secret. The moving power is clock-work, the originality in the arrangement being, we believe, the method by which the inventor effects the elliptical motion of the planet. Not a sound is heard when the machinery is in motion, the whole working in that "solemn silence" which the hymn tells us is characteristic of the starry sky. The inventor could, we believe, make his planetarium of any size, from the dome of St. Paul's to a little thing that might be used for school instruction. Signor Perini has devoted his nights and mornings to this structure for seven years, and has expended upon it something like $3,500; the earth itself, we believe, has cost him $200. We believe he has been prompted to this work solely by the enthusiasm of a mechanician, and by a desire to do something to enable those interested in astronomy to realize, as far as possible, the arrangements of the solar system.

The Clay-Pits of Pennsylvania and Delaware.

The chairman of the Committee on Crude Materials reported to the Potters' Association that the immense deposits of fine, pure kaolin in Chester and Delaware counties, Penn., and across the line, in the State of Delaware, are sufficient, if properly opened and worked scientifically, to supply all the potteries of this country for a century. He adds, however, that the clay mines of this rich region have been thus far opened and worked in the most unscientific, slovenly, and wasteful manner. And the worst feature of all is that what clay they do get out is absolutely spoiled for the finest wares by this slovenly, wasteful process of mining. The system, or rather want of system, upon which these mines have been and are being worked is to open a small, insufficient area at the surface, just to enable them to reach the top of the clay, with an opening too small to enable them to separate the strata and keep the coarse and fine yellow and white clays from being mixed. Then, at every rain-fall, earth, sand, and gravel are washed down the bank into the pit; the sides of the pit cave in and cover all the clay over, then they are compelled to stop, clean out and separate the dirt and clay as best they can. Then they begin to get out clay until another caving in takes place, when all is mixed and turned into confusion again. Some of these pits have been worked over and over so long in this way, and the excavation become so large, and the dirt thrown around so loose, that regular land-slides occur, burying machinery, tools, and clay all in the utmost confusion. It needs no prophet to tell what kind of clay results from this process. There are one or two mines more broadly and better opened, where the different strata could be kept separate, but instead of doing this they systematically mix the white and yellow veins together, by taking alternate tubs of each, which is then washed and sold as best clay. The National Kaolin Company, with a pit in much confusion, under all the disadvantages of land-slides, are, by sharp, personal supervision, and with an evident intention of doing the best they can under the circumstances, getting out some really fine clays. The new mine opened by Major Willaner has been opened on a broader scale than most others, and he promises to immediately clear off a still larger area of superincumbent earth, sufficient to prevent its being washed into the pit among the clays. Then, if the fine white clays are kept separate from the yellow, thus making two grades of clay—*i. e.*, a first and a second quality—a great step will be taken in the right direction, for that is the direction in which our clays must be worked.

A Nitroglycerine Explosion.

A magazine of nitroglycerine and mica powder on Fox Island, opposite Amherstburg, Ontario, exploded December 12. The explosion was felt forty miles away, in Leamington and Ruthven, shaking every house in both towns. At Fletcher, on the Canada Southern Railroad, forty-four miles away, the people ran out of their houses in alarm, the shock was so severely felt.

The cause of the explosion is not known, but it is supposed to have been caused by hunters leaving a fire on the island, which reached the magazine. At the time of the explosion an immense blaze lighted up the whole heavens, the earth trembled, and a tremendous report followed. There were about three tons of nitroglycerine, besides mica powder, in the magazine at the time. Nothing remained of the magazine, a hole 60 feet in diameter and 15 feet deep marking the spot where it stood.

The great Suspension Bridge between New York and Brooklyn.

In a lecture on the Brooklyn bridge, Mr. E. F. Farrington, Master Mechanic of the work, gave some interesting facts in regard to the construction of the bridge. The lecture was illustrated by a large sectional view of the roadway, showing the carriageways and foot-walks on the outside of the roadway, and the two trackways for the cars, that are to be run across the bridge by means of an endless chain. Four high trusses were also displayed, which will run the whole length of the bridge, distributing the weight more evenly and stiffening the structure against the action of the wind. High above the flooring proper will be built a promenade, 15 feet in width, from which pleasure-seekers and others may obtain an excellent view. The roadway will be 135 feet above high tide, and its length from tower to tower is 1,595 feet 6 inches. It has two land spans (from the towers to the anchorages) of 930 feet each, and an approach on the Brooklyn side of over 900 feet, and on the New York side of over 1,500 feet. The total length of the bridge will be a little over one and one eighth miles. The suspenders which hang from the cables and support the roadway have enormous strength. The greatest weight which will ever be brought to bear on them is 10 tons apiece, yet they have been tested with a weight of over 140,000 pounds without giving way. There are no such things as rotten wires in this bridge. The first wire was thrown across the East River on the 23d of May, 1877; on the 11th of June following the process of running the wire across began. The process of wrapping the cables was so tedious, that frequently not more than 15 feet was wrapped in a day.

