enervation is always the consequence. The feeble layer of live peripheric wood is no longer able to give nourishment to the large crown of the tree, formation of new wood has nearly ceased altogether, and every year a new number of branches die out, while only here and there a desolate twig, whose few leaves have a conspicuous, light color, show that life still lingers in the old trunk, but that in a short time its end will come.

The process is different in those wood plants the vessels of which, even in old age, are still filled with liquid, such as the birch and the willow. Their death is not caused by enervation, but their vessels and tubes, full of sap, enter into a state of dissolution, which is introduced by the action of fungi and other parasites which take up their abode inside of the vessels. Finally decay spreads out more and more, new parts of the healthy wood are attacked and fall into pieces, till a strong blast of wind ends the long disease

BENZOLE.

This name is applied to a lightly oily liquid consisting of equal equivalents of hydrogen and carbon. Since the atom of carbon is twelve times as heavy as that of hydrogen, of course benzole contains twelve times as much carbon by weight as it does of hydrogen. Its percentage composition is: Carbon, 92·3; hydrogen, 7·7. Not every substance, however, having this percentage composition is benzole, for acetylene, a bad smelling gas, has the same composition, and chemists say they are isomeric. To benzole they give the formula C_6H_6, meaning there are six atoms of each element in the molecule, while acetylene has but two of each, and is written C_2H_2. How do they know this? it may be asked. Because the vapor of benzole is three times as heavy as that of acetylene; the former being 39, the latter 13, with hydrogen as a unit.

Before passing on to a description of benzole and how it is made, we must refer to the confusion caused by its having too many names. Faraday, who discovered it in 1825, called it bicarburet of hydrogen, because in those days the atomic weight of carbon was but half as large as now. Next it was called benzene, and this name still adheres to it in England and France, while in Germany and this country it is called benzole. Here the term benzine is limited very properly to the light petroleum oils which boil between 80° and 100° C.

Pure benzole is formed by heating benzoic acid with quicklime. In a less pure form it is obtained when organic matter is highly heated; thus, Faraday found it in illuminating gas made by heating the fatty oils, and Woehler made it by the dry distillation of quinic acid. At the present time it is usually made from coal tar, the refuse of the gas house, in which it was discovered by Leigh in 1842, and by Mansfield in 1847.

Coal tar is a mixture of a great number of different bodies, both solid and liquid. By distillation it is separated into three portions: the first, boiling below 150° C. (302° F.), is called light oil; the second portion is heavy oil, or dead oil, while a sort of pitch remains behind. Benzole is made from the light oil, and the commercial article is very impure, containing only 40 per cent of benzole; the remaining 60 per cent is chiefly toluol, C_7H_8, a substance quite similar to benzole, but of higher boiling point and richer in carbon. This impure benzole makes better aniline dyes than the pure, as we shall afterwards see. By careful fractional distillation a nearly pure benzole is obtained, which is then still further purified by freezing it and pressing out the crystals. Pure benzole boils at 80° C. (177° Fah.), and when cooled solidifies, forming tufts of crystals, which melt at 5½° C. (42° Fah.). It is insoluble in water, but soluble in alcohol, ether, and wood spirits. It possesses remarkable solvent properties, surpassing those of benzene or petroleum naphtha. It is an excellent solvent for India-rubber, gutta percha, the fixed and volatile oils, wax, and camphor; it also dissolves copal, gum lac, sulphur, phosphorus, and iodine, as well as a very large number of organic bodies. It is very inflammable and burns with a smoky flame. Many accidents have occurred from heating or distilling it over an open fire. If it is mixed with two volumes of alcohol it can be used as a lamp oil. When illuminating gas is passed through benzole its illuminating power is greatly increased. An apparatus for enriching poor gas is sold under the name of Woodward's carbureter.

The most remarkable and valuable property of benzole is its ability to form substitution and addition compounds. Chlorine is able to *replace* each and every atom of hydrogen in benzole, and, besides this, one or more atoms of chlorine, to the number of six, can be *added* to the molecule of benzole.

