# 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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MUNN & CO., Publishers,
361 Broadway, New York.

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NEW YORK, SATURDAY, JUNE 7, 1890.


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(Illustrated articles are marked with an asterisk.)



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SCIENTIFIC AMERICAN SUPPLEMENT

No. 753.

**For the Week Ending June 7, 1890.**

Price 10 cents. For sale by all newsdealers



## IMPROVED SHIPS AND LIFE SAVING DEVICES WANTED.

The recent experiences of several steamers plying between New York and Liverpool give renewed emphasis to the call for the invention of new and improved constructions and appliances for saving life and preventing accidents at sea.

On the 30th ult. the new and splendid steamer Normannia, 10,000 tons burden, 16,000 h. p., arrived at this port with part of her quarter rail carried away, having been in contact with an iceberg. Many bergs had been passed. Of a sudden, while going at full speed during a fog, a huge berg loomed up close aboard. By a quick and fortunate turn of the helm on the part of the captain, the ship's bow sheered off and avoided a bow contact, but the vessel swung so as to graze the ice with her stern quarter, breaking in the rail. Several tons of ice tumbled in upon the deck. It was a most narrow escape.

On the 26th ult. the Norwegian steamer Thingvalla arrived in this port with her bows badly crushed in, the result of a bow-on collision with an iceberg. Fortunately the ship was going at a reduced speed. The crash was terrific, the ice tumbled in upon the deck in great quantities, and the stem was torn open from the top to water line. The steamer backed off and stopped. By means of boards and cement the rent in the bow was stopped and the ship continued her voyage to New York. Here was another very narrow escape. On the 20th ult. the new ocean steamer Beacon Light reached this port with a leaky and battered bottom, due to collision with an iceberg. In this case, by a quick turning of the rudder, the ship sheered so as to receive, near the bow, a glancing blow from the berg, careening the ship, and bringing down many tons of ice, some of which fell upon the deck, causing the vessel nearly to capsize; while a great block of dislodged ice that fell into the sea came up under the ship and almost broke through the bottom.

These, we believe, are among the most serious accidents that have recently occurred from ice. They had their parallel in 1880, when the fast steamer Arizona, 5,000 tons, going at full speed, dashed bow-on into an iceberg. Her bow was torn open and the water poured in. Fortunately, the plates of the bow compartment were strong, remained uninjured, and the ship safely reached Newfoundland, off which coast the accident took place.

In the construction of the hulls, in means to ascertain the vicinity of ice in fog, in automatic devices for quickly turning and stopping the vessel, in boats, rafts, life preservers, in means for preventing the sinking of ships, there is abundant room for invention and improvement. Perhaps the greatest want of all is a ship that cannot sink, no matter where or how badly wounded.

## THE NEW STEAMER NORMANNIA.

The latest of the superb Atlantic racers, the Normannia, of the Hamburg-American Line, arrived at New York, May 30, making, in her maiden trip, from Southampton, England, the distance of 3,059 miles in 6 days, 21 hours, and 53 minutes. This is within twenty-five minutes of equaling the best time yet made for a similar trip, but the most remarkable feature of the voyage was the narrow escape of the vessel from a great iceberg, which she met dead ahead on the afternoon of May 27, when running at the rate of seventeen knots an hour. Between dawn and dusk the vessel passed twenty-two icebergs, some of them said to have been quite two hundred feet high, but about five o'clock, during a slight fog, what was said to be the largest berg of all appeared directly in her path, and only about a ship's length away. It took but a moment for her captain to have her rudder turned for "hard a-port," and her engines reversed, but so quickly did the vessel respond to the electrical signals that she seemed to turn as if on a pivot, and merely grazed the great ice mountain, receiving some twenty or thirty tons of ice on her quarter deck. The escape was so narrow that the passengers could readily touch the great ice wall, and yet those in the dining room hardly felt the jar of the slight collision which took place, and came so near sending the great vessel with the 1,300 souls on board immediately to the bottom of the Atlantic.

