

## LAUNCH OF THE YORKTOWN AND VESUVIUS.

(Continued from first page.)

minutes later the Vesuvius followed her. The larger of the two vessels was the United States gunboat No. 1, henceforward to be known as the Yorktown. As she started down the ways she was named by Miss Cameron, daughter of the Hon. Don Cameron, of Pennsylvania. The ship is an unarmored vessel. Her length is 230 feet, width 36 feet, with a mean draught of 14 feet. She measures 1,700 tons.

Having no projecting keel on her bottom, bilge keels are provided, one on each side. These are designed to counteract any undue tendency to rolling. Her bow, which is strengthened internally, projects forward below the water line, so as to form an efficient ram. The stem is adorned with quite an elaborate carving in the place of a figurehead, and near the top, directly in the line of the stem, an ominous opening appears, whence it is proposed to eject torpedoes. The stern overhangs the rudder to such an extent as to appear quite ungraceful when out of water.

Within the hull little is in place, except portions of the bulkheads and decks. She will be well divided into water-tight compartments. The coal bunkers are to be arranged along each side, so as to afford protection to the machinery. They alone are to have a capacity of 400 tons of coal, and will offer a protective body of coal about nine feet thick. Across the ship, within the hold, an arched deck is carried. This springs on each side from a line three feet under water, and rises at the center to the water level. It is of three-eighths steel plates. Under this deck are the magazines, steering gear, and boilers. Six sponsons are provided for guns, and the six principal pieces will be of six inches caliber. She is built throughout of steel. She will be provided with a full electric light plant, and all her equipments will be of the most improved and modern type.

The ship is to be propelled by twin screws, carried by 9½ inch shafts of Whitworth fluid compressed steel. The shafts are hollow. For each screw a horizontal triple-expansion engine is provided. These engines, and those of the Vesuvius, will be illustrated in a succeeding issue of the SCIENTIFIC AMERICAN. The three cylinders are respectively of 22 inches, 31 inches, and 50 inches diameter, and the stroke of each piston is 30 inches. The cranks are equally spaced as regards angular disposition. A horizontal engine, arranged for driving a screw shaft in a ship, fills up a large space laterally, for which reason the engines are arranged one forward of the other, the order of the cylinders being reversed, one engine having its low pressure cylinder forward and the other one having its low pressure cylinder aft. One shaft, therefore, exceeds the other in length.

The type of boiler adopted for both the vessels is a modified locomotive boiler, with corrugated cylindrical fire boxes set within the shell. They are built to carry 160 pounds of steam, each ship having four.

The engines of the Yorktown have heavy composition journal boxes, and are metallic packed. The valves are cylindrical and balanced. The valve gear, Marshall's type, is worked by an auxiliary steam cylinder, so that without effort the engine with its three cylinders can be instantly reversed by a single hand. The steam boilers and engine are to develop 3,000 indicated horse power, and a speed of 17 knots is expected.

The United States pneumatic dynamite gun boat, as she descended the ways, was named the Vesuvius, by Miss Breckenridge, daughter of Congressman Breckenridge, of Kentucky. Our readers have been informed of the nature of her armament as regards its general features—the Zalinski torpedo gun.

The recent experiment upon the Silliman was fully illustrated and described in our columns.\*

The accuracy and efficiency of the weapon can be judged of from the record. But while that trial, successful as it proved, was executed with an eight inch gun, the new vessel is to carry three guns of sixteen inch caliber. Vastly greater destructive powers will be developed by them. They will throw projectiles each containing six hundred pounds of explosive gelatine a distance of over a mile. The guns are to be capable of maintaining a rate of discharge of two projectiles per minute.

The three tubes are to be placed forward in the ship, their ends projecting above the deck well forward, while their breeches are down in the hold. They are to be set at a fixed angle of 16°. The range is to be adjusted by varying the amount of air admitted. The eight inch projectile has reached a destructive range of one mile with about the same elevation. The range will be undoubtedly much greater with the larger projectile. All the details of the loading and discharging mechanism are to be as perfect and automatic as possible. Within the hold are stowed a quantity of heavy tubes to contain the compressed air.

In firing practice, the distance of the mark must be estimated and the discharge valve set accordingly. The vessel is then turned until the gun points to the mark, when the projectile is discharged. Should the vessel be rolling, the discharge must take place when

she is on an even keel, the artillerist waiting his time. The pitching will tend to alter the range, but owing to the high trajectory the effect will be far less than in ordinary gun practice. An inclination of over 4°, due to pitching, is not looked for in any ordinary sea.

