

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.

VOL. X. NO. 13. [NEW SERIES.].....*Twentieth Year.*

NEW YORK, SATURDAY, MARCH 26, 1864.

Contents:

(All illustrations are indicated by an Asterisk.)

*Root's Reciprocating Steam Engine.....	198	Small Leaks in the Household Siphon.....	199
The Invention of the Card-making Machine.....	194	Loading Guns by Steam.....	199
Miscellaneous Summary.....	194	A Chorus of Anvils and Artillery.....	199
Recent Southern Intelligence.....	195	A Novel Patent Case.....	199
To Machinists and Others.....	195	Smith's Leather-polishing Machine.....	200
Rust Joints.....	195	Lakin's Patent Ox-Yoke.....	200
A Substitute for Eggs.....	195	New Rolling Mills in Pittsburgh.....	200
Polytechnic Association of the American Institute.....	196	Explosions of Steam Boilers.....	201
Farmers' Club.....	196	The New "Call," and Breach-loaders.....	201
Impregnable Armor.....	197	A Remonstrance against the Extension of the Goodyear Patent.....	201
*Crosby's Pocket Calendar.....	197	The Monitor Turrets.....	201
Circular from the Navy Department.....	197	The Centigrade Thermometer.....	202
Artificial Ivory.....	198	Special Notices.....	202
*Interfering of Horses' Feet.....	198	Recent American Patents.....	202
Removing Incrustations from Steam Boilers.....	198	Patent Claims.....	203, 204, 205
Strength of Steam Boilers.....	198	Notes and Queries.....	205, 206
The Term "Ratchet".....	198	*Brittan's Lightning Rod.....	208
The Best Lime for the Calcium Light.....	199	Diseases of Over-worked Men.....	208
A Hint to Letter-writing Boreas.....	199	The Alantus Silk-worm in France.....	208
Trivial Things.....	199		

EXPLOSIONS OF STEAM BOILERS.

In Manchester, England, there exists an association of engineers who carefully survey every disaster of this kind upon its occurrence, and report the prominent features which, in their opinion, were the cause of the accident. They not only do this, but they also inspect the boilers of all persons who are members of the society, from time to time, as they deem necessary, so that every reasonable chance of explosion may be anticipated, and the proper means taken to prevent it. The results of this organization are forcibly shown by the report; out of 36 boilers which exploded in 1863, but one of them was under the charge of the association, and this was an exceptional case; all the others ran their chance, as we may say, and suffered accordingly.

By a tabular statement given in the London *Engineer* we find that the principal cause of explosion with most boilers was corrosion—chiefly external. The report also mentions that damp, or "sweat," as it is sometimes termed, formed between the walls in which the boilers were set, and thus caused the injury spoken of.

Careful and deliberate synopses of the several disasters enabled the members of the inspecting committee to arrive at the conclusion that one-sixth of the explosions which occurred could be traced directly to this external corrosion. From this it appears, that however important it may be to examine the interior of the boiler, it is also of vital importance to investigate the outside, especially those parts which are either in immediate contact with the setting walls, or else so covered by them as to prevent thorough ventilation.

A very general opinion prevails that explosions arise either from shortness of water, tampering with the safety-valve, or excessive pressure. An examination of the table alluded to does not warrant this assumption, for out of thirty-six explosions only two were from excessive pressure, four from scarcity of water, and but one of the cases of over-pressure was caused by carelessness, the other being an inadvertency.

"The consideration that has been given in the preceding remarks to the thirty-six explosions that occurred during the year 1863, and of which the circumstances were ascertained, clearly shows, that, however complicated the subject of steam boiler explosions has been made to appear, and however numerous and ingenious the theories may be that are propounded from time to time by way of explanation, yet on a close inspection of the simple facts in each case, the whole question with regard to those under consideration admits of a very clear solution; and

