Scientific Museum.

Lightning and Lightning Conductors.

(Prepared for the Scientific American.)

No. 2.

These extracts sufficiently show that Dr. Franklin was fully aware of the importance of a system of lightning conductors. A conducting rod, whatever the metal may be of which it is made, or the manner in which it may be applied should be viewed onlyas a connector of the various conducting parts of the entire mass of buildings, ships, &c., to allow of the transmission of discharges of electricity with security, which would not pass without intermediate explosion and consequent damage, for were buildings, &c., composed entirely of metal, there would be no occasion for such an addition, nay the occurence of accident to them would then be unknown. The cathedral at Sienna, in Italy, was fitted with a conductor, consisting of large bars of iron. The popular prejudice of the time caused it to bear the appellation of the Heretic Rod; a terrific thunder-storm however visited the city, the cathedral towers seemed doomed to destruction, a vivid flash, a hissing noise, and a loud peal took place in almost instantaneous succession the darkness consequent upon the vividness of the flash disappeared and the tower stood, even to its gilded ornament untouched.

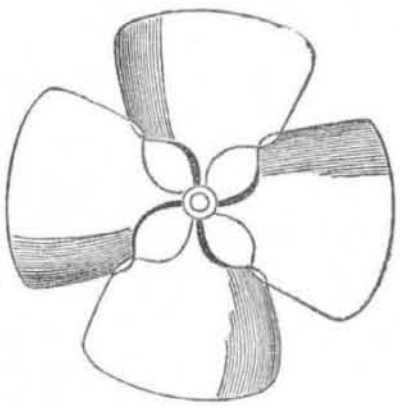
The results of experimental enquiry and practical application have shown that conductors should be composed of the best conducting metal, in a commercial point of view. They should also have the greatest electrical capacity—should be always well connected together, and of such a form as to present the greatest amount of surface for a given quality of material. Where these conditions are fulfilled their application to buildings require the first consideration—their superior terminals should be securely fixed above the highest immediately surrounding object, and be continued in the shortest and most direct line to the earth, being in their course downward fixed closely and securely to the external walls of the building, terminating at their inferior extremity below the surface of the ground, from the wall dipping downwards. Where practicable they should be continued into some well, drain, or damp place away from the building. Another and important point, about which there has until lately been much cavil, is, that not only should the conductor be fixed close to the wall but be connected also with all the principal metallic surfaces in the building. For marine purposes the same conditions equally apply, but the particular method of application here required is necessarily different to that in buildings. To fulfill the first condition, copper, as a material for the construction of conductors has been found the best in a commercial point of view; for the 2nd and 3rd conditions, copper-rods, copper-chain, copper tube, flat copper strips, and copper-wire rope, have been severally proposed, recommended, applied, and tested. To fulfil the 4th condition, copper strips, copper tubes, and copper-wire ropes have been also proposed and tried. The copper rod for buildings, has been applied according to rules; the mean diameter of those erected being ½ or inch. They have been applied to churches, towers, monumental pillars, chimney-shafts and high buildings of every kind, with success as regards their efficiency. The objections to this form, since the introduction of others, are, that where applied to high buildings, even plain and straight, such as gable end of houses, chimney-shafts, &c.; 1st, the number of joints render the perfect continuity dependant upon the care and skill of the workmen, employed; 2nd, the expense of making these joints; 3rd, the greater cost for a given surface, &c. For other forms of buildings, as spires, towers, &c., where the conductors require to be bent, set, and fitted in various positions, the waste of material in cutting, and the time required in applyiug and connecting the lengths of rod, and the expense attendant thereon, are amongst the principal objections. For marine purposes theyare practically inapplicable; their form and the arrangement of the masts, &c., preclude their being fixed thereto; even if they were, they must of necessity be grooved into the masts which would weaken this important part of the ship, the superior masts having to be raised and lowered; the difficulty in effecting a perfect mechanical contact is also great. The termination of this form and the application of conductors is most objectionable; continuing down the mast it must either go through the bottom with the risk of imperfect continuity, and consequent disruptive discharge, or be conducted out of the vessel by branches at right angles, which are, of course, not only exceedingly objectionable in theory, but most dangerous in practice, as also is the introduction at all of the discharge into the vessel, which, if there be another mode, is by all means to be avoided. That this cannot be applied to the shrouds or rigging of a vessel will readily be understood.

