Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

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NEW YORK, SATURDAY, MARCH 27, 1886.

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 584

For the Week Ending March 27, 1886.

Price 10 cents. For sale by all newsdealers.

LOSS OF THE CUNARD STEAMER OREGON.

On Sunday, March 14th, at 4:30 A. M., the splendid steamer Oregon, from Liverpool bound to New York, when off the Long Island coast, collided with an unknown sailing craft, and both vessels were lost. The sailer is supposed to have instantly sunk with all on board. The Oregon floated for 8 hours, and then went down in 120 ft. water. All on board were saved. The accident took place about 10 miles out from the shore and about 50 miles east of the entrance to New York harbor. The wind was light, sea calm; it was dark, but clear enough to see lights on shore.

The steamer was running at full speed, over 20 miles per hour. The lookout shouted as he saw the approaching sailing vessel, a white light was seen, the wheel was turned hard-a-port; instantly the two ships collided, the supposed schooner swept by, and was seen no more. The Oregon's engines were worked for half an hour, when the fires were extinguished by rise of water to the furnaces. It was found she was making water rapidly. By the collision a large hole, stated by the captain to be 18 feet square, was made on and above the water line, and another hole, 4 × 6 feet, was made below the water line. The great ship soon began to settle. Signals were given—guns and rockets; orderly preparations made to occupy the ten lifeboats. All were supplied with life preservers. By 10 A. M. two small sailing vessels had come to the rescue, and to these, by means of the boats, the passengers and crew, 896 souls in all, were safely transferred. The crew numbered 205. Soon another large steamer, the Fulda, came up, and the people were taken on board and carried into New York. At 12:30 P. M. the Oregon, having settled to the level of the water, plunged head downward and went to the bottom, in water 120 feet deep, and there lies, in an upright position, masts above water.

It is supposed the schooner may have been at anchor waiting for turn of the ebb tide, as the usual colored lights, required to be shown by sailing vessels when under way, were not seen on the steamer. Captain Cottier of the Oregon seems to have been equal to the emergency, and to have done all that a cool and skillful officer could do under the circumstances. Of this his successful transfer of so many persons without loss is evidence.

Probably no finer specimen of marine architecture than the Oregon has yet been produced. She was unsurpassed in strength and speed, supplied with many requisites for safety, but lacking in flotation power and in devices suited for the temporary stoppage of leaks. She had no special means for preventing access of water to the furnaces. One of the firemen states that the passageways between three of her compartments were open at the time of the accident, and could not be closed; another statement is that the force of the collision was so great as to break one of the compartment partitions, thus knocking two compartments practically into one.

The loss of the Oregon emphasizes the need, many times heretofore by us expressed, of further inventions and study in the line of safety appliances for sea-going vessels. Honor and emolument await the man who can show how to keep a merchant ship afloat, without greatly increasing the cost. It is easy enough to make unsinkable vessels if the exchequer or building fund is large enough. Double ships, with many air chambers, can be made, which will certainly keep the ship afloat. But for commercial purposes such boats would not pay, owing to enormous cost; and it is doubtful whether they could have speed enough, owing to their increased weight.

Let inventors ponder the subject, and if possible contrive some new way of arranging materials so as to evolve a new style of unsinkable vessel. The compartment system is of great value, but is not wholly sufficient. To say the least, it can be much improved.

The steamship Oregon was built by John Elder & Co., at Glasgow, and was launched on June 21, 1883. [illegible]

Her dimensions were: 520 feet in length, 54 feet breadth of beam, 40¾ feet depth of hold, and 7,250 tons [illegible] bulkheads, five iron decks, and a strong turtle-back deck forward and aft as a protection from the heavy seas. She was fitted to accommodate 340 saloon, 92 second-cabin, and 1,000 steerage passengers.

The fittings of the Oregon were unusually fine. The grand saloon, capable of dining the whole of the 340 cabin passengers, was placed in the fore part of the vessel, and was laid with a parquetry floor. The ceiling decorations were almost exclusively confined to white and gold. The panels were of polished satinwood, the pilasters of walnut, with gilt capitals. The saloon measured 65 by 54 feet, and was 9 feet in height in the lowest part. A central cupola of handsome design, 25 feet long and 15 feet wide, rose to a height of 20 feet, and gave abundant light and ventilation.