A gun of about the same size has been constructed for the Italian government, ultimately to be erected at Spezia. This piece is now the subject of experimentation at Fort Lafayette, New York harbor, in the charge of Lieut. Zalinski, and will show what is to be expected from the armament of the new ship.

The Vesuvius is built of steel. She is 246 feet long, 26½ feet wide, with 8½ feet mean draught. Thus she is sixteen feet longer than the Yorktown, and only a little over two-thirds her width. She is of 700 tons measurement. These dimensions, as well as the elegance of her model, indicate high speed, and her machinery is built to attain the same end. She is to have twin screws. The machinery comprises two vertical engines, each with four cylinders arranged for triple expansion. Of the cylinders belonging to each engine, one is 21½ inches, one 31 inches, and two 34 inches diameter. The stroke is 20 inches. The engines are not yet complete, but a good idea of what they will be is afforded by the cut. The four cranks are disposed at angles of 90° with each other. They are similar as regards valve gear to those of the Yorktown. The contract calls for 3,500 indicated horse power, but 4,000 is confidently expected. A speed of 20 knots per hour, equal to about 23 statute miles, is to be attained. Her shafts, of Whitworth fluid compressed steel, are hollow and of 8 inches diameter.

The vessel's sides are smooth plated with ¼ in. steel, butt jointed, fastened by interior straps over the juncture lines. The joints are made as perfect as possible, and are calked outside with a flat faced tool. The thinness of the sheets made it extremely difficult to give her a smooth skin, and the work must be regarded as singularly successful.

When all the machinery is in place, the Vesuvius will float low in the water, and if by her two screws she keeps bow on to her adversary, will present a very small target, and at the same time be able to discharge her torpedoes.

Much other work of interest is in progress at the yard. Two of the new U. S. cruisers are being built, and a twin screw passenger steamer for the Central R. R. of New Jersey is nearly ready for launching. She is to run between New York and Sandy Hook, and will be the largest vessel of her style in the waters about New York. She is 250 feet long, 35 feet wide, and 10 feet draught, and is to have 2,500 indicated horse power.

For the new Long Island Sound steamer Connecticut, of the Stonington line, engines and boilers are in process of construction. They are of a new type for this class of boat; being diagonal oscillating compound engines. The two cylinders are 56 inches and 104 inches diameter, with eleven feet stroke. The boilers for this gigantic machine are to be 12½ feet diameter and 19½ feet long. A development of 5,000 indicated horse power is to be attained. The steamer is now approaching completion, and lies at the foot of 8th Street, on the East River, New York.

## Changes of Level in the Coast of England.

*Ciel et Terre* states that attention was long ago directed to the changes of level that the southern coast of Great Britain is undergoing; but that unfortunately the movements are so complicated that the study of them is not much more advanced than it was when they were first observed, when an attempt was made to explain them by a variation in the level of the sea. Mr. Gardner, in a recent number of the *Geological Magazine*, expresses the opinion that the entire coast is in motion.

In many places there are found remains of forests buried 65 feet below the level of the water. At Penzance human bones have been collected at a depth of 40 feet beneath the limit of high tide, and at Carnan at a depth of 65 feet. The Isle of Wight has separated from English soil only since the beginning of the Christian era. But it is in Cornwall especially that the sea has encroached upon terra firma. The city of Poole, for example, is built upon a spot where, seventy years ago, the water was very deep. The dunes near this city, on the contrary, were in forty-four years (between 1785 and 1829) encroached upon by the sea to the extent of nearly a thousand feet. The county of Kent seems to be rising, and that of Sussex to be rising on one side and subsiding on the other, while the counties more to the west are settling.

## A Meteor.

Dr. G. O. Williams, of Greene, Chenango Co., writes: "I witnessed last evening, April 21, at 7:30, a large meteor. It appeared in N.N.W. Elevation, 30. 0. Direction, east. Course, curved. Observed length of path, 20. 0. Terminated by separation into three or four fragments, nearly due north. Elevation, 15. 0. Heard no report. Duration, two seconds. Others may have observed the same."

\* See SCIENTIFIC AMERICAN, Vol. 57, No. 14.

## Correspondence.

## Improved Lamps Needed.

To the Editor of the Scientific American:

Notwithstanding all that has been said and written about the danger of oil lamps, it is stated, on reliable authority, that we have in the United States a daily average of three hundred accidents, entailing serious loss to life and property.

The rapid spread of flames by the explosion or breaking of a lamp is well known, but it is not generally known that the gas which occasions such disasters is formed in the brass receptacle which holds the wick, and not in the tank (as is commonly supposed) which contains the oil. The multitude of devices for preventing lamp explosions go a great way to show that the subject has been very imperfectly investigated.

