

of lightning is yet unaccounted for, and its extreme rarity renders it practically of small importance.

The ancient idea that the destructive effects of lightning were produced by the projection of a solid body from the clouds which was called a thunder bolt, is still entertained by many; and it is claimed that these bolts have been found imbedded in the sand at the point indicated by the course of discharge. The supposed thunder-bolts are hollow tubes coated on the interior with brilliant glass, and are formed of sand vitrified by the intense heat. They are winding in their form, often throwing out lateral spurs, or branches, and contracted in size toward the lowest extremity. They generally terminate at a spring of water or other good conductor of electricity. The diameters of the main tubes vary from four hundredths of an inch to three inches and a half; and they are often many yards in length. One is on record which was forty feet long. The thickness of the sides vary from one fiftieth of an inch to nearly an inch. These formations have received the name of fulgurites, and are of quite frequent occurrence upon the sandy plains of Silesia where they were first discovered.

There is a prevalent doubt in the popular mind as to the utility of lightning rods. Some grounds for distrust have been created by their improper construction and by the failure to attend to requisite repairs in season. The main cause of doubt is, however, to be attributed to want of knowledge in regard to the principles upon which they are constructed.

The action of a lightning rod depends upon the principles of electric induction, and the power which pointed conductors possess, of conducting away electricity silently and without explosive effects. The tension of electricity upon the surface of a sphere is everywhere uniform. On an ellipsoid the greatest tension is found at the extremities. Pointed rods may be regarded as modifications of the latter form, and when electrified the tension at their points becomes so great in proportion to their entire surface, that discharges take place in rapid succession and in so small quantity as to be harmless in their effects. Induction is the production of an opposite state of electricity in any body, by the proximity of another body positively or negatively electrified. Thus a cloud positively electrified would induce negative electricity in the earth below it, or, positive electricity if negatively electrified. A good conductor having one end in contact with the earth, and the other raised to a considerable height and terminating with points, restores the equilibrium between the two bodies, or so to speak, effects the recombination of the positive and negative electricities which renders them inert. This would not be done with a sudden and violent discharge, but by a series of minute discharges, which might be considered as practically a continuous flow. These discharges may take place from the cloud to the earth, or vice versa. It having been shown, however, that positive electricity passes through the air with greater facility than negative, it is probable that the discharge takes place in a direction from the positive to the negative, as the case may be. The discharges are most frequently from the clouds to the earth. In either case the discharge will follow—all other things being equal—the nearest conductor. If, then, the lightning rod is higher than any other part of a building within a certain distance, and is constructed of materials and of a size which render it a better conductor than the structure which it is designed to protect, it becomes a reliable safe-guard from the destructive effects of lightning.

It will be seen from these facts that the opinion that lightning-rods attract discharges of electricity, and thus endanger the safety of buildings has no foundation whatever. The conditions for a discharge must be established before it can take place through a lightning-rod or otherwise, and the employment of the rod is simply the substitution of a good and safe conductor for an imperfect and dangerous one.

DIFFERENCES IN OPINION.

Among the numerous causes of differences in opinion there is none more common than misconception. The peculiarity of the differences in opinion that arise from misconception is that they are rather apparent than real. It is often the case that parties engaged in hot dispute are surprised to find, that when they come to comprehend, fully, each others meaning, they agree perfectly.

Such disagreements are very apt to arise in the discussion of theories and hypotheses which can not be brought to the test of experiment, or subjected to rigid mathematical demonstration. In such discussions it is exceedingly difficult to express a proposition so clearly, or to give so complete definitions that the meaning intended shall be fully understood, and nothing more; and greater differences of opinion will be found in speculative philosophy than in the entire range of the positive sciences.

Volumes have been written to defend diverse doctrines which are based upon different conceptions of the meaning of the word space. The same may be said of each of the words time, cause, effect, distance, force, existence, and many others. The meaning of the word poison has never been fully agreed upon. Of course we refer, not to the popular sense in which it is used, but to its scientific signification.

Nothing is so difficult as to define. This difficulty, and the great effort to avoid misconception, which speculative writers feel to be a necessity, is apt to give the reader the impression of heaviness and want of conciseness in the works of such authors. Such subjects can not be discussed hastily, or be understood by desultory and careless perusal. Each thought is labored, and its clear expression demands the severest and most critical use of language. The same critical analysis is required in its perusal, in order to properly conceive the author's meaning.

It seems to be one of the inevitable tendencies of language to saddle words with different significations. In ordinary conversation and communication, this does not occasion so much inconvenience as in scientific and philosophical discussion, yet even in our most common intercourse we often misunderstand each other from this cause.

