in this city and considerable newspaper discussion have called public attention to all the facts, and full justice has been done to Morse, not only by his admiring and grateful countrymen, but by scientists and public men, by crowned heads and peoples in all parts of the world. He had to struggle for years against the prejudices and timidity of capitalists; he went to England in 1838 with his invention, only to find that an electric telegraph—in which the signals were conveyed by the pointing of a needle on a dial—had been already patented and introduced to the public by Messrs. Cooke and Wheatstone; but persistency at last met its reward, and success and fame, honors and wealth fell to his share; and he has left us after the enjoyment of a long life, crowned with an unusual meed of all those things for which men ordinarily toil and worry away their existences.

He was liberal and charitable in all his transactions, and took a paternal interest in all that belongs to the great invention he gave to the world. Living alternately in New York city and at his country residence on the Hudson, near Poughkeepsie, N. Y,, his face was well known to all classes of his countrymen; and the latter part of his life was unclouded by trouble, and his end was peaceful.

SPIRITUALISM ANSWERED BY SCIENCE.

Mr. H. L. Hinton, 744 Broadway, N. Y., has issued the pamphlet entitled as above, by the celebrated London barrister, Mr. Edward W. Cox, in which he gives expression to his views concerning spiritualism, or spirit manifestations, as deduced from the series of scientific experiments made last year in London, under the auspices of Dr. Crookes, Dr. Huggins, and others, Mr. Cox being one of the examining party. A description of some of these experiments, with drawings of the testing apparatus employed by Dr. Crookes, will be found in our back numbers.

In the present work Mr. Cox describes the various forms of spirit manifestations that he has witnessed, from which it is evident that he has been a careful and extensive observer. He has become fully satisfied that intelligent noises or rappings are actually produced, that chairs, tables, or other objects are undoubtedly moved, and that the proofs of the reality of these demonstrations are just as absolute as are the proofs of any other fact in nature. The force by which these demonstrations are made, he calls psychic force. It may be indicative, he thinks, of the existence of a soul within man, and it is this soul which he thinks may exercise psychic force beyond the body. He rejects the idea that the manifestations are produced by the agency of disembodied spirits. They are purely and wholly the result of forces residing in the human organism, and neither our departed friends, angels, or devils have to do with them. The medium is never able to communicate anything that is not already known to some person present.

This psychic force, Mr. Cox thinks, operates by a vibratory or wave like action, is opposed to and capable of overcoming the attraction of gravitation. Tables and other objects that are moved are first filled, so to speak, with the psychic emanation, which renders them buoyant in the air, when they float, swing, and sway about as if supported by an invisible balloon.

One of the explanations of these phenomena, and upon which Mr. Cox lays much stress, is *the unconscious cerebral action of the mind of the medium*, which action is manifested through the psychic force. Now as this unconscious cerebral action can be induced and made to set men's bodies in motion, without their knowing it, it becomes a question whether Mr. Cox himself and his friends did not have their cerebrums unconsciously excited so that they could hear noises and see sights that in reality never took place; or so that they could not see the person who pushed the piano, lifted the table, or forced down the balance.

What Mr. Cox and Dr. Crookes now need, in order further to verify their published conclusions and observations, is a scientific apparatus so made as to indicate the true condition of their own cerebrums. An instrument, that shall be capable of indicating the unconscious excitement or action of the mind, would be of great value in pathology. In addition to its uses in unraveling these "spirit" mysteries, it would doubtless be of inestimable importance to physicians in the diagnosis and treatment of mental disorders and diseases that react upon the brain.

There are various forms of unconscious cerebral action to which persons have been subject. To some individuals, visions and spectral personages have appeared when they have been wide awake and in the full possession of their ordinary senses. Sir David Brewster mentions several examples of this kind of cerebral action.

The latest phases of these psychic demonstrations, as brought out in this country, to wit, the visible production of the forms of departed friends, standing out clear and positive in the presence of the members of the psychic circle, have never been witnessed by Mr. Cox; at least he makes no mention thereof; nor does he allude to the spirit flames and lights now produced here. Mr. Cox should come over and visit Mrs. Mary Andrews, at Moravia, N. Y., who will show him things in this line that will probably make his hair stand on end. One visitor has assured us that the sight of these things brought on a cold perspiration, and he felt as if the gates of the eternal world had been actually thrown open. Until Mr. Cox goes to Moravia, it is evident that spiritualism will not be fully answered by science.

REPEATED spectroscopic measurements made last year by Professors Zöllner and Vogel, in Germany, show that the velocity of rotation of the sun on its own axis is at the rate of six hundred and sixty miles an hour.

A TRADES UNION TIRADE.

To appeal to the passions and prejudices of men rather than their reason, to distort and misrepresent facts, statements and motives, to misconstrue the slightest and most friendly criticism into an abusive attack, and to reply to it by real and undisguised scurrility and abuse has ever been the method of discussion and the characteristic manner of men who, through the false pretence of regard to the interests of the working classes, seek only the furtherance of their own private interests and purposes. We are sorry to say that in this spirit the editor of the *Machinists' and Blacksmiths' Monthly Journal*, an International Union organ, published at Cleveland, Ohio, comments upon some remarks of ours relative to the action of trades' unions in regard to apprentices.