If the requisite funds are not withheld, the completion of the bridge is promised in eighteen months, or the middle of 1881.

NEW MUSICAL INSTRUMENT.

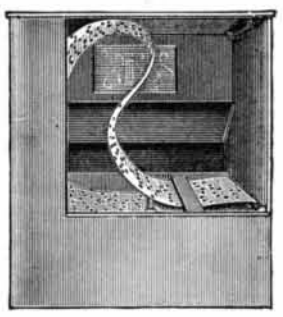
Undoubtedly the happiest households in the land are those in which music forms a part of daily life. It is not necessary to inaugurate a grand concert, nor to employ an orchestra, nor an organ to produce music that is enjoyable, that will render home pleasant, and cultivate tastes of the children and older ones.

The little instrument shown in the accompanying engravings is designed not for anything pretentious, but for home use and pleasure.

Some of the recent improvements in musical instruments have reduced the matter of playing to a mechanical performance, so that with properly prepared sheets any music may be played correctly. The phonographic piano shown in the accompanying engraving is an instrument that can be furnished at a small cost, and will play any tune in a purely mechanical manner, something on the principle of the wonderful phonograph.

FIG. 1.

FIG. 2.



PHONOGRAPHIC UPRIGHT PIANO.

A child can play it as well as a grown person, and it affords a great deal of amusement to both young and old.

Fig. 1 in the engraving is a front view of the instrument, and Fig. 2 is a rear view, giving an idea of the arrangement of the endless strip of paper in which the tune has been perforated. This strip is inserted between rollers, and the door is closed, when, by turning a small crank, the paper strip is made to move through the instrument and over the key board. The keys or strikers press through the perforations, when the hammers strike the bars and produce music which it is said is clear, loud, and melodious. The instrument does not get out of tune, and it will furnish music for dancing, or an accompaniment for singing. Paper strips may be perforated for any new music and readily applied to the instrument.

The manufacturers of this instrument are the well known Massachusetts Organ Co., 43 Washington street, Boston, Mass., who will furnish further particulars on application.

The Armor of the Polyphemus.

Mr. J. L. Buskett, of St. Louis, Mo., claims that the method of convex armor plating of three inch steel, proposed for the British naval vessel Polyphemus, and described as the invention of Sir George Sartoris, was anticipated by himself several years ago.

Under date of November 26, Mr. Buskett writes as follows: "I had a model made which two years ago I took to Washington City and submitted to several of our principal ordnance officers, who declared the idea to be impracticable. Last June I was again in Washington and called upon Commodore Jeffries, Chief of the Ordnance Department of the Navy, to whom I explained my idea, and he also declared it to be totally impracticable and useless. Being poor and not having money to make the necessary experiments myself, I left my model at the office of A. H. Evans, Esq., and for the time being abandoned all hope of having it tested by our government.

"Judging from the meager description in the article referred to, I am inclined to think my invention was not only first conceived, but is superior to that of Sir George Sartoris, in that in mine the plates are not only convex, but are also circular in form, and each one fastened to the vessel by a single round bolt passing through the center, so that the *plate is set in motion at the moment of impact, and the deflection of the missile made certain.*"

New Steamers.

The Compagnie Générale Transatlantique, one of the largest French steamship companies, has lately given an order for the construction of several large steamers to four English shipbuilders, and this fact has excited considerable indignation in French mercantile circles. The president of the company has addressed a letter to a French journal explaining the circumstances under which the order was intrusted to English instead of to French hands, and stating the following interesting facts. The vessels were required to be delivered in eight months, and when estimates were invited from the principal French shipbuilders they all, with one exception, declined to tender on the ground that the time allowed was too short. The Société des Forges et Chantiers du Havre et Marseilles offered to build six vessels at 1,400,000 francs (£56,000) each, and to deliver the first in ten months and a half, the second in twelve months and a half, and the rest in fourteen months. Fourteen English firms tendered, besides several whose offers arrived too late to compete, and four of them agreed to deliver the vessels at an average of 1,139,750 francs each. This is 260,250 francs, or £10,410, less per vessel than the lowest French estimate, and each firm contracted to deliver the vessels within seven months and a half.