Her engines were of 13,000 horse power, screw 24 feet diameter, 9 boilers, 54 furnaces; coal consumption, 300 tons per diem. Some of her passages are among the shortest ever made, namely, Queenstown to New York, 6 d. 9 h. and 42 m.

Some of the difficulties in the way of safety in such a ship as the Oregon may be conceived if we consider what takes place, mechanically, during an ocean voyage. The exertion of 13,000 horse power is equal to 191,517 tons lifted a foot high every minute. Her screw pushes the ship ahead with a power equal to that of twenty of the most powerful locomotives; 300 tons of coal a day must be brought to the fires, and the ashes removed; 2,500 tons of fuel must be stored and handled. The confined area of the vessel seems to forbid the employment of anything except manual labor in the work.

AS TO THE SINKING OF THE OREGON.

The bare fact that the Cunarder Oregon received the injury which caused her loss from collision with a sailing vessel seems to be pretty well sustained. Beyond that, the testimony is confused and conflicting, and the reticence of the ship's officers, especially upon several important points, lends an air of mystery to the affair which certain admissions of the crew serve to intensify. On the one hand, we are told that it was a clear, starlit night when the collision took place, and, on the other, that it was hazy. Remembering that neither the first officer, who was on the bridge, nor the watch on deck, including the lookout forward in the ship's eyes, could be certain as to whether the strange sail was a sloop, schooner, tern, or square-rigger, whether she was close-hauled or running free, the supposition that the weather was hazy seems not unreasonable.

When, contrary to the sea-going rules, the masters of the ocean racers run at full speed as well in thick as in clear weather, it is scarcely to be expected that they will acknowledge so great a speed as eighteen nautical miles an hour, and at the same time admit that it was logged in thick or even hazy weather.

The testimony of all those on deck at the time of the accident agrees that the stranger went down soon after "with all on board."

Yet, under the hypothesis that it was so thick they did not see her, and could not make out her exact rig even when she was close aboard, and that, running at the rate of eighteen knots an hour, their vessel would have been fully two miles away from the scene in about six minutes—before she could have been stopped—this assertion must be set down as surmise only.

With the conditions prevailing of smooth sea and light wind, it is not impossible that some of the stranger's crew were taken from the wreckage by a passing vessel, and, if such is the case, we may yet hear a very different version of this unfortunate affair.

A curious bit of testimony, gathered from more than one person aboard the Oregon, is to be found in the assertion that a *white* light was seen ahead several times before the accident occurred. The first officer, who was on the bridge and in command, says he took it to be the light in the rigging of a pilot boat, or a torch, which it is customary to burn on the deck of such craft when a steamer is sighted. But the pilot boat on that station having now been heard from, we know with something like certainty that the vessel which caused the disaster was not a pilot boat. Now, no other sailing vessels save pilot boats are permitted under the law to show a white light when under weigh. The law says that, when under sail, these craft must show a green light in the starboard fore shrouds and a red one in the port shrouds. Therefore, when a sailing vessel shows a white light, it indicates her to be either a pilot boat cruising for ships or a merchantman *at anchor*. We are told that the wind was west by north and light, and a glance at the tide tables shows us that, at the time of the collision, the tide was running on the first quarter of the ebb, that is to say, it was running to the eastward. Under these conditions of head wind and tide and smooth sea, the most natural thing for a sailing vessel bound for the port of New York to do, as those will agree who, like the writer, have followed the sea, would be to come to an anchor. She could [illegible] do anything with the wind light and dead ahead, and to have stood down to the southward would have been only throwing away her chances of a fair wind later on, remembering that at this season a westerly wind is more likely to veer to the north than haul to the southward.

Supposing, then, that the strange sail was at anchor, with the wind west by north and an ebb tide; she would have been tailing the direction from which the Oregon was advancing, and thus the statement made by one of the Oregon's passengers that he saw her stern seems not improbable. Again, if the stranger was really in this position, it would readily account for the flashing white light which the first officer and others say they saw, because, as she swung to her anchor, the masts and after shrouds of the stranger would at times have been in range with and temporarily obscured the white light in her forestays.

