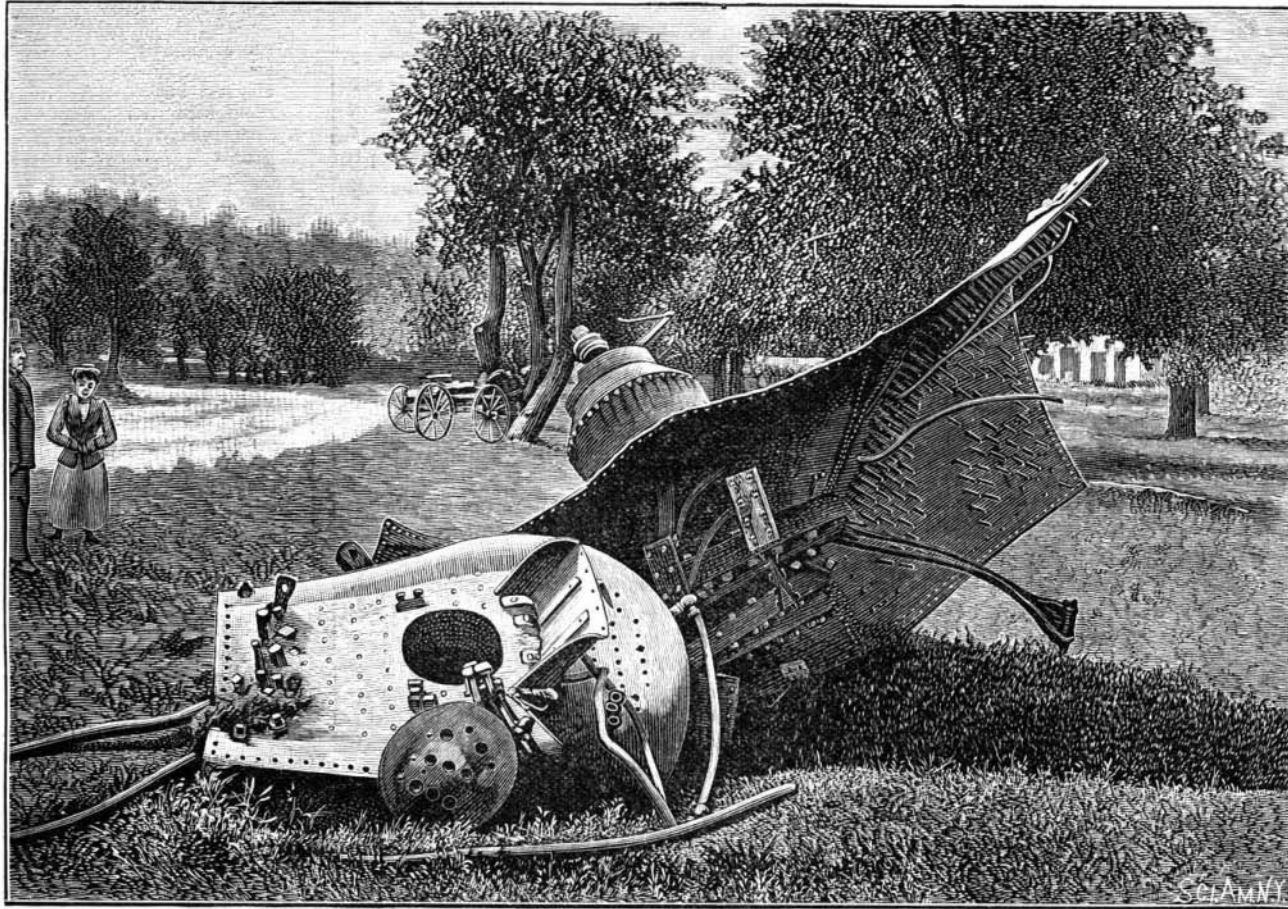


LOCOMOTIVE EXPLOSION.

At Oyster Bay, Long Island, on September 9, the boiler of a 46 ton passenger locomotive exploded, killing the engineer and fireman and one brakeman. The body of the engineer was thrown two hundred feet away to the south of the track, while that of the fireman was thrown a hundred and fifty feet to the north, and the body of the brakeman was thrown over and twenty feet to the rear of the train, which consisted of three cars. The brakeman was on the tender, and the engineer and the fireman were in the cab. The train standing at the depot just ready to start when the explosion occurred. The crown sheet of the firebox, with a portion of the cab, shown in our engraving, were thrown about a hundred and fifty feet away, while the frame and remains of the locomotive were left in a nearly vertical position, its front portion being partially forced into the ground. This peculiar position of the locomotive was illustrated in the SCIENTIFIC AMERICAN of Sept. 26. The explosion was evidently in the water chamber over the firebox, but its cause is unexplained, although it is reported that the dead engineer had said the riveting in the crown sheet and some of the outer plates of the firebox was defective. The locomotive was built in 1889 and had been overhauled a few months ago.