MECHANICAL INVENTIONS.

An improved device for stopping horses, patented by Mr. Isaac J. Warner, of Watertown, Conn., consists in mechanism for pulling upon the bit of a horse, constructed so that power may be applied to the mechanism by operating a lever, or from the running gearing of a vehicle, to check and hold the horse should he become frightened or fractious In the latter case the apparatus works automatically without the presence of the driver. The same device answers for checking and unchecking without alighting from the vehicle. It is also useful in breaking and training colts. It is simple and inexpensive, and does not injure the appearance of the vehicle. The inventor states that it may be applied to sleighs as well as carriages.

Messrs. William E. Jones and Benjamin P. Myers, of Jones' Station, Ohio, have patented an improved carpenters' lever for facilitating the laying of floors, wainscoting, weatherboarding, and especially to overcome the difficulties attending the use of warped and crooked lumber.

Mr. John L. Copp, of Rochester, N. H., has invented an improved buffing machine for boots and shoes. The improvements consist in a swinging standard hung upon a driving shaft, and extending over the bench, to the upper end of which is jointed an arm that carries the sandpapering roll, and is capable of movement to bring the roll to the positions required. The roll is driven, by pulleys and belts, from an intermediate cone pulley on the standard, which is driven by a belt from the driving shaft.

An Advertiser's Experience.

To the Editor of the Scientific American:

Permit me to use a little of your valuable space to give expression to my views of advertising one's business, and the best medium. Some nine years ago, while still in the oil business, I had associated with me as salesmen practical engineers and chemists. Our observations led us to devise some plan whereby we could lubricate the bearings without the great waste of oil and consequent drip. The result was a lubricating compound known as "lubricene," which met every requirement, and reduced the cost of lubrication to its minimum.

We considered ourselves among the benefactors of the human race, and as such looked for our reward. We prepared our machinery, and began manufacturing and sending out samples and salesmen. Every one admitted we had a "good thing," but we found it slow work, and were forced to the conclusion advanced by a successful business man that "the more confidence you have in your goods the more need there is to advertise it." Acting on this hint we got out pamphlets, showcards, etc., but the response was very limited. We then resorted to the different trade journals, and now after these years of experience we are free to say that we have had a far larger return from the SCIENTIFIC AMERICAN than any four other papers combined. We are glad we advertised.

Yours very respectfully,

R. J. CHARD.

6 Burling Slip, New York.

Preservation of Wood.

The improved French method of preserving wood by the application of lime is found to work well. The plan is to pile the planks in a tank, and to put over all a layer of quicklime, which is gradually slaked with water. Timber for mines requires about a week to be thoroughly impregnated, and other wood more or less time, according to its thickness. The material acquires remarkable consistence and hardness, it is stated, on being subjected to this simple process, and the assertion is made that it will never rot. Beech wood prepared in this way for hammers and other tools for ironwork is found to acquire the hardness of oak, without parting with any of its well known elasticity or toughness, and it also lasts longer.—*Amer. Building News.*

The Science of Government.

Commodore Whiting, a century or so ahead of time, has presented to the Senate a memorial asking that body to authorize the President to invite all the governments on this continent to unite in an offensive and defensive confederation. The memorial proposes that each government remain independent in the administration of its own affairs, but be otherwise subordinate to the general government of the confederacy; the general government to have the executive right to declare war, to proclaim peace, to maintain armies and navies, and to regulate commerce.

History of the Cucumber.

A writer in a recent number of the *Science Gossip* says that the cucumber is known to have been cultivated for more than three thousand years. In ancient Egypt it was extensively grown, and so at the present day. The want of this vegetable was one of the grievances complained of to Moses by the Israelites in the Wilderness; we also find it mentioned in other parts of Scripture. It is mentioned in a particular manner by some of the early Greek writers on plants. Cucumbers grown in the neighborhood of Antioch were considered by the ancient Greeks the finest. Columella mentions that the inhabitants of Mendes, in Egypt, were accustomed to take the largest bramble bush they could find, transplant it to a warm, sunny spot, cut it down about the time of the vernal equinox to within a couple of fingers of the ground, then insert a seed into the pith of the bramble, the roots of which were well covered over with fine manure to withstand the cold. By this plan they were enabled to have cucumbers all the year round. This same author states that cucumbers ought to be propagated from seed that has been steeped in milk and honey for a couple of days, this method having the effect of rendering them sweeter and pleasanter to the taste.

