Mica.

Mica fills the interstices of modern progress. A few decades ago we were seeking practical use and market for the output of mica mines already found; now we are seeking new mines to supply the multifarious uses to which mica can be applied. Thus the law of necessity changes in its relation to all things.

Mica is now as essential to the various uses of electricity as this great force is necessary to human progress. In all appliances for electrical lighting and power the most important reciprocal agent entering into their machanism is mica. All armatures are built up with its insulation, whether for dynamos, motors, generators, or transformers. Without its use as an insulation the core of the armature would burn out with a flash. But by placing sheets of mica between the thin sheets of iron, which are secured to the shaft that runs through the drum of the armature, insulation becomes perfect. Thus armatures of even the largest generators can be run for twenty-four continuous hours without heating them more than 80° Fahrenheit above the temperature of the surrounding air. By this use of mica the lines of force are dissipated, but do not lose any of their electrical energy.

In all electrical safety appliances mica also performs an important part as an insulator. To its infusible and indestructible nature much of the success of the rheostat can be ascribed. This wonderful mechanism, which is applied as a motor starter, a governor of speed, a reversing switch, and an automatic safety switch, is absolutely fireproof, and can be subjected to a red heat without mechanical injury. This is rendered possible by making the resistance of thin plates of iron packed closely together, but separated by mica.

Thus the lines of force operate on the same principle as in the armature. Aside from these important uses of mica in electrical apparatus, it is also applied to a thousand minor ones, which make it the constant and willing servant of the greatest power that man has turned to intelligent subjugation.

Mica is also an important factor in many branches of manufacture and art. Owing to its peculiar elasticity and toughness, qualities in which it is not excelled by anything natural or artificial, it is used as an absorbent of nitro-glycerine, and when so used explosions by percussion are rendered almost impossible, while at the same time nothing is taken from the energy of the nitro-glycerine when exploded by fulminates or similar device. For such purpose the plumose mica is used, or that in which the scales are arranged in feathery form.

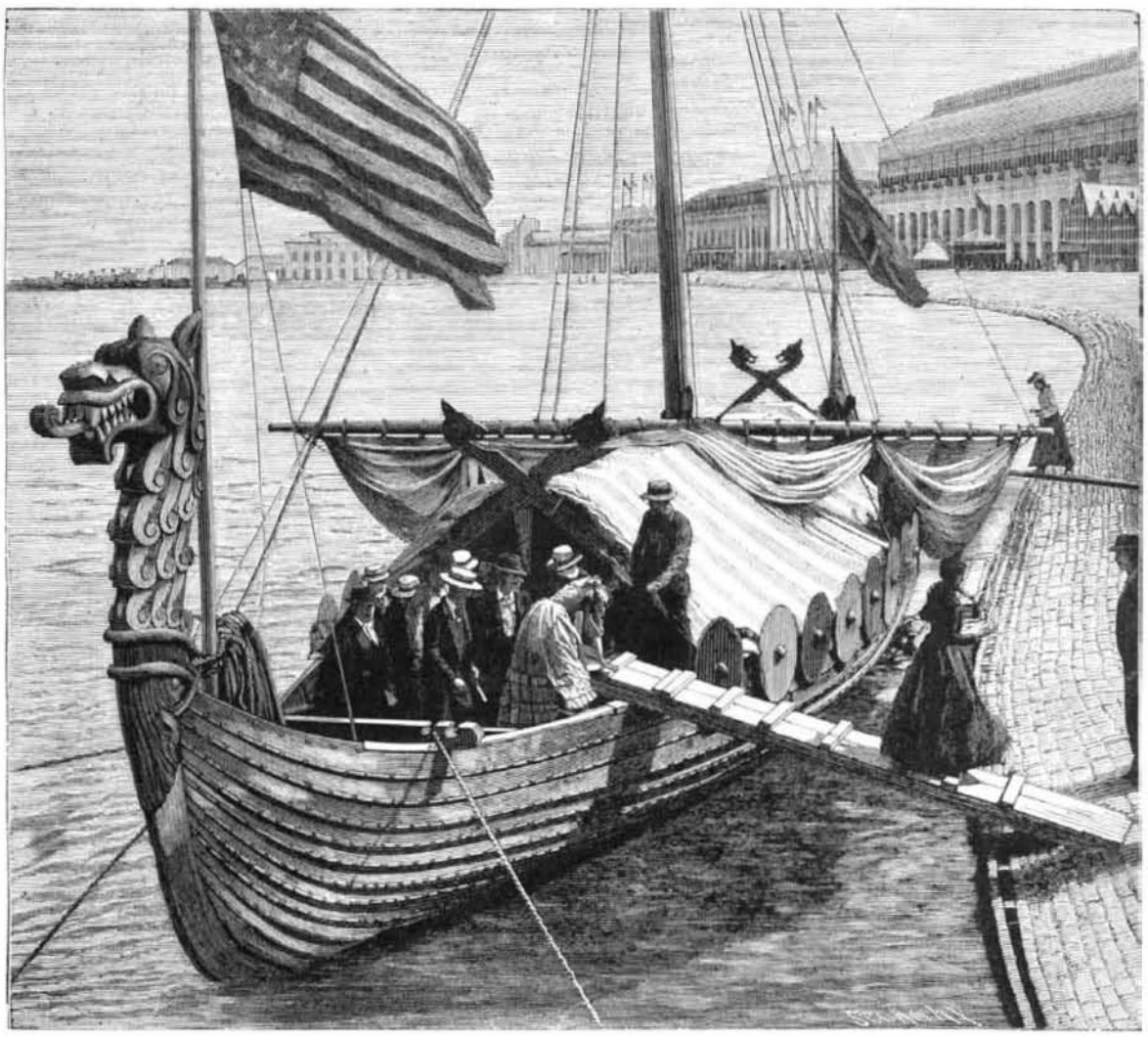
The prismatic or foliated mica is also used by passing it through a mill. This vastly increases the mica's bulk and forms masses of bran-like scales, translucent and beautiful. The French silver mouldings are also made with this ground mica. The unalterable nature of mica and the fact that it entirely resists the action of corrosive acids, smoke, and dust, make it a valuable material for edificial decoration. It can be readily colored or metalized, and its transparency preserves in all its pristine beauty anything to which it is applied. This ground mica is also used as a lubricant and axle grease, and for such purposes has no superior except plumbago. Coarsely pulverized, it is also used for roofing material and as a fireproofing for iron safes.

