

Scientific American.

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The End of our Year.

With this number we close the tenth volume of the SCIENTIFIC AMERICAN, and drop the curtain upon the professional labors of an entire year. To one and all of many thousands of kind readers and friends, we return our sincere thanks for the aid they have lent us in sustaining our work during the past, and for the encouragement they have so nobly proffered, to increase our efforts in the future. They may rest assured that nothing within the reach of our humble capacities will be spared in order that we may merit the continuance of their generous patronage and approbation.

Set out in the size and form of an ordinary book, the contents of our last year's volume would cover hardly less than two thousand pages, with near five hundred fresh, original engravings. No expense or pains have been omitted to render our work, in a measure, complete in all its divisions. The world of discovery and knowledge has been watched and ransacked, and its various departments made to contribute, in some degree, to the wants and interests of the great family of minds within our care.

In compensation for these outlays and labors we have levied a tax upon our subscribers of two-thirds of a cent per diem from each,—the sum they pay for our paper at the subscription price of \$2 a year. When we reflect that the ordinary cost of a good Encyclopædia is seldom less than ten dollars, and that such a work touches not a tithe of the subjects which come within the range of a single volume of the SCIENTIFIC AMERICAN, we think none of our readers will be apt to regard the levy we make as very extravagant. On the contrary, they cannot fail to be impressed with the extraordinary cheapness of our publication, while they feel that its circulation ought to be extended to the highest possible degree. We ask, this year, that each of our subscribers will act under the impulse of such thoughts; that he will use a little personal exertion to increase the number of subscribers to our work; that he will endeavor, for once, to gladden our hearts, and also contribute his mite towards the spread of sound and useful information, by endeavoring to send us at least one new name, with his own, on the renewal of his subscription.

More About Lightning and its Conductors.

Lightning rods do not attract electricity, nor is that their object; they are simple conductors of the electric fluid, and are erected higher than the other parts of buildings so as to act as highways for the fluid from the cloud to the earth.

The great number of houses, towers, and ships without rods that have been struck with lightning, afford evidence that it always selects the nearest object from a surcharged cloud to reach the earth. With respect to lightning and its action, Sir Snow Harris, who has perhaps written most ably on the subject, says: "lightning is the evidence of some occult power of nature forcing a path through substances which offer greater or less resistance to its progress, such as atmospheric air, vitreous and dry vegetable substances, and the like. In the case of such bodies, a powerful evolution of light and heat attends its course, together with an irresistible and disruptive force, by which compact substances are rent asunder, whereas it finds an easy path through some substances which offer but little resistance, such as copper, iron, &c." By good metallic conductors, then, lightning becomes transformed into an unseen harmless current, hence the great benefit of and necessity for the use of such protectives in all countries subject to severe thunder storms. A lightning rod, to be effective, must be of such a capacity as to conduct all the electric current unseen to the earth, for if too small it may be fused, and the current will discharge itself through other parts of a building. It must always be continuous, and terminate in some moist part of the earth, to conduct it away and dissipate it in the mass below. The larger the electric conductor, the better, for it possesses the greater capacity to conduct the current with safety and ease. If the bed of a stream is too narrow to allow the passage of

accumulated waters, they overflow its banks and carry destruction in their course, but if its banks are high and spacious they confine the water, and protect the surrounding vales; it is the same with electric conductors. If all houses were built of metal, such as cast iron, they would be perfectly free from danger by lightning, as great masses of conducting material obviate all danger. We have seen many lightning conductors put up too small to be of any great value, and others erected displaying equal ignorance of the nature of lightning.—Thus, some rods are made to terminate in a dry sandy soil and others in ground which becomes hard, dry, and caked in summer.—The effect of such methods of terminating the conducting rods is like raising a dam to obstruct the progress of a swollen river. Conductors shall always terminate in moist earth, or in water.

For the central tower, 150 feet above the roof of the new House of Parliament in London, Sir Snow Harris recommends a capacious conductor of a copper tube two inches in diameter and one-eighth of an inch thick, and conducted to the earth in as straight a direction as possible, and also connected to all other metal tubing in the building, for the purpose of spreading the electric current through numerous channels, and thus weaken its force.

