drying, for preserving fruits so they will keep in any climate? A. There is no other practical method, we believe.

(31) W. M. L. asks (1) if there is any way by which a large tower bell that is cracked can be mended so as to be serviceable and also sound well. If so, how? A. A mode that will improve (but not restore) the tone of a cracked bell is, to drill a small hole at the extremity of the crack and make a saw cut the whole length of the crack. 2. What is the best compound for setting iron posts in stone? A. Salammoniac (powdered), 2 oz.; flowers of sulphur, 1 oz.; iron borings (free from oil), 5 lb.; water, q. s. to moisten.

(32) C. T. W. asks: 1. What is the horse power of a steam engine, cylinder 2 inches bore by 4 inches stroke, with 60 lb. of steam in the boiler, and running at the rate of 200 revolutions per minute? A. About two-thirds of one horse power. 2. What size boiler is needed for the same? A. A boiler with 25 square feet heating surface. 3. If such an engine be made to run the largest possible electric machine, how many lamps would the machine supply? A. One, and possibly two. With small machines and small power, electric lighting is not economical. 4. What is the candle power of an ordinary Edison lamp, such as is used for lighting dwellings? A. About 16. 5 How many candle power would be required to properly light a room 26 feet long by 17 feet wide by 13 feet high? A. 100 would do it well.

(33) W. B. A. writes: A firm in this city use three boilers in one battery, set in brick work the usual way. They now intend to do away with the water line, tile, and back plates, put cast iron arches over the top, and fill with brick, leaving the boilers naked and exposed to the action of the fire. The boilers are 25 feet by 42 inches, 4 flues; have been in use about eight years, and fired hard. Do you think this a safe plan, and is there any benefit to be gained by so doing? A. It will be liable to injure the boilers and may lead to accident. 2. If the fire flue of a Cornish return flue boiler be 24 inches diameter and 16 feet long, working pressure 100 lb., what kind of iron should be put in the flue? A. Half-inch or nine-sixteenth inch thick, and should have strengthening rings.

(34) H. T. asks how to make dynamite. A. Dynamite is prepared by mixing infusorial silica (a fine silicious sand resembling tripoli) with about 75 per cent of nitroglycerine, which it readily absorbs. It is exploded by percussion priming. See answer to F. & S., page 202 (3), current volume.

(35) R. I. M. asks: 1. Will coke injure a boiler? A. No. 2. How can I prevent coke from clinkering? A. Pure coke will not clinker, there must be some impurity in your coke. It might be beneficial to burn it at a lower temperature.

(36) R. H. M. asks if the linear expansion of thick iron is greater than that of small wires. A. No. 2. What would be the probable linear expansion of one-eighth inch wire 100 feet in length? A. Iron wire for an increase of temperature of 180° expands $\frac{1}{715}$ of its length. 3 Does expansion in length cause corresponding contraction in thickness? A. No. 4. Does contraction and expansion cause displacement of molecules? A. No permanent displacement, unless the iron is under strain. 5. Is there a point in temperature where heat and cold cease to expand and contract iron? A. No such point has been discovered.

(37) J. H. H. asks: 1. How much bituminous coal is required under a tubular boiler to evaporate one gallon water? A. With a good boiler you should evaporate from three-quarters to one gallon of water per pound of coal. 2. What power would be required to put the water at 60 horse power into boiler at 90 lb. pressure to the inch. Does it require more power to put in water at 200° to 212° than at 75° Fah.? A. It does not require more power at 200° than at 75°. To determine the power required we must know the quantity of water to be delivered in a given time.

(38) J. F. S. asks: Does the piston in engine driving machinery stop while the machinery is in motion? A. Yes, it stops twice every revolution of the crank.

(39) A. H. H. asks: 1. Can anything be done to apple trees, the bark having been eaten off above the ground by rabbits? A. Wrap with common gunny or jute bagging and whitewash. 2. Can you give me a composition for welding cast steel at a low heat, which will be cheap and more efficient than borax, and what is the philosophy of its action? A. Try the following: Fuse together in a crucible, at a quick heat, borax, 2 parts; potassium chloride, 3 parts; boracic acid, 1 part; cool and powder. It melts at a low red heat and readily dissolves iron oxide, thus cleaning the metal.

