British Association for the Advancement of Science.—No. 3.

BINOULAR VISION—Sir David Brewster read a paper on this subject. Prof. Dove had published an account of some beautiful experiments in connection with this subject some years ago, and showed in his paper that when different colors at the same real distance are regarded by the eye they appear to be at different distances; this is also the case when a white surface is compared with a black. Now M. Dove argues if a white surface and a black one be stereoscopically combined, one of them must be seen through the other. Taking a figure for the left eye with a white ground, and a second figure of the same object on a black ground for the right eye, when these two figures are combined, a beautiful effect is observed; the figure starts into a relief, and its sides appear to possess a shining metallic luster. This is the case when the surface of each single object is quite dull and lusterless. On this experiment M. Dove founds a theory of luster, supposing it to be produced by the action of light received from surfaces at different distances from the eye. An example of this is the effect observed on looking at varnished pictures; one portion of the light comes from the anterior surface of the varnish, and the other from its posterior surface, the action of both of these conspiring to produce the observed luster. The metallic luster of mica is also referred to by M. Dove as an example of the same kind. In his communication Sir David Brewster controverted the theory here laid down, and based his objections on the following remarkable experiment:—where a white surface without definite boundary, and a black surface of the same kind, are regarded through the stereoscope no luster is observed. Sir David therefore infers that the luster is due not to the rays from one surface passing through the other to the eye, but to the effort of the eyes to combine the two stereoscopic pictures.

CURIOUS MOTIONS ON THE SURFACES OF ALCOHOLIC LIQUORS—A paper on this subject was read by J. Thomson. The phenomena of capillary attraction in liquids are accounted for according to the generally received theory of Dr. Young, by the existence of forces equivalent to a tension of the surface of the liquid, uniform in all directions, and independent of the form of the surface. The tensile force is not the same in different liquids. Thus it is much less in alcohol than in water. This fact affords an explanation of several very curious motions observable, under various circumstances, at the surfaces of alcoholic liquors. One part of these phenomena is, that if, in the middle of the surface of a glass of water, a small quantity of alcohol, or strong spirituous liquor, be gently introduced, a rapid rushing of the surface is found to occur outwards from the place where the spirit is introduced. Another part of the phenomena is, that if the sides of the vessel be wet with water above the general level surface of the water, and if the spirit be introduced in sufficient quantity in the middle of the vessel, or if it be introduced near the side, the fluid is even seen to ascend the inside of the glass until it accumulates in some places to such an extent that its weight preponderates, and it falls down again. The manner in which Mr. Thomson explains these two parts of the phenomena is, that the more watery portions of the entire surface, having more tension than those which are more alcoholic, drag the latter briskly away, sometimes even so as to form a horizontal ring of liquid high up round the interior of the vessel, and thicker than that by which the interior of the vessel was wet. Then the tendency is for the various parts of this ring or line to run together to those parts which happen to be most watery, so that there is no staple equilibrium, for the parts to which the various portions of the liquid aggregate themselves they become too heavy to be sustained, and so fall down. On this matter Mr. Thomson exhibited a very decisive experiment by pouring water on a flat silver tray, previously carefully cleaned from any film which could hinder the water from thoroughly wetting the surface. The water was about one-tenth of an inch deep. Then, on a little alcohol being laid down in the middle of the tray, the water immediately rushed away from the middle, leaving a deep hollow there, which laid the tray bare of

all liquid, except an exceedingly thin film.—These and other experiments, which he made with fine Iycopodium powder dusted on the surface of the water, into the middle of which he introduced alcohol gently from a fine tube, were very simple, and can easily be repeated. Certain curious return currents which he showed by means of the powder on the surface, he stated had not yet been able fully to explain.

