THE

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ Messrs. Trübner & Co., 60 Paternoster Row, London, are also Agents for the SCIENTIFIC AMERICAN.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions for advertisements for the SCIENTIFIC AMERICAN. Orders sent on them will be promptly attended to.

☞ "The American News Company," Agents, 121 Nassau street, New York.

☞ American and Mexican News Company, Mexico, are Agents for the SCIENTIFIC AMERICAN.

VOL. XIV., No. 18. [NEW SERIES.] *Twenty-first Year.*

NEW YORK, SATURDAY, APRIL 28, 1866.

Contents:

(Illustrations are indicated by an asterisk.)

FOREIGN AND AMERICAN STEAMERS.

The advertising columns of the daily papers show that there are upwards of twenty five foreign steam vessels leaving this port at various intervals for ports in Europe. All the imports and exports to and from this country are brought by these ships, and the money earned by them goes abroad into the hands of foreign manufacturers, instead of into our own. The smallest repairs needed to the machinery are kept, if possible, until the vessels arrive home; none but the most urgent being made here.

Whatever the commercial cause of our maritime decline and fall may be, it certainly cannot be laid at the doors of our engineers. It is not that our vessels are so much more costly to run than foreign ones that we cannot, or do not, compete with them. The reverse is the case. Engineering has made great progress in the past ten years. Radical improvements have been introduced, and plans which were only put forth as experiments have been adopted in practice to manifest advantage. The difficulties with the surface condenser have been surmounted; the prejudice against it has passed away. A more intelligent system of working steam expansively prevails. Variable cut offs are being adopted more generally, and give satisfaction to the owners of the ships. And well they may, when it is found that less fuel is burned and better time made under equal conditions. If we want facts for this assertion they are at hand. Examples of the superior economy of American marine engines are to be found.

For purposes of comparison no better examples could be found than two steamers lately built to run between New York and Richmond, Va. These ships are exactly the same in measurement and model, and have similar engines. The only exception is that one has a fixed cut off of the Stevens's pattern, while the other has Herman Winter's rotary cut off, which can be used at all grades of expansion at the will of the engineer. The result is that the ship with the variable cut off makes 2½ hours better time and consumes less fuel by three tuns than her consort.

Fifteen years ago, when the Collins ships were first started, they made their time (and good time it was) on 80 tuns of coal per 24 hours, and that was the day of fixed cut offs—for they had Stevens's long-toe movement. The *Fulton* and *Arago*, vessels of 2,500 tuns burthen, running between Havre and New York, make 11½ knots per hour on 50 and 55 tuns of coal, and the *Cahawba*, a vessel of 1,800 tuns burthen, makes 11 and 12 knots on 40 tuns average consumption.

The Pacific mail steamships are the most economical vessels in the world. The largest are rising 3,500 tuns burthen, and can steam an average of 12 knots an hour on 35 and 40 tuns of coal per day of 24 hours. The *Persia*, an English iron ship of the Cunard line, burns more than three times as much. The *China*, one of the latest vessels added to the Cunard line, has oscillating engines of 80-inch cylinder and 66-inch stroke, geared so that the screw shaft makes 2½ revolutions to one of the engines, and burns, on the statement of her chief engineer, Mr. Nixon, 80 tuns per 24 hours. Even the *Re De Italia*, a huge iron-clad vessel, nearly 300 feet long and 50 feet wide, clad with 4½ inch plates, crossed the Atlantic at the speed of 11½ knots on 40 tuns of coal per day.

We might continue to multiply instances at great length which would sustain the assertion that, compared with foreign ships, American steamers are more economical, but we have already cited enough.

It has been said that wooden steamships are so much more costly to run and keep in repair, and in point of durability so inferior to iron ships, that we are unable to compete with foreign lines, for all our ships are of wood. If this be true, then the carrying trade will be confined for some time to come to English bottoms. All vessels under that flag are of iron, and we cannot compete in the construction of them with labor and material at present rates. In 1821 the total per centage of the foreign trade was 11·3, and in 1864 it was 60 per cent of the whole tunnage, showing a rapid and alarming increase.

