Scientific Museum.

Lightning and Lightning Conductors.

(Prepared for the Scientific American.)

No. 4.—(Concluded.)

The wire rope, as a conductor, meets the objections urged against copper rods, as regards the shortness of the lengths in which that material can be obtained, and the consequent number of pieces and joints necessary in the formation of a conductor for a high building, as the rope can be produced in extremely long lengths; it is applied much more readily and with greater facility adapted to angles and other forms and surfaces; it is easier fixed and in much less time at a considerable less cost. It possesses all the enumerated conditions of a perfect and sufficient electric conductor, with the advantage of the method of applying chains, without the objections which attend that form of conductor. It only then remains to compare it with the metal strip or riband conductors. The copper wire rope as a marine conductor is preferable to any other; its chief advantages are the immense difference of expense between it and the strip or riband plan. The spars are not injured or in any way affected by its application, and the electrical discharge would be led down to the water instead of into and through the body of the vessel, and therefore remove all liability to explosion; it is, in fact, much superior to the riband plan, and obviates all the objections advanced against the common chain conductor.

Immense numbers of these conductors have been applied to buildings of every kind, in the British navy and in the merchant marine, and they have had the most severe and repeated tests with uniform success.

For buildings, square iron rods, twisted, have been successfully used and are highly esteemed; they are made to run along the eves of a large roof, branching up into spikes every few yards distant, and are attached to rods running up at both gables, and down into some moist place in the ground. The lightning conductors should be continuous—well connected together and lead into the moist earth. As some people may wonder after all, how to erect conductors—for houses it is better to have a wire, let it be ever so slender, than no conductor at all. There need be no fears of any person failing to put up a conductor, if care is taken to connect all the parts, and to have it braced in the wall, by glass, or some non-conducting substance; or by iron staples, taking care to have the staples bedded in dry plaster in the walls. Any person may get a number of copper or iron wires zinced, say three or four, twist them together and let them branch out at the top separately, and be pointed; bind them well to the wall, and a simple and good conductor is erected at a very small expense. The upper ends of the copper or iron wires, should be zinced at any rate, if the rest of them are not. This is done by melting zinc in an iron pot, along with some salamoniac, and dipping in the ends of the wires.—This is also the way to zinc (galvanize) iron plates.

A Chinese Art.

A remarkable and valuable Calcydona, which had been engraved in China, with a figure of the Venus of that empire, has been recently presented by a Captain Gaull to the Society of Antiquaries of London.

It is a very large peculiar stone; and Mr. Kœnig gave it as his opinion that nothing like it is known. The design is of little interest as a work of taste, but wonderful as a work of art and skill, from the amazing labor that must have been bestowed on the cutting of so hard a stone. The best seal engravers in England state that the work could not have been executed in that country—or, at all events not without extreme labor, for years.

Iron Mountain.

An iron mountain has been discovered in Wisconsin, the ore of which yields 90 per cent. of pure metal. It covers about forty acres. There is an abundance of wood and water power near it.

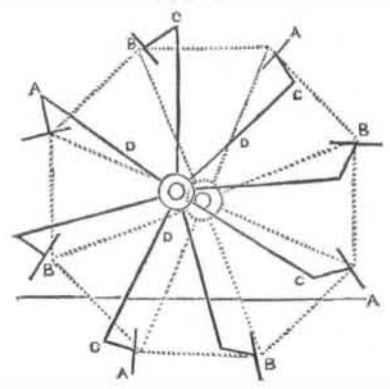
History of Propellers and Steam Navigation.

[Continued from page 352.]

MORGAN'S PADDLE WHEEL.

This paddle wheel is the invention of Elijah Galloway, the author of a history of the steam engine, and an inventor of a number of rotary engines. It is called Morgan's Wheel after the name of the assignee. It was invented about fifteen years ago, and has been applied to several of the Government vessels in England. The Mail Packets running to France have them, and their speed is said to be 25 per cent more than by the common wheel. A steamboat on the Clyde has been lately fitted with these wheels, and her speed has been increased two miles per hour—she had formerly the old paddle wheel. The object attained by Morgan's wheel is causing the paddles to enter and leave the water vertically, instead of at an angle. This prevents shocks and tends to increase the speed; but it is difficult to construct them—they are expensive and liable to get out of order. For long sea voyages they are held to be impracticable by eminent engineers, but for short and fair voyages, they are considered far superior to the common paddle wheel.