The cleavage of mica is so perfect it is estimated that it can be split or divided into leaves 250,000 to an inch. Much of its commercial value depends upon this wonderful property of lamination. The largest plates of mica with such foliacious structure are obtained from the Siberian mines, and they sometimes attain a diameter of five and seven feet. Crystals over two feet in diameter have been found in Pennsylvania, eighteen to twenty-four inches in New Mexico, and fourteen inches in North Carolina. Blocks of crystals weighing over one hundred pounds are frequently mined. The North Carolina mines are supposed to be very ancient.

Mica plates found in them when first discovered were trimmed to particular shapes, and it is supposed they were used for windows, mirrors, and ornaments. The number of the mines and the magnitude of these ancient operations excite wonder. Some of the mines are tunneled to a considerable length, and distinctly show marks of chisel-shaped tools. Mica in some form exists all over the earth, but not in quantities of any commercial value. It can be found in granite and quartz rubellite, green tourmaline, feldspar, lepidolite and other minerals, also in granular limestone, gneiss, and slate. It varies in color from white through green, yellowish, and brownish shades to black. Its chemical composition is silicite of alumina and potash, with a small amount of iron, magnesia and soda, and about five per cent water. —*Inter-Ocean.*

VISITING THE VIKING SHIP.

This now famous little Scandinavian vessel, only 74 feet long, which was sailed across the ocean from Norway in May last, is a constant attraction to large numbers of visitors at the Fair. She is an exceedingly well built little craft, but as to this it is said she in no way surpasses the original for which she serves as a model, and the interest in her, therefore, clearly lies entirely in the fact of her being an exact copy of one of the old Viking vessels, such as used to cruise along the English and French coasts about a thousand years ago. In this way the vessel affords one of the many valuable historical object lessons in which the Exposition abounds, and which amplify its far-reaching educational character.



THE WORLD'S COLUMBIAN EXPOSITION—THE VIKING SHIP FROM NORWAY.

Fast Ocean Steamers.