HIGH WAGES.

"Five years ago, I built a house for two-thirds less money than I can now," said a friend, recently, "and I notice that notwithstanding prices of living are tending downward, like Oliver Twist mechanics want more. Sugar is lower, butter is falling, flour is lower, beef is no higher than it has been, but in the face of all this, strikes are the order of the day, and I should like to know where it is going to end. What is the reason of it?"

"The reason is quite plain," we answered. "Mechanics cannot help wanting more; they are in demand. Did you ever hear of a merchant taking less than the market price for his goods because people wanted him to? Did you notice that butter became cheaper, or coal lower, when the press commented upon the exorbitant prices charged for these articles?"

"No, I did not."

Yet you see on the approach of warmer weather, that coal and butter both fall, simply because the supply is greater than the demand. When the call was brisk, however, certain skillful operators were able to control the market. Kerosene oil, that three months ago, retailed for ninety cents a gallon, now sells at seventy-five cents. What made that fall? Daylight. The days grew longer; less oil was consumed; the demand was less, and the price came down, as a matter of course. It is precisely the same with wages. You will notice that mechanics get about the same rates all over the country; changing only with the state of the local market. Mechanics are in demand now, and their wages must go up; no power can prevent it. When building materials were high, capitalists held aloof, saying, "there will be a fall," and then wages remained at a fixed point. So soon as gold fell, and the political prospects of the country were brighter, increased activity was manifest in all branches of industry, and mechanics' wages rose as a natural consequence, for there were not men enough to do the work. This is the simple reason for the movements that are taking place.

They will continue until there are more men. In 1857, good mechanics could be had for $1 25 per day, because there was nothing for them to do; nobody wanted them; their labor was a drug. Now it is the reverse; everybody wants them, and up they go.

Our advice is, that they hold on to their earnings so that when the evil days draw nigh they may have an anchor to windward to hold by.

ANOTHER EXPLOSION OF NITRO-GLYCERIN.

A telegram from San Francisco informs us that, "on Monday afternoon, April 16th, a terrible explosion of what was supposed to be nitro glycerin occurred in San Francisco, near Wells, Fargo & Co.'s building. The explosion shook the earth like an earthquake for a circle of a quarter of a mile. Samuel Knight, superintendent of Wells, Fargo & Co.'s express, died in half an hour of injuries received. G. W. Bell, supervisor and assayer, was instantly killed. Mr. Wallut, Wells, Fargo & Co.'s assayer, Joseph Elliot, John Gallagher, Frank Webster and William Justin were also killed. Eight dead bodies were so mutilated that they could not be identified. Louis McLane, Captain Eldridge, of the Pacific Mail Steamship Company, and Judge Hoffman were bruised and cut. Felix Lamax, D. Stacy, Jefferson Taylor, H. Blane, clothing dealer, Captain J. Ayres, Fred Leiz, Frank Moran and others were injured, but not fatally. The damage is estimated at least two hundred thousand dollars. The cause of the explosion is a mystery; the freight agent of the Pacific Mail Company says that two boxes, each measuring about four cubic feet, were taken from the steamer's dock to where the explosion occurred. One box was consigned to Idaho City and the other to Los Angelos. Both were stained with oil. The contents are not known."

This explosion, like the one that occurred in Greenwich street in this city, seems to have been the result of spontaneous combustion of nitro-glycerin. The various fats and oils from which soap is made, are composed of glycerin in combination with an acid; when brought in contact with an alkali, they are decomposed, the acid uniting with the alkali to form soap, and the glycerin being set free. By proper manipulation glycerin may be induced to combine with nitric acid, to form nitro-glycerin. The nitric acid being composed of nitrogen and oxygen, in the proportion of 14 pounds of nitrogen to 40 of oxygen, carries into the compound a large quantity of oxygen, which, being held to the nitrogen by a very feeble affinity, is ready on a change of conditions to enter into combination with the hydrogen and carbon of the glycerin, burning them with explosive violence.