Mono-chloro-benzole, C_6H_5Cl, is formed when chlorine is passed into benzole containing iodine. It boils at 138° C. There are two kinds of dichloro-benzole, one melting at 53° C., the other below zero. There are also two kinds of trichloro-benzole, as well as of the tetrachloro-benzole. Of the pentachloro-benzole, of course, but one form is possible if Kekule's ring-shaped formula is true; yet Jungfleisch and Otto both assert that they have made two kinds. When all six atoms of hydrogen are replaced by chlorine we have a chloride of carbon C_6Cl_6. It is made by pouring benzole on antimonic chloride and then passing in chlorine as long as it is absorbed. It forms silky needles, melting at 220° C.

Thus it will be seen that benzole forms at least nine chlorine substitution compounds. With bromine and iodine it forms nearly as many, although the latter are more difficult to prepare. By the action of chlorine upon benzole in sunlight an additive compound, $C_6H_6Cl_6$, is formed, and in like manner chlorine may be added to the substitution compounds forming such bodies as $C_6H_5Cl_7$ and $C_6H_4Cl_8$.

A much more important series of substitution compounds is that formed by the action of nitric acid on benzole.

Nitro-benzole, $C_6H_5NO_2$, in which an atom of hydrogen is replaced by the NO_2 group, is a yellow oil, heavier than water, and of an agreeable odor, resembling that of bitter almonds. In commerce it is known as essence of mirbane. It is formed when benzole is poured slowly into fuming nitric acid as long as the benzole dissolves. The mixture is then poured into a large quantity of water (in which it sinks) and thoroughly washed. It should next be distilled in a current of steam, and may afterwards be distilled *per se.* On a large scale it is prepared by acting on benzole with sulphuric acid and sodic nitrate, or a mixture of ordinary nitric acid (sp. gr. 1·3) and strong sulphuric acid. It is a violent poison when taken internally, two drops having in one case caused death. When pure benzole is employed in its manufacture the purified nitro-benzole boils at 210° C.; when commercial benzole containing toluol is employed the resulting product is a mixture of nitro-benzole and nitro-toluol, and boils at a much higher temperature.

When nitro-benzole is acted upon by a mixture of sulphuric and fuming nitric acids, a solid dinitro-benzole is formed, which crystallizes in long needles. It is soluble in alcohol, but insoluble in water.

In addition to the two nitro-benzoles, there are several nitro-chloro-benzoles, as well as nitro-bromo and nitro-iodo compounds.

The nitro-benzoles are readily converted, by means of reducing agents, into amido compounds by substituting NH_2 for NO_2. Amido-benzole, $C_6H_5NH_2$, which is much better known under the name of aniline oil, is prepared on a large scale by the action of acetic acid and iron filings on nitro-benzole.

Aniline was first discovered by Unverdorben in Saxony in 1826, among the products of the distillation of indigo. In 1833 Runge discovered it in coal tar, and called it kyanol. In 1842 Zinin, recently deceased, prepared it from nitro-benzole by reduction with sulphhydric acid; he called it benzidam. A. W. Hofmann, of Berlin, subsequently proved the identity of all these substances. The name aniline was given to Unverdorben's new compound by Fritzsche from *anil*, meaning indigo.

Pure aniline is a colorless liquid of bitter taste and unpleasant odor, which soon turns brown in the air. It boils at 184·8° C. The admixture of toluidine, etc., raises its boiling point.

When heavy aniline oil of higher boiling point is treated with certain oxidizing substances it is converted into a base called rosaniline or fuchsine, $C_{20}H_{19}N_3$, the salts of which have a beautiful green color when solid, a magnificent red when in solution. Arsenic acid is the reagent mostly employed in making rosaniline, although corrosive sublimate, nitro-benzole, and perchloride of tin are also used. A description of the methods employed in the manufacture of the aniline colors would far exceed the limits of our present article.