ON THE ANCIENT STONE WRITINGS OF THE BABYLONIANS AND ASSYRIANS—The following is an abstract of an interesting discourse before the Association on the above subject, by the celebrated Col. Rawlinson:—

“Col. Rawlinson began by saying he feared the vastness, as well as to a great extent the novelty, of the subject would prevent him doing it anything like justice in the very limited time he had at his disposal. The excavations which had been carried on in Assyria and Babylonia had been continued through six or seven years—they had ranged over tracts of country one thousand miles in extent—the marbles excavated would be sufficient to load three or four ships, and the historical information contained in them would exceed ten thousand volumes in clay. Of course, in dealing with such a subject he could only select a portion of it—and even of that he could only communicate the heads. The part to which he wished to direct their attention was the Cuneiform Inscriptions. This phrase merely signified the wedge-shaped form of writing, and was not employed in any particular language or by one particular nation. The cuneiform system of letters was a species of picture writing, invented, not by the Semitic inhabitants of Babylon, but by those who preceded them. This writing was, however, reduced by the Semitic race to letters, and adapted to the articulation of their language. Their mode of writing consisted of several elements—the picture-writing, and the phonetic, which was equivalent to the alphabet of their language. He had been able to obtain among the ruins of Nineveh a tablet which actually exhibited the several developments of this system of writing into a regular alphabet. The cuneiform inscriptions were divided into three branches—Persian, Scythic, and Assyrian—and it was on the third of these that he wished to say a few words. About twenty years ago his attention had been directed to a series of inscriptions in cuneiform characters on a rock at Behistun, near Kermaixhah. The tablet was divided into three compartments, giving three different versions of the same inscription, and on the simplest of these, the Persian, he set to work, and found, by comparing it with the two others that they corresponded, with the exception two or three groups, from which, on further investigation, he made out Hystaspes, Darius, and Xerxes. By means of these proper names he obtained an insight into the Persian alphabet, and by analyzing the names of the ancestors of Darius and Hystaspes, and obtaining a list of the tributary provinces of Persia, he managed to form the alphabet. This was, however, but the first step; the great object being to decipher the Assyrian inscription, and this could only be done by comparing it with the Persian. The tablet was situated on the face of the rock, five hundred feet from the ground, with a precipice above it of one thousand and two hundred feet, and in order to reach it it was necessary to stand on the top rung of a ladder, placed almost perpendicular. Nor was this all, for there was still the Babylonian to be copied, and it was engraved on the overhanging ledge of rock, which there was no means of reaching but by fastening tent-pegs into the rock, hanging a rope from one to the other, and while thus swinging in mid-air, copying the inscription. An insight into the system of writing being thus obtained, the fortunate discovery of the ruins of Nineveh furnished a great mass of documents to which it might be applied. Wherever they had found tumuli, or any appearance of a ruin, trenches were sunk, galleries opened, and in almost every case they came upon the remains of inscribed tablets. The decipherment of these inscriptions led to important results in an ethnological point of view, both as indicating the race to which the writers belonged, and affording important information with reference to the habitat of races and their migrations.—

Among the many points which they were now enabled satisfactorily to settle, he alluded to the connection between the Turanian and Hamitic families, and to the occupation of Western Asia by the Scythic, and not the Semitic race. He also mentioned that from the inscriptions he believed it could be shown that the Queen of Sheba came from Idumea. An erroneous impression was at one time in circulation that the information obtained from the inscriptions was adverse to Scripture. But so much was it the reverse of this, that if they were to draw up a scheme of chronology from the inscriptions without having seen the statements of the Scriptures, they would find it coincide on every important point. He then mentioned some circumstances with reference to the mound at Birs-Nimroud, which he had recently uncovered, and which he found laid out in the form of seven terraces. These were arranged in the order in which the Chaldeans or Sabeans supposed the planetary spheres were arranged, and each terrace being painted in different colors, in order to represent its respective planet. He also mentioned a small ivory cylinder which he had discovered, and round which were engraved mathematical figures, so small that they could hardly be seen with the naked eye, and which could not have been engraved without the aid of a very strong lens. In concluding, he said that before the British Association met next year, he hoped to be able to bring before them the decipherment of several highly important inscriptions.

Gratitude to Improvers of the Iron Manufactures.