that the occurrence of all the explosions, with the exception only of that of a locomotive boiler, may be attributed to one or the other of two causes, viz.—either to the defective construction of the boiler in the first instance, or to the defective treatment it received in the second, that treatment in some cases extending over a term of years, till it reduced the boiler to an unsafe state, and in others producing immediate explosion by a reckless tampering with the safety-valve, neglecting the water supply, or by other careless mismanagement. It is important that this view should be clearly brought before steam users, since the subject has too frequently been enveloped in mystery, and where mystery begins the adoption of vigorous measures for prevention is sure to end. The public have been sadly misinstructed upon this subject. It is true that they are duly informed, by means of the newspapers, of the frequent occurrence of boiler explosions, as well as of the loss of life and damage to property resulting therefrom; but on carefully looking through all the reports that were currently circulated throughout the past year, as to the causes of these explosions, it may safely be stated, that, as a rule, they were incorrect, and only tended to mislead, so that the opportunity was lost of making the facts of one explosion serve as a guide to the prevention of the recurrence of others.

"Many other illustrations might be given, but these will suffice to show the mistaken views too often entertained and promulgated with regard to the cause of boiler explosions, while it will be seen, that with such evidence and such reports, there is but little prospect of any progress being made, and therefore that this association will render important assistance to the cause of the prevention of steam boiler explosions, by circulating correct information of all the circumstances connected with their occurrence."

Why shall we not have some such association as that in this country? We have in this city alone hundreds of steam boilers, some of which are never properly inspected, and the vast number of accidents occurring from the use of steam render it imperative that some action should be taken immediately. Who will move first in this matter?

THE NEW CALL, AND BREECH-LOADERS.

The President has issued a call for 200,000 more men for our armies; and if the complement is not previously filled by enlistment, a draft is to be made on the 15th of April next. By the letter of Colonel Wilder, published on page 170 of our current volume, it was shown that long experience in practical warfare has fully demonstrated that one regiment armed with good breech-loading rifles is equal to at least three regiments armed with muzzle-loaders. By the reports from our great armory at Springfield we learn that a large portion of the force is still employed in the manufacture of muzzle-loading small-arms.

The experiences of this great war are rapidly teaching lessons in all departments of the military art. If the heads of the War Department decided a few years ago against the use of breech-loaders by infantry, the results of the large experiments in practical warfare which have since been made, and which have changed the opinions of so many of our officers, demand, at least, a new examination of the subject. And, considering the enormous effort and expense required to send a single regiment to the field, this examination cannot be too promptly made.

A REMONSTRANCE AGAINST THE EXTENSION OF THE GOODYEAR PATENT.

We notice that our hint to those who are opposed to the extension of the Goodyear patent—to get up remonstrances against it and send them on to Congress—is being acted upon. Senator Sumner has presented a remonstrance from manufacturers in Lowell, and others are in circulation for signatures. We have before us the petition of Thomas J. Mayall, of Boston, who has devoted a great deal of time to making improvements in the manufacture of india-rubber. In a letter addressed to us and referring to our discussion of the subject, Mr. Mayall says:—"I have read, with much satisfaction, your articles in the last two numbers of the *Scientific American*, upon the application for the extension of the Goodyear patent. I do not know that I can now add anything

to the lucid manner in which you have presented the injustice which would be worked upon a class of the community who, to say the least, have been and still are of vital importance, in a pecuniary point of view, to the licensees under that patent—I mean the inventors—that class of the great public whose contributions to the welfare and pride of our country are more worthy of protection than the 'soulless corporations,' who oblige them to sell their brains for a 'mess of pottage.' I enclose to you my 'remonstrance,' and bid you 'God speed' in your righteous undertaking."

The "remonstrance" to which Mr. Mayall refers is addressed to Congress in the following words:—

That he has read the petition of Charles Goodyear, Jr., executor of Charles Goodyear, deceased, for the extension of Letters Patent granted to Charles Goodyear, deceased, for the invention of vulcanized india-rubber.

That he believes he can prove, to the satisfaction of your honorable body, that said Charles Goodyear and his legal representatives have been amply rewarded for his said invention, and that the public has been sufficiently taxed for the same.

That the extension prayed for would be an act of injustice to this remonstrant for the following reasons, among others:—

Your remonstrant has made many and valuable inventions in the manufacture of india-rubber, for some of which he has procured Letters Patent, and for others of which he has applied and intends to apply for Letters Patent.