Diazo-benzole is a benzole derivative containing, as the name implies, two atoms of nitrogen. It is obtained as a nitrate by passing nitrous acid gas into a solution of the nitrate of aniline. Also as the hydrochlorate by dissolving aniline in an excess of hydrochloric acid and adding potassic nitrite. In a dry state the diazo compounds are dangerously explosive, and even in solution undergo spontaneous decomposition. By the action of various diazo compounds upon the phenols, Griess has obtained a great variety of dyes, some of them quite interesting and beautiful, and still they come. James H. Stebbins, Jr., of this city, has also made a number of dyes from diazo compounds.

Sulphanilic acid, $C_6H_7NSO_3$, is formed by the action of sulphuric acid upon aniline at a high temperature; in the cold only sulphate of aniline is formed. It crystallizes from hot water in rhombic plates. Two other acids having the same composition may be obtained, the one from sulpho-benzoic acid, the other from nitro-benzole. In making the former acid, sulpho-benzoic acid is first converted into a nitro-sulpho-benzoic acid, and that reduced to amido-sulpho-benzoic acid. It crystallizes in white needles.

In the above sketch we have described but a few of the most important derivatives of benzole. The list might be prolonged to an almost limitless extent by adding the various chloro and nitro derivatives of each of the above compounds, the acids derived from them, their salts, ethers, and esters; but these must wait until they have become of greater industrial or technical importance than they are at present, before they can claim a place in our crowded columns.

The Leather Industry of Philadelphia.

One of the oldest of the staple industries in Philadelphia is the manufacture of Morocco leather, which began early in the present century, and was an outgrowth of the East India trade that once distinguished that port, and continued fitfully until 1861. The Morocco leather manufacture, however, grew steadily, and is now more prosperous than ever before. There are thirty establishments, says the *Public Ledger*, making goat skin Morocco to the value of $5,056,000 for the last year, as compared with twenty-three in 1870, then producing $2,307,113 in value. The improvement effected by the introduction of steam machinery has given most of this increase, and the demand for fine leather in shoe manufacture takes all that the factories can produce. A few cases have been sent to foreign markets, but it is not a regular trade, as the export of sole leather has become. More than half the supply of sumac, the chief tanning material, is now produced in Virginia; formerly it was all brought from Sicily.

Next to the Morocco manufacture is that of calf-kid and glove-kid, nine factories producing $1,050,000 in value, as compared with $574,043 in 1870. A still larger product is that of colored and fancy leathers, bindings, and linings, chiefly of sheep skin, fifteen establishments producing $1,500,000 in value, as compared with $1,133,568 in 1870. The tanning of heavy leather, sole and upper, has declined, and many of the old yard tanneries have disappeared. But six or seven remain, producing $314,000 in value, as compared with $523,000 in 1870. A large industry remains in currying and preparing leather, although this has declined under the competition of the great steam tanneries of the interior of the State. The produce of about twenty of those tanneries is regularly sold in Philadelphia, one-half of it for export to foreign countries. The value, so handled, is about $6,000,000, and is increasing.

The only feature of the old order of things remaining is the importation of French and Belgian calf skins, which continues at about $750,000 in value yearly, although in the manufacture of calf-kid and like leathers here, the Alsatian and Belgian workmen, transplanted bodily to Philadelphia, give to Canal street and St. John street the air and flavor of the most ancient city of the continent. The only thing lacking, it is said, is time. The continental tanner has months or years before him without limit, whereas time with us is cut off at both ends, and the leather must be out of the tannery in a month. So Philadelphia brings into North Third street every year half a million dollars' worth of the best products of the North of France and adjacent Germany, leaving the poorest for Europeans to wear, because our bootmakers will have the best of French calf skins, or none at all.

In manufactures of leather, including every form of cut leathers in belting, bands, harness, straps, etc., the industry is conducted with great activity. Belting is made for export, and the clean and perfectly finished belts of Pennsylvania leather are now driving machinery in England and Scotland, in Sweden, and in Australia. Even the great factories of Mulhouse would have procured 46-inch belts here if they could, but in France the importation of manufactures of leather is prohibited.

