

## LIGHTNING CONDUCTORS AND ATTRACTORS.

We published an article on this subject on page 305 of the present volume of the SCIENTIFIC AMERICAN, and now recur to it again for the reason it has excited considerable attention. We stated that a lightning-rod was simply a conductor, not an attractor; this is the statement which has caused some commotion, and in regard to which we will make some further comments, in order to spread reliable information before our readers on this important topic. A correspondent writing to us comes to the central idea at once, and says: "Does the point of a rod have no attractive power? If so, why have a point on a rod? A round ball would do better, as it has more conducting surface."

If the efficiency of a lightning-rod depended upon its attractive power, and if this power were centered in its point, then a cheap pointed wooden rod would answer as good a purpose as one of metal. There can be no retreat from this conclusion, as the form (point) and not the material is held to be the attractive agent which invites the electric fluid, and draws it safely down to the earth. The phenomena of attraction and repulsion belong to electrified bodies, but this is a very subtle and intricate branch of electric science connected with induction. No lightning-rod, however, is ever erected upon any other consideration than that of a conductor, and its efficiency depends entirely upon its conducting capacity. A steel magnet possesses attractive and repulsive power, but copper does not, and yet the latter metal is much superior for a lightning-rod. A copper rod one-fourth of an inch in diameter is as effective as a steel rod one inch in diameter. A lightning-rod composed of iron or copper, having a ball on it, will conduct lightning from a thunder cloud to the earth, but a pointed rod made of wood or any other non-conducting substance will not answer the purpose at all. Every person knows this; why, then, should there be a single question raised regarding the office of a lightning-rod being simply that of a conductor?

An immense amount of quasi-science has been published by some of our daily papers on this subject, but there is not a person in the world whose scientific opinion on electrical subjects is worth a straw that regards a lightning-rod in any other light than as a conductor. The term is so used by Sir Snow Harris, the most recent writer on the subject. He says: "A prejudice once arose against their use (lightning-rods) under the idea that they did more harm than good, by inviting (another term for attraction) the destruction they were intended to prevent. An attentive examination, however, of numerous cases of damage from lightning has shown that the path of discharge from the cloud to the earth has always been in the line of the least resistance. This line is in all cases the shortest electrical distance; the lightning picks out the best conductors in its transit to the earth. The conductor ought to be of metal, and as metals greatly vary in power (lead 1, tin 2, iron 2.4, zinc 4, and copper 12), one of the best should be selected, and copper has many advantages over every other metal. It is found that a copper rod three-quarters of an inch in diameter, or an equal quantity of copper in any other form is capable of resisting the heating effect of any charge of electricity whose effects have been recorded."

Such authority is worthy of attention, yet, as we are not in the habit of pinning our faith to great men's names without some practical data to back it up, we will adduce one or two facts on the subject. Franklin, in one of his letters published in the "Philosophical Transactions" (London), Vol. 64, states that Professor Winthrop saw a tree struck by lightning at a distance of only 52 feet from a pointed conductor attached to a house. The tree was shivered while the house and rod escaped. That is, the lightning fell upon an object which is generally held to have no attraction for it, in preference to one which some say attracts it. Franklin also states that, in endeavoring to draw off electricity from a charged sphere, by means of a pointed wire, he found that the point when placed on a glass rod or a piece of wax (non-conductors) had no action whatever to draw it. Had it been an attractor, it certainly would have drawn off the electric fluid.

In the report of the "Commission on Shipwreck by Electricity," appointed by the British government, Capt. Wellesley, of the frigate *Sapphire*, which was furnished with copper conductors, says:—"The *Sapphire* often met with severe lightning, but it was never attracted to her."

We could furnish several other statements of a similar character, but these are sufficient for the present. If lightning-rods were attractors, instead of being simple conductors, then they would be most dangerous devices, as they would invite the electricity to the destruction of life and property, instead of furnishing safeguards for them.

## INFRINGEMENT CASE.

UNITED STATES CIRCUIT COURT, BOSTON.

Before Judge Sprague as referee.

Nov. 19—*Milton D. Whipple vs. The Middlesex Company at Lowell*.—A patent case of considerable importance to wool manufacturers has just been tried and decided before his Honor, Judge Sprague, of the United States Circuit Court at Boston. An action was brought by Milton D. Whipple, of Charlestown, Mass., against The Middlesex Company at Lowell, Mass., for alleged infringements by them of plaintiff's patent for a machine for burring wool. The defendants use what are called the Parkhurst or Goddard steel ring or steel-toothed ring burring cylinders, in connection with their carding-engines. The case was contested with great ability and vigor, with a strong array of counsel and witnesses. A. B. Ely, Esq., of Boston, appeared for the plaintiff, assisted by the Hon. B. R. Curtis and J. Giles, Esq., also of Boston. Hon. B. F. Butler appeared for the Middlesex Company; in addition Mr. Goddard was represented by C. L. Woodbury, Esq., of Boston; and Mr. Parkhurst and the Atlas Manufacturing Company were represented by J. G. King and George T. Curtis, Esqrs., of Boston, and George Gifford, Esq., of New York. A case involving the same issues having been once tried by a jury in Boston, and a verdict had for the plaintiff, and another case having been tried in Connecticut, before Judge Ingersoll, and judgment also had for the plaintiff, it was agreed that this case should be submitted to Judge Sprague as a referee, and it was accordingly so submitted and tried. After a thorough and careful investigation, a decision has been finally given, sustaining the patent and the fact of infringement; and damages have been awarded for \$2,000 and costs, which may amount to \$1,000 more.