It is necessary then, in order to avoid misconception in writing and talking upon scientific matters, to first state distinctly the meanings of the terms employed, and secondly, to so express all propositions that, if properly considered, there shall be little or no possibility of being misunderstood. It is also necessary in the conduct of a dispute upon such topics, to accept the significations given, and not to allow ourselves to substitute a signification of our own for that given by an opponent. If a definition of terms cannot be agreed upon, there is an end to profitable argument.

Such diversities of opinion, would more readily be harmonized were it not for the peculiar tendency of the mind to antagonistic action, rather than passive reciprocity, in listening to the arguments of others. It is difficult to fix attention upon, and give due weight to the opinions and arguments of another, because it is hard to resist mentally framing arguments against them; and while the mind is thus engaged it is impossible to obtain the full force of the ideas advanced. Candid listeners are even more rare than candid talkers, and cool, dispassionate, and able thinkers, are rarer than either. It is well to consider these things when we find ourselves inclined to impatience with the views of others, and be perfectly sure that our differences are not such as arise from mutual misunderstanding.

\$250,000 FOR STAMP ERASER.

It is announced that Marcus P. Norton, of Troy, N. Y. has been awarded the sum of \$250,000 for the past use of his patent for canceling stamps, illustrated upon page 104, vol. IX, SCIENTIFIC AMERICAN. The report is that the Court of Claims certified their decision to Congress, and asked that a bill might pass, covering this amount in favor of Mr. Norton, which recommendation was promptly acted upon by Congress and the President's ten days for signing the bill expired a few days since. We have not seen the official report of these proceedings, but if true, we cannot but regard the transaction as extremely questionable.

The invention has been in use about five years, and the award is equal to \$50,000 a year, or at the rate of \$850,000 for the full term of the patent.

We are always pleased to record the success of inventors, but we should take no pleasure in allowing the people to be taxed after this fashion, and for an invention involving so little ingenuity. We do not believe the story.

SHOES.—It is said that a coat of gum copal varnish applied to the soles of boots and shoes, and repeated as it dries, until the pores are filled and the surface shines like polished mahogany, will make the soles waterproof, and also cause them to last three times as long as ordinary soles. We are inclined to think however that the sole would by this operation be rendered so inelastic as to endanger the integrity of the uppers, and also to render the boot uncomfortable to the foot. On boots however made of very stout leather and with very heavy soles this might not prove an objection.

ALFRED NOBEL'S nitroglycerin manufactory at Stockholm, Sweden, was recently blown up. Fifteen persons were killed and several seriously injured. The destruction of property in the neighborhood was also extensive. This occurrence, if any further evidence was required in addition to what was lately given by successive violent and fatal explosions, shows the extremely dangerous nature of nitroglycerin, and will do much toward weakening the statements lately made by Mr. Nobel, in leading European papers, with regard to the comparative safety of this compound.

OFFICIAL REPORT OF PATENTS AND CLAIMS Issued by the United States Patent Office. FOR THE WEEK ENDING JULY 7, 1868. Reported Officially for the Scientific American.

Table with 2 columns: Fee description and Amount. Includes 'On filing each caveat', 'On filing each application for a Patent', 'On issuing each original Patent', etc.

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

79,535.—MANUFACTURE OF VULCANIZED INDIA-RUBBER Balls.—Henry A. Alden, Matteawan, N. Y., assignor to The New York Rubber Company, New York city. I claim, 1. The method of forming the valve for the admission and discharge of air into and from rubber balls, or other hollow articles requiring to be distended by inflation, substantially in the manner herein shown and described. 2. A vulcanized india-rubber ball, or other like hollow article, the aperture or opening in which, for the passage of air, is closed by an elastic valve piece, provided with a slit or valve opening, &c., and applied to the interior surface of the ball, substantially as herein set forth. 3. The employment, in connection with the chamber or opening formed in the ball, and the elastic valve piece, for closing said chamber, of a shot, or its equivalent, inserted in said chamber, so as to close the valve tightly, and prevent the entrance of dirt, as set forth.