In leather strictly, embracing none but finished forms, the total value of that manufactured for the past year is $8,000,000—an increase of 33 per cent over 1870. The establishments are little subject to depression, and rarely to disturbance. Whatever may happen to other departments of business, the special forms of leather made in Philadelphia are always in demand, and there is no record of a corner in the market for Patna or Tampico goat skins.

MECHANICAL INVENTIONS.

Mr. Freadrick P. Danunhauer, of Philadelphia, Pa., has patented an improved apparatus for dyeing yarns which consists, first, in a series of nipping rollers hung on vibrating arms and fitted for movement to and from the supporting bars of the yarn to draw the yarn around the bars a regulated distance at each vibration; second, in an automatic stop motion for shifting the driving belt and stopping the mechanism when the desired number of turns have been given to the skeins, so that they may be removed.

An improved retracting device for the picker sticks of looms has been patented by Mr. James J. Geoghegan, of Westerly, R. I. The object of this invention is to provide a simple, durable, and inexpensive device for pulling back the picker sticks of looms, whereby the expenses and delays consequent upon the frequent breaking of the ordinary picker stick spring will be avoided. The invention consists of a rocking lever to one end of which the picker stick is connected, while to the other end weights or springs are attached to pull back the picker stick after each forward motion.

Messrs. Richard Matthai and Charles A. Clinton, of San Francisco, Cal., have invented a simple device for indicating to railroad car passengers the names or numbers of streets and stations on the line of the road as the car approaches them. The invention consists of a box or case containing rollers over which is rolled an index strip having the names or numbers of the streets and stations printed on it, which names or numbers are exhibited in proper succession through an aperture in the box as the rollers are revolved; and also of a novel combination of wheels, springs, levers, and other devices, whereby the said rollers are moved and a bell simultaneously sounded when desired.

Causes of the Present Figure of the Earth.

The *Comptes Rendus* of the French Academy contains a remarkable paper by M. Faye on the physical forces which have produced the present figure of the earth. After remarking on the use of the pendulum in determining the figure of the earth from series of measurements of the intensity and direction of the gravitation force at different parts of the earth's surface, he draws attention to the very curious fact that while the direction and intensity of gravity are affected perceptibly by the presence of hills such as Schichallion and Arthur's Seat, or even by masses as small as the great pyramid of Gizeh, gigantic mountains such as the Himalayas, and great elevated plateaux and table lands, do not affect the pendulum indications in any sensible man ner, except in certain cases where upon elevated continents there appears to be a veritable defect of attraction instead of the excess which might be expected. Indeed, the observations are sufficiently striking to seem to point to the supposition that not only under every great mountain, but even under the whole of every large continent, there were enormous cavities. More than this, the attraction at the surface of all the great oceans appear too great to agree with the distribution presumed by Clairant's formula, which is exact enough for most purposes. Sir G. Airy's suggestion that the base of the Himalaya range reaches down into the denser liquid interior, and there displaces a certain amount of that liquid, so that the exterior attraction is thereby lessened, is one which, inherently improbable, fails to have any application in explaining why the attraction above the seas should be greater than over the continents. M. Faye propounds the following solution to the difficulty: *Under the oceans the globe cools more rapidly and to a greater depth than beneath the surface of the continents.* At a depth of 4,000 meters (13,000 feet) the ocean will still have a temperature not remote from 0° C., while at a similar depth beneath the earth's crust the temperature would be not far from 150° C. (allowing 108 feet in depth down for an increase of 1° in the internal temperature). If the earth had but one uniform rate of cooling all over it, it would be reasonable to assume that the solidified crust would have the same thickness and the same average density all over it. It is therefore argued that below the primitive oceans the earth's crust assumed a definite solid thickness before the continents, and that in contracting, these thicker portions exercised a pressure upon the fluid nucleus tending to elevate still further the continents. This hypothesis, M. Faye thinks, will, moreover, explain the unequal distribution of land and sea around the two poles, the general rise and fall of continents being determined by the excess of density of the crust below the oceans, and by the lines or points of least resistance to internal pressure being at the middle of continents or at the margin of oceans.