Pliny states that in Italy the cucumbers are small, but in some countries are large and of a wax color or black. He tells us that the Emperor Tiberius was so fond of this vegetable that it was served up at his table all the year round. The same author appears to have considered the cucumber unwholesome in an uncooked state, as he tells us it will live in the stomach until the next day, and cannot be reduced to food; but when boiled and served up with oil, vinegar, and honey, it makes a delicate salad; he also recommends a pinch of the seed beaten up with cumin and taken with wine as a good remedy for a cough.

The precise date at which the cucumber was first cultivated in England is unknown. It was probably introduced with other fruits and vegetables at the time the Romans were masters of the country. It became neglected in time and entirely lost, but was at length introduced again at the later part of the reign of Henry VIII. Parkinson, in his "Paradisus" (1656), tells us that in many countries they do eat cucumbers as we do pears and apples, paring and giving slices of them as we would to our friends of some dainty apple or pear. The cucumber was not generally cultivated till almost the middle of the seventeenth century, and it is stated that the first successful forcer of this plant in England was Thomas Fowler, gardener to Sir Nicholas Gould, of Stoke Newington. Some years ago the cucumber was cultivated in large quantities in the outskirts of London, and it is stated in Dr. Wynter's "Curiosities of Civilization," that fourteen acres might be seen under hand glasses in a single domain, and that it has been known that 200,000 gherkins have been cut in a morning for the pickle merchants. In Loudon's time large quantities were grown in the fields of Hertfordshire, without the aid of glass, for the London markets during the summer months. The village of Sandy in Bedfordshire, has been known to furnish 10,000 bushels of gherkins in one week for pickling purposes.

The cucumber, notwithstanding its extensive use, is considered unwholesome by most medical men. Dr. Doran, in his "Table Traits," mentions that in the days of Evelyn (1699) the cucumber was looked upon as only one remove from poison, and adds that it had better be eaten and enjoyed with that opinion in one's memory. Abernethy also gave a quaint recipe for its use, which was to peel the cucumber, slice it, pepper it, putter vinegar to it, then throw it out of the window.

The extent to which this vegetable is consumed by the inhabitants of Egypt and the southwest of Asia, but also in European Russia and Germany, would scarcely seem credible to this country. You never see a Russian peasant at dinner but you see the lump of black bread and a cucumber. The vegetable seems certainly a singular dish to be so national in a country with a climate like that of Russia. Some writers say that there used to be a great annual fair at Leipsic for cucumbers, when the streets were heaped up a story high with that precious element of German cookery. In Germany barrels of half and also full grown cucumbers are preserved from one year to another by immersion in deep wells, where the uniform temperature and exclusion from air seem to be the preserving agents. Tartary has been assigned as the native country of the cucumber, but upon what authority is equally questionable with that of the melon. No modern traveler appears to have found it growing wild.

Ericine, a Color from Poplar Wood.

This new coloring matter, says the *Moniteur de Fils et Tissus*, has received its name of ericine from *Erica vulgaris*, the botanical description of the common heath. It is prepared by heating with an alum solution the wood of (1st) the common heath; (2d) different kinds of poplar.

A liquor is obtained of a fine, clear yellow color, which becomes turbid on cooling, yielding a yellowish resin. The liquid separated from the resin by filtration oxidizes rapidly in contact with air and light, becoming at the end of a few days of a beautiful golden yellow, capable of competing with similar substances prepared in France by means of the weld (wau) of Avignon berries, or even with those manufactured in England.

The operation is conducted thus: The stems of the common heath, or the new branches and twigs of the poplar, cut, crushed, and pulverized, are boiled with alum solution in the following proportions: For 10 lb. wood, 1 lb. alum, 3 gallons water.

The whole is boiled for 20 to 30 minutes, then filtered. The filtrate becomes turbid on cooling, and deposits a greenish yellow resin abundantly. When the liquid is sufficiently free from the resin, it is filtered again and left for three or four days (sometimes five, according to the weather and season) exposed to the double influence of light and air. The liquor thus acquires the golden yellow color, and is fit to be worked either into extract or precipitated as a yellow lake. The extract is obtained in the usual way, by evaporating the mother liquor down either to a sirupy consistence or to the dry state.