79,537.—MILL-SPINDLE SPRING.—Thomas Alsop, Elkhart, I claim the spindle C and pinion D, in combination with the spring C', when the same is connected with the spindle and pinion by means of the projecting pin c' and removable bolt c'', and the whole is constructed and arranged substantially as and for the purpose specified. 79,538.—FOG ALARM.—John H. Anderson, Brooklyn, N. Y. I claim the arrangement of the trumpet or horn, B, and hollow plunger, C, relatively to each other, and with the cylinder A, substantially as herein described for the purpose set forth. 79,539.—HARVESTER RAKE.—Charles J. Arlington, Auburn, N. Y., assignor to C. Wheeler, Jr. I claim, in a combined "reel rake," the arms of which are hinged to a head, moving around an axis nearly perpendicular to the platform, the rake-heads so hinged to their arms, and combined with springs, that their teeth shall be retained in a position nearly parallel to the platform in reeling, in combination with mechanism under the control of the operator, so that he can bring their teeth to a vertical position at pleasure, for the purpose of raking, substantially as described. Also, the combination, substantially as described, of a continuous fixed cam-way, for guiding the rake and reel arms, and a second moveable cam, which, when raised by the attendant, forms a guideway outside the first track, for controlling the rakes. Also, the spring, L, in combination with the arms, I, for the purpose of keeping the wheels, M, in proper working position, substantially as described. Also, the spring, P, as combined with the rake, N, and wing, A, for the purpose of keeping the rake out of the way of the grain in the process of reeling, substantially as described. 79,540.—GARDEN IMPLEMENT.—James Armstrong, Bucyrus, Ohio. I claim the sliding of the handle, A, through the eye of the frame, B, so as to lock the lower roller, C, by coming in contact with the teeth of said lower roller, in combination with all the other devices aforesaid, as herein described for the purposes set forth. 79,541.—RAILROAD CAR VENTILATOR.—G. W. R. Bayley and John McCuskey, Algiers, La. We claim the arrangement of the connecting rods, D and D2, with the connecting rods, F and F2, forming a series of operating mechanism for opening and closing the windows, in the manner and for the purposes described. 79,542.—CHURN.—S. Besser, Dorchester, Ill., assignor to himself and James Draper, St. Louis, Mo. I claim the dasher rod, C, when provided with a spiral groove, c1, and combined with the wheel, A, and connecting rod, B, and engaged by the pin c2, so as to produce a combined motion, as set forth. 79,543.—VEGETABLE SERVER.—Theodore F. Bigelow, Boston, Mass. I claim the apparatus above described, consisting of the base, A, the top B, the rollers, C, and a journal, arranged and operating substantially as described, when the same is made portable so as to be used on any ordinary table. 79,544.—STEAM GENERATOR.—William Branagan, Burlington, Iowa. I claim, 1st. The fire-chamber, A, terminating in a gas-chamber, A', and with a curved top-plate, in combination with the horizontal flues, a, a, and with the bent or angular water-pipes, D, and with the outer case or water-jacket, C, the said pipes D being inserted into the jacket by horizontal branches at points below the gas chamber and below the first horizontal flue, a, and the several parts being constructed and arranged together, substantially as described. 2d. The angular water-pipes, D, arranged directly in a line with the flues, a, a, and inserted into the outer case or jacket, C, and applied to the space G all around the case C and below the crown sheet A' of the fire box or chamber, all substantially in the manner and for the purposes described. 3d. A double-wall air-heating jacket, E, applied to a steam-boiler, substantially as and for the purposes described. 79,545.—GAS BURNER.—J. S. Bridgman and Edwin G. Wellman, Brockport, N. Y. We claim the branched burner, A, A', provided with the vertical nipples, a, a, and horizontal nipples, b, b, arranged as described, and operating in the manner and for the purpose specified. 79,546.—CHEESE SAFE, GAGE, AND CUTTER.—Edwin G. Bulgin, Vienna, N. J. I claim, 1st. The sliding doors, G and H, as arranged and combined with a rotary bottom and a cutting apparatus, for the purposes set forth. 2d. The arrangement and combination of the cutting knife, K, hand lever, O, regulating-screw, F, with a cheese safe, as described, for the purposes herein set forth. 3d. The graduated scale or index plate, L, the sliding plate, M, with its index finger, e, and the marker, I, as connected with a cheese-safe, for the purpose set forth. 79,547.—PLOW.—William D. Burgess and George W. Zeigler, Maumee, Ohio. We claim, 1st. The standard, C, constructed with a draught eye, c, parallel flanges, c', lugs, g, g, and a point C', adapted for receiving and having secured to it the shovel plate, J, and laterally-projecting hilling wings, G, G, substantially as described. 2d. The clevis, E, constructed with an eye, e, upon its front end, and also with a flanged slotted segmental portion, I, upon its rear end, substantially as described. 