Now, it seems that under certain conditions the oxygen may slowly enter into combination with the combustibles of the glycerin. In this case the heat generated is the same in quantity as in the case of sudden combustion, but if the oil is so situated that the heat may escape as rapidly as it is formed, the temperature of the liquid is not perceptibly raised, and no explosion takes place. But if the oil is packed in wooden boxes, or is surrounded by any kind of slow-conducting material, then the heat accumulates till the temperature of combustion is reached, when the whole mass explodes.

THE CHOLERA.

The cholera is a disease of the stomach and intestines, manifested by purging and vomiting, and running sooner or later into discharges like water with rice boiled in it. This is the essential nature of the disease, no matter where it appears. When it comes as an epidemic, commonly called "Asiatic cholera," there co-exists, to a greater or less degree, what is called malignancy; manifested by coldness of the surface of the body, depressed pulse, purple, shriveled appearance of extremities, and perhaps spasms. It is this quality that is the source of danger, and it may vary in intensity from the slightest to the most virulent degree, causing death in three hours, and before the purging and vomiting have had time, of themselves, to produce any effect.

There is now a very general impression that this dreadful scourge is to visit our country during the present season. Owing to the large amount of foreign immigration constantly flowing to this port, people are generally expecting that this will be the spot where the epidemic will first make its appearance. It is, however, quite as likely to break out in some other seaport; indeed, Halifax has had a very narrow escape, and one case is reported to have occurred at Portland.

In view of a probable visitation, we devote some

space in this number to the treatment of the disease. We publish a communication from Dr. Hall, the well-known editor of *Hall's Journal of Health*. It was called forth by the criticism published on page 262 of the SCIENTIFIC AMERICAN. We also reprint from the *Missionary Herald* an article upon cholera and its treatment, written by Dr. Pratt, of Marash, who was at Constantinople during the prevalence of the epidemic in that city last year.

We do not undertake to recommend any special medical treatment for this disease, but would urge upon our readers the importance of cleanliness in every respect—a removal of everything that can possibly generate malarious influences; also, a regular diet of plain, wholesome food; a total disuse of stimulants—which invite, rather than, as many erroneously suppose, ward off the disease—and to avoid excesses and excitements of every description.

An acquaintance of ours was in this city in the summer of 1849, when cholera was very prevalent and fatal, especially among the unfortunate poor, who are so shamefully huddled together in this and other large cities. There was cholera in the air, cholera in the street, cholera in the newspapers, cholera in every man's mouth, cholera in the houses of the rich, cholera in the tenements of the poor, and a general tendency to bowel complaints among all classes. Our acquaintance, being attacked with strong premonitory symptoms, at once sent for his doctor, took to his bed, covered up warm (it was a hot July day), had bottles of hot water put to his feet, and applied a generous mustard plaster to his stomach and bowels, all of which worked like a charm.

Such treatment can do no harm; and if the doctor has wisdom enough to hit upon the right remedy, and the patient can hold on to his courage, there is not much danger. In cholera the whole system is rapidly drained off through the alimentary canal, like water through a fresh break in the dam. If the break is not stopped, the whole structure gives way. It is said that fear kills more than the disease itself.

STILL ANOTHER EXPLOSION OF NITRO-GLYCERIN.

Since the article on the editorial page, discussing the spontaneous combustion of nitro-glycerin, was written, we have accounts of a still more terrible calamity from this cause, which occurred at Aspinwall on the third of April.

The steamship *European*, an iron screw steamer of about 1700 tons burthen, belonging to the West India and Pacific Steamship Company, arrived at Aspinwall from Liverpool on the second of April, and the next morning at seven o'clock the explosion occurred.