The city of Newark, N. J., is celebrated for various kinds of manufactures, such as jewelry, carriage-making, patent leather, and malleable iron castings. A number of companies are engaged in the two latter kinds of manufactures; they employ a great number of persons, and the fame of their productions is co-extensive with our country's commerce. The *Tribune* of the 4th inst. contains a very interesting article on the subject, and attributes—justly we have been informed—the introduction of both of these manufactures to Seth Boyden, an ingenious and enterprising Massachusetts mechanic, who took up his abode in Newark about thirty years ago. At that time an endless variety of small iron articles now made of cast-iron, were fabricated by forging them of wrought-iron, from the fact that common cast-iron is exceedingly brittle, and does not possess the quality of toughness. The discovery of rendering cast-iron tough by what is termed malleablizing, was one of the most important inventions ever made. It was well-known in England before it was in our country, but was kept a profound secret. In 1825 some malleable iron castings having been imported from England by David Beach, of Newark, they arrested the attention of Seth Boyden, and he immediately commenced experiments to discover the process; and he labored for years, until success crowned his enterprise and efforts. The process of malleablizing or rendering cast-iron tough, consists in submitting common articles of cast-iron to a high heat, for several days, in an iron box, separated from one another by iron filings, and then allowing them to cool very slowly. Soon after Seth Boyden discovered how to render cast iron tough, he erected a foundry in Newark, in company with some others, and commenced business. At that time malleable iron castings sold readily for 30 cents per pound; their price now ranges from nine to sixteen cents. Instead of only one small foundry doing the whole malleable iron business in our country as in 1827, there are now seven different establishments in Newark alone, whose sales amount to \$375,000 per annum, and there are various like foundries in other different cities. And how has Seth Boyden been rewarded for his discovery, and the valuable contribution which he has made to the solid wealth and industrial progress of our country? The *Tribune* says he is now working as a journeyman in a Newark machine shop. It is stated that he had made considerable money, but he never loved it for its own sake; his desire has been to elaborate useful ideas for the good of the community, and so when he has made money by one useful discovery or in the way of business, he has been impelled by a restless desire to use it in

making experiments to discover new improvements. Such men as Seth Boyden are public benefactors, they do more for the material prosperity of their country than the most renowned orators or statesmen. We hope that Seth Boyden will never know the approach of penury. If the citizens of Newark ever allow this to be the case, they will never escape the obliquity of ingratitude.

Republics have been accused for pre-eminence in ingratitude, but are monarchical governments stainless in this respect? Let us take a case and try it. The greatest improvements ever made in the manufacturing of wrought bar iron were invented by Henry Cort, a native of Lancaster, England. In the years 1783 and 1784 he obtained two patents; one rendering cast iron malleable in a reverberatory furnace heated by the flame of coal to avoid the impurities of the fuel mixing with the metal in a fluid state—the process called *puddling*. The other invention was the manufacture of bar iron, by passing the puddled iron in *blooms*, through fluted or grooved rollers. These two inventions are now used in the manufacture of bar iron in every civilized country under the sun. All nations are his debtors; the benefits conferred upon them by his inventions are beyond calculation. His improvements have reduced the cost of making bar iron 66 per cent., and have been the means of saving, to Great Britain alone, no less, it is calculated, than £300,000,000 sterling in sixty years, and have raised that country from being an importer of iron from Russia, America, and other countries, to be the greatest iron manufacturer and exporter in the world. And how was Henry Cort rewarded for his inventions by a grateful monarchy? In making his experiments he expended a private fortune of more than \$100,000, and when he had them perfected he was obliged to take into partnership another person who could furnish some capital to carry on the business. His partner was a deputy of the British Navy, who saw at once the value of the improvements, and invested £27,000—about \$115,000, which he privately applied from the public funds entrusted to his care. He soon afterwards died, and when his accounts were examined, it was found he was a public defaulter. His effects were then seized by the government, and with them the two patents of Henry Cort, whose business was destroyed, and from this blow he never recovered, and a few years afterwards he died a ruined and broken-hearted man. It is indeed true that when reduced to poverty in 1794, upon the representations of several bankers and merchants in London, Wm. Pitt obtained a pension for him of \$1000 per annum, which he received for only six years, his death having occurred in 1800.