The *ericine extract* has all the qualities belonging to the yellow extracts ordinarily found in commerce, but it surpasses most of them in brightness.

It is easily recognizable, not only by the peculiar orange appearance it possesses, but especially by chemical analysis, giving a peculiar brown coloration with alkalies, particularly with ammonia; besides which the alum it contains can be easily detected by the well known reactions for alumina. Here are a few of the results obtained with this new product:

Greens.—In connection with indigo, Prussian blue, greens can be obtained on wood, silk, cotton, etc.

Chamois and noisette shades with oak rind.

Green or bronze with most of the iron salts, especially sulphates.

Wood shades with nitrate of iron.

Orange in connection with red woods, as well as with cochineal, turmeric, etc.

Orange yellow with ericine extract alone. The goods are mordanted first with acetate of lead or manganate of potassium, tartar, or any other basic salt, or, better still, with muriate of tin; then it is dyed in a boiling bath with the necessary quantity of ericine.

Light yellow, on wool, cotton, etc., by simply dipping in the dye bath prepared with the extract.

Fast golden yellow obtained as follows: The liquor, oxidized by exposure to air, is treated with muriate of tin; this precipitates the lake, which has only to be collected on a filter and dried. This solid yellow can be employed in paper staining, in the manufacture of artificial flowers, calico printing; in one word, in all industries where a yellow in the solid is applicable. Finally it unites with Prussian blue or indigo to form greens, and with sandal wood to give oranges.

The Alum Industry of France.

The principal chemical factories for the production of alum, sulphate of alumina, and sulphate of iron in France, numbering about 10, are grouped around Laon, La Fere, and Noyon. Others are met with at Lyons, Paris, Fontainebleau, and Montpellier. They number 14 in all, and the value of the plant is estimated at 6,000,000 francs. They produce 180,000 tons of alum, sulphate of alumina, and sulphate of iron. These establishments use 70,000 tons of raw materials extracted from the soil or furnished by French industry, and supply to the railways and canals 40,000 tons to transport. They pay directly or indirectly in salaries a sum of 1,500,000 francs to 1,200 workpeople. These factories produce annually alum and sulphate of alumina exceeding the national wants by 4,000 tons, which finds its outlet in exports. It is not necessary to enlarge here on the various industrial uses of alum and sulphate of alumina: the paper manufacture, dyeing, and currying are largely dependent on it. The use of sulphate of iron is even more extensive: in dyeing, in the purifying of gas, the polishing of plate glass, the disinfection of fæcal matters, and agricultural operations it is extensively employed. Even the residues of the manufacture are utilized, in the state of the mother liquor, or the exhausted ashes, for purifying the sewage waters of towns, and a fertilizer for artificial grass lands. All these substances, therefore, are of real and indispensable utility as raw materials for a large number of industries. These facts are set forth in a memorial from the manufacturing chemists, complaining of the competition they meet with from Italy, and they oppose the renewal of the treaty of commerce with that country.

The importation of Italian alum has reached 2,000 tons, and the export of French alum dropped to 1,200 tons. In consequence five of the French chemical factories were closed last year. In 1876 a financial company became proprietors of the alum mines of Tolfa, formerly in the Papal States, which contain natural deposits of alum valued at 2,000,000 francs. These operations were aided by the treaty of commerce, which admitted alum at a duty of 5 per cent *ad valorem*, and by introducing large quantities of this Italian alum, they naturally sent down the price of the home production, so that it now fetches in Paris only about 13 francs the 100 kilos. The Italian company is enlarging its capital and operations, and pretends to be able to supply the universe with alum. Vessels loaded with 2,500 tons of the mineral have been sent to France to supply new factories being established at Rouen and Avignon. These 2,500 tons of raw materials represent more than 7,000 tons of pure alum, as the mineral is so rich that it yields 300 per cent. This composition, it is alleged, will close many more of the chemical factories, and also those making sulphate of iron, as this can only be made cheaply from the aluminous schists of Picardy. What the result of the Government Commission appointed to take this matter into consideration has been we do not know.

Pearl Inlaying.