How the Pyramids were Built.

Brugsch Bey, the eminent Egyptologist, says, in his work on Egypt:

From the far distance you see the giant forms of the pyramids, as if they were regularly crystallized mountains, which the ever-creating nature has called forth from the rock, to lift themselves up toward the vault of heaven. And yet, they are but tombs, built by the hands of men, which have been the admiration and astonishment alike of the ancient and modern world. Perfectly adjusted to the cardinal points of the horizon, they differ in breadth and height, as is shown by the measurements of the three oldest, as follows: 1. The Pyramid of Khufa—height, 450·75 feet; breadth, 746 feet. 2. Pyramid of Khafra—height, 447·5 feet; breadth, 690·75 feet. 3. Pyramid of Menkara—height, 203 feet; breadth, 352·78 feet.

The construction of these enormous masses has long been an insoluble mystery, but later generations have succeeded in solving the problem. According to their ancient usages and customs, the Egyptians, while they still sojourned in health and spirits, were ever mindful to turn their looks to the region where the departing Ra took leave of life, where the door of the grave opened, where the body, well concealed, at length found rest, to rise again to a new existence, after an appointed time of long, long years, while the soul, though bound to the body, was at liberty to leave the grave and return to it during the daytime, in any form it chose. In such a belief, it was the custom betimes to dig the grave in the form of a deep shaft in the rock, and above this eternal dwelling to raise a superstructure of sacrificial chambers sometimes only a hall, sometimes several apartments, and to adorn them richly with colored writings and painted sculptures, as was becoming to a house of pleasure and joy. The king began his work from his accession. As soon as he mounted the throne, the sovereign gave orders to a nobleman, the master of all the buildings of his land, to plan the work and cut the stone. The kernel of the future edifice was raised on the limestone soil of the desert, in the form of a small pyramid built in steps, of which the well constructed and finished interior formed the king's eternal dwelling, with his stone sarcophagus lying on the rocky floor. Let us suppose that this first building was finished while the Pharaoh still lived in the bright sunlight. A second covering was added, stone by stone, on the outside of the kernel; a third to this second, and to this even a fourth; and the mass of the giant building grew greater the longer the king enjoyed existence. And then, at last, when it became almost impossible to extend the area of the pyramid further, a casing of hard stone, polished like glass, and fitted accurately into the angles of the steps, covered the vast mass of the sepulcher, presenting a gigantic triangle on each of its four faces.

More than seventy such pyramids once rose on the margin of the desert, each telling of a king of whom it was at once the tomb and monument. Had not the greater number of these sepulchers of the Pharaohs been destroyed almost to the foundation, and had the names of the builders of these which still stand been accurately preserved, it would have been easy for the inquirer to prove and make clear by calculation what was originally, and of necessity, the proportion between the masses of the pyramids and the years of the reigns of their respective builders.

ALUM and plaster of Paris, well mixed in water and used in the liquid state, form a hard composition and also a useful cement.

Correspondence.

Protection from Lightning.

To the Editor of the Scientific American:

In your paper of August 28 is an article written by Professor Kirchoff, on connecting lightning rods with gas and water mains, in which, after citing a case of lightning destroying several lengths of cast iron water pipe in Basch, he proceeds to state that if the said pipes had been joined with *lead* instead of pitch, no mechanical effects could have been produced.

That the assumption of Professor K. is not justified by the facts is proved by the following cases:

A church in Terre Haute, Indiana, was struck by lightning, the rod knocked down, after which the electricity followed the gas pipes in the church to the mains in the street, and melted the *lead* joints for upwards of one thousand feet.

Another church in Iowa City, Iowa, received a heavy discharge, which damaged the rod, ran on the gas pipes, and thence to the main, and for a distance of several hundred feet every particle of the *lead* joints was burned out.