That, by reason of the monopoly enjoyed by licensees of Charles Goodyear, your remonstrant has been compelled to sell to them many of his inventions for merely a nominal consideration, and so has been deprived of all benefit thereof, while said licensees have made large sums of money therefrom.

That, if the monopoly of said Goodyear and his licensees is longer continued, your remonstrant will be deprived of all benefit from the remainder of his inventions aforesaid during said continuance.

That, as your remonstrant is informed and offers to prove, the very parties for whose benefit the continuance of this monopoly is now sought, are the same parties who, by reason of their position, have derived great benefits from the inventions of your remonstrant, whilst, at the same time, they compelled your remonstrant to part with them for a nominal consideration.

Your remonstrant will prove the foregoing averments when, and as, your honorable body shall direct, and for the above reasons, he earnestly remonstrates against the passage of the act prayed for.

The above remonstrance presents the question very simply and squarely to every inventor. No matter whether they are studying out india-rubber inventions or are engaged in other departments, the great underlying principle is the same. The question is, shall one inventor and his heavy manufacturing monopolists so control the legislation of the country as to prevent all other inventors from making and using their own improvements, and shall the people continue to be taxed to support such a scheme? We cannot believe that Congress will ever sanction such an outrageous system.

THE MONITOR TURRETS.

In the field of abstract science speculation is pardonable; but in dealing with matters of fact we cannot rely upon the opinions of a select few, however oracular their utterances may be. The London *Mechanics' Magazine*, of February 26th, contains a comparison between "Captain Coles' and Captain Ericsson's Turrets," with several engravings intended to illustrate the principal features of each. We have watched the progress of Coles' cupola-ships and cupolas, and have read much of the advantages of the inclined sides of the Coles' cupolas and their power of deflecting shot. Our London cotemporary now presents to its readers something quite different from those of which we have read so many glowing descriptions. It now appears that Captain Coles has adopted the American "turret"—a structure perfectly cylindrical, of nearly the same internal dimensions, height, and diameter, as those of the monitors, but sunken below decks for one-half of its height. The inclined sides have vanished with the old name; the name and form have both disappeared. Our "cousins" have adopted the Ericsson turret (they even call it "turret") and now deride us for preferring it to their clumsy adaptation of Ericsson's ideas, which are set forth in Coles' plans. We consider their course most wise and a high compliment to the skill of Capt. Ericsson.

We cannot, however, pass unnoticed the erroneous comparisons which the *Mechanics' Magazine* institutes between the English and American mode of building and applying the turrets. Our cotemporary has evidently been grossly imposed upon by the draughtsmen in delineating the monitor turrets, and

by the historian in recording the performances of the monitors. He bases his argument against our turrets on the supposition that the monitor system has utterly failed in practice, because, during the short initiatory action at Charleston on April 19, 1863, some slight derangements occurred to some of the turrets; but he ignores the fact that those were so slight that all the vessels were reported ready for action the morning after the conflict. He appears not to know that, several weeks before the Charleston attack, some of the monitors had been engaged with batteries in Southern rivers for days without sustaining any damage which impaired their efficiency. Is it possible that the *Mechanics' Magazine* is so completely misinformed on a subject immediately within its sphere, as to be ignorant that the monitor fleet, after the first attack, has been for several months engaged with the Confederate batteries near Charleston? All Europe knows that each monitor has been hit hundreds of times. The records at the Navy Department show that, for instance, the *Palapseo* has been in action twenty-eight times. Not a single shot has penetrated the side armor, pilot-house or turret, and the latter revolves as freely now as when it first left the constructor's yard. Not the slightest injury has been received by any person on board, neither has any damage to her turret engines or other steam machinery been sustained, notwithstanding the severe ordeal to which this monitor has been subjected. In the face of these incontrovertible facts, the *Mechanics' Magazine* perverts history by telling its readers that the Ericsson turret is a failure.

We have carefully examined the engraving of Capt. Coles' turret, and we advise the inventor thereof to pay a visit to some of our monitors off Charleston to ascertain how they are constructed, and learn the effect of glancing shot—such shot as we employ on this side of the Atlantic—on the decks. The apt sailor will see at a glance that the first Yankee projectile (not a sixty-eight pounder) which strikes the deck of the *Royal Sovereign*, near the opening through which the turret protrudes, will close said opening by forcing the plating against it and effectually prevent the turret from turning.