(40) H. L. writes: On our line shaft is a pulley 42 inches in diameter, fastened by set screws, which supplies power to our exhaust fan. These set screws are constantly slipping, and I propose to reduce strain on them by substituting a smaller pulley on line shaft, and interposing a counter shaft geared so as to give same speed to exhaust as before change. Please inform us through your paper if this arrangement will reduce strain on set screws holding driving pulley to line shaft or not? A. It will not reduce the strain on the set screws, if the fan runs at the same velocity. It is the resistance of the fan that determines the strain on the set screws, and not the mode of belting or gearing. Better slot your wheel, put a key seat in your shaft, and drive in a well fitted key.

(41) A. D. writes: I wish to know how I can prepare pulp for casting papier mache heads, similar to masks or false faces, in a plaster cast; or would it be better to make the cast out of some other composition. A. Paper is pulped in a mortar (or pulping engine) and mixed with ordinary glue size thinned somewhat with hot water. Remove the pulp and let it partially drain upon a linen covered frame. Put a quantity of this into the mould under strong pressure, and let it remain until it becomes hard enough to handle. A counter mould is used in casting such thin sheets. Plaster moulds are too fragile. Casts in type metal or fusible metal are much better. See SUPPLEMENT, No. 17.

(42) J. W. asks (1) if there is any cloth or knit work that will conduct electricity. A. Cotton and linen are conductors of static electricity. Cloth having filaments of metal will conduct dynamic electricity. 2. Is there any cloth that will not conduct it, the cloth or goods being dry? A. Silk is a non-conductor of electricity, but of course a static discharge would pass through a silk fabric. 3. Give some simple method of telling whether a battery gives a current of electricity or not. A. Touch the ends of the wires to the tongue when they are connected with the battery, and then do the same thing when they are detached from the battery. If you discover no difference the current must be very feeble or absent altogether.

(43) S. B. D. asks: 1. How can I regain the silver from an emulsion as described under the head of "Emulsion for Amateurs," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 226? A. Mix with about three times its weight of warm water, slightly acidified with hydrochloric acid, and let it stand. Collect the chloride of silver upon a filter, wash it with warm water, and mix it with a few fragments of clean zinc and enough dilute sulphuric acid to cover it. When the chloride is reduced pour off the acid liquid, pick out what remains of the zinc, wash the spongy metal with hot water, and dry it. It may be obtained in the form of a button, if desired, by mixing it with a little borax and heating the mixture strongly in a small black lead crucible. 2. How can I make the iron develop for the same? A. Proto-sulphate of iron, 2 drachms; dissolve in 8 oz. water and add 2 drs. glacial acetic acid and 2 drs. alcohol. 3. How is albumen paper made? A. Albumen can be obtained from any dealer in photographic goods. It is ordinarily prepared by beating up egg albumen to a froth with a little floured salt (about 15 grs. salt to each egg), and after this has stood twelve hours to subside, floating the paper upon its surface in such a manner that every part becomes uniformly coated, after which it is fastened to frames to dry in the air. 4. Can I use French gelatine? If not, where can I obtain Nelson's? A. Yes. See our advertising columns and Hints to Correspondents. 5. I am making an induction coil of the following dimensions: Core 3 inches long by ½ inch diameter of No. 18 annealed iron wire; primary, two layers of No. 18 copper cotton covered wire; secondary, 14 layers of No. 36 silk covered copper wire, with a condenser of 300 square inch surface. What size spark can I get using two Leclanche batteries? A. You may be able to get a spark from one-eighth to three-sixteenth inch long. The coil is rather small for sparks.

NEW BOOKS AND PUBLICATIONS.

THE MAGAZINE OF ART. Cassell, Petter, Galpin & Co., 739 Broadway, New York.

The April number of this *Art Journal* is, like the previous issues, full of engravings of choice and artistic works, consisting of elaborately carved oak furniture, ancient mosaics, and other art objects of rare beauty. The most interesting of the various subjects illustrated is an engraving of the French artist, Bonnat's, famous painting of "Ribera at Rome." which was recently sold by Knoedler & Co. for about $12,000 to a gentleman in this city well known in art circles, as a collector of rare and costly pictures. This number also contains a portrait of Bonnat the artist.

SWINTON'S SUPPLEMENTARY READERS. IN SIX BOOMS. I. EASY STEPS FOR LITTLE FEET; II. GOLDEN BOOK OF CHOICE READING; III. BOOK OF TALES; IV READINGS IN NATURE'S BOOK; V. SEVEN AMERICAN CLASSICS; VI. SEVEN BRITISH CLASSICS. Edited by William Swinton and George R. Cathcart. New York and Chicago: Ivison, Blakeman, Taylor & Co.