While this is, of course, mere supposition, and offered only as suggestion, it may safely be said that the generally accepted theory, based upon the testimony of the Oregon's officers, that the strange sail was standing inshore on the port tack, with the wind over her port quarter, is untenable. For, if she were bound east, the west by north wind would have been dead astern for her; the most natural position for her sails, wing and wing; and her course exactly parallel with that made by the Oregon, though in the contrary direction. To say that a sailing vessel bound east, with the wind dead aft, was on the port tack, and heading N.N.E., would imply that her skipper had lost his senses.

If, on the other hand, the stranger was bound into New York, but instead of being at anchor, as suggested above, was really beating down the coast against wind and tide, she would seem, according to the position of the injury to the Oregon, to have been close-hauled on the starboard tack. She could not pay off her course without running into the steamer. All that was left her was to come up into the wind and go about on the other tack. Having the right of way, and time being short, she did neither, and the steamer, when too late, ported her helm to avoid running over her, and as a result struck her a glancing blow.

PRACTICAL DIRECTIONS FOR LIGHTNING RODS.

As the season of thunder storms is not far distant, a few practical directions for lightning rods may be found useful.

Quarter inch naked copper wire, such as is used for street electric lights, will do for the rods. Two of such rods are better than one, each rod to be continuous, or if jointed, the joints to be soldered.

Run the upper end of rod around the edges of the chimney, and the peaks and edges of the roof; bend so as to leave a looped point at each corner; points to be 6 inches high. Fasten the rod directly to the exterior of building with staples, no insulators. The bottom of each rod should be wound around the metallic street water pipe (or gas pipe, if there is no water pipe). Better solder the rod to the pipe.

By means of branch wires or rods connect the lower ends of the water leaders, also one end of each metallic gutter, also all metals and metallic roofing, if any, with the rod; solder the connections, and run rod to ground and around the water pipe, as before stated. Several separate rods may be used. The more the better, if properly grounded.

The essential rule of safety is to have the rods well connected with the earth. For this reason soldering to the underground water pipe is advised.

If no metallic water pipes or gas pipes exist, then dig a very narrow trench four feet deep, cone-shaped bottom, and fill into bottom a continuous layer of coal dust and lay the rod therein. Any kind of coal dust, charcoal, hard or soft coal will do. The trench with coal dust layer and rod therein should be say 100 feet long. Coal is an electrical conductor. The object of placing the lower end of the rod therein and extending the rod so far is to secure good ground conduction and connection for the rod.

The great majority of rods now erected are deficient in their ground connections, and consequently are practically useless. This is the reason we hear of so many instances of damage, even when buildings have rods. In general, the rod is simply stuck down two or three feet deep into dry earth, which is about the same as if the lower end of the rod were inclosed in a bottle; such rods are fatally defective. Now is the time to look to your rods. Correct the main defect, by making a first rate ground connection, as above described, or take down your rod. The only chance for safety is with a good ground connection. The risk of damage is less without a rod than with one badly connected to the earth.

WATERPROOF WRITING INK AND PAPER.

An incident connected with the loss of the steamer Oregon and her cargo calls attention to some much needed inventions.

A portion of her mail was saved before she sank, but the bulk went down with the ship. A considerable portion of this mail is reported to be of great value, containing securities, coupons, etc., amounting, as has been estimated, to over a half a million of dollars, besides drafts, letters of credit, etc., the value of which is unknown.

A wrecking company employed to inspect the wreck, and report upon the possibility of recovering the ship and the cargo, reported that the cargo and mail might probably be got out of the steamer, and the reconnoitering steamer also picked up some floating mail bags and brought them to New York, where their contents were dried previous to forwarding them to their ultimate destination. Much of this mail matter was, of course, badly damaged by wetting, and more serious injury is to be expected in that which, at the bottom of the sea, must be subjected to long soaking prior to its recovery, if ever recovered.

