though working at a very high velocity. The finest work can be executed with the utmost facility. The construction is peculiar, and such as to insure durability. For an engraving and full description, see last volume of the SCIENTIFIC AMERICAN, page 353.

King & Hyneman, of Philadelphia, exhibit their patent Street Sweeping Machine. This is a two-wheeled vehicle, much resembling a common cart. Rotating brushes below are put in operation by the wheels, and the dirt is swept against an oblique dash-board, and thus turned so that it falls in a winrow at the side of the machine, upon the pavement. The apparatus is simple, and is said to work extremely well.

Denison & Bradley, of New York, exhibit their improved elastic tube Rotary Pumps; they consist of a strong rubber tube bent into circular form. A friction roller attached to a rotating shaft is made to press against the tube and collapse it, thus producing a vacuum and causes the water to rise. A full description of this invention, with engraving, was published in the last volume of the SCIENTIFIC AMERICAN, page 324.

Horatio N. Black, of Philadelphia, exhibits his patent Grain Cleaning and Drying Machine. It is said to be very effective for the purification of all kinds of grain, and for the separation of the worthless seeds that are intermingled, such as chess, garlic, etc. It will also scour buckwheat and hull rice with great expedition.

James. Wilcox, of Philadelphia, exhibits Hunt & Webster's improved Sewing Machines. They make strong stitches, are simple, run without noise, and are very rapid. The samples of work that we examined were done in the very best manner. Price $75 and upwards.

John N. Gould, of Philadelphia, exhibits his patent self-acting Turning Lathe, for turning ornamental and other kinds of work, such as balustrades, table-legs, bed-posts, wagon-hubs, tool handles, etc. The machine is extremely simple, and operates well.

A. Barker, of Philadelphia, exhibits his patent double-action Force and Lift Pump. It is alleged that it causes a constant flow of water towards the discharge orifice, and therefore, that it has important advantages in power over those pumps where the column of water starts and stops alternately at each stroke. For an engraving and description see SCIENTIFIC AMERICAN Vol. 7, page 260.

Chemicals.—H. W. Worthington, of Philadelphia, exhibits some fine specimens of crystalized prussiate of potash, sulphur, etc.

The Oldest Inhabitant, a rustic statue of an old Quaker gentleman, composed of grain, seeds, corn husks, vegetable skins and the like, attracts much attention. It is, really, quite a work of art and its fair originator, Mrs. Thomas H. Fergus, of Westchester, Pa., is entitled to much credit for her skill. We are certain that no sculptor, working with the same materials, has ever surpassed this production.

The arrangement of the articles in the exhibition is bad. Where the goods could not be sufficiently crowded together, rails are nailed, so as to form narrow lanes, leading, like a labyrinth, one into the other up and down the rooms, with no cross communications. This is extremely inconvenient for visitors. If intended to enhance their ideas of the magnitude of the exhibition by compelling them unnecessarily to travel over a lengthy path, it was a poor ruse. The basements in which the machinery is exhibited are damp, unwholesome, and dangerous to health.

The Mississippi Suspension Bridge.

This bridge—projected to be built over the Mississippi at St. Louis—it is stated, will cost $2,000,000, and will be a mile long. The cost of the Niagara Falls Bridge was not quite one-fifth this sum.

Fat salt pork is employed in some of the journal boxes of locomotives, as a lubricator, and is stated to be excellent for the purpose. We used to apply it to the bearings of the old grindstone we had to turn when some years younger, and the result of its application was equally satisfactory.

Ancient and Modern Chemistry.

The great difference between the ancient and modern chemists consists in their entirely antipodal views entertained in pursuing their investigations. The old alchemists entertained the idea (and some modern casual observers sometimes broach it yet) that all the varied materials of creation were made of one or two substances, and that could they but hit upon the particular process, they believed that they could manufacture gold from iron, and change one metal to another. This idea pervaded Europe for some centuries, and many an impostor deluded kings and nobles with the imposition that they could manufacture gold for their empty coffers if furnished with certain considerations.