How boundless was this generosity of the British Government and the British public to this inventor. Just think of the paltry sum of one thousand dollars per annum, doled out to him, when his inventions were saving to the public of more than £10,000,000 per annum and in 1853 no less than £65,000,000 sterling. And for this great public benefit the British Government paid him altogether twelve hundred pounds—about six thousand dollars—while he himself had spent a private fortune of \$100,000 in perfecting his invention. Oh what ingratitude. Can any Republic be more ungrateful; has any Republic ever exhibited so much ingratitude? We think not. Do not let the British public throw the blame of such ingratitude upon their government; they hold the public purse strings, and the blame must rest on them. One of Henry Cort's sons and three daughters, each over seventy years of age, we understand, are now living in indigent circumstances in England, while the nation has grown rich on their father's discoveries. If the Monarchy desires to show its gratitude, here are worthy objects for its display. May such charges never have to be made against our own country.

A Great Traveler.

The celebrated Dr. Barth, the German traveler, who has recently returned from Africa to Europe, traveled 12,000 miles in that strange and pestilential part of the globe. His explorations of Central Africa rank as high, and are just as important, as the contributions of Cook to the geography of the Pacific, and those of Humboldt to the knowledge of America.

Science and Art.

Another New Metal.

A recent number of the *Siecle* (Paris,) under the head of "Transmutation," publishes an article upon the new discovery of turning paving stones into a substitute for silver, by M. Plee. He starts from the necessity of producing an equilibrium between the two metals, gold and silver, and says that such an equilibrium, wanting totally at the present moment, since the influx of gold from California and Australia, is of the utmost importance for trade; and remarks that the advanced state of science will assuredly not leave us in the impossibility of supplying the void left by the insufficient yield of silver; and that we shall end either by extracting silver elsewhere than from the silver mines, or by discovering new metals to take its place. "There are, for instance," he observes "new metals noble and beautiful as the old ones, hitherto held to be not reducible, which are now perfectly reduced, and which, for the fabrication of every object till now fabricated in silver, would be a complete equivalent for it, and thus allow it to be exclusively consecrated to the monetary circulation." M. Plee follows up his assertion by the ensuing details:—"Take a thick lump of quartzose silice, reduce it to powder, mix this silice, when pulverized, with a sufficient quantity of alkali, fuse it, and you will obtain a soluble glass that you can dissolve so as to precipitate the silice it contains in the shape of a jelly. You then take this last product and have it filtered, then re-dissolved a second time in a cyanurated lixivium, so as to produce a compound cyanuret.—This operation will give you a fluid from which to extract the metal called silicium. Plunge into this liquid your utensils, whether of copper, zinc, tin, or lead, bring the electric process to bear upon them properly, and they will instantly be covered with the adherent plating of silicium, which is white as silver, and attains to the highest degree of luster under the polisher's hand." M. Charles Junot is the inventor of this new metal, and he has, according to the account given by M. Plee, spent years in indefatigable research; nor does the silicium appear to be the only substitute for silver he has discovered. Two or three others are equally mentioned by M. Plee. The silicium, however, seems to be so difficult to distinguish from silver, that a learned French chemist has already presented to the Academy of Sciences a report on the necessity of devising fresh methods of analysis, in order to distinguish between the two metals. "Other chemists," he adds, "have other processes for the reduction of silicium, and all are setting to work at it. It is, therefore, to be expected that a complete transmutation will be effected. We shall from clay draw aluminum; from freestone, silice, and from sand, we shall extract silicium; these metals, given up to industry and fabrication, may replace silver for domestic purposes, and silver be thus entirely restored to monetary circulation."

The basis of silicon has been known to be a metal for a long time, but we have never heard of it being obtained pure before. It may therefore be called a new metal, with great propriety. We are of opinion that it may yet be obtained at a lower cost than silver, but this will all depend on the discovery of improved processes for its cheap reduction from its ore, which is one of the most plentiful on our globe.

Chemical Technology.

H. Bailliere, No. 290 Broadway, this city, has just issued Vol. 1 of "Chemistry Applied to the Arts and Manufactures," by Dr. E. Ronalds and Dr. Thomas Richardson.