Fig. 72.



This figure represents the mechanism of the wheel; A A A A, &c., are the paddles which turn upon spindles, having a bearing in the angles of the framework of the wheel, B B B, and which is of a polygonal figure, with as many sides as it is required to have paddles. The inside frame or polygon is alone attached to the shaft of the engine, which does not continue beyond the side of the vessel; and the outer one has an independent bearing on a centre attached to the paddle box, so that it receives its motion entirely from the rim or angles of the polygon; by this means the space between the sides of the wheel is left entirely free. The part of the shaft or centre upon which the outer side of the wheel revolves, is projected in an inclined direction to the middle between the sides, but of course to a point considerably eccentric with the wheel.

Each paddle has a crank, C, attached to it at an angle of nearly ninety degrees, and rods, D D D, &c., connect the extremity of this crank with a movable boss which revolves upon the fixed eccentric point of the shaft.

It will thus be seen, that in consequence of the fixed point being situated out of the centre, the paddle will assume different positions during the revolution of the wheel, which positions can be so arranged as to differ very little from a vertical direction while passing the lower part of the revolution, or that part where the action of the paddle takes place.

Freezing Mixtures.

The application of heat from an external source is not always indispensible in order to liquefy solid bodies; many substances undergo this change of form if they merely come in contact with a liquid. Nearly all the crystallized salts possess this property. If a mixture be made of one of these salts with snow, or with some other liquid, the action of these substances on each other will convert one or both of them into liquids, one portion of their free caloric being consumed in effecting this change, as also a part of the heat of the vessels containing the mixture. The consequence is, that the greater the degree of cold generated during the liquifaction of mixture, the more quickly will the liquefication be brought about, and the greater will be the quantity of heat taken up, and rendered latent by the substances composing these freezing mixtures.

The following experiments will serve to illustrate the principles laid down above:

First Expt.—Place a thermometer in a glass, into which throw some finely-pulverized sulphate of soda (Glauber's Salts) and some chlorate of ammonia, or nitrate potassa (saltpetre)—Shake the mixture and the thermometer will indicate a considerable depression of the temperature.

Second Expt.—One part nitrate of ammonia and 1 of water at 50° mixed together produce a cold of 5°; or 5 parts of chlorate of ammonia, and 5 of nitrate of potassa, with 10 parts of water at 50°, lower the temperature to 10°.

These salts may crystallized again, and they will be equally available for use.

Third Expt.—Five parts of hydrochloric acid poured on 8 parts of freshly-pulverized sulphate of soda reduced the temperature from 50° to 1°,

Water placed in thin glass vessels or tubes, and set in the mixtures named in this and the preceeding experiment, is very quickly converted into ice.

Improvements in the Manufacture of Sugar.

An improvement in the manufacture of sugar, whereby all metalic oxides are dispensed with, and only simple lime used, has recently been discovered in France, which appears to be good, and deserves attention by those interested in the manufacture in America. The saccharine juice is obtained in the usual way from cane, or beets, and heated from 122° to 167°—the higher temperature for cold, and the lower for warm weather. To the juice so heated, a quantity of lime, previously slacked and sifted, is to be added, sufficient to separate the foreign matters capable of being coagulated by it. For every 100 gallons of juice the quantity of lime varies from 15 to 20 lbs. A sensible alkaline taste is an indication that sufficient lime has been added. The lime is well stirred and the temperature raised to 194°—care must be taken not to let it boil. This coagulates the foreign matters, some arise in scum, and others fall to the bottom as sediment. If the lime could be added to precipitate the foreign matters only, the sugar and the soluble salts would then be contained alone in the solution; but the sugar and lime unite and form a saccharate of lime and when this is formed, this part of the process is completed. The next thing to be done is to separate the sugar from the lime. This is effected by blowing into the juice by any convenient apparatus, a stream of carbonic acid gas, which may be obtained from the combustion of charcoal. This forms an insoluble carbonate of lime, which falls down to the bottom. An excess of the carbonic acid gas is thrown in, and the juice is then boiled to remove the free carbonic acid and the bi-carbonate of lime in the solution. The muddy liquor is then filtered, concentrated in the usual way and run into moulds. This makes a coarse sugar; to make finer sugar, the concentrated juice is filtered through charcoal, and run into moulds. The drainings of the sugar may be concentrated and filtered again, and will produce a good sugar. The *very* poorest drainings which contain some foreign matters, may be treated with lime as the raw juice, and then concentrated, filtered and run into moulds.

