tings. The latter have long been held in the greatest esteem by the first political economists in France and England. Of his reports on local taxation, to the legislature of this State, one hundred thousand have been printed in England and distributed throughout Europe. Soon after the German war, the French legislature caused Mr. Wells' report on taxation of 1869 and his New York report of 1870 to be translated and printed as public documents.

FROM CHAOS TO CORAL.

Many of our readers doubtless have noted, perhaps during the study of experimental chemistry, that silver when melted and afterward allowed to solidify in an earthen crucible will, as it cools, assume a brisk effervescence. The mass bubbles and swells; small particles are thrown out of the pot, and, in fact, a miniature volcanic eruption is reproduced: to complete the resemblance to which, the silver, when solid, appears covered with little cones pierced at the center, simulating the form of volcanoes. This phenomenon, however, we can easily account for from the knowledge that gases are absorbed not only by liquids at the ordinary temperature, but by melted bodies. The silver absorbs oxygen, which it abandons on cooling; the more sudden the latter, the greater the disengagement of the gas; while, on the other hand, if the metal be allowed to get cold slowly, the oxygen escapes insensibly and hardly disturbs the surface. Melted litharge also absorbs oxygen, and similarly abandons it. A like absorption takes place in the combustible gases which are found in the furnaces for melting metals, and recent investigations in France have proved that cast iron after cooling retains a notable quantity of gas, especially of carbonic oxide and hydrogen.

While, however, totally melted bodies absorb gases and reject them at the moment of cooling, the same bodies, when simply softened by the action of heat (though absorbing gases as before), retain the gases after becoming cool, and give them off slowly under the influence of a new elevation of temperature and of an almost perfect vacuum. These facts are not only very curious, but are of considerable importance from a geological point of view.

Volcanoes, it is known, when in eruption emit various gases: first hydrochloric acid, sulphuric acid, and hydrosulphuric acid; later, the carburetted hydrogens predominate; and finally appears a disengagement of carbonic acid, which lasts for centuries. The volcanoes of Auvergne, in France, have been extinct for thousands of years, and yet springs charged with carbonic acid are abundant in the vicinity. There are other well known instances, such as the celebrated Dog Grotto, near Naples, so called from the practice of lowering unhappy dogs into its depths to see them overcome by the deleterious gas, and the *Guevo Upas* or poisonous valley of Java, where the atmosphere is so deadly that the soil is said to be covered with the bones of animals and of men who have died from its effects: in both of which the discharge of gas has existed from time immemorial. Humboldt counted 407 volcanoes on the earth, of which 225 only were active. This latter number has since been increased to 270, of which 190 are on the islands or shores of the Pacific. The majority of volcanoes are situated near the great fracture which extends along the coast of the American continents, and is prolonged to Kamschatka, to Japan, and as far as Java and Sumatra; others are located in New Zealand, New Britain, the New Hebrides, New Caledonia, and, in the antarctic regions, Mounts Erebus and Terror. The quantity of carbonic acid disengaged by these vast furnaces is enormous. Boussingault estimates it at 95 per cent of their entire gaseous emission, and this has been verified by Bunsen in investigations upon the emission of Mount Hecla. Here then is an immense and apparently inexhaustible series of reservoirs, which forms the source of a large amount of the carbonic acid in the world. It remains to examine how this supply was generated, and the theory which has been proposed is readily followed.

When the earth cooled down from its molten state, the various substances, which were maintained separate by the excessive temperature, became united according to their respective affinities: hydrogen and oxygen formed water; oxygen and carbon, carbonic acid; chlorine and sodium, sea salt, and so on. The incandescent rocks, however, while still liquid, found themselves in contact with a dense atmosphere containing various gases, which they absorbed in exactly the same manner as we have stated the silver and litharge to act as regards oxygen, and iron, in reference to carbonic oxide and hydrogen. Further, it was possible that these rocks should become charged in a greater degree with carbonic acid than with other gases existing in the atmosphere, through the action of a relative affinity, just as the melted silver absorbs oxygen instead of nitrogen, though both are present in the same atmosphere. As commotions on the surface of the globe were frequent in its transition state, the rocks were perpetually changing places. Vast masses would be engulfed, to be replaced by others rising from the depths, and so an incredible quantity of carbonic acid became occluded in their substance. As these rocks solidified, the carbonic acid slowly escaped; and if, as is proved, with reasonable probability, there still exists in the interior of our globe an incandescent mass which is constantly cooling, here then is the source of the disengagement of the gas which, escaping through the volcanic apertures, mingles with our atmosphere.