We have been greatly amused on looking at the slight covering which Captain Coles places over the opening between the turret and deck. The captain, it strikes us, lacks practical knowledge, but he has made out a case for himself by depicting the monitors with bolt heads on the outside, which they never had, and his own with countersunk heads, which the monitors always had. The editor of the *Mechanics' Magazine*, who enters the arena in Coles' behalf, is evidently unaware of the crushing effect which a large cast-iron shot striking Coles' turret would produce on his delicate means for covering the opening around the turret; nor does he seem to understand that the fragments of broken shot and shell would fall into this opening and wedge the turret so that it never could be turned; the holiday experiments on the *Trusty* to the contrary notwithstanding. The idea of placing half the turret below the deck, as Captain Coles now proposes, is not new; there are numerous plans and models in possession of the Navy Department at Washington, on this principle, and even the little *Keokuk* was so built. There is scarcely a square foot of surface on the turrets of some of the monitors now off the Southern coast that is not marked or indented by shot. It would be waste of time to prove that if built on the Coles' system, these turrets would have been jammed with fragments entering the opening in the deck, and that all monitors built with his turrets would have been condemned after the first action as worthless. It is a distinguishing feature in the Ericsson turret, that the fragments of broken shot cannot interfere with its rotation. The engraving in the *Mechanics' Magazine*, intended to show this detail of the Ericsson turret, is wrong in every particular, and grossly erroneous at the junction of the turret and pilot-house. The heavy wrought-iron ring, five inches thick and fifteen inches wide, attached to the base of the former, and the massive ring bolted to the turret roof for preventing shot from hitting the base of the pilot-house, are not shown at all in the engraving, being omitted, doubtless, to make the comparison strong. The guard plates covering the nuts of the bolts which hold the plates of the turret and pilot-house together, are also omitted in the engraving, and any one who should build such a turret as the

Mechanics' Magazine presents, might justly be accused of having taken leave of his senses.

An absurd statement is put forth concerning the breaking of the bolts, and projection of the nuts inwards. The facts in this case are simply that the inadvertent omission of the guard plates in the *Nahant's* pilot-house caused a *solitary accident*, which was at once guarded against by attaching the detail alluded to, and not a single accident has since occurred from this source. Our cotemporary should have known this before making the broad assertion that the Ericsson turrets and pilot-houses are unsafe on account of flying nuts. It is discreditable to any journal, at this day, not to know that our monitors and their turrets afford absolute protection, not only to their crews, but also to their own mechanism.

The misstatement of our cotemporary about the want of proper means for giving orders from the pilot-house to the engine-room is ludicrous. We have no "call-boys," as in the theatres, but we transmit orders to engineers by bell-signals. "Ah," he says, "but the bell-wires get shot away!" This is another error, and as sensible an objection as it would be to dispense with the smoke-stack because that is likely to get hit.

The arguments (?) presented against the American system of building turrets and protecting hulls, by a series of thin plates, exposes a want of correct knowledge on the subject unpardonable in a mechanical journal. On page 197 may be found an extract from a paper bearing on this question of laminated protection, which it is hoped will be the means of giving those desirous of information some new ideas on the subject; and as the positions taken in it are fully sustained by practice, it becomes additionally valuable.

We look upon the plan of placing the *stationary* pilot-house on the top of the *revolving* turret as a feature of paramount practical importance in the monitor system, besides being a mechanical inspiration of the first degree; but our London cotemporary intimates that this structure is useless, and gravely calculates the number of square feet of surface which it offers to the enemy's shot! Why should we argue this point? Surely every practical person can appreciate the perfect control which this location of the pilot-house gives the commander. In action his place should be near the helmsman, and above the gunners. What other vessel than a monitor, with the pilot-house placed over the battery, fulfills the conditions stated? Not one. Captain Coles, with his nautical acquirements, surely cannot fail to admit the great advantage of this arrangement, though the editor of the *Mechanics' Magazine* cannot comprehend it.