History of Propellers and Steam Navigation.

[Continued from page 336.]

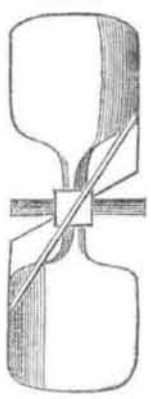
ERICSSON PROPELLER.

Fig. 68.



It is a number of years since the screw propeller was introduced into America, and in March 1834, a patent was granted to John B. Emerson for a submerged propeller. The first specification of Emerson was a bungling business, and the patent with it was not worth a snuff, as it had not a correct drawing attached, but a second drawing was filed after the patent was granted, and in a trial for infringement of his patent against Hogg & Delameter, the jury found a verdict for Emerson, and against the propeller known as "Ericson's Propeller," which is now presented as applied to the Princeton, an American frigate, which proved to be a very bad vessel in every sense of the word. The Princeton was 164 feet long, with a breadth of beam of 30 feet; the depth of the hold was 22 feet 6 inches, the draught of water was 17 feet 6 inches, and the burthen about 700 tons; the propeller was 14 feet in diameter, with six blades, and made from 32 to 36 revolutions per minute, at which rate the vessel's speed was stated to be nearly 14 miles per hour. The engines were about 400 horses power; they were of peculiar construction, having two steam cylinders, or chests, containing vibrating pistons or flaps, with

Fig. 69.



cranks upon the ends of the suspending pivots both these were coupled by connecting rods to a main crank on the driving shaft; the length of these cranks being so proportioned that their alternate vibrations should give a rotary motion to the main crank, and thus act directly upon the propeller, without the intervention of bands or gearing.

We have seen many flattering notices of connecting the pistons by direct action with the propeller shaft, and have heard many grave objections to the use of cog gearing in propellers, but the argument seems all to be in favor of the cog gearing, when the master wheel has good wooden teeth. The "City of Glasgow" is connected in this way, and if there is one fact stronger than another to give force to her arrangement of gearing, it is her success.

Henley's Magneto-Electric Telegraph.

A striking experiment has just been made under the direction of the French goverment, to test the efficacy of Mr Henley's magno-electric telegraph, which is worked without batterries of any kind, and at a fraction of the cost of the Voltaic system. The line of railway assumed for the trial was that from Paris to Valenciennes. At the Paris end the director-in-chief of telegraphs for the French government, M. Foy, superintended; while at Valenciennes were present the minister of public works Count Shekendorff, the Prussian Ambassador, M. Mosay, the chief engineer of the Belgian railways, Baron Devaux, M. Quetelet, and M. Cabray, chief engineer of the Belgian government; the three latter being members of a commission appointed by the Belgian government to report on the subject. The distance is 180 miles, being the longest telegraphic line in France. After a most satisfactory series of trals on the single distance, first with one twentieth of power, the wires were connected so as to treble the total length of wire, making 540 miles to and from Paris and back—the magnetic message being communicated through the first wire, back by the second, through the third, and back again by the earth. It was not anticipated that the magnet could possibly work through this enormous resistance; but, in fact, it is alleged it is worked as distinctly and rapidly as when only made to traverse the 180 miles with full power. The ordinary telegraph with battery power used by the French government, was then put in requisition; but not the slightest effect was produced. On the single distance, even a signal was sometimes not obtained for several minutes, owing, it is said, to some fault in the batteries, although the officials were exerting themselves to the utmost. The government officers and others inspected the working operations from 10 to 3 o'clock, and expressed themselves thoroughly satisfied with the success of the tral.