The crowning defect of the ordinary kerosene lamp could not be more forcibly illustrated than by comparing the wick holder to a miniature gas machine, generating gas and depositing it in the oil tank. This comparison may be more readily seen when it is considered that the wick holder referred to has a flame of intense heat burning at the end of it.

If inventors could diminish the danger attending the present use of kerosene oil, by some improved method, they would doubtless be deserving of public gratitude and compensation.

W. H.

To the Editor of the Scientific American:

I have constructed an electric motor by the description as published by you in the SCIENTIFIC AMERICAN of recent date. I followed the directions carefully except in the use of a cast iron field magnet and base all in one piece.

The machine runs beautifully and develops considerable power. In testing it I placed it in a shunt of a 2,000 candle arc lamp of the Thomson-Houston system, with a wad of paper between the ends of the lamp carbons. In this way the motor made about 1,000 revolutions per minute, and runs very steady. On allowing the carbons to touch each other, the motor immediately starts off at a most terrific rate of speed, which we were unable to measure with a speed indicator, but think it must have been at least 10,000 per minute. At first I was afraid the coils would heat in a circuit of 4 or 5 amperes, or that the centrifugal force would spread the coils on the armature, but no harm was done. A continuous run of an hour did not heat the coils or bearings (brass) in the least, and I am much pleased with the machine. I propose to put up eight 1 gal. cells of 18 or 20 electric light carbons in each, with 3 zincs, 2½ by 9 inches, to each porous cup, and connect in series, to run the motor. I propose also to construct another armature to fit the same field magnets, but wind to the same diameter with much smaller wire, say 24 or 30, and use the machine as a dynamo, the field being the same as now (No. 16 wire).

THOS. C. HARRIS.

Raleigh, N. C.

## A Cingalese Rock Fortress.

For the first time for a number of years, the Sigiri Rock, in Ceylon, has been scaled by a European, the feat on this occasion being performed by General Lennox, who commands the troops in the island. It is said, indeed, that only one European, Mr. Creasy, ever succeeded in reaching the summit. The rock is cylindrical in shape, and the bulging sides render the ascent very difficult and dangerous. There are galleries all round, a groove about 4 inches deep being cut in the solid rock. This rises spirally, and in it are fixed the foundation bricks, which support a platform about 6 feet broad, with a chunam-coated wall about 9 feet high. The whole structure follows the curves and contours of the solid rock, and is cunningly constructed so as to make the most of any natural support the formation can afford. In some places the gallery has fallen completely away, but it still exhibits flights of fine marble steps. High up on the rock are several figures of Buddha, but it is a mystery how the artist got there, or how, being there, he was able to carry on his work. The fortifications consist of platforms, one above the other, supported by massive retaining walls, each commanding the other. Owing to the falling away of the gallery, the ascent in parts had to be made up a perpendicular face of the cliff, and General Lennox and four natives were left to do the latter part of the ascent alone. The top they found to be a plateau about an acre in extent, in which were two square tanks with sides 30 yards and 15 feet respectively in length, cut out of the solid rock. A palace is believed to have existed on the summit at one time, although time, weather, and the jungle have obliterated all traces of it. During the descent the first comer had to guide the foot of the next into a safe fissure, but all reached the bottom safely after two and a half hours. It is said that the amount of work expended on the galleries is incredible, and the writer of the account of the feat doubts if all the machinery of modern times could accomplish the stupendous work that was achieved here in old days by manual labor alone.

**Water Power for Milling.**

The *Post-Dispatch*, of St. Louis, published in a recent number the following account of an interview between one of its reporters and Mr. Allan T. Gale, a Minneapolis miller. Mr. Gale was apparently apprehensive regarding the prospects of Minneapolis as a center of flour milling, as he said: "We Minneapolis millers have for years been very anxious concerning the water supply. Year by year the amount of water coming over the Falls of St. Anthony has been diminishing, and this winter the trouble has been more serious than ever before at this season. The ice has always interfered with the operations of the mills, but this year the trouble has been the lack of water, and all mills without subsidiary steam power have either suspended operations or run at half power. Of the eighteen great mills, nine have substituted steam for water, while it is evidently a question of a very few years when all must do so. The decrease in the volume of water, caused by the diminution of the rainfall, generally ascribed to the cutting away of the timber, is not the only or indeed the most threatening danger that impends over the water power of Minneapolis, and bids fair to depose our city from its present position as the great flour-producing point of the world. The rock

