

Gold in Ocean Water.*

The waters of the ocean contain gold. In 1851, Malaguti and Durocher determined the occurrence of silver, but did not extend their inquiries into the question of the presence of gold in sea water. This fact was first accurately determined by Sonstadt in 1872. His experiments were not quantitative, but he stated, in parenthesis, that the amount was "certainly less than one grain in the ton." More recently, however, Munster found an average of five milligrammes per ton. In endeavoring to arrive at an approximate estimate, it must be remembered that local conditions, such as the temperature of the water, will affect the amount in solution. Sonstadt's researches were made with water obtained near Ramsey, in the Isle of Man, while Munster got his from the Kristiania Fjord. In each case the sea water was that of a northern latitude. In warmer regions it is probable that precipitation, due to the presence of putrescent organic matter, may diminish the amount of gold held in solution. Let us, however, take five milligrammes (equivalent to one-thirtieth of a grain) as an approximation. This, though in itself a minute quantity, will be found to represent an enormous total amount of gold in the waters of the ocean. From the results obtained from the careful soundings carried out by the Challenger and similar scientific expeditions, it has been computed that the ocean has an average depth of 2,500 fathoms, and that it contains four hundred million cubic miles of water. This is equivalent to about 1,837,030,272,000 million tons, which upon the basis of five milligrammes per ton would represent 10,250 million tons of gold. By way of contrast, it may be added that, according to Soetbeer, Leech and others, the gold production of the world, from the beginning of 1493 to the end of 1892—a period of exactly four centuries—has amounted to only 5,020 tons. The present output is equal to about 200 tons per annum.

The gold in sea water is kept in solution as an iodide. The amount of free iodine present in the ocean is very minute, but a large proportion of that element occurs combined as an iodate of calcium. From the results of a series of six experiments, Sonstadt found that a cubic mile of sea water contains about 17,000 tons of iodate of calcium, or 11,072 tons of iodine. This represents the occurrence in the entire ocean of no less than 4,428,800 million tons of iodine.

The iodine which maintains the gold in solution is obtained from the iodate of calcium. Gold is soluble in extremely dilute solutions of iodine, which, under ordinary conditions, are in turn readily reduced by organic matter. That the gold in the sea is not precipitated is due to the presence of the iodate of calcium, in which it is not soluble, but which, being readily decomposed by putrescent organic matter, liberates the iodine required to keep the gold in solution.

There is reason to believe that the sea waters of today contain much less iodine than those of former geological periods. That there is so little free iodine in the ocean is due to causes parallel to those which bring about the noteworthy absence of carbonate of lime. Marine animals abstract the latter while marine plants absorb the former. How great is the work done in this way is evidenced by the dimensions of the coral reefs and by the extent of the foraminiferous and other marine limestones.

The abstraction of iodine is no less striking. Seaweeds, and more particularly those which grow at great depths, are the chief source of the iodine of commerce. When, after a storm, such seaweeds are cast upon the shores of Great Britain, France and Sweden, they are collected and burned, and from their fused ashes, termed "kelp," the iodine is subsequently extracted by a simple chemical process. From 13,000 kilos of kelp, about 10 kilos of sodium carbonate and 15 kilos of iodine are obtained.

That iodine is not now so plentiful in the sea as during former geological periods has been suggested by chemical investigations into the composition of rocks. Certain sedimentary formations contain notable quantities of it. It has been found in some aluminous shales in Sweden and also in certain varieties of coal and turf. The saline waters of several springs contain large amounts of it. Even rain water has been known to give a recognizable iodine reaction when tested, such iodine having been obtained by the agency of winds which have been blowing over certain areas of the sea where it was being liberated by the action of organic matter upon the iodate of calcium.

THE ROMANS built the first dikes in Holland.

* Extract from paper read by T. A. Rickard, of Denver, Colo., before International Engineering Congress, Chicago, August, 1893.

THE MYSTERIOUS CHAPEL OF HERON.

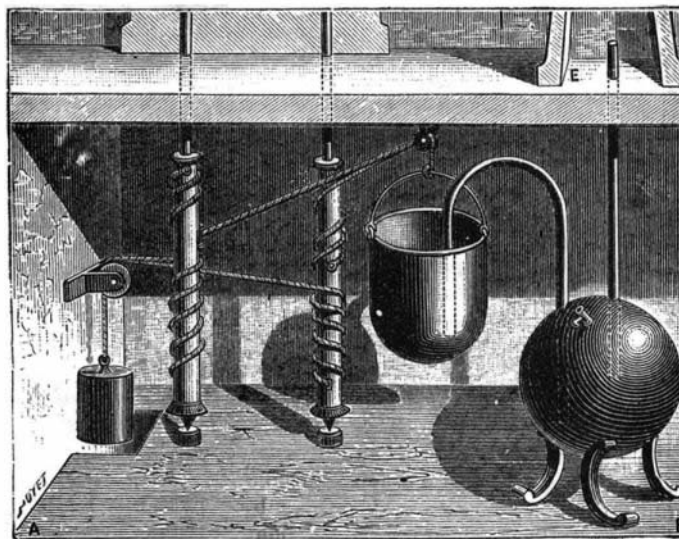
The accompanying engravings represent the construction of a chapel the doors of which are opened by kindling a fire on the altar adjacent, and which closes automatically when the fire goes out. This apparatus is described and illustrated in a work entitled "Les Origines de la Science," by Albert de Rochas, to which we are indebted for the cuts and description.