We have much pleasure in bringing before the notice of the public this new edition of the first volume of Knapp's Chemistry. As the authors say in their preface: "during the few years which have elapsed since the publication of the first volume of our edition of Knapp, so rapid has been the growth, and so great the development of those branches of manufacture more intimately connected with fuel, that, in preparing a second edition, we have found it necessary to re-write much of the original, so that it may with far greater propriety be called a new work rather than a second edition.

The elaborate researches undertaken at the instigation of the governments of the United States and England into the chemical nature of coal, more particularly with reference to its adaptation to the generation of steam, and the recent legislative measures towards the prevention of smoke in large cities, have invested this subject with unusual interest."

A peculiar feature in this work is the arrangement of the subjects into groups, comprising those branches of manufacture which are dependent upon each other, and necessarily connected in a commercial point of view. Thus, among the products obtained from dry distillation of fuel, will be found an account of the manufacture of pyroligneous acid and its salts, of ammonia and its salts, of coal-tar naphtha, paraffine, etc., etc.

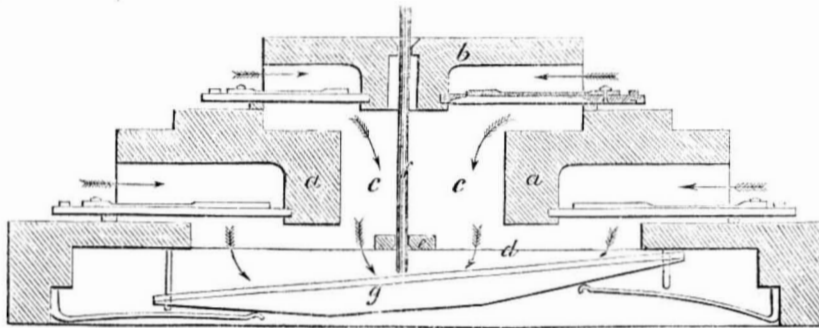
The first chapter is "Observations on the nature and properties of Fuel," followed by an article "On the effect of Heat upon Fuel," in the production of charcoal, coke, waste gases, etc., etc. "The application of Fuel to the production of Heat," for warming dwellings, &c. The latest inventions of stoves,

grates, hot-water apparatus, furnaces, &c., are illustrated with excellent wood cuts.

Three hundred pages are devoted to "The application of Fuel to the production of Light." This is one of the most important parts of the book, and is most extensively illustrated. The subjects treated are fats, oils, tallows, wax, gas, &c., &c., with their most approved modes of manufacture, and the different lamps, &c., in which they are used. The article on safety lamps is the most complete ever written, and contains forty-five delineations. Much useful information may be obtained from the statistical tables, and the tables of the relative value of the different kinds of coal found in Europe and America.

The authors, aided by several of the scientific men of England, have added a chapter on the subject, "What is Coal?" on the reply to which important interests depended, in the recent cause of Gillespie vs. Russell, in Scotland, and Gesner vs. Cairn, in New Brunswick. Two colored plates of the microscopic examination of the Nova Scotia, Allenheads, Bovey, German, and other coals, are inserted.

MELODEONS---HUNT'S PATENT IMPROVEMENT.



This engraving represents a vertical transverse section through the reed-board of a melodeon illustrating the improvement for which a patent was granted to George G. Hunt, of Wolcottville, Conn., on the 23d of October last.

The nature of the improvement consists in such construction of the "reed-board" that two, four, or even more sets of reeds may be added to the usual instrument, thereby increasing the quantity of tone or the fullness of the chords, or both, without requiring an additional rank of keys, and with but slight, if any addition to the heaviness of touch necessary in playing.

As commonly constructed, the melodeon has two sets of reeds, the one being tuned either a second above or in unison with the other, and both being sounded by the opening of one valve. To this, two other sets have been added by introducing another reed-board of precisely similar construction, having its rank of keys situated above and in the rear of the keys of the first sets. These are tuned to some other interval, or in unison, as desired, and all may be sounded by the lower key-board by merely coupling the upper one to it, as is well known. The touch, however, of the keys used, it is obvious, must be now doubled in its heaviness and stiffness.

According to this improvement the reed-board of ordinary construction is divided along its central line, and the two parts removed a short distance apart, say one inch, as shown at *a a*. Upon these is placed another ordinary reed-board, *b*, but having no pallets or valves

Iodo-Nitrate of Silver.