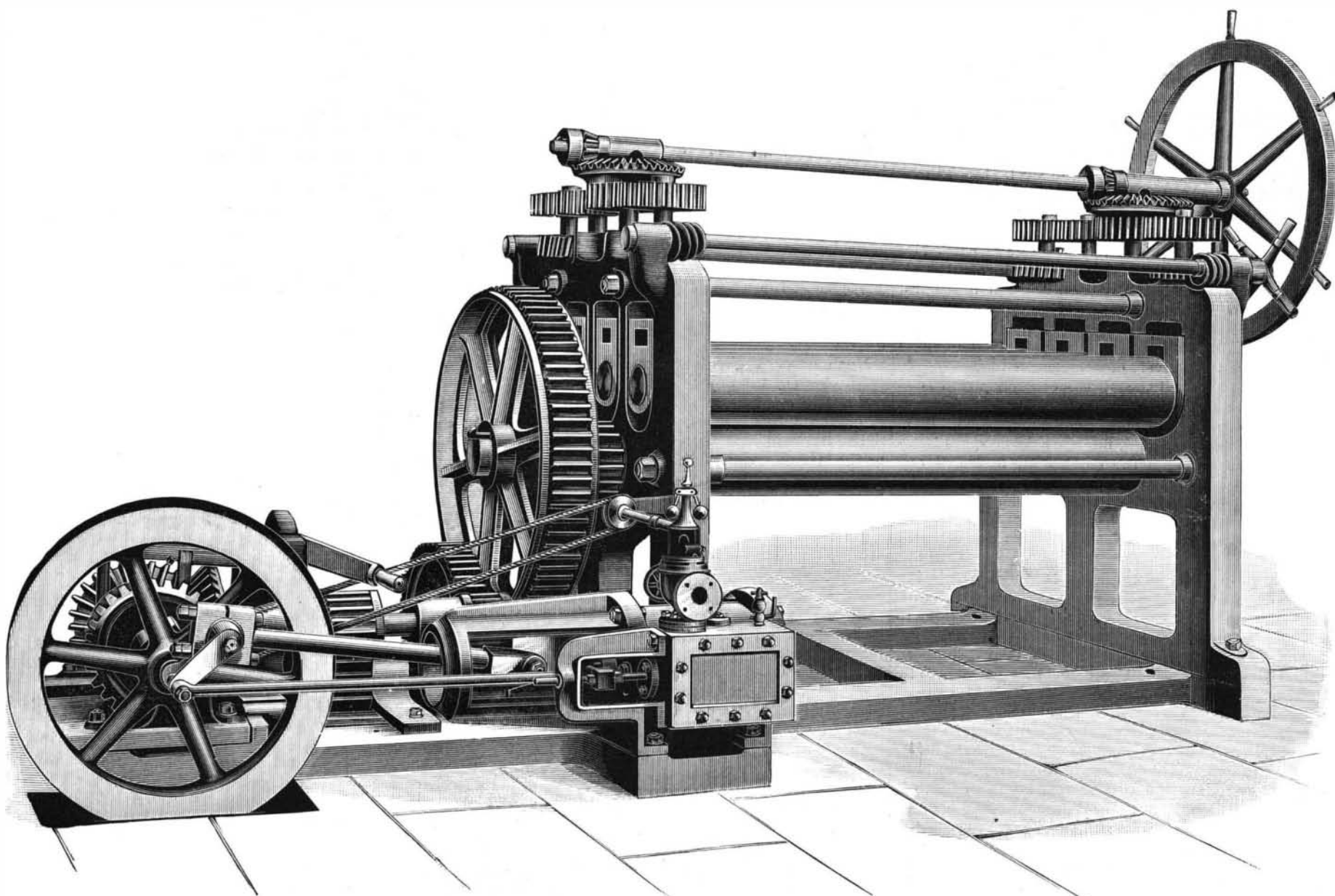
be surprised by the number of new mills that will be erected. The region along the Red River of the North is excellent for wheat, in spite of the low temperature of winter, and the river itself furnishes ample water power for all the mills in the world, being one series of swift rapids. Many of our most enterprising men have thoroughly prospected this field, and last winter many contracts for land suitable for mill sites were closed. Of course the millers, and the citizens of Minneapolis in general, are inclined to laugh at the danger which threatens that city, but they are fully alive to its seriousness and imminence, and many of those now most vociferous in their declarations of the future greatness of the city have quietly made preparations to move elsewhere."