The immediate cause of offence, to our brother editor, is the clause in one of our recent editorials which follows:

"The refusal of mechanics' unions to reconsider their unreasonable restriction, whereby their own sons are denied the privilege of learning the trades of their fathers, is one of the mysteries of the age. We have before alluded to this, for we feel that the prosperity of the country, the interest of humanity, and the welfare of coming generations, all demand that the shutting out of boys from learning trades ought to cease, so that they may be trained up to become good workmen, and able to learn an honorable mode of living."

Upon this we are charged by the editor with being very abusive, with departing from the truth, with being "opposed to trades unions, not from principle," with being destitute of virtue, with shamming interest in the welfare of the mechanic, with giving nothing tangible for their benefit, and with picturing a state of affairs that does not exist. We are sarcastically complimented for our learning and directly called feeble minded, both of which are equally flattering from such a source.

Perhaps we shall again be called abusive when we say that such a tirade can avail nothing against the truth of the paragraph which has provoked this uncalled for attack. We might add that a contrast, between the tone of our offending paragraph and the charges based upon it, might lead candid minds to throw back the charges of abuse upon the accuser, and inspire some doubt as to his respect for the truth and candor he professes to revere.

LIGHTNING RODS.

"We have a company in our town putting lightning rods on our houses. They use a copper rod, corrugated or fluted, and they fasten the rod to the shingles with zinc, allowing the rod to rest on the shingles and against the sides of the houses. My idea of putting up rods is to insulate the rod by means of glass tubes. But when questioned on the subject, the company's agent produced a paragraph, from an essay by Sir David Brewster, in which that eminent philosopher is made to say that the old theory of insulation is exploded, and that the conducting rod should be placed as near as possible to the object to be protected, in other words, should touch the wood and shingles of the building.

Now, I am a constant reader of the SCIENTIFIC AMERICAN, and many of our engineers and builders read your paper. We wish to know from you what we shall do with the rod that is not only not insulated from the house but put in as close contact with it as possible. A reply through your paper will be read and acknowledged with gratitude by many of your readers in this place and surrounding country.

W. C. MCDOUGAL."

Meridian, Miss., March, 1872.

Answer.—The method of attaching the rod which you describe is correct; it should not be insulated. The golden rule in regard to the erection of lightning rods is to *place the lower end of the rod in communication with an extensive conducting surface underground;* the electricity is thereby dissipated without injury to the building should the rod be struck.

If the area of this conducting surface equals that of the roof of the building, the rods being of proper size, perfect protection may be expected, not otherwise.

You will invariably find, in the examples of rodded buildings that have been damaged by lightning, that the lower extremities of the rods were not arranged in accordance with the above rule. The general practice is simply to stick the extremity of the rod into the ground for a short distance and there leave it, no provision for underground conducting surface being made. This is a very defective and unsafe practice.

A good way to provide the necessary conducting surface is to connect the rod with an iron pipe, laid down specially for the purpose and extended several hundred feet under ground away from the building, burying the pipe for the whole distance in charcoal or in moist earth. Another plan is to make a trench leading from the building and fill in with old iron or iron ore, the lower end of the rod being made to communicate with such conducting material. Leader pipes, metal roofs and chimneys should also be connected with this conducting material. In towns where there are water and gas mains, the lightning rods should connect with them, as the metals of such pipes present large conducting surfaces.

You will perceive from the foregoing that an essential part of the lightning rod is *an extensive conducting surface underground*. If your rod lacks this, it is of little value, your house is not protected, and in the very next thunder storm you may suffer damage.

COLONEL C.W. JENKS has traced into the Blue Ridge several fine veins of corundum, some of them four feet wide, in Franklin, N. C.

NEW BOOKS AND PUBLICATIONS.

THE AMATEUR MICROSCOPIST; or, Views of the Microscopic World. A Handbook of Microscopic Manipulation and Microscopic Objects. By John Brocklesby, A.M., Professor of Mathematics and Natural Philosophy, Trinity College, Hartford, Conn. New York: William Wood & Co.

This is a very convenient and useful little work, full of practical instruction upon the uses of the microscope. It is profusely illustrated with engravings which show the construction and various powers of the instrument, together with views of many remarkable objects that may be easily obtained and prepared for observation. A most interesting chapter is that devoted to crystallizations, in which the author presents us with many new drawings, and gives directions for preparing the slides so that the process of crystal formations may be readily witnessed under the microscope. This part of the work will be especially welcomed by amateurs. The examination of crystals is always attended with peculiar interest. The beholder revels for the time being amid sights of gorgeous beauty, and gazes upon gems seemingly most rare, exquisite, and precious. This book is a valuable addition to our stock of scientific literature.

BARRY'S FRUIT GARDEN. New Edition. New York: Orange Judd & Co., 254 Broadway.