## LOOK OUT FOR THE LOCOMOTIVE!

We are much obliged to the *Locomotive*, a sprightly paper published at Indianapolis, Ind., for the following friendly notice. Our go-ahead cotemporary is the official paper appointed to publish the weekly list of letters; it having the largest circulation within the general delivery of the Indianapolis post-office:—

"We would call attention to the prospectus of the SCIENTIFIC AMERICAN, in another column. This paper is known to all practical men, and there are few who can afford to do without it. The reliable and valuable information it contains in a year will profit any man fifty times more than any investment of the same amount we know of. It is one of our especial favorites, and will be of all that take it and read it regularly."

LEISURE.—How happy all ought to be who have leisure, a freedom from business or hurry, a convenience of time to do just what the mind dictates—to read, to walk, to ride, to study, or to pray. We hope you, who have leisure, have a consideration for those who have it not. Many a weary limb will rest to-night, but to labor again on the morrow, on and on, day after day, from sunrise till far into the coming night. To such, leisure is unknown. They may be likened unto the apostles, "coming and going, and they had no leisure so much as to eat." You who have leisure, be proud of it, make use of it; once past, it is sunk into the catacomb of eternity. Leisure is spare time, and properly employed, it is so much of life increased beyond its natural span.

"Make time in time, while time doth last;  
For time is no time, when time's past."

EXTENSION OF STREET RAILROADS.—Street railroads are rapidly being built in every city in the Union. They are already in operation in Pittsburg, Cincinnati, Chicago, St. Louis, Baltimore, New York, Brooklyn, and Boston, and are now beginning to appear among the other chief cities, such as Milwaukee, Detroit, &c. In Cleveland, Ohio, the building of a line has been commenced. One portion of the plan of this work contemplates a curve in the side of a hill. The whole length of the route is four and one-fifth miles, and it is to be built and run under the management of Mr. H. S. Stevens, the present proprietor of the omnibus line traversing the same route.

## A COLUMN OF INTERESTING VARIETIES.

At a recent meeting of the American Institute, it was verbally stated by the Fair Committee, that the receipts of the late annual fair amounted to \$13,000, that there had been \$13,560 expended, and that there remained bills still due amounting to \$2,500, a deficiency which was caused by the expenses of the agricultural fair and the steam plow. The treasurer was ordered to appropriate sufficient money from the treasury of the institute to cover the deficiency occasioned.....An English architect (Mr. Tite) says: "So far as I have observed, all artificial systems of ventilation are a failure. Whether you have to ventilate a large room or a House of Parliament, the best way is to open a window.".....The city of New York is in the same latitude as Naples, in the south of Italy.....The cupola on the New York City Hall, which was burned at the time of the great cable celebration, is just being rebuilt.....M. Thiers, in 1834, while in the French ministry, gave as his opinion, after returning from England, where he had seen the Liverpool and Manchester Railway, that "railways were only toys for the curious, or means of transport in exceptional cases, only".....Professor Whitney, of Yale College, is engaged in the translation and publication of a Hindoo work on astronomy.....There were 366 locomotives employed in the working of 1,573 miles of railroad in Canada on the first of January last. Of this number of engines, 209 had been built in the United States, 110 in England, and 47 in Canada.....In Messrs. Cail's locomotive factory, at Paris, in which are about 1,200 workmen, 82 draughtsmen are constantly employed.....There are carp in the lakes of Fontainebleau, which, from certain marks, are believed to be 300 years of age.....Church bells are occasionally made of glass, and one 14 inches high and 13 inches in diameter has recently been placed in the turret of a chapel at Borrowdale, England.....Most of the German and Prussian railroads, which have been found to be the safest in the world, have single lines only.....A salt company is boring an artesian well at Grand Rapids, Mich. The *Eagle* says the deeper they go the stronger is the brine they get. They have reached a depth of 250 feet, and the water that boiled up tasted quite as briny as that of the ocean, and looked, when running into and mingling with fresh water, like milk.....The tunnel on the Covington and Ohio Railroad, in Virginia, is 4,700 feet long, and 700 feet below the surface of the earth. It is 300 feet longer than the Blue Ridge tunnel. The width is 27 feet, to accommodate a double track, and the height is 23 feet.....Mr. Mudie, of London, is the proprietor of the largest circulating library extant owned by one person. Since January, 1858, 200,000 volumes have been added to his collection. The list of these works indicate, to some extent, the relative circulation of different classes of literature in England. The books are thus classed: history and biography, 56,472 volumes; travel and adventure, 25,552; fiction, 87,780; miscellaneous, including works of science and religion and the principal reviews, 45,250. Total, 215,054. The present rate of increase of Mr. Mudie's library exceeds 120,000 volumes per annum, consisting chiefly of works of permanent interest and value.....The sale of Rufus Choate's library, just completed by auction, will realize to his family about \$15,000.....The British Museum has just received a magnificent addition to its numismatic treasures, by the gift, from the Count de Salis, of his well-known collection of coins. These are in 14 cabinets, containing, altogether, as many as 7,000 coins, brought together with the greatest taste during many years of the count's life, and at an expense of about £5,000.....Mr. Alfred Robinson, of Hartford, has in his possession a Hebrew shekel which is supposed to be more than 3,000 years old. They are said to be valued at \$100 each.....Careful analyses and experiments, made by officers of the United States government and by those of the State of New York, have shown that the salt made at Onondaga, in this State, is the purest and best of any in the world.....There is in Bourbon, Ky., a family, consisting of a man, his wife, and eight children, whose average height is 6 feet 4½ inches, and average weight 214 lbs. One of the sons is the tallest in the family, and measures 6 feet 11 inches; he also weighs almost 296 lbs. A daughter who died was 6 feet 3 inches in height, and weighed 160 pounds.....Astronomy was first studied by the Moors, and by them introduced into Europe in 1201.