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Applications of Lightning---Ingenuity of Science.

Strange must have been the reflections of the Roman sentinel mentioned by Cæsar, who first saw the electric flame during the dark midnight watch, gleaming on the point of his lance; and the ancient mariner, too, what singular thoughts must have shot across his mind as he beheld the fire balls (Castor and Pollux) playing on the *main truck*, at the close of a terrific thunder storm. The action of a piece of amber, in attracting a feather, was of old viewed as something. mysterious and belonging to the spirit world, hence it was worn by our superstitious predecessors for amulets of rare virtue. From the depths of the past till A. D. 1618, little was recorded concerning electricity; in that year Dr. Gilbert published his treatise "De Magnette," which revealed to us that in the brave days of old, neither the scholastic Greek nor the learned monk knew aught of the now sublime and wonderful science of electricity. It was not until the days of Franklin that this science made any advances worth mentioning; then Gray and Wheeler discovered that some bodies were conductors, and some were not, and with this knowledge only, Franklin, by one of the most simple and romantic scientific experiments on record, proved the identity of lightning and electricity, by wooing the fluid from a thunder cloud and locking it up forever in the portfolio of science with his iron key. After this, many improvements were made in electrical machines, but practically speaking, electricity was applied to accomplish nothing useful, except it may be a few doubtful cures of diseases, and the amusing but impracticable pith ball telegraph of Lomond—it was merely employed as the toy of the Lecture Room. It was not until 1790 that the grand discovery was made, which has rendered electricity the most ubiquitous handmaid of the arts. Galvani, a professor of anatomy at Bologna, having passed a copper wire through the nerves of a dissected frog and suspended it over an iron ballustrade, was surprised to see its limbs begin to play as if they were alive; an account of this soon reached, Volta at Pavia, and he, with higher powers of mind, pursued the investigations until he discovered that electricity was evolved by the contact of two different metals. In 1800 he made the famous Voltaic Pile, and from that date we can trace a series of the most wonderful and brilliant discoveries and useful applications of electricity. Volta soon saw the importance of his discovery, and at once wrote an account of it to Sir Joshua Banks, of the Royal Society of London. A pile or battery, was soon constructed, and the first fruits of its application was the decomposition of water, and the resolving of it into its original elements—oxygen and hydrogen. It was now successfully applied to chemical analysis, and in the hands of Sir Humphrey Davy the world was soon dazzled with a series the most brilliant chemical discoveries on record. By the old electric machine, powder had been ignited at a considerable distance, but now the Voltaic pile fused the diamond and the most fractious metal, and, with charcoal candles, a light was produced rivalling in brightness that of the solar orb. Here, then, it was usefully applied in chemical investigations, but another power belonging to it was soon to be discovered. In 1819, Oersted discovered that a current of electricity travelling along a conductor, moved a magnet on its axis, and it was then suggested that messages might be carried to distant places on the lightning's wing. The *electro-magnet* (formed by a circuit wire coiled around a piece of soft iron) had yet to be discovered; this was done by Sturgeon in 1825, and afterwards perfected by Prof. Henry, then of Albany, N. Y., in 1829, who was the first person in the world that moved machinery by lightning. It but required the application of these discoveries to move a machine, which, at a distance, would make marks, to produce an effective telegraph, that would carry messages, from lip to lip, hundreds of miles in a few seconds; this was successfully accomplished by Prof. Morse, in 1836. It is singular, that although the principles of the chemical telegraph were well known long before the discovery of electro-magnetism, that these principles were not applied for the same purpose till 1838. In that year there was not a line of working telegraph in the whole world, now the wires stretch over one half of our continent, and there is an electric net work of more than twenty thousand miles in length. In the old world the electric current passes under the waters of the sea, and unites old Albion with old Gaul, old Caledon with old Erin, and it is now proposed to stretch the wires underneath the waters of the Mediterranean, and send the lightning's flash from Europe to Atrica.

In 1838, Jacobi discovered how to make medals and takes copies of objects in metals, by depositing pure metals from their oxyde solutions; from this discovery has arisen that beautiful extensive and wonderful art—"Electro-Metallurgy. The lightning deposits copper on the face of the printer's type; it plates with silver the vase, the wine cup, the fork, the spoon; in short, in this department, it is possessed of the utmost versatility.