Other cases might be cited, but these are sufficient to prove that *lead joints* do not prevent mechanical effects when lightning passes over gas pipes.

Another correspondent, in the same issue of your paper, J. C. M., of Bradford, Pa., writing on the subject of protecting oil tanks from damage by lightning, says:

"We would only be too glad to learn of some method other than the old theory, by which we could protect our property from lightning, as that has been demonstrated beyond a doubt to be a failure. We want information on the subject."

J. C. M. is only one of many thousands seeking such information, and it certainly should be forthcoming from some of our scientists. Of what practical value to the human family has been the vast amount of knowledge accumulated on the subject of atmospheric electricity within the last forty or fifty years? Our scientists have studied its modes of action until all agree upon the laws which govern it; yet, so far as protection from lightning is concerned, this knowledge has not helped us forward one single step. The scientific world has demonstrated clearly, and have taught us by their writings for half a century, that what is known as *electric induction* is a universal mode of electric action.

Scientists have also clearly proved that Franklin knew nothing of this law of electric induction, hence that his theory regarding the action of atmospheric electricity was erroneous. Is it not strange, then, that our scientists should to this day countenance a system of lightning protection (so-called) suggested and recommended by Franklin, and which, by him, was based upon what has been so clearly proved to have been an erroneous theory? Is it reasonable or logical to expect protection from a system founded upon such a basis? Had the great Franklin understood electric induction, his wonderful intuition would have enabled him, without doubt, to suggest the proper method of constructing apparatus for protecting our property from lightning.

Electric induction is theoretically acknowledged and taught by all scientific authorities, yet when the subject of devising some practical system of protection from lightning is under consideration, these same authorities as completely ignore this law of electric induction as did Franklin, who, they prove, knew nothing about it.

Before we can hope for any efficient system of protecting our property from the dire effects of the lightning stroke, it must be clear to inquiring minds that we must no longer ignore this wonderful law of electric action known as electric induction, but must keep it ever before us and recognize it as an all-important and indispensable factor in our investigations. Any other course must result in the future, as it has in the past, in total failure. J. H. A.

Cleves, Ohio, September, 1880.

REMARKS.—Our correspondent's letter is chiefly valuable in reporting the two churches that were struck, the rods of which were connected with the underground gas pipes. It is undoubtedly true that lead is a poor conductor, and that when a heavy discharge of electricity passes along leaded pipe joints, mechanical effects will sometimes be produced. The object in connecting the rods with the gas pipes is to enlarge the connection of the rods with the earth, and thus to protect life and property in the building. If this is accomplished (and it seems to have been done in the cases cited by our correspondent) then the temporary mischief resulting to the lead joints is of no importance, as it may be readily repaired. The connection of the rod with water or gas pipes is recommended, although lead joints are known to be electrically bad, because such pipes usually form the best available means of connecting the rods with the ground.

Our correspondent assumes that Franklin was an ignoramus in respect to atmospheric electricity, and that his system of protection by lightning rods is good for nothing, not being based, as he supposes, on the "wonderful law of electric induction."

We think the probable difficulty is with our correspondent and not with Franklin, who was not, as our correspondent assumes, ignorant concerning atmospheric electricity. Franklin's original instructions relative to lightning rods have been proven by experience to be substantially correct; furthermore, they agree with the theory of "electric induction," and are as sound and good in practice to-day as they were when first published by the illustrious inventor in 1753. Franklin taught that in order to protect buildings the rod should be carried down into moist earth; and the proper inference from his instructions is that he considered it essential that the bottom of the rod should always be well grounded in the earth. All experience with rods since Franklin's time proves the correctness of this idea; and in almost every case where rods are used and damage is done, it is found that the earth connection of the rod was bad, and that Franklin's directions were not followed.

When our correspondent can produce an authentic example of a properly-rodded building, having its rods and metals thoroughly connected with the earth, that has been seriously damaged by lightning, then it will be time enough for him to assume that Franklin knew nothing about the subject, and that his lightning rods are of no account.—EDS. SCI. AM.]