It is stated that this process produces a sugar fit for the market at one operation. It is a very simple process at least, and can easily be tested by our planters.

Waterspout.

The Pittsfield (Mass.) Sun says that this phenomenon, so rarely witnessed by denizens of the country, was presented on a magnificient scale on Friday July 5, at the commencement of the rain storm. It occurred between Pittsfield and Lanesborough, on the Pontoosuc Lake. The water ascended 100 feet and to such an extent that the water flowing over the dam of the Pontoosuc Manufacturing Company near the outlet, receded, and ran backwards into the lake.

During a thunder storm lately at Mobile, the electric fluid ran along the the wires into the telegraph office and destroyed two magnets.

A Corps of Sappers and Miners.

It is said that the extensive breaks in the Erie Canal, in New York, to repair which will cost the State $17,000, was produced solely through the agency of rats. On the bank stood a slaughter house, in which the rats burrowed, and in order to get to the water they undermined the embarkment and let the water in.

A list of steamboat casualties and the losses of life by them, during the present year, is published in the St. Louis Union of the 3d.—There have been sixty-seven boats lost by being blown up, collisions, fire, snaged, &c., causing the loss of four hundred killed and scalded, besides loss of property.

LITERARY NOTICES.

The Scalpel—A Journal of Health for popular and professional reading; edited by Dr. E.H. Dixion, a ready, pungent and forcible writer. Published quarterly at $1 per annum.—The number for August contains a brilliant series of articles among which are the following:—Hereditary Descent of Diseases, Consequences of Intermarriage of Blood Relations, Sketches of New York Physicians, A Dish for the Gods with Philosophy, and Garnished with the Gout; Treatment of the Cholera by Quinine; Dr. Bell's Lectures upon the same subject; Heroic Medical Education and Practice; Hysteria—its power; Heroic Surgery; Extirpation of a Tumor—besides an abundance of Sharp Shots at the quacks—puff balls and soda powdered species. Glorious Scalpel! your visits are heartily welcome.

Sartain's Magazine of Literature and Art, August number: Dewitt & Davenport, Agents, Tribune Buildings, New York.—This number contains upwards of 20 embellishments, and a briliant series of contributions from the pens of our first authors. This magazine enjoys a well earned reputation and may be considered one of the finest publications in the world, for female reading.

Graham's Magazine, August number.—For sale by the same publishers; it contains "The Origin of Music," an elegant steel engraving by Tucker, "Paris Fashions," and a fine mezzotint of "The Sisters," by Welch. The number also contains articles from Bayard Taylor, Gilmore Simms, Mrs. Neal, C. J. Peterson, Miss Duval and several others of known merit. The typography is beautiful and the paper very fine.

Peterson's Ladies' National Magazine for August can be had of the New York Agents Messrs. Dewitt & Davenport Tribune Buildings. It contains five illustrations and several original articles of merit. This number is a good one.

Shakespear's Dramatic Works, No 20, Phillips, Sampson & Co., publishers, Boston; for sale by Dewitt and Davenport, price 25 cts. This number contains the second part of King Henry IV., embellished by an elegant steel engraving of Lady Northumberland. A more splendid edition of the works of the immortal bard has never been published.