The vessel is a twin screw steamer just completed by the Fairfield Engineering and Shipbuilding Company (John Elder & Co.), at Govan, on the Clyde. Three days after leaving her dock she made the trial speed of 21 knots on the measured mile and 20½ knots on a long run. Her makers guaranteed that her engines would develop 14,000 horse power, and they did better by 2,000. Her screws are smaller than those of any Atlantic liner with twin propellers, being only 18 feet in diameter. Her engines are of the triple expansion type, and have cylinders of 40, 67, and 106 inches in diameter. She has nine double-ended boilers, with eight furnaces to each. She is 520 feet long, 60 feet wide, and 40 feet deep, and measures 8,500 tons gross. Captain Charles Hebich, her commander, formerly had charge of the Columbia. He is commodore of the line. There are 316 men in the ship's company, 158 of whom work in the machinery department. Her coal bunkers have a capacity of 2,700 tons. She is divided into 17 water-tight compartments, formed by 16 bulkheads. She has a double bottom, the inner skin being four inches above the lower, except under the engines, where the difference is seven feet. The water space of this double hull is divided into thirty-six compartments, which will be used for water ballast.

### A Sad Mining Accident.

At Ashley, Pa., near Wilkesbarre, on the 15th of May, a sad mining accident occurred, by which some thirty miners lost their lives. While the men were at work in their various chambers, a sudden inrush of air put out all the lights. The men congregated in the gangway, and, after consultation, explored every outlet, but without success. A party of three then tried to make their way out through an old opening in the hillside, the majority remaining where they were to wait till aid came. The exploring party came to where the air was better, when one of them, believing the air was so good there could be no danger, drew a match to light his lamp. Instantly a terrific explosion followed. All the men left behind were killed, thirty-one in number. Of the three in the exploring party, two survived and were rescued.

A correspondent sends us a sketch and description of a simple device for safely lighting a safety lamp. It consists in having a screw plug made to enter the side of the lamp. A pair of scratch plates are attached to the plug, and the match is introduced between the plates through a hole for that purpose in the plug. Contact of the match with the roughened plates ignites the match and lights the lamp wick.

### Electric Light from Gas Engines.

A highly interesting fact has been brought out by Mr. O. Tirrill, of New York, in some practical tests in producing electric light by using illuminating gas for driving a gas engine and a Perret dynamo. Naturally one would suppose that the loss due to the double transformation of energy in producing the electric light from illuminating gas by this means would place the cost of the electric light far above that of gas. On the contrary, however, Mr. Tirrill has found to his surprise that a given amount of gas will produce far greater illuminating effects when used to drive this dynamo than when burned direct. The gasolene gas is produced by his machine for one dollar per thousand feet. The engine, it is found, consumes four feet of this gas per sixteen candle power lamp per hour when driving the dynamo under full load, making the cost per lamp two-fifths of a cent per hour, so that the luxury of the electric light by this means, instead of being expensive, he finds in reality to be a great economy. Mr. Tirrill explains the phenomenon by the fact that the gasolene gas contains eighty per cent of air when delivered at the explosion chamber of the engine, and he gets the benefit of the expansion of this large volume of air by the heat of the explosion.

### Light of the Fire Fly.

Professor S. P. Langley has been investigating the nature of light emitted by the fire fly, *Pyrophorus noctilucus*, using the spectroscope. He finds the light is substantially from the green side of the spectrum. It is of exceedingly narrow range of refrangibility, extending only from F to C, and culminating in the green, so that it contains no appreciable heat. The amount of heat yielded, as measured with Professor Langley's wonderfully delicate "boloscope," is less than one-half of one per cent of that given out with an equal amount of light from the candle and other common combustible illuminants.

That the light produced by the fire fly is a chemical product would seem to be indicated by the fact, established by Professor Langley, that it decreased by the processes which check combustion and increased by the opposite, that nitrogen quenches it and oxygen stimulates it, while the product of the operation, whatever it may prove to be, is apparently carbon dioxide. It may prove, however, so far as can be judged at present, that these effects are simply those of variation of the vital powers, and a resulting variation in intensity of the light.

### Eye Magnet.

In machine shops it is a frequent occurrence that particles of metal penetrate in the skin and eyes. Messrs. Frister & Rossman have, according to *Revue Industrielle*, constructed a magnet for the special purpose of extracting such particles. It is horseshoe-shaped, polished, and nickel-plated; the two branches are rounded off and end in a point only a few millimeters thick. Its attraction for iron extends for several millimeters.