The wharf beside which the steamer was laying, was about four hundred feet long and forty wide, and was constructed in the most substantial manner, with a heavy flooring and roofed over its entire length. The *European* was on the north side, and her sister ship of the same line, the *Caribbean*, on the other side. The freight house was a splendid building, constructed of stone, slate and iron entirely, and was about three hundred feet long and eighty wide.

To those removed from the wharf the first visible effect of the tremendous force of the explosion was in the instant and almost entire demolition of the freight house—a structure of the most durable nature, and one that was apparently able to resist almost any explosive force except within the building itself. One track only ran through the building, the rest of the floor space being devoted to a platform for freight discharged from or to be loaded in cars. Both the end walls of this building were demolished, and the superb iron roof, rafters, girders, braces, etc., fell into the interior of the building, forming a huge unshapen mass of ruins and destruction, where a moment before everything was strength and symmetry. Of course, in an instant after the occurrence, when those unhurt recovered from the effect of the concussion, a rush was made for the wharf to succor those injured, and here it was that the whole scene burst upon the view—a scene heartrending and awful, and telling that many of those who a few moments before were in the enjoyment of life and health had forever passed away from earth. The iron plates of the ship's hull were torn out completely, and almost everything about decks was a mass of ruins. The wharf abreast of where the explosion occurred was completely cut through the piles, cross beams, flooring, and in fact everything was carried away, and the entire structure was shattered, every plank even being started from its position. On board the *Caribbean* the destruction was very great; her boats were all crushed, her deck houses shattered and many of the heavy iron beams and knees of the ship's hull were broken like pipestems.

The *European* was towed out into the bay by a naval vessel, when she took fire, a second explosion of moderate violence occurred, and she sunk.

It was some time before the true cause of the disaster became known. The bills of lading called for no gunpowder, and the ship had but a small quantity for firing signal guns. No steam was up, and all were at a loss for a knowledge of what it was until the seventy cases of glonorin, or nitro-glycerin, shipped at Liverpool for San Francisco, told the whole story, and brought to light how much more dangerous an article than gunpowder formed one of the principal items of the ship's cargo.

The number of killed and wounded is not accurately known, but it is stated at upwards of seventy.

FAILURE OF A LAUNCH.

Recently an attempt was made in England to launch a huge ironclad war vessel, called the *Northumberland*, but after running down about 170 feet on the ways, she stopped, and at latest advices was hard and fast. Our foreign contemporaries are full of accounts of the disaster, and attribute it to different causes. The most apparent one, however, is the slight incline given to the ways, and the immense weight of the ship, which crushed out the lubricants between the sliding timbers, and interlaced the fibers of them. A very forcible realization of the effect of friction is thus given, when it is seen that it can suddenly arrest the momentum of a mass weighing over 9,000 tuns, after sliding 170 feet in a few seconds.

From the *Mechanics' Magazine*, we take a portion of an article referring to the preparations which were made to launch the ship anew—all total failures:—

"To prevent the ship launching herself unexpectedly during some exceptional high tide, she has been shored and wedged in, in such a manner, that any downward movement on the ways seems impossible. In addition to this, two chain cables have been taken through the hawse holes and made fast to anchors buried in the ground, the ship's own capstans having been used to draw the cables taut. The arrangements for floating are more complex; her keel has been wedged up throughout its entire length, so as not only to secure and ease the weight up, but take some of her enormous pressure off the forward cradle. In addition to this, twelve large wooden pontoons have been constructed, each of which is 30 feet long by 9 feet broad and 9 feet deep, perfectly caulked and water-tight. They have all been prepared from molds, so that they fit close to the bottom of the ship, on each side of which they are made fast in pairs. The floating power of these is equal to 400 tuns, in addition to which 100 tuns more are obtained from a number of empty puncheons made fast under her stern, Eight lighters have also been moored under her stern at dead low water, which, with the previous appliances, give a floating power 1,000 tuns. Beyond this a dredging machine having a steam capstan on board, and moored in the river, is reckoned on for another 100 tuns, beside powerful purchases applied on both sides of the ship from the Millwall yard. Under the bows of the *Northumberland* three powerful hydraulic rams are placed, two of which, equal to a total pressure of 1,200 tuns, are fixed one against each cradle, and both are securely supported with timber backings down to the launching ways. The third, similarly held by a timber frame, is of nearly 1,000 tuns power. This, however, is fixed in the center, and upright, so that it can work from the ground up beneath the bows of the vessel, which it was assumed it would, to the full extent of its immense pressure, partly lift and ease off the ways forward.