MYSTERIOUS CHAPEL OF HERON.

When a fire is lighted on the altar, which is hollow, the air contained within will expand and will be forced into the globe beneath, and will force the water contained therein through the bent tube into the pail, which is suspended by cords passing over a pulley and wound around two movable cylinders, which are the prolongations of the axes by means of which the doors are operated. Two other cords are wound around these same cylinders in an opposite sense, and after passing over a pulley support a counterbalance weight at their outer end. When, therefore, the water passes into the receptacle the equilibrium will be disturbed, and the receptacle will descend and the cylinders, will be rotated, thereby opening the doors with which they are connected.

This operation is reversed when the doors are closed.



APPARATUS FOR OPERATING THE DOORS OF THE CHAPEL BY MEANS OF HEAT.

The bent tube which connects the pail and the globe forms a siphon, the longest arm being inside of the globe. When, therefore, the fire on the altar is extinguished, the air in the altar and globe becomes cold and diminishes in volume and forms a partial vacuum, which draws the water from the pail into the globe. When all the water in the pail has been withdrawn, the receptacle will rise under the influence of the counterbalance weight, and this weight, by means of

its cords, will rotate the cylinders in the reverse direction and will close the doors of the chapel. Heron states that mercury may be substituted for water, which in some cases may be of advantage, because of the greater weight of the mercury.

Patent—Infringement—Royalties.

In the case of The Standard Button Fastening Company vs. Ellis et al., recently decided by the Supreme Judicial Court of Massachusetts, which was an action of contract to recover rent or royalties for the use of certain button-fastening machines which were patented by plaintiff, it appeared that while the agreement authorizing the use of the inventions by the defendants was still in force, the patent was adjudged an infringement and invalid. The defendants claimed they were not liable for the rents subsequent to the said adjudication of invalidity. The court sustained a finding for the plaintiff, saying: "So far as the invention described in the letters patent is concerned, the so-called lease was merely a license. No exclusive rights were granted thereby, and anything short of a grant of exclusive rights is a license. A license imparts no warranty that the patent is valid, and no case has been found which holds that a covenant for quiet enjoyment of the right to use the invention is implied. The analogy to a lease of land is not very close. A license to use a patented invention gives permission to make such use so far as the licensor can give such permission; that is, to use it so far as that can be done without infringing other patents. Where a grant of an exclusive right is made, if the exclusive right fails, the consideration of the grant fails. But where a mere license is given, it is held that there is no failure of consideration till the licensee is actually prevented from using the invention. The fact that the license is contained in a lease of a machine does not alter its character. No question arises under that portion of the contract between the parties which is properly regarded as a lease. The only questions are in relation to the right granted to use the patented invention. This right is a license, and is quite different in its legal effect from rights under a lease. No covenant for quiet enjoyment is implied in a license to use a patented invention. When the defendants were prevented from using the invention, they might have refused to pay for the rent or royalties and given up the use of the machine. They did not, however, do this. They continued to use the machine, and now admit that this makes it their duty to pay the rent. There being no implied covenant for quiet enjoyment, this ground of defense fails."—Bradstreet's.

Labor Day.

We must confess that we never hear "Labor Day" or "Labor's Holiday" mentioned without a feeling of contempt and disgust for the impudent demagogism on one side, and cowardly servility on the other, which have brought the descendants of those who prepared and defended the Declaration of Independence down to the embodiment in legislation of the idea that, instead of all men being born free and equal, there are two sorts of men in this republic, one consisting of the members of certain organizations, and the other including the miscellaneous persons who do not belong to these organizations, and that those who do belong to them are entitled to favor and recognition from the government which is not accorded to other people. In a community whose whole public system is founded upon the idea that there should be no class legislation, it is certainly curious to find, of late years, statute after statute enacted at the demand of the crafty and ambitious foreigners who control the forces of "organized labor." For several years "organized labor" has, or would have had, but for internal squabbles, things pretty much its own way in the legislatures, but just now circumstances which neither legislatures nor walking delegates can control have given a very large number of citizens more leisure than usual for thinking, and there are indications that a good many of them are reflecting whether, after all, they might not be as well off in the simple capacity of "free and equal" citizens of the republic as they are now in that of abject slaves of a foreign tyranny which dictates to them when, how, with whom and at what price they shall work, which prevents them from teaching their own business to their own children, and which forces them to sit idle and see their families suffer, when work is plenty, for the sake of "sympathizing" with some other people, of whom they never heard, and whose relations to them consist solely in a concerted scheme of their respective leaders for their private advantage. —Amer. Architect.