It is curious, in thus tracing the part which the extinct volcanoes play in the economy of our globe, to note how perfectly the migration, which the carbonic acid that they evolve may assume, illustrates the truth of the indestructibility of matter. First found in the primitive atmosphere of our earth, it became absorbed by the incandescent rocks, and remains buried in their depths for thousands of years. Little by little, however, as its captors become colder, it makes its way from its subterranean prison, and escapes into our atmosphere. Its liberty is, however, of short duration, for the rain again seizes it and carries it perhaps to the rivers, and the latter to the sea. From the water it is wrested by lime to form a carbonate, which minute animalculæ—the coral insects, working tirelessly century after century—build first into a reef and then into an island, forming perhaps the nucleus of a new continent, to be completed in the ages far in the future.

ART AMONG THE ASHANTEES.

The thousand ounces of gold gathered in such haste by King Koffee, as the first instalment of the indemnity demanded by his English conquerors, furnish many curious and striking illustrations of the artistic development of the native goldsmiths. Their skill in working gold—which appears to be the most common metal of the country—seems, indeed, to be fully equal to that of the best European artists, while their fertility in invention is simply wonderful.

Among the larger articles brought away by the English is a human head of massive gold, nearly five pounds in weight: a ghastly object, apparently representing the head of a victim gagged for sacrifice. Of a more pleasing character, and more to be preferred as works of art, are two heavy golden griffins, said to have been broken from the King's chair of state. There are besides, many badges of office of different styles, some of them massive fibulæ of wrought gold, like those worn by the heralds sent by King Koffee to treat with the English commander, others of various patterns according to the office of the wearer. That of the King's chamberlain, for example, is distinguished by padlock and keys; the butler's, by cups and bowls, all of solid metal, and, for the most part, castings of exquisite design.

In addition to these great badges, each of which contains many ounces of pure gold, there are fetish caps ornamented with gold in *repoussée* work, the golden tops of umbrellas and sticks of office, grotesque lions for the heads of scepters, golden jaw bones, thigh bones, and skulls, a large sacrificial knife with a golden handle, and many indescribable objects which doubtless served their purpose in the fantastic ceremonies of fetish worship.

Smaller in size but not inferior in workmanship is an infinite number and variety of objects of native design, besides numerous imitations of the gold work of other nations and ages: bracelets, some so heavy as to be a burden, others of exceeding lightness and delicacy: necklaces, chains, pendants, brooches, and rings of curious yet beautiful shape.

The imitated articles give a striking indication of the skill with which the native workmen copy everything that comes to them from the outer world. Thus there are golden padlocks, buckles, bells, and even watch keys, whose use must have been unknown. Not the least curious are several copies of reliquaries, left, perhaps, by Roman Catholic missionaries in that benighted land, and reproduced in gold by the native workmen, with a faithfulness and delicacy which a Chinese might envy. Among the brooches, pendants, badges, rings, and so on, there are forms which are almost facsimiles of early Indian ornaments; others approach Egyptian styles: still others, Scandinavian and Anglo Saxon types. The whole world, in fact, has been laid under tribute and the relics hoarded in this out-of-the-way region.

Some of the articles are quite new, and still have clinging to them the fine red loam in which they were cast. Others are old and worn, and bear traces of frequent patchings and solderings. One of the most remarkable of the ancient pieces is a finely chased seal ring, the signet being made of an ancient Coptic coin. Two other rings were evidently copied from early English betrothal rings. Some of the necklaces and chains are formed of beautiful shells reproduced in gold, while others represent seeds and fruit. In every case, the design is individual and the beauty of the workmanship refreshing to see, in contrast with the machine-made jewelry worn by modern civilized belles.

The most noteworthy object in silver brought from Ashantee is an enormous belt or baldrick, to be hung over the neck by a massive chain, crossing the breast diagonally. From the belt depend seven or eight silver sheaths for knives, the use of which it is not difficult to imagine.

BURIAL IN THE SEA.

The disposition of our dead is a problem so important that any contribution towards its solution should be welcomed. Ordinary inhumation is manifestly objectionable on sanitary grounds. The pollution of the air we breath and the water we drink is enough to condemn the practice in densely populated countries. The Italian suggestion of casting the bodies into one common charnel house, hastening decomposition by caustic alkalies, is repulsive; the mingling of the good and the bad, the rich and the poor, offends our moral and social tastes; and then too we fear some one in this utilitarian age would propose, and some agricultural legislature carry out, the idea of using the compost as a fertilizer. The best modification of separate burials in the earth is the use of hydrated oxide of iron to assist the destruction of the body; but even this is not entirely free from the hygienist's objections. In spite of the utmost precautions (which in practice would seldom be carried out), the air and water would be more or less contaminated. The pagan plan of cremation has something in its favor, but much against it. The establishment of furnaces for the conversion of our departed friends into gases and ashes is too infernal to be popular; and we are not so sure that the atmosphere would be any the better for breathing or smelling, should the practice become general.

