

tion to the plan, provided the ends of the glass tube are fused to remove the sharp edge. By attaching a small platinum point (about the size of a pin's head) to the diaphragm instead of the carbon button the effectiveness of the instrument will be increased. 4. What size should the platinum wire be? A. It is immaterial; copper wire will answer just as well if used in the manner proposed by you.

(31) J. H. writes: 1. Our mechanic has made a dynamo machine as designed in SUPPLEMENT, No. 161, which did not work before it was connected with a battery, and after it was disconnected from the battery about an hour it began to work, and has done so ever since. Now, will a dynamo machine work without it being charged with a battery? A. Iron is usually more or less magnetic, and the slightest degree of magnetism in the iron of your field magnet would have been sufficient to start a current in the armature, which would have increased rapidly until the maximum current was reached. It seems that your field magnet must have been neutral. After having been charged by the battery it retained sufficient magnetism to start the current. It has been found that when the field magnet is neutral sufficient magnetism to start the machine may be imparted to it by placing it on the earth's magnetic meridian. 2. Can you give us a design of a dynamo machine which is strong enough to magnetize a piece of steel in the form of a horseshoe magnet which is 12 inches long, 1 1/2 inch wide, and 1/2 inch thick? A. For this purpose you would need a large machine such as the Edison, Maxim, Brush, Weston, or Siemens, all of which have been described in our columns.

(32) J. P. E. writes: 1. In a late edition of your valuable paper you give directions for building an upright, single-acting rocking valve engine. Please tell me how I can get up a cheap, effective, steam supply for an engine on that principle, having 2 inch bore, and 2 1/2 inch stroke. Would a copper boiler, 11 inches in diameter and 23 inches long, tested to stand 150 lb. to square inch, with 4-inch wicks burning good refined petroleum, be at all effective and efficient? A. Such a boiler should have 20 to 25 1-inch tubes. You would hardly get the full power of the boiler with the four wicks. 2. Would a grate burning fine coal be better than the oil supply? A. Yes, much better. 3. What should be bore and stroke for a pump for engine of given dimensions. A. A pump having a piston one-quarter inch in diameter and 1 inch stroke would be sufficient to supply the boiler. It would be well to make either the speed or stroke of the pump variable.

(33) P. S. writes: I would like to make an induction coil, but I think the one in SCIENTIFIC AMERICAN SUPPLEMENT, No. 160, too large, and in the SCIENTIFIC AMERICAN, vol. XXXIX, page 203, No. 14, too small. Would you please answer me the following questions. 1. Would a coil 4 1/2 inches long on inside, by 2 1/2 inches diameter, be too large to give shocks, using small battery power? A. It would not be too large, as you can regulate the strength of the current as may be required. 2. If not, please give diameter of core, weight, and number of primary and secondary wire? A. Diameter of core, five-eighths inch. Three layers of No. 18 silk covered wire for a primary, and 12 to 14 layers of No. 36 silk covered wire for the secondary. 3. Would a thin brass tube covering the wires of core, which draw out to regulate the current, keep the coil from working? A. It would modify the action somewhat, but it would not entirely prevent its working.

(34) F. S. P. asks (1) how the connections are made in a "Gramme electro-magnetic" machine. After having wound the soft iron ring armature with a number of lengths of insulated wire, how are the ends of these coils of wire connected to the copper strips upon the axis? A. The inside terminal of one coil is connected with the outside terminal of the next, and both together are connected with one of the copper strips, and so on throughout the entire series of coils and strips. 2. What position do these strips of copper have upon the axis as the coil passes from north to south pole of the magnet? A. The strips are parallel with the axis, and the collector brushes which press upon opposite sides of the commutator cylinder should be adjustable, so that they may be moved from the neutral point to the point where the maximum current is obtained.

(35) S. R. M. asks: Could a telegraph message be sent over a wire of any length, one end being well grounded in the earth, the other in a large water tank or lake of any size which was well insulated from the earth? A. No; a complete circuit is required.

(36) H. B. writes: Referring to an article in your paper some time since, "How far can cannonading be heard?" would say many of us (I among them) distinctly heard, two days (and think three) in succession, at Lynchburg, Va., while prisoners in the rebel lines, the sound of the guns of McClellan's battles on the Peninsula. It was clearly heard towards close of the afternoon, days bright and clear sky. It sounded like a bucket being dropped inverted in water. Whatever the distance is, there is no mistake about it.