Cast and sheet iron and *papier maché* are the materials upon which pearl is generally inlaid. If the article be of cast iron, it is well cleaned from the sand which usually adheres to the casting, and is blackened with a coat of varnish and lampblack. When this is thoroughly dried, a coat of japan or black varnish is spread evenly upon it. Before the varnish becomes too dry, pieces of pearl cut in the form of leaves, roses, or such flowers as the fancy of the artist may dictate, or the character of the article may require, are laid upon the varnish and pressed down with the finger, and they immediately adhere to the varnished surface. The work is then placed in a heated oven and kept there for several hours, or until the varnish is perfectly dried. It is then taken from the oven and another coat of varnish applied indiscriminately on the surface of the pearl and the previous coating, and again placed in the oven till dry. This process is repeated several times. The varnish is then scraped off the pearl with a knife, and the surface of pearl and the varnish around it are found to be quite even. The pearl is then polished with a piece of pumice stone and water, and the surface of the varnish is rubbed smooth with powdered pumice stone, moistened with water.

It is in this unfinished state that the pearl has the appearance of being inlaid, and from which it derives its name. Its final beauty and finish depend altogether on the skill of the artist under whose hands the shapeless and almost unmeaning pieces of pearl are made to assume the form of beautiful flowers, leaves, etc. The artist traces the stems and leaves of the flowers with a camel's hair pencil dipped in a size made of varnish and turpentine; upon this he lays gold leaf, which adheres where there is size, and the superfluous gold is carefully brushed off with a piece of silk. The flowers and leaves are then painted in colors, and when dry the picture and surface of the article are covered with a coat of refined white varnish.

The kinds of pearl used are three—mother-of-pearl, in the pearl oyster, or white pearl, as it is called by the artist, and it is known by its clear white surface; aurora shell, which can readily be told by its wrinkled appearance and its various prismatic colors, and is made from the shell of the genus of *Mollusca* known as the sear-ear or ear shell, and known to the conchologist as *Haliotis;* the green snail shell, which can be told by its glistening colors of light and dark green, or soft yellow and a bright and beautiful pink, blended together.

To manufacture the pearl ready for inlaying, the workman cuts the rough shells in pieces with saws, and then grinds the pieces upon both sides upon a common grindstone until they are of the requisite thinness. Out of these pieces the artist cuts the forms of leaves, flowers, etc., with a pair of common scissors preparatory to placing them in the varnished surface. The necessary forms may be cut from the thin pieces of pearl by means of a punch and dies, with power applied by the foot of the operator. When a number of pieces are required of the same size, the pieces may be fastened together with glue as one solid plate, and then the required form marked upon the outside one; then these being held in a vise, the form can be carefully sawed out with a fine saw. By placing the cemented pieces in warm water, the glue softens, and the shells are easily separated, and the glue washed off.

This art of inlaying is not confined to the representation of flowers alone; landscapes with houses, castles, trees, churches, and bridges are very easily made, and when represented as being seen by moonlight are very beautiful. The rising moon can be represented surrounded by clouds of gold and silver bronze; and when pieces of pearl are placed in certain positions to reflect their colors, the moonbeams are represented as glancing over the landscape in alternate light and shadow.

A varnished surface can be ornamented by transferring drawings or engravings to it, and the process is quite simple. A thin coat of copal varnish is spread upon the surface of the article, and when nearly dry the engraving is applied with its face downward and carefully pressed to exclude all air bubbles. When the varnish is sufficiently dry, the paper is thoroughly moistened with a sponge dipped in warm water, and the paper can be rubbed off, leaving all the lines of the print upon the varnished surface.—*Hardware.*

Nevada Names.

There is much in a name. A class of boys in geography will stumble dreadfully over a string of commonplace Smithtowns, Jonesvilles, Robinsonports, and so on. But we gaurantee that not one in twenty would miss in reciting a lesson set down in genuine miners' terms, as, for example, this, from the geography of Nevada: "Buttermilk cañon is in the Paradise mountains, northwest from Eden, about ten miles from Gouge-Eye, on the road leading from Limburga to Whoop-'Em-Up, via Bull Town, Lay-'Em-Out, and Hungry, and just over the mountains from Bung-Eye and Knock-'Em-Stiff."

Claude Etienne Minie.

M. Minie, the inventor of many improvements in firearms, died recently at Paris. He was born in Paris in 1805, and after serving several campaigns in Algeria was promoted to a captaincy of chasseurs. Subsequently he devoted himself to inventing improvements that would perfect the service of the infantry. Favored with the special protection of the Duke of Montpensier, he was able to secure the adoption of various of his improvements, which affected the shape and make of balls, cartridges, and gun barrels.