NATURE OF THE INNER EARTH.

The nature of the inner earth appeals to a circle of inquirers far outside the pale of the special sciences, whether the earth is a hollow shell containing molten matter, or compressed gas, or has a solid crust and nucleus separated by an intermediate layer of liquid, each has its advocates, and is supported by arguments of ore or less weight. During a visit to Vesuvius last May, Herr Siemens, to explain the phenomena which he witnessed, was driven to the conclusion that hydrogen gas, or its combustible compounds, rise from below, and, mingling with atmospheric oxygen, form an explosive mixture which is burnt in the upper part of the volcanic chimney.

By continued cooling of the molten globe, a separation of its components would probably occur, according to their relative weights. The igneous liquid would not be homogeneous throughout. Those compounds which were specifically heavier would be attracted toward the interior of the viscous sphere, while the less dense substances might remain nearer to the outside; thus, the acid silicates might be separated from, and float upon the denser basic silicates.

Whether the solidification would commence at the outside or at the center of the refrigerating globe, is the point of argument. If a mass of molten metal be allowed to cool, a crust soon forms over the surface, while the interior may remain for some time in a liquid state, and, hence, it is natural to argue that we live upon the crust of a sphere which contains a mass of molten matter.

It is now 30 years since Prof. James Thomson announced the theory that if a body expand during solidification, its melting point must be lowered by pressure. A theory afterward confirmed experimentally by his brother, now Sir William Thomson, who showed that the melting point of ice was lowered in the way suggested; pointing out at the same time that if the substance contracted during solidification, its melting point ought to be raised—a prediction confirmed by the experiments of the late Mr. Hopkins, of Cambridge, whose investigation extended to such substances as wax and stearine, sulphur and spermaceti. It is clear, therefore, that in such a case, pressure and heat directly oppose each other; the former tending to prevent, and the latter tending to promote fusion. Supposing that the surface of the cooling globe were locally solidified, the solid portions might be again fused as they descended to regions of higher temperature, and the globe might thus be kept in a liquid condition until it became sufficiently viscous to prevent the subsidence of the solidified portions, when a solid crust would permanently form on the exterior, enclosing a fluid mass within. But if the solidified portions, as they sank in the molten mass, had their fusing point greatly raised by the increased pressure to which they were subjected, then it is possible that they might retain their solid condition, even at the very center of the globe, and thus the process of solidification would gradually tend outward, until a solid or nearly solid spheroid was ultimately produced.

All depends, however, upon the question whether the molten rock would contract on solidification, and, if so, to what extent. Bischof's experiment went to show that solid rocks are about 20% denser than in a molten state. Mr. Mallet's experiments on blast-furnace slags show, however, that these silicates contract only about 6% during solidification. Herr Siemens found that if glass be perfectly fused to a thin liquid and be then allowed to cool, it rapidly contracts until it acquires a plastic or viscous condition; but on further cooling the contraction is greatly diminished; until at the moment of solidification a slight expansion occurs, and hence Herr Siemens concludes that the experiments of Thomson and Bischof prove, not that the earth in consequence of pressure is solid to its center, but simply that the interior has become plastic or viscous, and upon no other hypothesis can the formation of the many thousand feet of alternating sedimentary deposits which are spread over the surface of the earth be accounted for. Upon the plastic hypothesis may be explained the great elevation of many continental areas, and the gradual upheavals and depressions of large tracts of country at the present day. The difference in hight between the plateau of Central Asia and the bottom of the Pacific ocean is at least 12,000 meters, representing a difference of pressure on the viscous matter of about 1,000 atmospheres, whence the rocks which form the floor of the ocean, must, of course, be denser than the others in order to attain the requisite hydrostatic equilibrium. Archdeacon Pratt, remarking upon the attractive action of the Himalayas upon the plumb line, says: "The density of the crust beneath the mountains must be less than that below the plains, and still less than that below the ocean bed." The Astronomer Royal, in a popular lecture last year, at Cockermouth, expressed himself in similar terms: "If one might presume on such a point, I should say that the high parts of the earth are made of something light. The heavy dense parts are those covered by considerable quantities of water, and they have sunk deep in the center of lava, in which I conceive all things to be resting." And Sir George Airy adds the great weight of his authority to the view that the center of the earth is still fluid.—*Mining and Scientific Press.*

Sea Weeds for the Herbarium.—The recipe for pressing sea weeds for preservation used by the Rev. A. B. Hervey, of Troy, N. Y., well known as an expert in that process, is as follows: Float out each specimen by itself in salt water, in a white dish, like a washbowl. Put the paper under the plant in the water; arrange the plant on the paper and carefully draw it out. Lay the paper with the plant upon it on drying paper and spread over it a piece of white muslin. Then spread over this a layer of drying paper, then more plants, and then more cloth, drying paper, etc. Put all under a board, and weight it with 40 or 50 pounds of store or other heavy substances. The next day change the cloths and drying paper, and in one day more the plants will be dry and ready to go into the herbarium or the album for permanent preservation.