Now, to secure a mail, as far as possible, from injury by submergence in salt or fresh bodies of water there must be waterproof mail bags, waterproof paper, and waterproof ink.

Waterproof mail bags will not alone be sufficient, as in the process of handling or raising them from a wrecked vessel they are liable to be rendered leaky, and waterproof paper would be of no service unless it was accompanied by waterproof ink.

The mail bags need only be waterproof in the common acceptation of the term, and, if there could be certainty that they would remain so, nothing more would be needed to protect documents or anything else permitted in mail bags; but as holes are likely to be worn or torn in them, the only final resource is in the production of paper and ink that will resist the prolonged action of sea water.

There can be no doubt, we think, that if paper and ink which will meet this requirement can be furnished at reasonable cost, they would at once find a ready market throughout the civilized world, provided certain other requirements are at the same time complied with.

Waterproof paper and waterproof ink already exist. What is known as parchment paper will withstand the action of sea water indefinitely, and this can, of course, be written upon by certain carbon inks in market containing materials that, once dried, are thereafter practically insoluble. But that these do not meet the wants of the public for writing materials is proved by the fact that they are not universally employed for transatlantic correspondence. The materials required must not only resist the action of sea water, that is to say, the sodium chloride, iodine, and bromine held in solution, but they must be nearly or quite as convenient to use as ordinary paper and ink.

The paper should be light, flexible, and opaque, to economize postage; fold easily, and prevent writing from showing through. As for economy in foreign mails, it is essential that paper should permit writing upon and copying from both sides.

The problem is both mechanical and chemical in its nature, and the resources of modern chemistry and mechanics should be, we have no doubt are, equal to its solution. Any seeming incompatibility in the requirements named will probably vanish in a careful study of these resources.

The Gaskill Engine.

A new Gaskill pumping engine was added some months ago to the waterworks at Buffalo, N. Y. It has since been subjected to a three months' test, prior to its formal acceptance by the water commissioners. This probationary period ended on the first of March. The performance of the engine during these months has been very gratifying. It indicates a marked fuel economy, exceeding the guaranteed duty by about 11 per cent. Though now idle, awaiting the extension of the street mains, it will probably eventually be utilized for direct pumping, according to the Holly system, a portion of the city being at present but imperfectly supplied by the reservoirs.

Railway Practice in Italy.

Mr. S. Fadda, the Chief of the Department for Preliminary Studies of Rolling Stock in Upper Italy, contributes an interesting paper to the Transactions of the British Institution of Civil Engineers, descriptive of the methods of construction and operation of locomotive engines in that department. (Paper No. 2,081.)

The first line was built in that country in 1838, between Naples and Portici. In 1859 railways were opened in Parma and the Papal States. There are to-day 320 miles (15,000 kilometers) of road built, under construction, or authorized, about two-thirds of which are in operation. The engines are usually of English construction. Some of the more recent locomotives are from French, German, and Austrian establishments. Many of the gradients are very heavy, necessitating heavy engines.

The shells of the boilers, curiously enough, are of iron, the law forbidding the use of steel or of "homogeneous iron." The fireboxes are of copper, though steel has been tried unsuccessfully. The tubes are of drawn brass—70 copper, 30 zinc. They must bear a test pressure of 25 atmospheres, receive the ferrule without cracking, bear bending to a curve of 20 in. length and versed sine of 2½ in. without injury, and must be uniform and true to gauge. Iron tubes in adjacent parts of Europe have been given up and replaced by brass. All wheels, as well as axles, are of wrought iron. The tires are of crucible steel or of Bessemer or Siemens tin metal. The frames are wrought iron, the cylinders of cast iron, the slide valves of gun metal, often, the rods of crucible steel. During late years, the number of engines placed on the principal lines has exceeded those so added in England.

The carriages are usually of the English type, but sometimes of the American form. An intermediate or composite type has of late been adopted, as suggested by the late Heusinger von Waldegg, in which a passage is provided at one side the line of compartments, along which the guards can traverse the carriage and the train from end to end, the communication between carriages being effected by the use of platforms at the ends, as in American cars. This removes one of the great dangers and inconveniences attendant upon the use of the English style of carriage, and gives both the safety and convenience of communication of the American design and the privacy in each compartment enjoyed in the Continental system. In case of trouble, it becomes easy to notify the guard, and to secure his presence and aid.

