A SCIENTIFIC INVENTION WANTED.

The microphone has been successfully employed in Italy in studying volcanic and earthquake noises. In some experiments made at Vicenza the telephone emitted sounds which only could be attributed to subterranean agitations. Accordingly Professor de Rossi, of Rome, determined to make some further experiments in an underground observatory of his own at Rocca di Papa, situated on the Alban hills, on the edge of the crater of an extinct volcano. A special microphone, capable of being attached firmly to the rocks so as to feel any motion there might be, was carried down with great care into the observatory, and the reality of the mysterious noises was soon demonstrated. Though uncertain as to their causes, Professor de Rossi was soon able to divide the noises into three classes, which he calls rumblings, musketry reports, and metallic or bell-like sounds. He also discovered that the sounds were periodical at intervals of an hour, or half an hour, or even smaller fractions.

On the night of the 22d of September, at the hour when the explosions of Vesuvius and its eruptive cone were most vigorous, the microphone on the Latin hills was in the greatest agitation. On the following days the same sounds continued, following more or less exactly the course of the eruption of Vesuvius. Wishing to complete his evidence, Professor de Rossi determined to carry his microphone to a place where there was no doubt of being on ground vibrating from inner causes—to the side of Vesuvius and the Solfatara of Pozzuoli. Professor Palmieri not only put at Professor de Rossi's disposal his observatory, but did all in his power to make the experiment a fair one, himself watching at the outer door to prevent all intrusion or accidental noises. They wished here to establish the connection between the motions of the seismograph and the sounds communicated by the microphone. To ascertain this, one of the assistants of the observatory stood over the seismograph to mark the motions with signs previously agreed upon, to record the agitation preceding a shock, the actual shock itself, and whether the motion was undulatory or perpendicular. At the same time the sounds of the microphone were noted, and found to correspond exactly with the motions of the seismograph, and each different motion corresponded to a different sound. In this way it was possible to ascertain the value of the different sounds, which had naturally been impossible at Rocca di Papa; and it appeared that the perpendicular motion corresponded to the musketry reports, and the undulatory to the rumblings; while very often there was an uncertain sound, as had been noticed at Rocca di Papa.

Even more significant results were obtained by observations at the Solfatara of Pozzuoli. It was evident both at Vesuvius and at the Solfatara that the microphone was registering shocks of earthquake otherwise imperceptible; and, as the same sounds had been observed by Professor Mocenigo at Vicenza and Armellini at Rome, there can be no longer any doubt of the existence of microseismic vibrations of the earth as discovered by Bertelli and maintained by Professor de Rossi.

What is now wanted in the application of the microphone to meteorology is to obtain an instrument which will mark automatically all the variety of sounds which the microphone conveys to us; and this will be the much desired "panseismograph," which will show the number, form, and every variety of the vibrations of the earth.

MINING NOTES.

Notwithstanding the incorporation in San Francisco, in the past two weeks, of twenty mining companies with an aggregate capital of over $200,000,000—a significant indication of the spirit still existing there—the legitimate mining interests of California and Nevada continue to improve and invite attention, and quite a number of mines are spoken of as paying well, under proper management, with ores averaging only from $20 to $30 per ton. Among other reports is one that a prospector, while recently exploring on the west side of Bodie Bluff, laid bare with a few strokes of a pick an 8 inch vein of white quartz, almost filled with solid gold, and that the samples assayed over $40,000 per ton in gold and $1,500 in silver. The finding of such hand samples is not unusual, and it has not heretofore been very difficult to "get up" companies on them, but there are many unfortunates who have reason to believe that the "hand samples" contained more gold than all the rest of the mine.

The Standard Mine, of Bodie District, has made a month's shipment of $87,400. New cross cuts and new shafts are being vigorously pushed, and everything is looking well.

In San Bernadino county the finding of a rich ledge of tin ore is reported, many specimens of the ore assaying 40 per cent of tin. Rich and extensive discoveries of chrome are reported from San Luis Obispo. The Extra Company's mine, Copper City, Shasta County, continues very uniformly to ship about $1,000 per diem from a 10 stamp mill, and other mines there are prospering.

On the Comstock lode of Nevada the 2,200 foot drift of the Sierra Nevada has penetrated ore assaying from $80 to $100 per ton, and the vein so far as opened promises, it is said, to be one of the finest ore developments ever made on the Comstock. The lower levels of the Bonanza mines are gradually cooling, and the men are being put to work in them again.

The south lateral branch of the Sutro Tunnel is making excellent advance toward the Julia shaft, but owing to the great heat at the face of the header, 100° Fah., the workmen are on six hour shifts.