We look in vain for any means of closing the port-holes of the Coles' turret, for none are shown in the *Mechanics' Magazine*. In the monitors the ports are closed by means of a massive bent block of wrought iron, which revolves on "centers;" one man can operate it with ease. A change of direction of 90° suffices to open or close the port-hole by this simple and efficient contrivance. We advise Captain Coles to copy this port-stopper at once. Now that he builds turrets in place of "cupolas," we wish for the credit of our system that he should also close his ports as we do.

The points of superiority claimed by Captain Coles for his turrets are eminently untenable. When the English ships have borne the weight of shot which has been hurled against our monitors with as little injury, it will be time to boast; but all speculation and experiments in dockyards are idle, and ill befit the grave character of the subject. We have confined ourselves to facts, and have more to offer should these prove unsatisfactory.

THE CENTIGRADE THERMOMETER.

If the metrical system of weights and measures is introduced in this country, the adoption of the centigrade thermometer will doubtless constitute a portion of the reform. Indeed, independently of the metrical system, this instrument is gradually coming into use throughout the civilized world. It has already been generally adopted by men of science in all countries; and the time cannot be very far distant when it will be everywhere employed by the mass of the people.

To grade a thermometer we want two natural standards of uniform temperature, and among the

numerous standards furnished by nature, in the freezing and boiling points of various liquids and the melting points of different metals, the two best adapted to the purpose are the freezing and the boiling point of water.

The centigrade thermometer makes the freezing point of water zero, and the boiling point 100 degrees above.

Fahrenheit's thermometer is based on a series of errors and blunders. Gabriel D. Fahrenheit was an instrument-maker, of Amsterdam, who made some important improvements in thermometers about the year 1720. These improvements were suggested by Römer; and Fahrenheit has acquired universal fame by adopting them. The use of mercury as the liquid was a good thing; but the fixing of the zero point and the graduation of the scale were both absurd. The space between the freezing and boiling points was divided into 180 degrees, on what grounds nobody knows; and the zero was fixed at 32° below the freezing point, from the false notion that at that point there was entire absence of heat, or absolute cold.

The centigrade thermometer was devised by Celsius, of Sweden, in 1742, and was introduced into France, along with the metrical system of weights and measures, at the time of the Revolution.

SPECIAL NOTICES.

LOUISA RESSEGINE, administratrix of the estate of Wm. F. Ressegine, deceased, late of Brooklyn, N. Y., has petitioned for the extension of a patent granted to him on June 11, 1850, for an improvement in spring mattresses.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, May 23, 1864.

ALEXANDER C. TWining, of New Haven, Conn., has petitioned for the extension of a patent granted to him Nov. 8, 1853, and ante-dated July 3, 1850, for an improvement in manufacturing ice.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 20, 1864.

F. P. DIMPFEL, of Philadelphia, Pa., has petitioned for the extension of a patent granted to him on July 16, 1850, for an improvement in steam boilers.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 27, 1864.

All persons interested are required to appear and show cause why said petitions should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the day of hearing.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Hand-pegging Machine.—In this machine a blunt-ended awl is employed also as a driver and is automatically thrown up, alternately to a greater and a less height. The peg strip rests against the side of the awl when the latter is in its lower position, so that a blow of a hammer will force the awl into the leather, and at the same time a peg is separated from the strip by a knife working on one side of and parallel with the awl. The awl is then thrown up to a sufficient height to admit the peg beneath its end, so that a second blow of the hammer will drive the peg into the hole already formed. Luther Hall, of Boston, Mass., is the inventor of this machine.

Knapsack Hammock.—This invention relates to an article constructed of india-rubber cloth or analogous water-proof material, adapted to be readily converted into either a hammock or knapsack, said cloth being provided with a pocket or pouch to contain small articles, which pocket may serve the purpose of a pillow when the article is used as a hammock. A. Wm. Sus, of New York city, is the inventor of this improvement.

The gunboat *De Soto* has thus far proved herself the most successful of all the vessels on the Atlantic blockade. She has captured seventeen blockade runners, whose aggregate value is near \$1,200,000.