Italy is still far behind the other countries of Europe, generally, in all that relates to the useful arts, and the introduction and maintenance of manufactures seem to find but little encouragement or success. The writer of this paper hopes to see a change in this respect in the future, but evidently finds no great evidence of progress at present.

PHOTOGRAPHIC NOTES.

A Soda and Ammonia Developer.—Mr. W. Jerome Harrison in a recent number of the *Photographic News* speaks of using the following developer with considerable success in the development of lantern slides and negatives. He uses the pyrogallic acid in solution with citric acid and sulphite of soda, termed sulpho-pyrogallol, essentially a 10 per cent solution of pyro. He says: I have made many slides with this soda ammonia developer, and without a single failure; while the wonderfully steady and uniform manner in which the image is built up allows full density to be obtained and development to be stopped at exactly the right time. The small quantity of ammonia appears to act as a "whip," starting development, and the soda then carries on and completes the work.

With the use of sulpho-pyrogallol the development may be prolonged without staining the film.

The normal developer is:

Water	1 ounce.
Pyro	2 grains.
N. H. 4 Br	1 grain.
Carbonate of soda (washing soda)	100 grains.
Ammonia	1 minim.

The ammonia used is in the form of a 10 per cent solution.

Use of the Polariscope in Photographic Lenses.—In the *Br. Jour. of Photo.* Mr. J. Vincent Elsden speaks of the advantage which the polariscope has, when inserted between the lenses, of preventing the injurious effect on a plate of the strong reflection and glare which sometimes occurs when the lens points toward a window or a large body of water.

He took a small Nicol's prism from a microscope, out of its brass mounting ring, and fitted it into a cork rim; he then inserted it between the two lenses of a rapid symmetrical, so as to occupy the position usually taken by the diaphragm.

Owing to the small size of the prism, it acts as the diaphragm itself.

The exposure in comparison with the use of the smallest stop had to be twice as long.

By the use of the prism he was able to obtain a little more detail in certain parts of the picture, where there had been a strong reflection. Photographers have often to deal with awkward cases of reflection from shining surfaces, such as tombstones, oil paintings in a room, sheets of water, and similar things, and the ease with which a polariscope can be fitted to a lens suggests the advisability of at least trying its effect in diminishing the glare, especially as but little harm can result, except an increase in the length of the exposure.

Scranton Bessemer Steel Work.

The Scranton Steel Company, of Scranton, Pa., reports the following figures as the result of its December work:

Number of 12 hour turns worked	25
Number of heats made	1631
Total tonnage (gross)	7220
Average tonnage per turn (gross)	288·80
Average number of heats per turn	65·24
Average tonnage per heat (gross)	4·43

The number of heats per turn, 65·24, is very remarkable, and is due to the small size and convenient arrangement of the vessel plant.

Freight Cars Drawn by Electricity.

Mr. John C. Henry, of the Henry Electric Railway Company, Kansas City, Mo., writes us as follows:

"On January 29 I hitched our electric car Pacific to a K. C. F. S. & G. coal car, weighing 17,000 pounds, and took it up a 2½ per cent grade. Yesterday I coupled the same motor car to C., B. & Q. box car 19,178, weight 24,500 pounds, and started it without jerking, on a 3 per cent grade. I claim the distinction of being the first to haul regular standard gauge freight cars by electricity, and would be pleased to have you record it."

Zinc.

L. L'Hote in *Comptes Rendus* says: As to the inquiry if zinc free from any foreign metals decomposes water either on boiling or in presence of dilute sulphuric acid, experiment proves that such is not the case. Pure zinc heated with distilled water in a flask, so arranged as to receive the gases over mercury, gives off no hydrogen on prolonged boiling, nor is it attacked by dilute sulphuric acid. The presence of iron in proportions of from 3 to 5 in 100,000 enables it to decompose water. Traces of arsenic and antimony have the same effect.