DOCTOR FLINT is quoted as saying: "I have never known a dyspeptic to recover vigorous health who undertook to live after a strictly regulated diet, and I have never known an instance of a healthy person living according to a strictly dietetic system who did not become a dyspeptic."

### Dangers of Gas Heaters.

At a recent meeting of the Balloon Society of Great Britain a paper was read by Mr. A F. Chapple.

The author prefaced his paper by saying that the object he had in writing it was to raise, by his own sad experience and that of others, some interest in the matter, which should eventuate, through the co-operation of the press and those who had to do with the framing of laws, in bringing about some enactment to enforce on all makers of gas apparatus—especially such contrivances as gas and geyser baths—the obligation of not selling these appliances without certain safeguards, so as to avoid such dire calamities as that with which it was his misfortune to be made familiar. The number of persons using gas and geyser baths was, of course, comparatively small, though the number of itself was very large. Having explained the construction of these baths, Mr. Chapple related the circumstances under which his son, who was only in his twenty-first year, lost his life. In September last, he (the author) moved into a house where there was no hot water apparatus; and, at the suggestion of the landlord, a geyser was fitted up in the bathroom. Although he had reasons for believing who the maker of this geyser was, there was no name stamped upon it. Those made by the best makers, as well as by the most remote, were alike open to the same danger, in the absence of "special" precautions. With these precautions he admitted that gas baths and geysers were convenient, and perhaps desirable things; but until the necessity for these precautions was brought prominently before the eyes of those who used the machines, so long would fatalities continue to happen.

Resuming his narrative, he said that his son went into the bathroom early on Sunday morning, September 22, for the purpose of taking a bath. His continued absence causing surprise, some one went and knocked at the door, without receiving any response. An alarm was at once raised and the door broken open, when his son was discovered under the water dead. The gas was still burning and the water slowly flowing. The room was small, and without special means of ventilation. Getting into the bath while the gas was burning had been the fatal step in this and those cases which had since come to his knowledge. But who, asked Mr. Chapple, lacking the combined knowledge of chemist and gas engineer, was to know that, if he entered the bath under such conditions, he would never come out alive? He believed it was a fact that the oxide of carbon fumes generated by the atmospheric or Bunsen burners of these appliances were so deadly that a thousandth part in the air would destroy life, and so heavy that, directly they cooled on leaving the apparatus, they fell to the ground, and so enveloped the head of the victim, depriving him of the consciousness that he must immediately get fresh air or die in a few minutes. This deadly gas closed the air cells of the lungs, and killed the blood in the sense that it paralyzed those ever-changing conditions which were kept in constant activity throughout life by the vitalizing property of oxygen contained in pure air.

Having instanced other cases in which death had been caused by gas-heated baths, Mr. Chapple referred to some experiments he made after his son's decease. He lit the geyser, and turned on the water—regulating the gas and water to the same volume, as near as he could judge, to that prevailing on the fatal morning. He then placed a lighted candle on the side of the bath, at about the same level as the head of an adult would be while using it; shut the door of the room; and reopened it in ten minutes. The candle was burning dimly; but, of course, it immediately revived on the admission of fresh air. The experiment was repeated, but the door was not opened for the space of twenty minutes, when the candle had the appearance of having been out several minutes. The candle was found extinguished after a subsequent experiment of seventeen minutes' duration. From these experiments, the author was led to infer that the candle would not burn under those conditions much beyond twelve or fifteen minutes, which, he added, meant the extinguishment of life in about the same time. A repetition of the experiment, with the window open one inch at the top, showed that, at the end of twenty minutes, the candle was still burning brightly. He expected to be told that, if the room was small, the window should be kept wide open while the bath was filling; and the gas and water in any case be turned off before any one entered the bath. This he fully admitted; and it was what he desired to impress on the public.

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THE "instructions for engineers," published in the SCIENTIFIC AMERICAN of May 17, although issued by a Western pump manufacturing company, are, in fact, the "rules for the management and care of steam boilers," first published by the Hartford Steam Boiler Inspection and Insurance Co. It is true that such rules cannot too frequently be called to the attention of firemen and engineers, but the Hartford company first issued this set of rules some eighteen years ago, and is entitled to great credit for the energy and persistence it has manifested in keeping them before buyers and users of steam boilers.