Sheet copper for conductors 5 inches wide and 3-8ths thick, is sold at 31 1-2 cents per foot. Such strips of copper have proven to be safe conductors for ships, and they will make most beautiful ones for houses. As conductors require to be large—possess mass—according to their length, those for houses need not be so broad as those for ships. Such copper sheets cut into ribbons 2 1-2 inches wide, would embrace a solid capacity of nearly half a cubic inch of metal, costing not quite 16 cents per foot. How easily these can be laid along the crowns of roofs, and up the sides of gables and chimneys. It would be well to have a point extending above every chimney in a house, and all of them perfectly connected to the copper strips, and the latter terminating by a suitable rod in the earth. Copper is eight times a better conductor than iron, and not so subject to oxydation.

We have lately seen lightning conductors composed of copper and iron wires, twisted together and connected at the foot in the ground with a cylinder of zinc. The object of this combination is to prevent—as we have been assured it would—the iron being coated with an oxyd, which impairs its conducting qualities. Sir Humphrey Davy noticed that substances would only combine chemically when in different electrical states, and that by bringing a body naturally positive into an artificially negative state, its usual powers of combination were destroyed. Copper is a metal but slightly positive, and by bringing it in contact with another, to render it slightly negative, the decomposing action of moisture and air are rendered null. He therefore attached a piece of zinc about an inch square to a plate of copper, and immersed it in sea water, and the result was that the zinc preserved fifty square inches of the copper from corrosion. An iron nail secured to the copper plate produced the same results. The copper was preserved, but the iron and zinc slowly corroded. If a cheap lightning conductor, composed of iron and copper wire, can be preserved from corrosion by a small zinc cylinder in the ground—which can be renewed often at but little expense—then an object of some importance is accomplished, but this is a question which only relates to the preservation from oxydation of the conductors.

Statistics of the New York and Erie Railroad for July.

We are indebted to the General Superintendent, D. C. McCallum, Esq., for statistics of the work done and expenses of all the divisions of the above railroad during the month of July last. These are embraced in tables, showing the amount of miles run by each engine (with its number pointed out,) the load carried, and the whole expenses for fuel, oil, tallow, waste, repairs, wages, &c. The number of miles run on the whole lines, 249,470; the cost for engines and firemen was \$13,185,67, (5 29-100 cts. per mile;) the miles run to one pint of oil, 15 53-100; the cost per mile for waste, tallow, and oil, 1 31-100 cents; the cost for repairs of

engines per mile, 5 72-100; the cost of fuel (wood) per mile, 11 12-100 cents—31 38-100 miles run with one cord. The total cost, \$58,469,92 (23 44-100 cents per mile.) These tables are prepared for the benefit of the employees, and since the commencement of their publication, there has been a considerable reduction of expenses. In the month of May, the total cost per mile was 25 49-100 cents; in June, 24 30-100; in July, 23 44-100—amounting to 2.05-100 per mile, thus saving more than the expense for oil, waste, and tallow. The greatest constant expense for any one item is that of fuel, it amounts to more than double the expense for repairs of engines. Improvements for reducing the cost by the use of coal, or some other means are much wanted.

Alarming Encroachment on the Patent Office.

An esteemed correspondent, resident in Washington, informs us that the Secretary of the Interior has just issued a command directing the immediate surrender of one entire floor of the new Patent Office building, to the uses of the Indian Department. In less than a week's time, he presumes that an army of scribbling clerks, will occupy the noble halls, which wise statesmen of former days, had set aside and consecrated to the promotion of American genius.

We can regard this action as little better than an official outrage, which, if left to reach a full consummation, will result in evils of a very serious nature. It is, we fear, but the beginning of a sad retrogression in the affairs of the Patent Office, consequent upon the want of a vigorous and determined chief.

When the Hon. Charles Mason occupied the Commissionership, he resisted, successfully, all such attempts to abridge the usefulness of the Patent Office. He saw how the interests of inventors had suffered—and through them the whole country—by reason of the crowded and pinched space then allowed. Models had to be heaped up in promiscuous piles, never to be got at when wanted. Drawings and matters for immediate reference were deposited, some in one room and some in another. Every thing was confused and inconvenient, to such a degree, that labors which are now done promptly in an hour's time, were then dragged along for days and weeks, nay even months. Our readers are familiar with the history of his reformatory operations; they know how he gradually rescued the department from its deplorable condition, infused new life apparently into the entire patent system, put an end to those deadly delays in the issue of patents which had so long disheartened inventors, increased the business and revenues, and then, to the regret of all,—left office.

No sooner is his back turned than the insidious efforts of politicians are put to work, again to undermine and cripple the efficiency of this noble branch of the public service. Unless something is soon done to arrest the new encroachment, inventors may expect, ere long, to be compelled to await the action of the government upon their patent cases by the year, instead of by the week, as at present.