This volume of 490 pages, as its title implies, is devoted to the culture of fruits of every variety in orchards and gardens. It also contains hints on the kind of soils best adapted for the different varieties, best modes of propagation, pruning, training, etc. It describes the diseases incident to the various fruit trees, the kinds of insects that prey upon them, and the remedies for ridding trees of the evil. The book is illustrated with numerous engravings of green houses, propagating beds, grafting, pruning, and garden implements, and the mode of training trees into beautiful and grotesque shapes. It also contains directions for the management of strawberry plants and other like fruits, with a chapter on nutting trees, etc. It is a work important to every agriculturist, and will find ready sale.

POCKET BOOK OF MECHANICS AND ENGINEERING. By John W. Nystrom, C. E. Philadelphia and New York: J. B. Lippincott & Co. New edition, revised and enlarged.

This book is already extensively known, this being the eleventh edition. In the present revision and enlargement, much valuable matter has been added. For example: Logarithms of numbers and of trigonometrical functions for every minute of a degree, or for every four seconds of time, are given; also the eight natural trigonometrical functions for angles, expressed either in degrees or time, as may be required. In regard to dynamical terms, the author proposes to abolish a great number of them, including "moment of inertia," which is a well established term in the philosophy of dynamics. A list is also given of proper dynamical terms, limited to force, motion, time, power, space, work, static and dynamic momentums, which the author maintains are all the terms necessary in dynamics. Examples are given for the dynamics of fly wheels, in which the term "moment of inertia" ought to perform an important function, but does not appear in the formulas and calculations. However right or wrong the author might be in the philosophy of dynamics, his reasoning is well worthy of attention. Barometrical tables, for the measurement of hights, are new and very complete, in English and French measurers which have been arranged by the author from actual practice among the Andes; also, original formulas for the flow of water in bends of pipes; the evaporation on the surface of water, under the atmosphere; the harmonical and geometrical scales of vibration in music or acoustics; illustrations of the expansion of bodies by heat, at and near the temperature of fusion. The article on air and heat, and the specific heat of gases, contains simple and valuable formulas with original examples. The properties of inflamed gunpowder and its dynamics in heavy ordnance are given; also the properties of water and steam, with formulas and tables; also an original rule for determining a standard nominal horse power of steam boilers. On the parabolic construction of ships, the author gives a formula by which any form of a ship can be recorded, and by which any ship builder familiar with the parabolic method can construct a ship of a definite form. The formulas and tables for the parabolic method are very simple and complete.

NEW AND COMPLETE CLOCK AND WATCHMAKER'S MANUAL: Comprising Descriptions of the Various Gearings, Escapements, and Compensations now in Use in French, Swiss, and English Clocks and Watches, Patents, Tools, etc., with Directions for Cleaning and Repairing. With Numerous Engravings. Compiled from the French—with an Appendix containing a History of Watchmaking in America. By Mary L. Booth, Translator of the Marble Worker's Manual, etc. New York: John Wiley & Son, Publishers, 2 Clinton Hall, Astor Place.

This will, we should opine, be a valuable book for the watchmaker's and jeweler's craft, although there is not much in it regarding American improvements in watchmaking. The brief sketch of the history of watchmaking in this country is not of much importance. There is much in the book, however, useful for instruction and reference. The printing and binding are not of the highest order, and we suppose that the publishers sought rather to place the work before the public in cheap form than to limit its sale by a more expensive style of execution.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From March 8 to March 14, 1872, inclusive.

BATTERY GUN.—W. A. Mills, Salisbury, Conn.
BILGE WATER INDICATOR.—A. Harris, New York city.
BOAT LOWERING APPARATUS.—C. C. Quaritius, Canarsia, N. Y.
BOOT HEEL.—F. Richardson, F. Hacker, Providence, R. I.
COTTON CLEANING MACHINE.—N. B. Hall, Providence, R. I.
DIAL PLATE.—J. C. Dunn, E. C. Lewis, L. Atwood, B. W. Marshall, W. B. Mussy, B. M. Baily, C. E. Kilby, D. B. Channell, Rutland, Vt.
ELECTRIC TORCH.—W. W. Batchelder, New York city.
GOVERNOR.—J. B. Duff, Patchoque, N. Y.
HEALD, ETC.—D. C. Brown, Lowell, Mass.
LEATHER MAKING MACHINERY.—E. Fitzhenry, Somerville, Mass.
PREVENTION OF RAILWAY ACCIDENTS.—S. W. Emery, E. P. Boyen, W. Sparrow, Portland, Me.
PROPELLING VESSELS, ETC.—A. Mot, G. E. Weaver, Providence, R. I.
ROLL FOR SPINNING MACHINE.—W. A. Caswell, Providence, R. I.
ROLLING MACHINE.—A. Johnson, New York city.
ROTARY ENGINE, ETC.—C. Avery, Tunkhannock, Pa.
SEWING MACHINE.—J. A. House, Bridgeport, Conn.
TRIMMING BOOT SOLES, ETC:—S. H. Hodges, Boston, Mass.