### A Chat on Orchids.

MRS. N. PIKE.

Of late years great attention has been paid to the growth of orchidaceous plants, and as a natural consequence they have become fashionable with those who have well filled purses. It really needs them, for, whether as ornaments for a conservatory, or as cut flowers, their price is higher than ordinary ones. No wonder that all flower lovers are attracted when our florists mass together the rare and curious productions of this singular order, and display them to the public. Flora must have been in her happiest yet most versatile mood when she combined such an odd mixture of beauty and grotesqueness.

Look at the tortuous stems and roots, the varied leafage, and the brilliance or insignificance of their blossoms. In some are blended the most exquisite colors, the tenderest shades of pinks or yellows, with a sudden dash of the richest crimson or purple velvet. In others the flowers are inconspicuous, yet are they noticeable for their leaves; and again some greet you with perfumes from "Araby the Blest," while thereare those insupportable from their fœtid odor.

Not content with her own realm, Dame Flora has invaded the animal kingdom for her models, as is well seen in the imitation of a dove in the "Holy Ghost" flower or in the butterfly orchid. Instead of confining them to earth, she has placed her epiphytal or true orchids as parasites on living trees, whence they fling out their wreaths of fragrance, or they close with a beauteous shroud the gradual decay of her forest giants as they lie prone in the dank depths of tropical woods. Nor has she been sparing of her treasures. With the exception of regions where extreme cold or dryness reigns, orchids are found the world over. They grow in all temperate climes, as, for instance, our own Northern States, but more especially do they love the humid, steaming forests of Mexico, Brazil, Madagascar, etc. Few are of any use economically save the vanilla, but are of that other greatest use,

"To minister delight to man,
To beautify the earth."
"To comfort man, to whisper hope."

It is well known that most orchids can only be grown at all in hothouses where the temperature and soil can alone be made to resemble that of their native homes, and it is generally supposed that all others must have a greenhouse at least. I would suggest to my flower-loving sisters that there are many, not the gorgeous blooms of the tropics, but others of much interest to amateurs, that can be grown in a house that has the ordinary temperature of 60 or 70 degrees. There are *Odontoglossums* and *Oncidiums*, especially the papilio or butterfly orchid, which thrive with much less care than is often bestowed in winter on a rose or fuchsia that gives most unsatisfactory results. Have them well arranged by a florist, and you may bring to your homes denizens of far-off lands; they only want care and patience to reward you.

Then in a garden there are many of our lovely so-called orchids that can be transplanted from their marshy beds if you only follow Nature's own methods of growth. Take up your plant in a good clump of the fibrous earth they revel in, plant in a shady spot, say among ferns and wild flowers, and never let the roots get thoroughly dry. In winter again go to Nature and see how she cares for them. Mulch them with dead leaves, but never let manure be put over them, or they will be a dead failure and rot out. I speak from sad experience, for I lost a number by a gardener smothering them with manure from a stable near by.*

*Habenarias*, the curious *Cypripediums*, or ladies' slippers, *Spiranthes*, *Pogonias*, and many others will succeed in a "wild garden." Where you have room to devote a spot to one it will well repay you, believe me. "All labor hath profit," and truly nothing like a garden yields so large an interest in health and pleasure. Care for your pets yourself, for they will never thrive unless you love them enough to treat them as Eva did Topsy, instead of leaving them to the precise but harsh rule of "Miss Feely," alias the hired man. Never forget, when you allow your flower beds to be invaded, the advice of the farmer: "Digging is hard work, let Pat do it, but—it will pay to sit on the fence and watch Pat dig;" and especially is this true where your choice flowers are concerned.

While speaking of these interesting plants, it will not be out of place, I hope, to say a few words about an orchid show I attended in New York a short time since. Those who did not or could not go lost a great treat. It was truly a tropical scene, and much of it took me back to the time when I wandered in the forests of the isles of the Indian Ocean in search of ferns and orchids. Wreaths of greenery ornamented the whole room, and pendant were numerous baskets filled with *Nepenthes*, their curious little pitchers hanging low down. Every table had a palm in its center, fan, sago, or the rarer *Chamærops*, with orchids creeping up their rugged stems. One arrangement gave a peculiar charm to the place. The orchids were all embedded in masses of tender green *Adiantums*, and their delicate colors were enhanced by their surroundings. The smaller ones appeared as if they sprung from the graceful ferns instead of their own twisted stems.