LOCOMOTIVE EXPLOSION—APPEARANCE OF CROWN SHEET AND PART OF FIREBOX.

THE TWIN SCREW STEAMER VIRGINIA.

This is the name of a new and beautiful steamship lately built by the Globe Iron Works Co., Cleveland, Ohio, for the Goodrich Transportation Co. The *Marine Review* says she is the trimmest, neatest, handsomest and most elegantly appointed passenger steamship built on any inland water, and the finest ship that flies the American flag. The extravagant expressions about her yacht-like lines and her sylph-like mould are all contained in the fact that her per cent of fullness or coefficient is 0.61 full, 0.15 less than any large steamer on the lakes, and equal to the finest-lined ocean steamship. The dimensions of the hull are 278 feet over all, 260 feet keel, 38 feet beam and 25 feet deep. Built of high test steel; the stanchions are drop-forged steel. The water bottom is divided into six sections, three on each side, and contains a tank that will hold 4,500 gallons of fresh water. The hull is divided into six watertight bulkheads, in addition to the collision and stuffing box bulkheads. If by any possible force the boat could be cut squarely in two, both ends would float.

The Virginia's twin screws will be turned by two sets of inverted triple expansion engines, each with cylinders 20, 32, and 52 inches by 36 inches stroke. Steam will be furnished these engines by two double-ended boilers, 13 feet in diameter by 21 feet 2 inches long, having 12 furnaces and being equal to four 13-foot boilers. Steam fans can be used to produce an induced rather than forced draft, the same fans running regularly for the

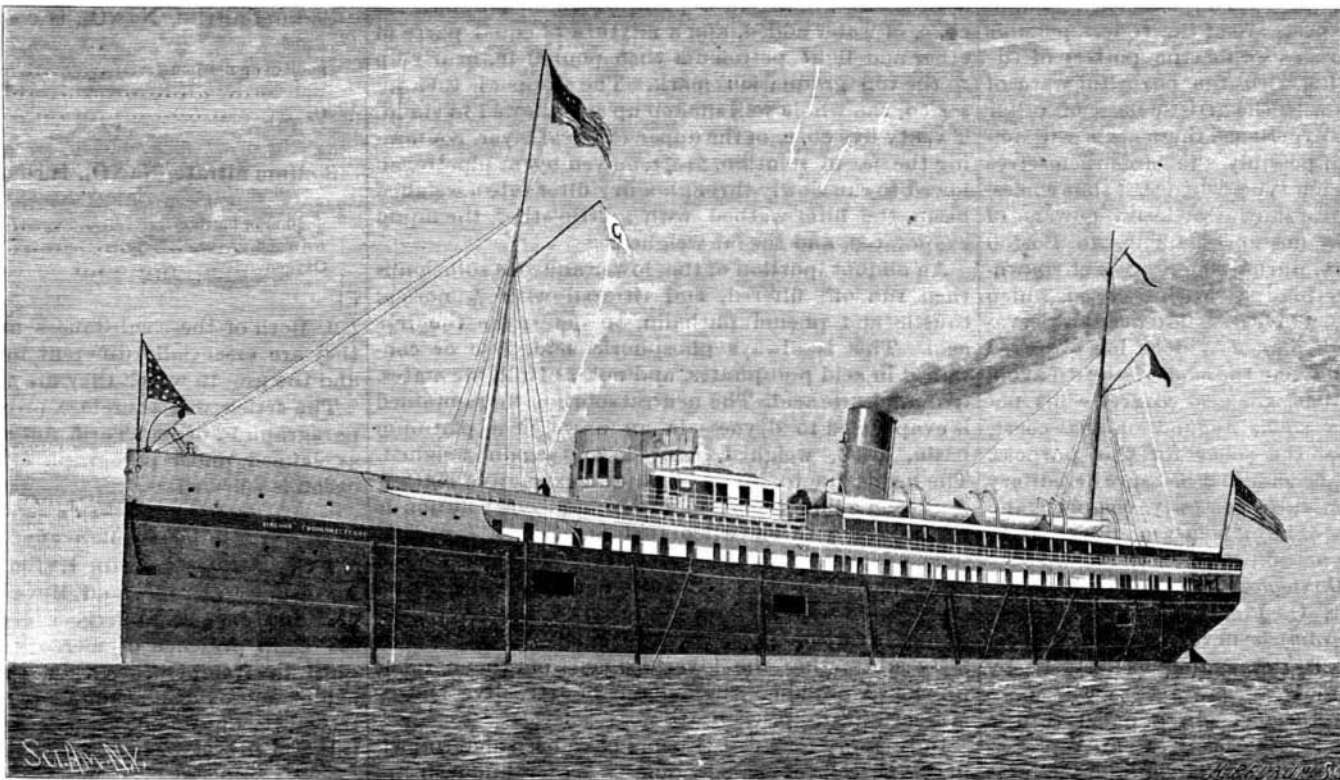
purpose of ventilating the fire hold. The engines make 130 revolutions while driving the boat 18 miles an hour, the starboard wheel being turned to the right and the port wheel to the left, in opposite directions. Each stateroom has four berths, two of which can be pulled out into the cabin. The latter are hung with curtains; 400 incandescent lights shining from every nook of the