The old alchemists or transmuters of metals were believed to be in league with Satan, and no doubtmany of them truly were—the cheats and knaves—still some lovers of the mysterious science, pursued their investigations honestly and in obscurity. The sulphuret of iron and the sulphuret of lead were held to be semi-metals, and as the iron pyrites had the color of gold, and as they had extracted sulphur from them both, leaving lead and iron behind, they naturally concluded that sulphur was an ingredient of all the metals, and that the amount of sulphur in them determined their properties. They thought that they could make silver out of lead and gold out of iron. The old chemists believed in the generality of metals, the modern chemists believe in the singularity of them. As chemistry has progressed, instead of contracting the number of known substances, they have been increasing in number, and many of them now held to be simple, it is believed, will yet be found to be alloys—compounds of two or more substances. It is believed by some chemists that hydrogen gas is a metal, and that oxygen gas is a compound, but at present they stand out as simple substances.

In Gregory's Inorganic Chemistry—the most recent work on the subject published in our country—we find that there are now sixty-one simple substances (elements) known to chemists, and of these fourteen constitute the great mass of our earth and the atmosphere; the remainder occur only in small quantities, and some are very rare.

The science of chemistry stands now at the head of all others; prior to 1740 it was but little more than the art of preparing medicines—most of them nostrums. The number of simple substances then known was eight. There was a general ignorance of the existance of the gases—oxygen, carbon, hydrogen, and nitrogen—which play the most important parts in the operations of nature. It is true, the old chemists believed there was a peculiar body in nature which caused combustion, and which they named *phlogiston*, but it was like a mysterious fairy land. This great agent, to them such a wonder, is now known as oxygen, and a school boy can manufacture it from the scales of a blacksmith's forge, with an old gun barrel for a retort, and the kitchen fire for a furnace. It is the agent which causes our fires to burn, and which enables man and all organic creation to live and breathe. Still there is one general principle in modern chemistry, and the most wonderful of all, of which the ancients had dreams, or rather bright visions. That principle is the production of new compounds possessing peculiar properties belonging to themselves, by the combination of two or more substances in various proportions, and by peculiar processes. It is to this fact in chemistry we wish to direct particular and general attention.

This science is one of experiment entirely, and the field for experiment is boundless.—Every man can pursue investigations for himself, if he has time and apparatus, therefore it is a field in which there is room for an unlimited number of all kinds of experimentors. They cannot manufacture gold out of cheap materials, but they may discover methods of manufacturing articles now comparatively dear, out of materials comparatively cheap, and thus add as much value to the useful arts as by the discovery of rich gold "placers." For example, alcohol is composed of 4 equivalents of carbon, 5 of hydrogen, 1 of oxygen, and a little water. Well, sugar is composed of the same elements, but combined in different proportions, namely, twelve of each. There are also isomeric compounds, such as acetic ether, and aldehyde, two entirely different liquids, which contain exactly the same relative proportions of carbon, hydrogen, and oxygen; their atoms are supposed to be differently arranged, thus producing quite different substances. Isomerism is of frequent occurrence among organic compounds, and Gregory says:—"Doubtless this principle plays an important part in the processes of organic life as well as in decay." Chemists have been very successful in analytic chemistry, that is, in resolving substances into their elementary parts, but not quite so successful in synthetic chemistry, that is, in manufacturing substances found in a state of nature, by endeavoring to combine their known elements. There have been some splendid achievements, however, in synthetic chemistry, but not a tithe of what must and shall be attained. Why cannot many articles, now very dear, be manufactured by synthetic chemistry from cheap materials? Two weeks ago we directed attention to the manufacture of a cheap substitute for leather, but there are hundreds of other articles of importance to mankind to which similar attention should be given. Thus fine stearine candles, for example, are dear, being from thirty up to sixty cents per pound. Could not a cheap substitute for them be manufactured from cheap materials? Stearine is composed of carbon, hydrogen, and oxygen, and so is common resin, which is sold for a few cents per pound. Here is a field for chemical investigation; and as every new chemical experiment—no matter by whom performed—leads to a new result, we trust that more of them will be made, and a new and great impulse given to practical chemistry.

The Honolulu Dredging Machine.

Since we published the extract in our last number taken from the Honolulu *Advertiser*, we have received a letter from a correspondent explaining why the dredging machine which they have obtained for that harbor has not operated successfully.

At the entrance of the harbor there is a bar of sand about 600 feet wide and 1320 feet long. About fourteen months ago the Hawaiian government took measures to deepen the entrance to the harbor from 22 to 30 feet deep, and for this purpose they procured one of Carmichael & Osgood's Excavators, which, upon trial, has been found to work well inside of the harbor in smooth water, but for the main work of removing the bar where there is a roll or swell of the sea from two to six feet, it has been found impracticable to work, because it is operated by a swinging crane and single bucket. The swell of the sea raises the hull of the vessel up and down, and throws out the contents of the scoop after it is raised up. Inquiry has been made of us by those in authority about the best method of removing the bar, and how to make the dredger operate in the swell successfully.