[The above is from the London News, and it shows how a thing may be described and yet not described. We are told that the above is a magno-eletric telegraph, and yet we are informed that no battery is used. What power on earth is used we are not informed. Without a battery of some kind, we venture to say the telegraph cannot be worked, unless by an electric machine, and that would not be a constant power, a thing which is required for working telegraphs. If, however, this is the "magneto telegraph," whereby a signalling current is sent along by the magnet, it is true that it will avoid the expense of batteries, but then it is too slow, and will not answer for anything but a railroad telegraph.

Pure Water--The Cholera.

The Cholera statistics of London for the year 1849, taken from the Registry in the last number of the Edinburgh Review, make it appear that a plentiful supply of pure and wholesome water is one of the most effective preventive means from the ravages of this terrible contagion. The Review states, and indeed it is well known to inquiring Americans, that London, compared with Philadelphia and New York, is miserably supplied with water. It appears that that portion of the great English metropolis which lies north of the Thames, is better supplied than that which lies south of the river. The striking fact follows:—The proportion of deaths from Cholera for the 13 weeks ending September 15th, 1849, to every 10,000 of population, was, north of the Thames, about 30, and south of it, about 159—showing that the mortality was five times greater than where there was a more sufficient and pure supply. These are averages, but more striking contrasts are exhibited in the details.

Tobacco Planting in New York.

The Syracuse Star states that Robert Fleming and Peter R. Reed have purchased a fifty acre lot three miles northwest of Syracuse, and are planting the whole of it with tobacco, employing twenty men. They have also several other fields in different parts of the same county, from all of which their crops will be heavy. For several years past they have been very successful in growing tobacco at Manlius.

After a drought of five years, the Province of Murcia, in Spain, was visited in the month of May last by copious showers of rain.

LITERARY NOTICES.

The Water Cure Journal—Published at $1 per annum, by Fowlers & Wells, Nos. 129 and 131 Nassau sts.—This work contains 32 octavo pages, besides several illustrations exhibiting the anatomy and physiology of the human body. The work is full of interest and should be introduced into every household. This July number commences the volume, and is therefore a favorable time to remit the subscription price.

The History of the Decline and Fall of the Roman Empire, by Edward Gibbon, enriched with copious Notes, (which add much to its value,) by H. H. Milman—Is now published complete in six volumes, of nearly 600 pages each: price 40 cts. per volume. This work was completed June 27th, 1787, having occupied the attention of its author for nearly 20 years. He has left a rich treasure to the world, and an enduring monument to his fame as a man of profound genius. Each successive era which marked the rise and fall of this mighty empire, are themes upon which the mind can dwell with infinite pleasure and profit, comprehending as it does one of the most awful spectacles in the history of the world—traced out in each connection by a master hand. To the statesman this is a work of incalculable worth. It is no less so to every individual who desire to become conversant with the records of the past, and the public are indebted to the enterprizing publishers, Messrs. Phillips, Sampson & Co., Boston, for an edition, at a cost so trifling, compared with its intrinsic value.

We are indebted to John Carruthers, our excellent Savannah Agent, for a copy of his "Advertiser," and also for the very complimentary notice of the Scientific American. We have known, for some time, that our friend kept constantly on hand a general assortment of the most approved "Guns, Pistols and Hardware," but never dreamed of his entering the editorial arena. Since, however, he does so "without the hope of fee or reward," nothing selfish can be attributed to him for coming out "occasionally" with the *Mammoth Advertiser*. He says in his prospectus that if he cannot give satisfaction in the editorial capacity, he feels sure of pleasing "all reasonable men with a first rate double barrel gun."

Marine and Naval Architecture.—Number 7 of this excellent and beautiful work, by John W. Griffiths, Marine and Naval Architect, is just published. It contains full descriptions for reducing from models, and enlarging from them. This work, we are happy to know, is highly prized by all those who are capable of judging of its merits.

Dictionary of Mechanics and Engine Work—Number 13 of this work, published by D. Appleton & Co., Edited by Oliver Byrne, contains varieties of Steam Engines, Engraving on Wood, Envelope Machine, Etching Machine, Fans, Falling Stocks (should be Fulling), and a Felloe Machine.

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