At the recent meeting of Naval Architects, London, Dr. Francis Elgar read a paper on this subject. The author sketched the history of the Great Eastern and compared her construction with that of the Campania, and then passed on to some of the general questions involved by the growing demand for increased speed at sea.

There are already several ships that can cross the Atlantic at an average speed of over 20 knots or 23 statute miles per hour. The Campania crossed from Sandy Hook to Queenstown, on her first voyage in May last, at an average of 21·3 knots, and during one day she averaged 22·3 knots. These speeds are a little over 24½ and 25½ statute miles per hour respectively. Among the conditions essential to high speed in all weathers are: (1) Great size of ship; (2) a form suitable for driving easily at high speeds over heavy seas without shipping heavy water, or lifting the propellers sufficiently to cause racing; (3) deep draught of water; (4) steadiness in a seaway; (5) great strength of structure and of machinery; (6) a large proportion of boiler power, so as to enable a full supply of steam for the engines to be easily kept; (7) a full and well regulated supply of air to the furnaces.

The speed of a ship at sea approximates more nearly to that obtained in still water, with the same propulsive power, the larger she is made. No doubt length is the principal element of size in this respect; but depth, or draught of water, is also very important. Whatever might be the speed obtained with a ship on trial in smooth water, the extent to which her average sea speed would afterward approach this would depend very greatly upon her size.

The full effect of form upon average speed at sea, over long voyages and in all weathers, cannot be measured by still-water trials.

One of the chief points in connection with the form best adapted for sea speed is that it should offer resistance to pitching. The fineness of ends that would give the best results in smooth water requires to be corrected by the fullness necessary to prevent undue pitching.

Deep draught of water is a most important element of speed at sea, and it is now strictly limited by the depth of water in the ports and docks used by the fast passenger steamers on both sides of the Atlantic. Twenty-seven feet is the extreme limit of depth to which a ship can load on either side. The Campania cannot load an inch deeper than the Umbria, although she is 100 feet longer.

Steadiness is important, not only as a very desirable element of comfort to passengers, but also as contributing to speed. When a vessel is rolling heavily from side to side, her resistance must be increased.

He concluded by saying that the improvements that would have the greatest effect in promoting the increase of speed at sea are: Increase of depth of water in harbors and docks, such as would admit of much greater draughts of water being obtained; and improvements in boilers, by which greater steam power could be developed out of the same space and weight. The Atlantic trade is increasing at such a rapid rate that larger and swifter ships are certain to be soon called for. The depth of water has lately been somewhat increased at Liverpool; but much deeper harbors and docks will be required if further great increases of speed at sea are to be obtained without excessive difficulty and cost.

The New York Aquarium.

The old historic fortress known as Castle Garden, situated on the extreme point of land at the south end of the city, where the waters of the Hudson and East Rivers unite, is now transformed into a free aquarium. The legislature appropriated $150,000 to pay for converting it, under the charge of the Park Department. The building has been remodeled by Mr. H. T. Woodman, a scientific aquarist. Round the walls and beneath a light circular gallery are two ranges of brick cells, which will form the tanks, and beneath the dome in the center of the building is a large central tank, which will in time become the home of a white whale or grampus; and six small tanks around the center tanks will be used for sharks, seals, etc. There are thirty-six side tanks in all, which will be lined with white tiles and faced with plate glass. In the gallery eighty-four small tanks will be placed. Great care is taken with the lighting, which is accomplished by means of skylights. Special tanks are provided for the blind fishes, and experiments will be carried on to see if the blind fishes will not, on favorable conditions, recover their sight. Abundant supplies of fresh and filtered salt water will be provided. The three great aquariums of the world are situated at Naples, Brighton, and Berlin. The present aquarium is much better equipped than the Berlin aquarium, and will doubtless in time rival the other two great aquariums. It is a valuable acquisition to the city.

Lead as a Coating for Iron and Other Metals.

To 100 pounds of lead are added 5 pounds of aluminum, 2 ounces salammoniac, ½ ounce arsenic, ½ ounce of borax or 1 pound of alum, and 1 pound of cryolite. The alloy of lead, aluminum, and arsenic gives a harder and more firmly adhering coat than is obtained in the ordinary process. The plates to be coated are cleaned and passed through the bath in the usual way.