COUNT LOUIS FRANCOIS DE POURTALES.

Science has recently met with a heavy loss in the death of Count Louis François de Pourtales, which occurred at Cambridge, Mass., July 18. His strong frame and temperate mode of life gave hope of a long period of usefulness, for he was only fifty-seven, and in the prime of his powers; but, stricken by an obscure internal disease, he succumbed after some weeks of suffering, and thus followed his teacher and companion, Louis Agassiz, after seven short years. Count Pourtales was a Swiss representative of an old family, which had branches also in France, Prussia, and Bohemia. He was educated as an engineer, and in early manhood emigrated to the United States at nearly the same time as his subsequent fellow worker, Agassiz, to whom he was warmly attached. He entered the government service in the department of the Coast Survey, and continued in it many years. Almost from the beginning of his duties therein he deeply interested himself in deep sea questions, and some of the earliest observations on the nature of the deep sea bottom and of Globigerina mud were made by him. By the death of his father, Pourtales succeeded to the title and received a fortune which enabled him to devote himself entirely to his favorite studies, and to do much in continuing the great work of Louis Agassiz. Receiving the appointment of Keeper of the Museum of Comparative Zoology, he devoted himself untiringly to carrying out the arrangement planned by his friend and master. Dividing the task with the curator, Alexander Agassiz, he pushed forward his part of the work with the easy power of a strong and highly trained intellect, and was the very model of an administrative officer. In 1871 he published (in Catal. Mus. Comp. Zoology, iv.) what is probably his best known work—"Deep Sea Corals"—a memoir containing valuable disquisitions on the affinities of various genera, notes on the distribution of species, and the nature of the bottom on which the dredgings were made. A second memoir on the same subject was contributed by him to the account of the zoological results of the Hassler expedition, and many others in this and other zoological subjects are to be found in the Bulletin of the Harvard Museum of Comparative Zoology. His last work is a description of the plates of corals in the Report on the Florida Reefs by the late Professor Agassiz, which has just been published by Alexander Agassiz, through the permission of the Superintendent of the Coast Survey. These plates are the most perfect and beautiful representations of corals that have as yet been published anywhere, and were drawn under the immediate direction of Professor Agassiz. Count Pourtales' name is indissolubly connected with deep sea zoology by means of the genus *Pourtalesia*, which was dedicated to him. The *Pourtalesia*—a sea urchin allied to *Ananchytes*—was found by the Challenger expedition to be one of the most ubiquitous and characteristic of deep sea animals, and numerous species new to science were obtained by the expedition.

Pourtales' range of learning was very extensive, and his command of it perfect. Nor was it confined to mathematics, physics, and zoology. He did not scorn to read novels and light poetry, and was knowing in family anecdotes and local history. It was a common saying in the museum that if Count Pourtales did not know a thing it was useless to ask any one else.

RECENT INVENTIONS.

An improvement in hoppers in which grain or middlings, etc., are placed to be fed to crushing rolls, purifiers, or other milling machinery, has been patented by Mr. John T. Cook, of Jordan, Minn. One side of the hopper is hinged and movable, and the invention consists in the combination, with the hinged part, of devices, which allow it to yield to the pressure of the grain or middlings and swing outward, but restrict its movement within certain limits, so that the grain shall not discharge too rapidly.

An improved thread case, which exhibits the thread to the greatest advantage, and permits of getting any desired kind of thread instantly and easily, has been patented by Mr. Eugene L. Fitch, of Breda, Iowa. The invention consists in a case with a glass front and top, and with a floor inclined from front to rear, and provided with a series of drawers, each containing a number of spools of thread which are held by spring catches at the end of the drawer, so that if a button on the drawer is pulled a corresponding spool will drop from the drawer and roll down the inclined floor toward the salesman.

A combined door plate and letter receiver, patented by Mr. Henry Free, of Lewiston, Me., is so constructed as