(37) S. R. asks: What is the longest railway bridge in the world? A. It is said that the railway bridge over the estuary of the Solway, near Annan, is the longest in the world, being 1,940 yards in length. The next longest to it is that built for the Orenberg railway over the Volga near Syzrau, which is a few yards short of 1,624 yards.

(38) A. B. M. inquires: How is pyroligneous acid (wood vinegar) made? A. It is obtained by distilling wood in iron retorts, resembling those used for making illuminating gas. The condensed products of the distillation contain, with tar and numerous other bodies, crude pyroligneous acid or wood vinegar, amounting in a well conducted distillation to about 7 or 8 per cent of the wood employed. The gas that accompanies the liquefiable distillates is conducted to the furnace under the retort, and serves to continue the distillation without other fuel. In purifying the acid, it is first saturated with lime, evaporated to dryness, roasted at a moderate temperature so as to free it from volatile matters, and decomposed in a retort, having a helm of copper and a condenser of tin or silver, with hydrochloric acid (90

parts acid to 100 acetate of lime), and the acetic acid distilled.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated: D. R. Y.—No. 1. Hornblende schist. No. 2. Red sandstone. No. 3. Dolomite. No. 4. Cherty flint.

COMMUNICATIONS RECEIVED.

On Parhelia. By U. F. G. On a Simple Experiment with Polarized Light. By E. G. H. On a Singular Atmospheric Phenomenon. By H. B. C.

NEW BOOKS AND PUBLICATIONS.

THE LOGICAL-MATHEMATICAL DEVELOPMENT.

The logical-mathematical development of the causes of the principal phenomena of nature, such as gravity, elasticity, light, color, heat, electricity, chemical combinations, etc., from a single fundamental principle. By Theodor Wiesemann. Brussels 1879. Paper, 63 pages.

THE PHOTOGRAPHIC TIMES.

The Photographic Times, which was formerly issued as an addendum to the Philadelphia Photographer, began the new year of 1881 as an independent publication, with an able editor—Mr. J. Trall Taylor, formerly of the British Journal of Photography. The January number of the Photographic Times, now before us, contains a large amount of matter of interest and value to practitioners of the art beautiful. \$2 a year. Single copies 25 cents. Scovill Manufacturing Company, publishers, 419 Broome street, New York.

JOHNSTON'S ILLUSTRATIONS OF ELECTRICITY. SHEET 5. ELECTRO-DEPOSITION OF METALS. WITH HAND-BOOK. By Alexander Watt. Edinburgh and London: W. & A. K. Johnston. 10s. Size 50x42 inches.

One of a series of charts in color for use in teaching natural philosophy. The illustrations of apparatus, etc., are large, so as to be readily seen by a class, and the several parts are colored as in the objects themselves. The sheet before us pictures twenty-three forms of voltaic battery, dynamo-electric machines and their elements, thermo-electric apparatus, and apparatus for electrotyping, electroplating, gilding, nickel plating, etc. The hand book briefly describes the objects figured and their uses. The charts would seem to be admirably adapted for use in schools unprovided with a physical laboratory; and if the price were reasonable, say fifty cents or less a sheet, they might find a wide acceptance among our common and private schools.

A TEXT BOOK OF ELEMENTARY MECHANICS FOR THE USE OF SCHOOLS AND COLLEGES. By Edward S. Dana. New York: John Wiley & Sons.

Though specially designed for use in schools this elementary treatise seems well adapted for individual study. Its scope is limited to the mechanics of solids. It would add much to the practical value of the mathematical courses in our schools if a treatise like this could take the place occupied by surveying, navigation, or mathematical astronomy.

SMITHSONIAN MISCELLANEOUS COLLECTIONS. JAMES SMITHSON AND HIS BEQUEST. By William J. Rhees. Washington: Published by the Smithsonian Institution.

This is the first authentic account of the man who has laid the United States and the world at large under such great obligation by his bequest to found the institution which bears his name. Though barred by law from claiming the family name and honors of his father, the Duke of Northumberland, Smithsonian sought a higher fame in the discovery and propagation of scientific truth. In one of his manuscripts was found this memorable prophecy following a reference to his relationship to England's noblest families: "My name shall live in the memory of man when the titles of the Northumbrians and the Percies are extinct and forgotten." The prophecy bids fair to come true.