To those who object to earth burial for the sake of the living, and to the roasting process on other grounds, we now propose a third method, which certainly has the merit of escaping the disadvantages of the other two. We mean burial in the deep sea, which, for the want of a better word, we will call thallataphy. Let a steamer for the purpose—a floating hearse—transport the dead at least a hundred miles from land and commit them to the depths. The coffin, whether of metal or wood, should be perforated with small holes and weighted. Is any one shocked? We doubt if he can tell why. Banish the idea of sharks; they belong to the coast. The deep sea fauna is made up of low and harmless forms of life—sponges, rhizopods, diminutive molluscs, and the like. The dead would never pollute anything of which the living partake. Do you prefer to commit the relics of your departed friends to their "kindred elements?" It is far more appropriate to lay them in the bosom of the ocean than to inter them in the land—dust with dust; for the average man consists of 88 lbs. of water to 66 of solid matter. Nor need any one be troubled about the resurrection; for we are assured that "the sea shall give up its dead." We say then, especially to the great maritime cities like New York and Boston, London and Liverpool, away with patent furnaces and crowded cemeteries, and find rest in the unlimited burial place which Nature has provided. J. O.

REGULATING THE SPEED OF AN ENGINE.

We have received a neat little pamphlet* from the J. C. Hoadley Company, of Lawrence, Mass., giving the results of experiments in regulating the speed of an engine, first by means of a variable cut-off, second, by throttling the steam, controlling mechanism being actuated in each case by the governor. It is scarcely necessary to say that the results are largely in favor of the variable cut-off. It is easy to understand why this should be so.

When a cut-off is employed, steam of nearly the boiler pressure is admitted to the cylinder; and the admission valve being closed before the piston has completed its stroke, only a portion of a cylinder full of steam is used. On the other hand, when the steam is throttled, its pressure is reduced before admission, and a cylinder full of steam is required. In the pamphlet referred to, quite a number of comparisons are given, and statements are made in regard to the amount of coal and water required for horse power per hour in each case. There is no account of the manner in which the experiments were conducted, nor is it stated whether they were made by members of the company or by disinterested experts, both of which facts will tend to lessen their value, in the opinion of many. There is little doubt, however, of the truth of the principal statement, that under ordinary circumstances an engine with a variable cut-off will be more economical than one in which the valve is arranged to cut off at a fixed point, all regulation being effected by throttling the steam.

THE MAGNETIC EQUIVALENT OF HEAT.

There has recently been devised, by M. Cazin, in France, a thermomagnetic differential apparatus, by means of which, it is stated, the absolute quantity of heat engendered by magnetism may be measured; in other words, the magnetic equivalent of heat may by its aid be determined. The investigator, after observing the thermic effects of magnetism on the core of a rectilinear electromagnet, around which the wire is rolled in alternately opposite directions, so as to produce several poles, enunciates the following law: "When the alternate spirals, constructed by the wire, have the same dimensions, and when they divide the magnet into several equal portions (*concamérations*), the quantities of heat created in the iron core at the opening of the voltaic circuit are inversely proportional to the squares of the number of divisions, the other circumstances not changing." For example, four similar bobbins are disposed around a cylindrical iron tube at equal distances apart, the tube extending a short length beyond the outer coils. In establishing the communications, there is obtained, with the same total length of wire and the same total number of points, one, two, or four divisions: the quantities of heat decrease as the numbers, $1, \frac{1}{4}, \frac{1}{16}$.

In order to measure this heat, M. Cazin has constructed a kind of differential air thermometer, in which air reservoirs are used. Two or three thousand interruptions of the electric current produce, with an ordinary battery, a calorific effect very plainly measurable. By dividing the pressure observed by the number of interruptions, and making a small correction analogous to that employed in calorimetry in taking account of the cooling action of adjacent bodies, the thermic effect of the magnetism is obtained.

RECENT BOILER EXPLOSION.—A correspondent in Lexington, Ky., sends us an account of a boiler explosion in that place. Considerable damage was done to the building in which the boiler was situated, and two horses were killed. The boiler was quite old, and the steam gage was very defective, according to our correspondent's statement; so it seems quite probable that the explosion occurred from excessive pressure. A steam gage that shows 45 pounds pressure, when the actual pressure is 100 pounds per square inch, with a so-called safety valve to correspond, and a careless and ignorant man in charge of the boiler, offer very favorable conditions for an explosion.

*Comparative Economy of Regulation, by Variable Cut-Off and by Throttle Valve, as Exemplified by Indicator Diagrams from engines built by the J. C. Hoadley Company, Lawrence, Mass.