The Homestake mine in the Black Hills, with its 80 stamp mill, is crushing about 175 tons per day, of an ore yielding about $9 per ton. The cost of its mining and milling ranges from $2.50 to $3.50 per ton, showing a profit of about $1,000 a day. The October run was $52,000, and expenses $16,000. There could be no better evidence of good mining management than the profitable working of a $9 ore; and those who have grown despondent over their poor mines may now take courage. Indeed, we learn that already many idle mines are resuming work.

How profitable some of these long idle properties have become since reopened is shown in Colorado in the cases of the California and its western extension, the Hidden Treasure. The latter has yielded nearly or quite $180,000 since last February, with a profit of late of from $10,000 to $16,000 per month; and the California is gradually becoming equally profitable, although not sufficiently opened yet to permit of the yield that can be relied on in the coming winter and spring. The Mayflower and Lafayette mines, owned in New York city, are being developed steadily, and show ore in all the shafts as well as in the tunnel. Rich strikes were lately made in both veins, and the production will be large and regular as soon as the requisite developments are effected. The last body of ore opened mills 217 ounces of silver.

On the north shore of Lake Superior free gold tellurides, with copper pyrites, are reported as occurring in large veins, never assaying less than $50 per ton. The Victoria mine, near the Sault Ste. Marie, has developed some fine ore, running 165 ounces of silver and 25 to 65 per cent of lead.

The approach of winter threatens no relaxation of mining enterprise in any direction, and with scarce an exception the prospects are better than ever before.

ALLOYS.

In one of our foreign exchanges we find a description of some very beautiful alloys, applicable as substitutes for gold and silver in the manufacture of jewelry and similar purposes, which have been produced by Messrs. Meiffren & Co., of Marseilles.

To make an alloy having the color and appearance of gold, they place in a crucible copper as pure as possible, platinum, and tungstic acid in the proportions below stated, and when the metals are completely melted they stir and granulate them by running them into water containing 500 grammes of slaked lime and 500 grammes of carbonate of potash for every cubic meter of water. This mixture, dissolved in water, has the property of rendering the alloy still purer.

They then collect the granulated metal, dry it, and after having remelted in a crucible, they add a certain quantity of fine gold in the proportions hereinafter specified. An alloy is thus produced which, when run into ingots, presents the appearance of red gold of the standard $\frac{750}{1000}$, and to which may be applied the name of "aphthite" or unalterable.

They can change the color of the alloy by varying the proportions of the different metals. As flux they use boric acid, nitrate of soda, and chloride of sodium, previously melted together in equal proportions. The proportion of flux to be employed is 25 grammes per kilogramme of the alloy. The proportions they employ, by preference, for producing an alloy of red gold color are: Copper, 800 grammes; platinum, 25; tungstic acid, 10; and gold, 170 grammes.

The alloy used in imitation of silver consists of iron, 65 parts; nickel, 23 parts; tungsten, 4 parts; aluminum, 5 parts; and copper, 5 parts. The iron and tungsten are melted together and then granulated, as in the case of the previous alloy, except that in this instance the water into which the mixture is run contains one kilogramme of slaked lime and one of carbonate of potash per cubic meter.

The nickel, copper, and aluminum are also melted together and granulated by running into water containing the same proportions of lime and potash. Care should be taken during the melting to cover the metals contained in the two crucibles with a flux composed of one part of boric acid to one part of nitrate of potash or niter.

In the crucible containing the aluminum and copper they place a lump of sodium of about two grammes in weight when treating five kilogrammes of the three metals (nickel, copper, and aluminum) together to prevent oxidation of the aluminum, and they also add charcoal to prevent oxidation of the copper.

Before granulating the metal in each crucible, it should be well stirred with a fire-clay stirrer.

The granulated metals are dried, as in the former case, then melted together in the same crucible in the proportions above indicated, and well stirred, after which the alloy is run into ingots.

The alloy thus obtained, to which may be given the name of "sideraphthite" (or unchangeable iron), presents the same white appearance as platinum or silver, and is not more expensive than German silver. These improved metallic alloys are capable of resisting the action of sulphureted hydrogen, are unattacked by vegetable acids, and but slightly attacked by mineral acids; they are also perfectly ductile and malleable.

New View of Infection.

The theory that very small organisms, either vegetable or animal, are the cause of all infectious diseases, is very generally accepted at the present day. It passes as established and almost mathematically proven, because this theory alone is able to explain for us a series of phenomena that would otherwise be totally inexlipcable. Hence the *alpha* and *omega* of all precautions directed against infectious diseases and epidemics consist in combating and destroying these organisms.

THE BREEDING OF EELS.