3d. The stand, K, constructed with a slotted foot piece, and a segmental elevation, the latter having recessed flanges formed upon it, substantially as described. 4th. Securing the handle support, K, to the beam, A, by means of the screw or bolt, which is used for securing the standard to said beam, substantially as described. 79,548.—MACHINE FOR MAKING TIN-LINED LEAD PIPE.—S. E. Chubbuck, (assignor to J. H. Chadwick), Boston, Mass. I claim, 1st. The combination of the annular fixed partition, D, with the cylinder, ram, and die, when all are arranged in relation one to another, as and so as to operate in the manner described. 2d. The construction and adaptation, one to the other, and to the mandrel, of the ram and annular partition, D, as shown and described. 79,549.—MACHINE FOR MAKING TIN-LINED LEAD PIPE.—S. E. Chubbuck and J. H. Chadwick (assignors to J. H. Chadwick), Boston, Mass. We claim the combination of the annular reciprocating casing, d, with the ram, cylinder, and die, when all are arranged, relative one to the other, as and so as to operate in the manner described. 79,550.—GUARD FASTENER FOR DOORS.—E. C. Cochrane, Buffalo, N. Y., assignor to himself and J. B. White, same place. I claim, 1st. The combination of a hinged bar attached to the jamb, and an arm attached to the door, for engagement with each other, substantially as and for the purpose set forth. 2d. The slot, c, of the hinged bar, enlarged at its inner end, to permit the disengagement of the arm from the rod only when the door is closed. 79,551.—HARVESTER.—J. F. Codrington, Bound Brook, N. J. I claim, 1st. The arrangement of shaft c', carrying the bevel pinion, c'', and gear wheel, d, and the shaft, b, carrying the spur pinion, d', and crank, b', and operating in connection with the bevel-wheel, c, on the axle, and the pitman, f', of the sickle, substantially as and for the purpose specified. 2d. The elbow-lever, m, constructed with a spring or yielding arm, m', for operating the sliding clutch wheel, d, substantially as set forth. 3d. The arrangement of the elbow-lever, m, circumferentially grooved hub, of the bevel-wheel, c, lever, r, and standard, s, substantially as and for the purpose specified. 4th. The transverse sliding piece, z, arranged at the inner end of the finger bar, c'', and in relation with the sickle, C, substantially as and for the purpose specified. 79,552.—QUILTING FRAME.—Mrs. Lois A. Collard, Plainview, Minn. I claim the combination of the hinged sides, A, A, and their cozs with the four hinged legs, B, B, having two staples on each, through which passes a pin, as and for the purposes set forth. 79,553.—VELOCIPED.—B. P. Crandall, New York city. I claim, 1st. In velocipedes, the combination, with the operating lever, J, of the tubular support, K, constructed of a hollow tube, K, having flanges, R, and the independent screw, L, as applied to the seat, I, in the manner and for the purpose specified. 2d. As an improvement in the mode of operating the steering apparatus of velocipedes, the parallel rods, E, having one end pivoted to the axle of the forward wheels, D, and the other end to the yoke, F, where by the said yoke and axle always move parallel to each other, substantially as described. Also, the reasoning or preparatory treatment of wood or timber by the method above described, in which the temperature of the vapors is elevated to a point above the temperature of the chamber containing the wood or timber, and the temperature of the wood or timber is, in cooling, allowed to fall more rapidly than that of the vapors, substantially in the manner and for the purposes hereinbefore mentioned. Also, the treatment of rail road ties, plies, and other timbers, by vapors, as above mentioned, in combination with the subsequent application of a solution of carbolic acid, or of petroleum oils, or of paraffine or other protecting substance, or as a preparatory treatment for the application of metallic or earthy solutions, substantially in the manner above described. Also, the arrangement and combination of the coil, distilling-vessel, and wood-chamber above mentioned, the whole being constructed and operating substantially in the manner and for the purposes aforesaid. 79,555.—CAR-AXLE.—Rowland Cromelien, Washington, D. C. I claim the construction of the swelled axle A' when made hollow, and with inner shoulders and nuts, a, a', and enclosing the bolt D with its spring E, E, all as arranged, and combined with the outer clamps as and for the purpose set forth. 79,556.—SHUTTLE.—Alexander H. Damon and James Whitaker, Lowell, Mass., assignors to Eaton & Ayer, Nashua, N. H. I claim, 1st. The forked stud, constructed substantially as described, and combined with a plate, a, and applied to the slotted-eyed shuttle, for the purpose set forth. 2d. The slotted curved plate, a, in combination with the screw, 10, the forked stud, and brushing, v, and the shuttle, for the purpose and substantially as described. 79,557.—SHUTTLE FOR LOOMS.—Alexander M. Damon and James Whitaker, Lowell, Mass., assignors to Eaton & Ayer, Nashua, N. H. We claim, 1st. In combination with the guide pins at the sides of the eye of the shuttle, the concentric plate, supporting stud, b, and plate, a, which covers the slot, c, in the side of the shuttle, in manner and for the purpose described.