**IMPROVED PLATE STRAIGHTENING MACHINE.**

We illustrate below a plate straightening machine, by Francis Berry & Sons, of the Calderdale Iron Works, Yorkshire. For our engraving we are indebted to *Engineering*. This machine, which is capable of dealing with plates up to nine-sixteenths inch thick by six feet wide, has seven rollers, four of which are adjustable, and can be raised or lowered either all together or the two outer ones can be adjusted inde-

**Uses of Mica.**

The peculiar physical characteristics of mica, its resistance to heat, transparency, capacity of flexure, and high electric resistance, adapt it, says *Engineering*, to applications for which there does not appear to be any perfect substitute. Its use in windows, in the peep holes on the furnaces used in metallurgical processes, as well as the ordinary use in stoves for domestic purposes, are examples of its adaptability to specific purposes which it does not seem to share with any other material. Recently there has been introduced in America a type of watch in which the plate covers about three-fourths of the works, and the remaining portion over the balance wheel and attendant mechanism is protected from exposure when the watch is open by a thin covering of mica. The inclosure of the mechanism of the watch is rendered still more perfect by a ring which is placed around the works before they are inserted into the case. Its fitness for use in physical apparatus is represented by its application for the vanes on the Coulomb meter recently invented by Professor George Forbes, F.R.S. For electrical purposes mica has proved useful, acting as an insulator between the segments of commutators of dynamos and safety fuses in lighting circuits, also as



IMPROVED PLATE STRAIGHTENING MACHINE.

over which the river runs about the falls is of a very soft and porous nature, and in spite of all that can be done is fast wearing away. The falls have been cased in boards, regular inspectors are continually on watch, and every precaution has been taken to check at once any tendency of the rock to break down. But in spite of all this, the danger of the river tunneling through the soft rock is always present, and it would surprise no one to find some morning that the Minneapolis water power had entirely disappeared. Some eight years ago the water began to penetrate the rock on the east side, and it was by a mere chance that the falls were saved. The likelihood of their disappearance increases every year, as the stratum of hard rock which incases the very soft underlying limestone is in places almost washed through, and the limestone itself will melt before the rush of the rapids almost as easily as clay. Minneapolis was made by the falls, and should they fail, her prominence will disappear.

"The millers, recognizing the impending danger," Mr. Gale went on to say, "are looking about for new locations. Two places present themselves to the consideration of the flour men—the Red River of the North country and St. Louis. Before the rise of Minneapolis, St. Louis was the greatest flour point in the United States, and to-day this city ranks second. Many of our most far-sighted flour men have been quietly surveying the ground here, and before long the city will

pendently of the remainder. Power is supplied by cast steel pinions keyed on the ends of the three remaining rollers, and the driving gear generally, which includes an engine having a cylinder ten inches in diameter, regulated by a high speed governor, is confined to one end of the machine, while the hand wheel for adjusting the rollers is placed at the other. In this way the workman in charge runs no risk of being caught in the gearing. As will be seen from the illustration, the machine is mounted on a strong cast iron bed plate, extending its whole length, so that, in spite of its weight being  $12\frac{1}{4}$  tons, but little foundations are required, and the machine is completely self-contained.

**The New Artesian Well at Paris.**

The artesian well of Place Hebert, at Paris, has just been finished, after twenty-two years' work on it. It was necessary to bore to a depth of 2,360 feet to reach water, and such depth was attained only with the greatest difficulty. The work had to be stopped several times, either on account of the hardness of the strata traversed or of the crushing of the metallic tubing, caused by the pressure of the earth. The new well is the third of the public wells of Paris, the others being those of Grenelle and Passy. Its diameter is  $5\frac{1}{4}$  feet, and the weight of the tubing about 880,000 pounds. The temperature of the water that it furnishes is  $84\frac{1}{2}^{\circ}$ . The cost of this important undertaking was \$800,000.

the base part of switches handling heavy currents, to obviate the danger of ignition by the arc formed when the switch is changed. For this latter purpose it shares the field with sheets of slate. Both of these uses were first suggested a number of years ago by an insurance expert in America, in the course of regulations governing the safe installation of electric light plants. As a lubricator mica answers a very peculiar purpose for classes of heavy bearings, where the powdered mica serves a useful office in keeping the surfaces separate, thereby permitting the free ingress of oil. It is used in roof covering mixtures in a powdered condition in combination with coal tar, ground steatite, and other materials, its foliated structure tending to bond the material together. Not affected by ordinary chemicals which are corrosive to many other substances, it has been applied in the valves to sensitive automatic sprinklers, where a sheet of mica placed over a leather disk has proved to be non-corrosive, and without possibility of adhering to the seat, while the leather packing rendered the whole sufficiently elastic to provide a tight joint.

PROF. LECLERC, writing in *Cosmos*, maintains that odors are due, not to the emanations, as such, of so-called odoriferous bodies, but to the vibratory movement among such emanations, due to processes of oxidation. Scent, on this theory, is analogous to sound.