The mystery which has hitherto attended the propagation of eels has at last been cleared up by the discovery of ripe ovaries by Professor Baird, and more recently Professor Packard's discovery of a male eel. Professor Baird's observation was made last year, but it was not confirmed until Mr. Eugene G. Blackford pointed out the ovaries to fishermen, fish dealers, and others, about Fulton Market a little while ago. Curiously the charged ovaries have been in plain sight from the first, the minuteness of the eggs causing their character to be unsuspected. "Oh, yes; that is what we call eel fat; it is always plenty at this time of the year," said the fishermen, when their attention was called to the egg mass. After showing the ovaries to his eel dressers, Mr. Blackford directed them to watch for any departure from the usual appearance—thus far without success. The question of the eel's sexuality has been set at rest, however, by Professor Packard's discovery. The male eel appears to be very rare. The ovaries of an eel weighing six pounds were examined recently by Mr. Frederick Mather, who found the eggs to average $\frac{1}{30}$ of an inch in diameter. Mr. Mather then proceeded to estimate the number of eggs contained in the eel, which was done by carefully subdividing the mass until a quantity which could be counted was obtained, and then the number of eggs was multiplied by the number of divisions. The mass was halved, quartered, etc., 17 times, making the last section 1-131,072 of the whole. To avoid error, this was done three times, giving the first time 68 eggs, or 8,912,896 in the whole. The second trial gave 77 eggs, or a total of 10,092,544, while the third yielded 71 eggs, which showed the mass to contain 9,306,112.

Considering the minuteness of the eggs, these different results are remarkably near each other, and Mr. Mather fixes the numbers contained in this individual fish at 9,000,000, which, when we consider that each of the ovaries was nearly a foot in length, and about a half inch in diameter at the thickest part, does not seem to be at all exaggerated.

SANITARY USES OF GUNPOWDER.

A correspondent writes us from the Sandwich Islands saying that during a long life spent in tropical fever districts he has been able to escape infection and miasma by the use of gunpowder, supplemented by a few simple precautions against sudden changes of temperature, sunstroke, bad water, and the like. He uses no water that has not been boiled and afterwards kept from air contact; but his main reliance is upon the practice of burning a thimbleful of gunpowder in his bedroom and very small quantities in his trunk, wardrobe, etc., so as to keep his clothes in an atmosphere feebly charged with gunpowder gas. In Madagascar, Reunion, Mauritius, the East Coast of Tropic Africa, and other fever-smitten lands he has found such simple means a sure preventive of epidemic and endemic diseases, and has thereby been often brought to the philosophic reflection that gunpowder is destined to invert the aim intended by its fabrication.

HAIR ON THE MUSK TURTLE.

Mr. Carl F. Gunther says that he has observed on the common musk turtle (*Test. moschata*) a growth of hair similar to that of the hairy turtle figured in a recent number of the SCIENTIFIC AMERICAN. On a young one, which he caught last fall, in a swamp in Westchester County, N. Y., the fine hairs could be readily distinguished by the aid of a magnifying glass. It sometimes happens that a semblance of hairiness is produced by vegetable growths on the shells of these sluggish creatures living in swamps. Possibly our correspondent may have been misled by such an appearance.

THE CONSTITUTION OF MATTER IN THE GASEOUS STATE.

The development of the kinetic theory of gases covers an enormous advance toward the solution of the great problem of the constitution of matter—a subject, withal, of extreme importance just at this time in view of Mr. Lockyer's reported resolution of the problem. Whether all matter is proved to be fundamentally one, as Mr. Lockyer asserts, or of several irreducible elements, as chemists have believed hitherto, the discoveries made during recent years with regard to the constitution of gases will mark an era not only in the history of chemistry, but in the wider history of human effort to penetrate the secrets of nature.

A masterly review of what has been done of late years in this direction will be found in the SCIENTIFIC AMERICAN SUPPLEMENT (No. 156), from the hand of Professor Charles Adolphe Wurtz, of the Ecole de Médecine, at Paris. Nowhere will the student find a more compact, lucid, and thorough explanation of the physics and chemistry of matter in the gaseous state. We may add that in furnishing, for the small sum of ten cents, articles of such sterling and especial value, the SUPPLEMENT is doing for American readers what has never before been attempted in any country.

Manufacturing Industries.

Believing that the readers of the SCIENTIFIC AMERICAN will be interested in a series of articles on some of our largest manufacturing industries, we have in preparation engravings for illustrating and describing several of the most important establishments in the country. The first of the series will be a representation and description of the interior of Lorillard's Tobacco Factory, Jersey City, and will appear in the next issue.