It is now employed to move clocks, and the astronomer, in his observatory, records the transit of rolling spheres by flashes of lightning. The adaptations and applications of electricity, are almost past numbering; the steam engine, in the eloquent language of Lardner, "can spin, weave, can make a pin, or forge a massive bar," but in doing this it only exhibits the one quality of pushing by mechanical force, on the other hand electricity has various qualities—it decomposes the hardest metals and re-composes them again from their solutions, into pure, solid, and beautiful forms, according to any pattern presented; it sets the diamond on fire; it rends rocks to pieces at the bottom of the sea; it conveys messages from the stars, and from friend to friend across seas and continents. What the future applications of lightning in the hands of man may be, we cannot tell, but assuredly we can say that since the discovery of the voltaic pile, in 1800—only fifty-two years ago—it has marched on with such rapid and ingenious strides, to subject all art to its dominion, that we are almost prepared for any new and wonderful application of its powers, whether it be in propelling Porter's Balloon or annexing Cuba. We can truly say, that the ingenuity of science, in the useful applications of lightning—electricity—above all other discoveries ever made, afford subjects for wonder, admiration, and thanksgiving.

The Fresnel Light and the Old System.

It was well, we think, for the honor of our country and the benefit of our great and rapidly increasing commerce, that the last Congress changed the old Light-house System, and established a new one upon a far superior basis.

Some years ago a Fresnel lens was purchased in France by our old Light-house Board, but so inefficient and careless was said Board, that, after its arrival here, although it cost $10,000 and was intended for the Iron Light-house on Carysfort Reef, Florida, it was suffered to remain in the New York Custom House, like a corpse, and was laid among the old lumber and unclaimed baggage. At last it was sold for old iron and such-like trumpery, nobody about the Custom House having the gumption to know that such a valuable apparatus was anything more than some wheels, pieces of glass, and so on. It was purchased for $300, and no sooner was this done than up awakened the Rip Van Winkles of the Light-house Board, and a writ of replevin was issued to reclaim it for the Government, as having been sold by a mistake. This led to a long law suit between the purchasers and the blundering officials; but at last it was obtained by government, and has been taken to Philadelphia, where it was exhibited on the 16th ult., at the monthly meeting of the Franklin Institute, by Lieut. Meade, U. S. Navy, who has put it together for the purpose of ascertaining whether or not it was perfect in all its parts. It is stated that those who witnessed the exhibition were almost overwhelmed with the mass of concentrated rays, and were nearly blinded. It is a Fresnel of the first magnitude and perfect in all its parts, excepting a few fractures which can easily be repaired and which were caused by the clumsy application of a crow-bar in opening one of the boxes. It will be set up in the Carysfort Light-house, where it should have been long ago, had our light-houses been under better management. The workmanship is excellent, and all the machinery is beautifully executed.

American Superiority at the World's Fair.

This is the title of a work by Charles T. Rogers, of Louisiana, as an accompaniment to a Chromo-Lithographic Picture, illustrative of the prizes awarded to American citizens at the World's Fair. This plate is the richest work of lithographic art, we believe, ever produced in our country. In the centre is the "Yacht America," with the stars and stripes floating aloft, bowling along so far ahead of all the yachts of the Royal Club, that no second is to be seen. The machines, works of art, and manufactured products, for which prize medals were awarded to Americans, number forty-one; these are all exhibited in this picture, and the handsome volume which accompanies them, gives a full description of each separately. The book has a lithographic likeness of Mr. Edward Riddle, U. S. Commissioner, and it is illustrated with a number of very fine engravings. We believe that Mr. Stansbury was to prepare a work with drawings of the various useful machines, &c., exhibited at the World's Fair, for our Government, but most of the works which have to be prepared and printed under our government superintendance at Washington, are always so far behind the age, in point of time, that before they are printed they have become old and seedy, because all the information they contain generally finds its way to the public long before the government printer has set up the first type. We are therefore much indebted to Mr. Rogers for this book at this particular time; some of his selections of remarks from newspapers we do not think are correct, but they are all spirited and graphic. We all remember what a poor show the American division made with its ill filled squares, in comparison with the departments of other nations, and we know how much "down in the mouth"—to use a common expression—we felt at the beginning of the Fair, on account of this; some quarrels among our countrymen, and the taunting remarks of the "London Times" almost gave us the blues, but the old proverb, "a bad beginning has a good ending," proved to be true as gospel in our case. First Hobbs began and knocked the whole science out of the famous English Bramah and Chubb Locks, and carried off, with a lightsome snap of his fingers, the prize of $1000 in gold; then came the triumph of McCormick's Reaper, and, finally, the Yacht America put on the cap stone of triumph by beating the whole of the Royal Squadron. The American Department which, before that, was visited by few of the visitors, now became quite a lion, and the "London Times," which aforetime had been so bitter, eat up its previous language, and declared that in things useful and of practical utility, America fairly bore the bell at the Great Exhibition. Our country has reason to feel proud of what was done by our countrymen at the World's Fair, but at the same time we do say, that, had the arrangements been made by other hands and heads, than those which made them, at Washington, we would have stood forth at the Great Exhibition in number as well as in the quality of exhibitors—the Model Department—"the Division of the Great Transatlantic Republic." As it is, we are thankful, and those who wish to freshen their memories and feelings with what our countrymen accomplished at the World's Fair, must get this plate and book. It is for sale by Schaller & Maggi, No. 7 Nassau street, N. Y.