We have never seen any of our dredging machines operating in such a swell as that which takes place in the harbor of Honolulu, but the endless chain bucket dredgers may be able to operate in such a situation. It is customary to stake down dredging machines by long stakes driven down at the bow, sides, and stern, to keep them steady while operating in a slight swell, but none of our dredgers, we think, could be staked down in a six feet swell. Those engaged in the business of dredging in our rivers and harbors may be able to give us some information on this subject that will be beneficial to the government of Hawaii. The port of Honolulu is frequented by a great number of American ships, therefore the improvement of its harbor is of kindred importance with the improvement of our own harbors. Our people have a self-interest in this matter.

Removing Large Boulders.

A correspondent, writing to us from Quebec, asks if there is any steam machine in the United States for removing large boulders from land. He thinks that such a machine would pay well in some places; his attention having been directed to the subject by his own wants. He has lately come into the possession of extensive property in the vicinity of that city, on the river side, which is covered with boulders that have to be removed for the purpose of flagging. He therefore thought that if there was any machine for this purpose in the United States, it might save him and others like him, a large amount of money for labor.

There is no such machine in use in our country, to our knowledge; machines for gathering small stones (boulders) from land, have been invented, but manual and animal labor alone are employed for removing large boulders on land. The common method of removing them is by blasting them by hand labor, then removing them on carts and sleds. A steam machine for removing large boulders might be profitable for special work in certain localities.

To Dye Ivory a Red Color.

A correspondent requests information respecting the method of coloring ivory billiard balls red. As the information may be useful to others as well as him, we give it as follows:—

First wash the balls in strong cold soap-suds, to remove all grease from their surface, then rinse them in cold water. Then place on the fire a tin or copper ladle containing ground cochineal, a little cream of tartar, and about a thimble full of the muriate of tin to four quarts of water in the ladle, and boil the balls in this for about five minutes; then take them out, dip them in cold water, and boil them in the coloring liquor for about five minutes longer, and they will be colored. Now take them out, wash them in cold water, and they are finished. Half an ounce of good cochineal boiled in three quarts of soft water, with one-fourth of an ounce of cream of tartar and a small thimbleful of the muriate of tin; or, as a substitute, *alum*, will color six ivory balls a good full red. This method of coloring ivory was given in our columns about four years ago, but the new subscriber, who has requested this information cannot refer to the previous receipt.

Effects of Indian Hemp.

The natives of the East Indies make a preparation of the above-named hemp, which produces a peculiar kind of intoxication. The sense of hearing becomes so exaggerated that sounds scarcely beyond a whisper, appear like loud explosions of artillery. M. Gaultier, of France, who partook of it, thus describes its effects:—

"A glass overthrown, the crackling of a foot-stool, a word pronounced low, vibrated and shook me like peals of thunder; my own voice appeared to me so loud that I dared not speak, for fear of shattering the walls around me, or of making me burst like an explosive shell; more than five hundred clocks sang out the hour with an harmonious silvery sound; every sonorous object sounded like the note of an harmonica or the Æolian harp. I swam or floated in an ocean of sound."

A Substitute for Leather.

MESSRS. EDITORS—In reading the article in the SCIENTIFIC AMERICAN, No. 10, on the above subject, I thought your suggestions well-timed and appropriate. I have remarked that quite a number of excellent inventions have been developed by the attention of inventors being directed to the things wanted through your columns, and I do not doubt but, that following your suggestions, some new substitute for leather will yet be discovered.

I would suggest to inventors—I have no time to make experiments myself—that some preparation of hemp made up like *papier machie* might be made effectual as a substitute for sole leather. A cement of india rubber mixed with other adhesive substances, may be employed to unite the fibers together. Sole leather is fibrous, as can be witnessed by tearing a piece of it lengthwise. Its appearance when thus riven is like that of oakum felted. R. R.

New York, 1856.

The screw of the frigate *Niagara*, made by Pease & Murphy, of this city, weighs 31,000 lbs., and is said to be the largest in the world. It is composed of brass, but iron would have answered just as well, and would not have cost one-third as much.