

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 mechanic, 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.

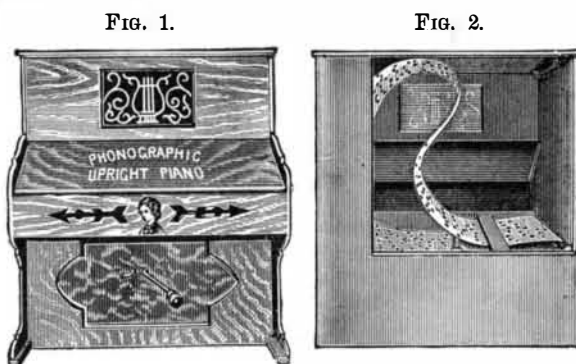
If the requisite funds are not withheld, the completion of the bridge is promised in eighteen months, or the middle of 1881.

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.



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 ex-

plaining the circumstances under which the order was entrusted 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 carpenter's 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.