But notwithstanding this array of power, the trial on Saturday to launch the vessel failed—not an eighth of an inch did she advance, although she moved vertically at the stern. So Monday, with its high tide, was waited for, and Monday came and went, but the *Northumberland* remained, although there was a great increase of power applied to move her. It is therefore now proposed to wait for Monday, the 16th inst., on which day it is anticipated the tide will be the highest of the year, and give nearly 25 feet of water under the *Northumberland's* stern post. In case of a favorable wind it may even rise as high as 26 feet—a depth that would place nearly 8 feet of water under her bows, which ought to be nearly sufficient to float her. But in order to make assurance doubly sure, it is intended to take every possible precaution against the contingency of low water by adding such powers of flotation to the ship as will enable her in a great measure to get off without an unusually high tide. To this end the lighters will be dispensed with and in their place two small frigates will be lashed astern at the low water preceding the high tide. Each will be fixed to the hull so as to have an independent action, while arrangements will be made to enable them to slip their fastenings and get clear of the vessel directly she begins to move quickly. In addition to these, four more large pontoons are to be placed under the stern. They will have a greater floating power than that of the whole ten now under the vessel, and will exercise their greatest power at the greatest advantage, and exactly where it is most needed. The ways will be well greased and two additional hydraulic rams will be brought to bear upon her.

A Flint Piano.

A curious novelty has just been brought to London and is about to be exhibited to the public. It consists of a remarkable-looking piano, made of flints suspended from an iron frame, which are struck with a short flint to produce the notes. The flints are about forty in number, and elongated, but of various lengths and thicknesses. They are arranged in the order of their tone, and the labor and investigation of years were required before the complete scale was formed.

The *Star* says that M. Baudry, the gentleman who has made the instrument, was two years seeking for one particular stone, or tone—the terms being here almost synonymous. Two other tones were, after an almost endless investigation of flints, obtained from pieces of schist, the only exception to the flint tones which form the instrument. M. Baudry entertained some friends on Saturday afternoon last with a performance on this curious instrument, which was much admired, not only for its novelty, but also for its musical effect. The tones are unlike those of any known instrument, as may be readily comprehended by any one who knows the ring of a piece of flint, and possess a sharpness that renders the performance peculiar, though by no means unpleasing. The flints are many of them very peculiar in form, and it would be a matter of no small difficulty to frame any coherent theory of the causes of the variety of tones observable, for they are by no means in the exact ratio of the size or weight of the different flints. M. Baudry's perseverance and skill in working out his ingenious idea have met with that success which he sought, and he deserves now to meet with a further success, which it is to be hoped will be awarded to him by the public.—*Mechanics' Magazine.*

A Cheap Galvanic Battery.

M. Gerardiu has sent a note "On a Battery of Iron Turnings," which he thus describes:—I replace the zinc of a Bunsen's battery by iron borings; an iron bar placed in the middle of the borings serves as a reophore. The iron is placed in common water. In the porous vessel I place a solution of perchloride of iron with *aqua regia* added. The electricity of this solution is collected by a carbon serving as the positive pole. The carbon is made of powdered coke agglomerated with paraffine. Such a battery may be made of large dimensions, and a great deal of electricity obtained at small cost.

ELECTRIC lights have been definitely established in the two lighthouses of the Heve, near Havre. The intensity of each of these new lights is estimated as equivalent to 5,000 carcel lamps, and it may be increased twofold, with little additional cost, whenever the condition of the atmosphere requires it.