To adequately describe those rare blooms would fill columns of space, but some were worthy of special notice from even a casual observer. The grand *Cattleyias*, from purest white to tender pinks and lilacs, with their diaphanous petals and deeply fringed, velvet lips, were in abundance. The orange *Lælias*, the fleshy, creamy *Lycaste Shinneri*, the yellow *Oncidiums* and varied *Cypripediums*, with slippers of hues fitting for an odalisque or Titania, and so many others I have neither time nor space to enumerate, made up a delightful picture.

A great deal is said of the value of museums and all collections of objects of natural history, and it is true in the widest sense. To the general public, especially those who have rare holidays, but have the wish to learn and appreciation of all they see, they are both recreation and profit. Forms are brought before them they are never likely to see in the flesh; but the life-like work of the taxidermist places them actually before their delighted eyes. To the student, who goes deeper into the nature of all created things, not enough can be said in praise of such institutions, and it is a shame that any large city should be without them. Yet they are only dead, inanimate forms, however great may be the semblance of life given them.

Here let me say a word in favor of the flower shows I am glad to see increasing in frequency. Take this orchid show I speak of, for instance. There massed together are plants, living, sentient beings, collected at vast expense of toil and money. They are placed before us in all their tropical beauty, growing as luxuriantly as in their homes in the depths of Brazilian or Sumatran forests.

The true botanist, who has spent midnight oil in poring over scientific works on botany, revels in the sight of these plants of such varied and curious organization, and his eyes at last realize what his brain had conceived before; and I fear many a one longs to use his dissecting scissors to unravel some unlooked-for complications in their singular construction. To the real lover of flowers for their own sake, independently of science, it is a rare treat; and one can quietly contemplate such a wealth of floral loveliness inhaling their fragrance, and taking in every feature of the display with intense delight.

Equally in a show of roses and other common flowers, it gives food for thought and pleasure to see art and nature hand in hand. By all means give us as many flower shows as possible, but let the price of admission he within the reach of the slender purse as well as the full one.

* I should state that the clump of fibrous earth brought from the woods to the garden degenerates after the second year's blooming, so care must be taken to renew it. Carefully break up the old mass, giving especial attention not to touch the roots, then add a quantity of fresh fibrous matter from the woods and pack it well round them. By this method our common orchids may be kept in a garden for years.

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### James Nasmyth.

On May 7 there passed away, at the advanced age of eighty-one, the famous engineer James Nasmyth, the inventor of the steam hammer. He was born in Edinburgh, and quite early in life showed a taste for mechanics. When he had reached a sufficient age to attend classes at the Edinburgh University, he was able to pay his own fees from the sale of models of steam engines and other mechanical contrivances which he had constructed under his father's roof. In the year 1829, when he had just completed his twenty-first year, he went to London and offered his services to Mr. Maudslay, the founder of the well known firm of engineers. He remained with them till 1831, when he started in business on his own account in Manchester. The work which came to him increased to such a degree that he had to erect more extensive premises, which developed into the celebrated Bridgewater Foundry. Here he devised and perfected a large number of mechanical tools, the most famous of them being the steam hammer, which was invented in 1839. Among the other appliances perfected by Nasmyth may be mentioned his safety founding ladle, the double-faced wedge sluice-valve, a reversible rolling mill, a form of steam engine derived from that of his steam hammer (and now almost universally adopted for screw steamships), and a spherical-seated safety-valve. In 1857, at the age of forty-eight, Mr. Nasmyth retired from the business, and went to reside at Penshurst, near Tunbridge, where his principal pursuit was astronomy.

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### Signing a Check by Electricity.

One of the marvels of electricity, and one of the most striking of the Edison exhibits at the Paris exposition, was the little instrument which enables the operator to sign a check 100 miles distant. The writing to be transmitted is impressed on soft paper with an ordinary stylus. This is mounted on a cylinder, which, as it revolves, "makes and breaks" the electric current by means of the varying indentations on the paper. At the receiving end of the wire a similar cylinder, moving in accurate synchronism with the other, receives the current on a chemically prepared paper, on which it transcribes the signatures in black letters on a white ground.