These readers are intended to supplementary series of school readers, the volumes falling in severity of requirement between the several numbers of the more technical and formal school books in use. In this way they offer half a dozen oases in the ordinary desert of elementary instruction in reading, and are open only to the possible objection that children may not take kindly to the less charming books of the regular series after enjoying these. Certainly in beauty of mechanical make up and illustration, as well as in the excellence and appropriateness of the selections for reading, they far surpass anything in the line of school readers that have come to our table.

THE MICROSCOPE.

Charles H. Stowell, M.D., and Louisa Reed Stowell, M.S., both of them writers and observers of distinguished ability, have commenced the publication, at Ann Arbor, Mich., of a new bi-monthly magazine, entitled "The Microscope and its Relations to Medicine and Pharmacy." It is a handsome periodical, and cheap enough in price, namely, one dollar a year. We welcome this new work. The first number is highly creditable to the editors.

THE DIET CURE. By T. L. Nichols, M.D. New York: M. L. Holbrook & Co.

An essay on the relations of food and drink to health and disease. The author believes that men eat and drink too much, both in quantity and variety, and that the average death rate is double what it would be were temperance and intelligence more the rule in eating and drinking. He also has a vast assortment of notions and crotchets about food and drink which are much less worthy of general acceptance. The professional dietarian is too prone to set up his individual likes and dislikes as rules for all men, overlooking the obvious fact that, injurious as indiscriminate and excessive eating and drinking may be, the extreme of water drinking vegetarian dietetics is quite as bad; if anything the latter is less conducive to, or at any rate less associated with, forceful and enjoyable living than the former. The men and women who determine and control the world's affairs, whoare strongest in thought and deed, are not generally or exclusively fed upon brown bread and roots.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending April 5, 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.

Advertising device, automatic, W. Akin 239,536
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Transom fixture, F. V. Phillips	239,620
Triple wheel motor, L. A. Wilson	239,904
Truck, house moving, J. Brown	239,599
Tuyere moulding device, J. M. Hartman	239,609
Type writing machine, G. McKittrick	239,823
Umbrella rack for doors, J. H. Southwood	239,874
Vapor burner, O. Seely	239,679
Vehicle gear, side bar, A. J. Seyler	239,625
Vehicle toppad, L. J. Fitzgerald	239,653
Velocipede, J. Lowth	239,812
Veneer cutting machine, F. L. Wilson	239,803
Ventilating furnace for mines, J. R. McBroome	239,816
Violin box, I. C. Monroe	239,617
Wagon body, J. Ryder	239,673
Wagon, dumping, L. Rodenhausen	239,848
Wagon, road, C. W. Saladee	239,850
Wagon spring C. M. Blydenburgh	239,708
Wagon spring, C. Heinen	239,774
Wall paper, apparatus for drying, C. S. Clark	239,603
Warping machines, heck for, T. Lamp	239,806
Washing machine, H. Tyler	239,889
Watch, L. Dee	239,738
Watch pendants, attachment of, C. K. Colby	239,732
Water closets, W. Blackwood, Jr.	239,705
Water cooler, C. W. McGregor	239,615
Water wheel, turbine, C. Angström	239,636
Water wheel, turbine, A. G. Cline	239,649
Wick, lamp, C. A. Schneider	239,855
Wine, manufacturing, F. A. Reihlen	239,842
Wireway, elevated, G. B. Scott	239,624

DESIGNS.

Blind pull, R. E. Goodrich	12,216
Mirror frame, J. J. C. Smith	12,217
Parasol, E. Wright	12,218
Sash lifter, R. E. Goodrich	12,215
Stage scene, T. Daly	12,214
Toilet ware handle, L. Berger	12,212
Water cooler handle, L. Berger	12,213

English Patents Issued to Americans.

From April 1 to April 5, 1881, inclusive.

Electrical sound transmitter, A. E. Dolbear, Somerville, Mass.

Electriclighting apparatus, A. G. Holcombe, Danielsonville, Conn.

Grain cleaning machinery, L. Gathman, Chicago, Ill.

Harvester rakes, Johnston Harvester Company, Brockport, N. Y.

Lock, L. Hunt, New York city.

Mining machinery, F. M. Lechner, Waynesbury, Ohio.

Motor, L. Gamgee, Washington, D. C.

Paper feeding apparatus, Sedgwick & Stuart Manufacturing Company, Poughkeepsie, N. Y.

Rolls, T. S. Cook, Cleveland, Ohio.

Spinning frame, J. Y. Anthony, Taunton, Mass.

Thermometer, W. B. Fowle, Newton, Mass.