How to Make Court-Plaster.—Soak isinglass in a little warm water for 24 hours, then evaporate nearly all the water by gentle heat, dissolve the residue in a little proof spirits wine, and strain the whole through a piece of open linen. The strained mass should be a stiff jelly when cool. Now stretch a piece of silk or sarsanet on a wooden frame, and fix it tight with tacks or pack-thread. Melt the jelly and apply it to the silk thinly and evenly with a badger hair brush. A second coating must be applied when the first has dried. When both are dry, apply over the whole surface two or three coatings of balsam of Peru. Plaster thus made is said to be very pliable and never breaks.

Emery Belts and Wheels.—A correspondent says that most users of emery belts and emery wheels do not use glue that is thick enough, fearing it may chill before the sand or emery can be spread. In making an emery wheel or belt, if the cloth has never been glued, it should be sized with glue about as thick as lard-oil, and allowed to dry thoroughly before applying the glue which holds the emery. Have the emery heated to 200° Fah., and coat the belt or wheel with glue about as thick as molasses and roll it in the hot emery. If a wheel or belt thus treated is allowed sufficient time to become thoroughly dry, it will be very serviceable.

NEW AMERICAN INDUSTRIES.

The recent rapid increase in American chemical manufactures—in many cases from native crude materials—is a very encouraging feature of American trade. The *Grocer* notes that six years ago we imported from France cream of tartar to the extent of 9,000,000 pounds yearly; but so successful has the manufacture of it in this country been carried on, that last year not a single pound was imported. Notwithstanding the crude materials have at present to be imported, the price of the manufactured article has been reduced from 32 cents per pound, the rate for the French article, to 23 and 24 cents per pound for the American production. France and England formerly sent us annually 500,000 pounds of tartaric acid, while the importation for the last fiscal year was 183 pounds. England formerly monopolized our market for nitric acid to the extent of 250,000 pounds annually, at the rate of $1.30 per pound, while last year 27,018 pounds were imported and sold at the same price as the American article—57 cents per pound. At present the lime juice from which citric acid is made has to be imported, but it could easily be produced from fruits grown in Florida, if only sufficient energy were put into the work. If the lemon and lime growers of the South can be induced to prepare the lime juice, the entire production and manufacture of citric acid will be kept in this country, saving hundreds of thousands of dollars annually, and developing another great industry. Borax was formerly brought from England at the rate of from 600,000 to 1,000,000 pounds per year. Owing to the development of borax mines in Nevada, this importation has largely fallen off, and the report for the last fiscal year showed only 3,492 pounds, and the price of the refined article, which is now prepared in New York city, is only from 8 to 9 cents per pound, when formerly it was 35 cents, England being now among the buyers instead of the principal seller, as she once was, both of the crude and refined product.—*Manufacturer and Builder.*

Imitation Inlaying.—Suppose I want an oak panel with a design inlaid with walnut. I grain the panel wholly in oil. This is not a bad ground for walnut. When the oak is dry, I grain the whole of the panel in distemper. I have a paper with the design drawn thereon, the back of which I rub with whiting, place it on the panel, and with a pointed stick trace the design. I then with a brush and quick varnish trace the whole of the design. When the varnish is dry, with a sponge and water I remove the distemper, where the varnish has not touched. This, if well executed, presents a most beautiful imitation of inlaid wood. Marbles are executed in a similar manner.

How to Make Plaster of Paris Hard enough for Turning.—Mix with fresh plaster of Paris from two to four per cent. of powdered marsh mallow root, then add sufficient water until it forms a mass. This will set in about an hour and become so hard and dry that it may be sawed and turned. It is used in the manufacture of dominoes, dice, etc. When eight per cent. of the root is added a still harder mass is obtained which may be rolled into leaves and painted or varnished. A small quantity of alum added makes it set harder and quicker.

Gold in Russia.—The St. Petersburg papers report a great development of the gold production in Russia. Strata containing gold dust in considerable quantity have recently been discovered in the Ural mountains. It is said that in the district of Sennigsei a Russian proprietor has found in his gold mine, near Motygym, a nugget 445 pounds in weight, representing a value of nearly $75,000.