This substance, the active principle in the collodion photographic process, has been found to be a definite compound of the iodide and the nitrate of silver, its composition being represented by $AgO, NO_5 + AgI$. It is blackened on exposure to light much more rapidly than either of its ingredients alone. It is unaffected by, and insoluble in absolute alcohol, but is decomposed by water. Its proper solvent is a concentrated solution of nitrate of silver. It may be obtained in regular crystals. Photographic silver baths which have been for some time in use, always contain a portion of this compound, the reason of their superiority to those more recently prepared.

Chloride and bromide of silver do not yield similar double salts, which explains why negative photographs on bromide of silver alone are deficient in intensity.

NITRATE OF SILVER STAINS—These stains may be removed by a solution of 8 parts per-

of its own, and in which the reeds are placed at the same distances apart as are those in the first board, whereby each pair of reeds of the upper board will be in the same vertical plane with a pair of the lower board. The divisions between the reeds of the board, *b*, must now be continued down through the intermediate space, *c*, to the lower surface of a board, *a*, as indicated at *d*, and in each of these spaces a block, *e*, is put, having a hole bored through to serve as a guide for the valve-rod, *f*. One valve, *g*, of usual construction, will now cover the slot in the lower reed-board, and this slot is just so much longer as the two parts, *a a*, have been removed asunder. Two other sets of reeds may be added by removing the parts, *a a*, still further, and dividing the board, *b*, as before described for *a*, when another reed-board may be placed upon that. The valve, *g*, is represented as opened, and the arrows show the direction of the currents of air in an instrument operated by an exhausting bellows. The valves, it will be seen, are not increased in number by any increase in the number of reeds, but are only slightly lengthened, and in an exhausting instrument the heaviness of touch is but very slightly increased for each additional set of reeds. Any one set of these may be shut off by stops, as usual, so that the quantity of tone may be reduced at will.

This appears to be a very excellent improvement. Other information relating to patent rights, &c., may be obtained by letter addressed to the patentee at Wolcottville, Litchfield Co., Conn.

chloride of mercury, and 4 parts sal-ammoniac in 125 parts water, or one of 5 grms. cyanide of potassium, and 50 centigrms. iodine in 45 grms. water.—[London Artizan.

Japan Cotton.

Samples of Japan cotton recently received in this city, have a fine color, and the fiber has a greater number of barbs, so that it will draw with proper handling, into a very fine thread. It has apparently a great many natural crooks in each fiber (this appearance may be given to it in dressing,) which renders it easier to spin, and makes a bat of it very elastic. From this cause, and a natural harshness, owing to the number of barbs in the fiber, it feels to the touch very much like wool.

Pennsylvania now produces as much iron as was manufactured in Great Britain thirty years ago, and of a quality that compares very favorably.—[Exchange.

Literary Notices.

THE EDINBURGH REVIEW.—The number for the present quarter of this able review published by Leonard Scott & Co., No. 54 Gold st., this city, contains eleven powerful articles on various subjects. The first is a review of the memoirs of King Joseph Bonaparte, and contains many incidents favorable to Joseph, and the reverse to his brother, Napoleon the Great. One article on the early Pilgrim Fathers of New England, is very unfavorable to their reputation as lovers of freedom. Essays to prove that the planets are inhabited, and vice versa, are not yet exhausted; one of the articles is a review of the recent pre-eminent works on this subject. It displays an intimate acquaintance with astronomy. Although this review is the oldest in Great Britain, this number shows that it is edited with the same vigor as when Jeffrey sat in the editorial chair.

VILLAGE AND FARM COTTAGES.—Messrs. Cleveland and Backus Brothers, three of the most talented architects of which New York City can boast, are the authors of a new work entitled as above. It contains a large number of splendid engravings representing a great variety of exterior designs and internal plans for dwelling houses, with statements of their estimated cost. The buildings represented are chiefly those that are wanted by farmers, and residents in the country. Many of the designs, although beautiful in appearance, may nevertheless be realized for very moderate sums. Indeed, it has been one of the principal objects of the authors to acquaint the public with the fact that it is just about as cheap to build a handsome looking, convenient dwelling, as a mean and awkward one. In this volume there are designs for houses costing from \$500 to \$2000 which, for comfort and beauty are fit for princes to live in. The more costly designs are still more elegant. We believe that all who propose to build, whether their dwellings are intended to be small or great, will have their architectural ideas improved, and some of their money saved, by consulting the pages of this book. A portion of the work is devoted to information respecting the laying out of grounds, gardens, and the culture of fruit. New York, published by D. Ap-ton & Co.