The Secretary of the Interior will add nothing to his reputation for sagacity and statesmanship by this uncalled-for thrust into the vitals of the Patent Office. Instead of retarding and reducing the Department, it should be his highest study to promote its convenience and extend the sphere of its usefulness. We are surprised that he should regard the personal comfort of his Indian clerks, as superior, in importance, to the free and unrestrained operation of the United States Patent Office—that glorious institution through whose instrumentality the long catalogue of splendid inventions and discoveries, which now help to prosper our country and give her a name throughout the world, have been called into existence.

Shocking Railroad Accident.

A most lamentable railroad accident occurred on the Camden and Amboy Railroad, N. J., on the 29th ult. by which three passenger cars were smashed to atoms, twenty of the passengers killed, and seventy wounded.

The 10 o'clock train from Philadelphia had arrived at Burlington on its way to New York, somewhat behind its usual time, and was obliged to wait there ten minutes for the 8 o'clock train from New York, which was also behind time. Having waited the required time

it moved cautiously on its way for about three miles, when it was discovered that the New York train had arrived first at the half-way post, and was, by the rules of the road, entitled to the track. It then backed at the rate of twenty miles per hour, when it came into collision, on a crossing, with the horses attached to the light pleasure wagon of a Dr. Heineken, about half a mile from Burlington. The horses were killed instantaneously, one being thrown forty yards from the track.

The scene was horrible. The cars were piled upon each other, and numbers of human beings were lying among the ruins—some dead, some dying, some shrieking from pain. Those saved in the train, and the passengers on the down train, aided by citizens of Burlington, who were quickly informed of the terrible accident, went to work to rescue the wounded and dying from the ruins. As soon as taken out they were conveyed to Burlington, where many private houses were thrown open to the admission of the wounded. The coroner's jury has been employed since in investigating the causes of this terrible catastrophe. These appear to be transparent; the fault lies entirely, we think, with the managers of the railroad. If the road had a double track, the accident would not have taken place. For years we have advocated double tracks, well fenced in, with gates at all the crossings. If such improvements were made on all our railroads, no collisions would ever take place. There is less excuse for this old, wealthy railroad corporation not having these improvements, than any other in our country.

Van Amringe's Fire Ladder.

A trial of Van Amringe's Fire Ladder was made at Cincinnati a few days since, with complete success. The machine is mounted upon wheels, and the ladder proper consists of four spars, forty-five feet long, each springing from a corner of the bed, which is ten feet by fifteen. When not in use, the spars are lowered past each other, and rest upon supports at each end of the bed, so that one pair projects over the horses, and the other "astern." The affair looked heavy and cumbersome, but upon its arrival upon the ground it was erected, by means of a rope attached to the top of one pair of spars, and run over a sheave on the other to a windlass on the bed, in forty-five seconds. Several lines of hose had been attached to the gallery previous to erection, and before the horses were unhitched four men were upon the highest gallery, fifty feet from the ground, and coupling their hose pipes. It was afterwards drawn along the street with five men in the highest gallery, and six men in the lower ones, of which there are four, corresponding in height with windows in different stories of houses.

Altogether, it is a plain, common sense invention, which relieves firemen from the dangerous duty of clambering over slippery roofs, blinded by smoke and glare, and in constant dread of falling walls and roofs, while the force required to work it effectually is but four men and two horses. Measures have been taken to secure a patent.

INVENTIVE ACTIVITY—111 applications for home and foreign patents were made through the Scientific American Agency last month.

SPLENDID CASH PRIZES!

The proprietors of the SCIENTIFIC AMERICAN will pay in cash the following splendid prizes for the fourteen largest list of subscribers sent in between the present time and the 1st of January, 1856; to wit:

For the largest List	\$100
For the 2d largest List	75
For the 3d largest List	65
For the 4th largest List	55
For the 5th largest List	50
For the 6th largest List	45
For the 7th largest List	40
For the 8th largest List	35
For the 9th largest List	30
For the 10th largest List	25
For the 11th largest List	20
For the 12th largest List	15
For the 13th largest List	10
For the 14th largest List	5

Names can be sent in at different times, and from different Post Offices. The cash will be paid to the order of the successful competitor immediately after the 1st of January, 1856.—Southern, Western, and Canada money taken for subscriptions. Post-pay all letters, and direct to

MUNN & CO 128 Fulton st., New York. See prospectus on the last page.