cabin will illuminate the same. The vibration experienced on most steamers will be eliminated by transverse frames of the bulkheads, which will give the main deck a high degree of stiffness.

The Virginia will leave Chicago at 9 o'clock each morning and, including the stop at Racine, will make the run to Milwaukee in five hours. Each of the Virginia's auxiliary engines will be fitted with a reducing valve, instead of having, as most steamers have, only one reducing valve for all auxiliary engines.

Coating Metals with Lead.

To coat sheet iron with lead (Horgan's process) it is freed from scale by means of hot dilute sulphuric acid, washed with water, and transferred to a vat contain-



THE NEW LAKE STEAMER VIRGINIA—TWIN SCREWS.

ing a solution of lime or other alkaline compound, which serves to prevent oxidation and acts as a flux. The sheet iron is then placed in a dilute solution of zinc chloride containing on the average 20 pounds of oxalic acid and 10 pounds of sodium sulphite per ton of iron treated. These quantities depend, however, upon the quality of the metal. After this immersion the sheets are passed through melted lead and allowed to drain. A very closely adherent coating is obtained by this process.

Terrestrial Magnetism and Radiant Sunlight.

Prof. Frank H. Bigelow contributes a note to the *American Journal of Science* for September, on the cause of the variations of the magnetic needle. He finds, from a discussion of magnetic observations made at thirteen stations during the month of June, 1883, that "the permanent magnetic condition of the earth may be principally due to the orbital motion of the earth through the radiant field of sunlight. The rotation of the earth on its axis causes a modification of the direction of the axis of polarization, by diminishing the angle between the two axes, and as the result of the annual motion may cause it to rotate in a secular period about the axis of figure, or if the magnetization has already become set in the body of the earth, may cause a succession of secular waves to sweep over it from east to west, as is shown to be the case in the history of the isogonic lines and the long-period deflections of the needle." This interesting identification of the magnetic and light action of solar radiants is in harmony with the results of the investigations of Maxwell and

Hertz. And Prof. Bigelow believes that, by the application of similar considerations to Mercury, we will be able to satisfactorily account for the outstanding motion of this planet's perihelion.

Pictures in Sulphur.

In demonstrating that sulphur melted at about 115 degrees can be cooled in paper, the author happened to use a lithographed card, of which the edges were turned up. Upon taking away the card he discovered that the lithographed characters were clearly and distinctly impressed upon the cooled surface of the sulphur, and remained after hard friction and washing. By repeated experiments he has been able to get very fine results, removing the paper each time by a mere washing and rubbing process. He finds that sulphur will receive impressions from and reproduce faithfully characters or designs in ordinary graphite crayon, colored crayons, writing ink, typographical inks, china ink, lithographic inks—colored or uncolored—and others. He remarks, too, that it will reproduce with remarkable exactitude geographical maps.—*Charles Lepierre, Bull. Soc. Chim.*

Spouting Wells in Washington.

Near North Yakima, Wash., a company recently secured a large body of arid land on Moxee, and immediately began the work of boring. August 15, flowing water was struck at 400 feet, which has increased in flow from the rate of 80,000 gallons to 250,000 gallons per diem, and is increasing. As the work went on, water was sent through an 8 inch pipe 33 feet in the air. Those interested in the scheme claim that hundreds of thousands of acres of arid lands will be reclaimed in central Washington, through a system of artesian wells, which would otherwise be without value except for cattle range.