TEN YEARS AMONG THE MAIL BAGS.—This is a handsomely illustrated volume by Mr. J. Holbrook, a special agent of the U. S. Post Office Department. He narrates some of the most thrilling and remarkable circumstances connected with the discovery and detection of crime in the matter of mail robberies that we have ever read. Much light is also thrown upon the interior workings of the American postal system. The author's travels upon official business were very extensive, carrying him to all parts of the country, among all sorts of people. His descriptions of scenes and characters are vivid and life-like. Philadelphia, H. Cowperthwait; New York, J. C. Derby.

THE KANSAS REGION.—By Max Greene.—The Author is an amateur traveler, fond of roaming and adventure. His volume is an easy, off-hand, interesting description of Kansas, through which country he has repeatedly passed. The book also contains directions to emigrants as to the best routes, localities for settlers, outfits required, usages of society, &c. Those who are looking Westward for homes, or who desire to inform themselves respecting matters and things in general out there, will do well to consult this new work. Fowler & Wells, publishers, 303 Broadway, N. Y.

NEW YORK HORTICULTURAL REVIEW.—This is the title of a new periodical, which has just appeared as a candidate for the patronage of all those interested in horticulture. It is edited by C. Reagles, No. 208, Broadway, this city, and judging from this specimen number, he appears to be eminently qualified for his profession. The engravings in it are neat, and the subjects well chosen and skillfully treated.

"Mysteries of the Court of the Stuarts," by Wm. H. Ainsworth; T. B. Peterson, publisher, No. 102 Chestnut st., Philadelphia, Pa. Price 50 cents. Just issued.



Inventors, and Manufacturers

ELEVENTH YEAR!

PROSPECTUS OF THE SCIENTIFIC AMERICAN.

This work differs materially from other publications being an ILLUSTRATED PERIODICAL, devoted chiefly to the promulgation of information relating to the various Mechanic and Chemic Arts, Industrial Manufactures, Agriculture, Patents, Inventions, Engineering, Mill-work, and all interests which the light of PRACTICAL SCIENCE is calculated to advance.

Every number of the SCIENTIFIC AMERICAN contains Eight Large Pages, of reading, abundantly illustrated with ENGRAVINGS,—all of them engraved expressly for this publication.

REPORTS OF U. S. PATENTS granted are also published every week, including Official Copies of all the PATENT CLAIMS. These Claims are published in the SCIENTIFIC AMERICAN in advance of all other papers.

The proprietors of the SCIENTIFIC AMERICAN will pay, in cash, the following SPLENDID PRIZES for the fourteen largest lists of subscribers sent in between the present time and the 1st of January, 1856; to wit:

For the largest List	\$100
For the 2d largest List	75
For the 3d largest List	65
For the 4th largest List	55
For the 5th largest List	50
For the 6th largest List	45
For the 7th largest List	40
For the 8th largest List	35
For the 9th largest List	30
For the 10th largest List	25
For the 11th largest List	20
For the 12th largest List	15
For the 13th largest List	10
For the 14th largest List	5

Names can be sent in at different times and from different Post Offices. The cash will be paid to the order of the successful competitor immediately after the first of January, 1856.

TERMS:—\$2 a year; \$1 for half a year, Southern, Western, Canada Money, or Post Office Stamps taken at their par value for subscriptions. Letters should be directed (invariably post-paid) to

MUNN & CO.,
28 Fulton street, New York

CLUB RATES.

Five Copies for Six Months	\$4
Ten Copies for Six Months	\$8
Ten Copies for Twelve Months	\$15
Fifteen Copies for Twelve Months	\$22
Twenty Copies for Twelve Months	\$28