

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. Triibner & 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.

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

NEW YORK, SATURDAY, APRIL 28, 1866.

Contents:

(Illustrations are indicated by an asterisk.)

*Chavannes's Apparatus for delivering and receiving Mail Bags on Moving Trains	275	Felly-Boring Machine	232
What I saw of the Pearl Fishery	276	Western Steam Boilers	282
Boilers	276	A Spiritual Invention	282
Weakness of Large Flues	276	Album for Porcelain Pictures	282
Trichina in American Pork	276	*Chrysler's Fruit Jar	282
Paper Made from Wood	277	A Seven-Tool Lathe	282
The Solar System	277	Foreign and American Steamers	283
Schubert on Ozone	277	High Wages	283
Polytechnic Association of the American Institute	278	Another Explosion of Nitro-Glycerin	283
*Illig & Neuberger's Fruit Can Prof. Boreman's Lectures	278	The Cholera	283
Match Making	278	Still on their Explosion of Nitro-Glycerin	284
All things in Motion	278	Failure of a Launch	284
Solid Iron Floating on Molten Iron	28	A Flint Piano	284
Coin and Feather in Vacuum	28	A Cheap Galvanic Battery	284
Hardening Dies	28	Renewing Worn Bank-Note Plates	285
Water Wheels for the South	28	The Nautilus	285
The Long and the Short	28	Pneumatic-Electric Organ	285
Several Questions	28	French Ironclad Navy	285
Taps	28	Treatment of Cholera	285
Popular Remedies	28	Miscellaneous Summary	285
Hot and Cold Solutions	28	Notes and Queries	286
Photo-lithography with half-tone	28	Patent Office Decisions	287
New Process for Indigo Dyeing	28	Patent Claims	288, 289, 290
New Inventions	28	Chases's Self-Adjusting Blind Pastener	284
*Bole's Spoke-Tensioning and Useful	284	*Dars's Bomb-tro	284
		Lighting the Heat of Steam	284
		Southern Cultivator	294
		A National Curiosity made	294

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 2 1/2 hours better time and consumes less fuel by three tons than her consort.

Fifteen years ago, when the Collins ships were first started, they made their time (and good time it was)

on 80 tons 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 tons burthen, running between Havre and New York, make 11 1/2 knots per hour on 50 and 55 tons of coal, and the *Cahamba*, a vessel of 1,800 tons burthen, makes 11 and 12 knots on 40 tons average consumption.

The Pacific mail steamships are the most economical vessels in the world. The largest are rising 3,500 tons burthen, and can steam an average of 12 knots an hour on 35 and 40 tons 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 2 1/2 revolutions to one of the engines, and burns, on the statement of her chief engineer, Mr. Nixon, 80 tons per 24 hours. Even the *Re De Italia*, a huge iron-clad vessel, nearly 300 feet long and 50 feet wide, clad with 4 1/2 inch plates, crossed the Atlantic at the speed of 11 1/2 knots on 40 tons 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 tonnage, 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; charging 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 Ellicott, 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 Angeles. 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