Stewart's Rotary Engine.

J. A. Stewart, the inventor of the rotary steam engine illustrated on page 57, Volume 6, Scientific American writing to us from Mitchellsville, Tenn., says, "the experiment of uniting the power of two steam wheels, through the medium of outside wheels, has been successful," and he has three of his engines in that section of country running on that plan. One has been in operation four months, with a cylinder boiler 28 inches in dirmeter, and 32 feet long. It generates steam enough to saw with one of Page's 52 inch saws, 4,000 feet of surface per 12 hours, the slabs, without the saw-dust, making all the fuel required. Another engine of the kind has been applied to grinding. Both of the engines were made at the Eagle Foundry, St. Louis."

He has another engine of the kind which was made in Cincinnati, which run well for nearly four years. To it he also applied outside wheels, and a great improvement has been effected. The backlash has all been done away, and as applied to grinding grain, it operates in a most satisfactory manner.

Barrow's Rotary Steam Engine.

On Wednesday, Sept. 22, at the invitation of Ebenezer Barrows, Esq., we accompanied him on the first trial trip of his new miniature steamboat "Rotary," fitted with his improved rotary engine. The boat is 70 feet long, and the engine cylinder only 30 inches in diameter, and 12 inches in length, with a steam way of only 2¼ inches in depth, or of an area of 27 square inches, and as the steam in this passage acts upon only two pistons at once, the entire surface acted on by the steam is only 54 square inches, or about equal to that of a cylinder 8 inches in diameter. With an average pressure of about 45 lbs. to the square inch, the boat was propelled against a strong head wind and tide at an average rate of about nine miles an hour,—the trip from the Battery to Yonkers and back, about 36 miles, against tide both ways, occupying 4 hours and 5 minutes; the upward passage being against a strong head wind. During a great portion of the trip, the speed was much higher than that we have given as the average made, and must have reached 11 or 12 miles an hour, but owing to the quality of the coal provided, the fire had to be almost entirely withdrawn soon after starting, the fire-bars being so covered with clinkers as to almost entirely stop the draught, and during this time the steam was unavoidably allowed to descend to 22 lbs. On the fire being renewed, the boiler, a very small one, got up steam to 90 lbs., the engine working the whole time, and cold water being continually fed in. We think it necessary, in justice to Mr. B., to state the disadvantages under which his experiment was made. The consumption of coal required to propel this boat is only about 110 lbs. per hour. The engine throughout worked beautifully and regularly, and we do not recollect ever having been in any steam vessel where the vibration was so imperceptible. The room taken up by the machinery is less than that of an ordinary two horse-power engine, so that the economy of space is great. Upon the whole, we think the experiment, especially as a first one, was very successful, and under more favorable circumstances a vastly better result will be accomplished. The engine, notwithstanding the small area of steam surface, has been proven to be capable of propelling the boat with a very low pressure of steam. We are assured by Mr. B. that the friction of the engine is so slight that it only requires a pressure of two and a-half pounds to overcome it and set the engine in motion; this is about one half the friction allowed by engineers. With a large vessel there is no doubt that an extremely high speed could be obtained.

Through the Scientific American Patent Agency, Mr. Barrows has obtained patents for England, Scotland, France, and Belgium, and the patent in this country is ready to issue upon the inventor's order. We are preparing engravings of the Engine, which will appear next week.

Those Glass Dials.

We observe by the Philadelphia papers, that the Councils of that city have made arrangements with Messrs. Sherry & Byram, of Sag Harbor, N. Y., to furnish glass dials for the old State House Clock, otherwise known as "Independence Hall." Each dial will be 7 feet 6 inches in diameter, and composed of one piece of glass. The genius of Mr. Byram is rapidly winging its way, and specimens of his handiwork, in the shape of clocks, dials, &c., will soon be found in all parts of the United States.

Enrollment Papers.

We have in our possession the enrolled specifications of W. Van Anden, A. Chapman, J. H. Tuttle, and E. Barrows, English patents.