AMERICAN SANITARY ENGINEERING. By Edward S. Philbrick, C.E. New York: The Sanitary Engineer. 8vo, cloth, pp. 129.

A dozen lectures covering in a peculiarly suggestive and practical manner the subjects of ventilation, house and town drainage, sewerage, and the like. The matter is presented in a way well calculated to command attention from home makers as well as house builders and sanitary engineers. The methods and appliances recommended have been chosen for their fitness to meet the conditions of our climate, our modes of life, and more obvious sanitary needs. The single marked defect of the book is the lack of an index.

DEBAUN'S PRACTICAL CALCULATOR, No. 1. New York: Bicknell & Comstock. Folio. 50 cents.

A multiplication table extended to 100x100, and very compactly arranged, so that one can readily find at a glance the product of any two numbers within the limit. Obviously it can be used as a division table with equal readiness, and with slight figuring extended to products and quotients of larger numbers.

CIRCULARS OF INFORMATION OF THE BUREAU OF EDUCATION. No. 4. RURAL SCHOOL ARCHITECTURE. No. 5. ENGLISH RURAL SCHOOLS. Washington: Government Printing Office. 1880.

The Bureau of Education is doing good service in preparing and distributing information of the kind given in these circulars. They should go not only to all school officers or communities intending to build school-houses, but to every school district in the land, for the instruction of school trustees, teachers, and parents. There is a vast amount of barbarism in and about our country school-houses which these circulars will help to mitigate.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH Letters Patent of the United States were Granted in the Week Ending January 25, 1881,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866, but at increased cost, as the specifications not being printed, must be copied by hand.

Table listing inventions and their patent numbers, including items like Air compressor, Air engine, Axle lubricator, Bale bands, Bale tie buckle, Baling press, Bedstead, Beehive, Beer, etc.

Table listing inventions and their patent numbers, including items like Incubator heat regulator, Ironing board, Jewel setting tool, Journal box, Journal box, Lubricating, Knitting and other light machines, Lamp, Lamp supporting bracket, Latch, Lighting and extinguishing device, Liquid cooler, Loom, Loom, Metal shaping machine, Miter machine, Motion upon a single screw, Music chart, Nail plate feeder, Needle polishing machine, Optometer, Packing, Paint, Paint mills, Paper bag machine, Paper drying and other similar machines, Pen, Pen, Pencil, Phaeton, Photographic camera, Pipe coupling, Planter and cultivator, Planter, Plow, Plow carriage, Plow, Plows, Printing press, Pump, Pump bucket, Pump force, Punching device, Rail joint, Railway chair and splice bar, Razor guard, Refrigerating butter box, Rock drill bar, Rotary engine, Rowing apparatus, Saddle, Saddle, Saddle, Salt purifying apparatus, Sample exhibiting stand, Saw, Saw handle, Saw mill, Saw set, Scarf, Scarf ring, Screw driver, Seaming elbows, Sewer trap, Sewing machine, Sewing machine, Smoke consuming furnace, Soap for toilet purposes, Soldering iron, Sole and welt trimmer, Sole trimming knife, Spark arrester, Spinning machine, Spinning mule, Stamp, Stamp, Station indicator, Steam engine, Steam generator, Stirrup, Stove, Stovepipe fastener, Stovepipe flange and cover, Tag, Tanning compound, Tea and coffee pot, Teeth, Telephonic receiving apparatus, Tire tightener, Tool handle, Tool or implement, Truss, Turret, Undervest, Vaginal dilating pipe, Valve, Valve, Vegetables and fruit, Vehicle spring, Vehicle spring, Washing machine, Watch case opener, Watch key, Water closet, Water closet, Water elevator, Whiffletree and double tree, Wind motor, Windows, Wood bending machine, Wood borders.

DESIGNS.

Table listing designs and their numbers, including Gimp, J. H. Thorp.

TRADE MARKS.

Table listing trade marks and their numbers, including Cigars, cigarettes, cheroots, smoking and chewing tobacco, and snuff, L. Wertheimer.

English Patents Issued to Americans.

Table listing English patents issued to Americans from January 21 to January 25, 1881, inclusive, including Axle bearings, Feed water heaters, Ice machine, India-rubber waste, Lawn mowers, Ore separator, Vinegar, Watches.