

### The Decay of Westminster Abbey.

The atmosphere of London has played havoc with the stone in this famous building, and although the interior is in good condition, beneath the coating of grime and dirt with which long ages have covered the structure, and which conceals the decay from the eye of the casual observer, there has been long going on a process of decomposition which, if not arrested, will speedily cause ruin. The London *Times* states that in 1882 a well known architect examined and reported upon the condition of the Abbey. The wall surfaces round the clear story windows, wherever the fire stone has been allowed to remain, have become very seriously decayed, the decay in some places penetrating to a depth of seven or eight inches, "so that the architect is surprised that the heavy cornices and parapets should have found a sufficient support in so ruinous a wall." Before the report was made, in some of the worst places in the nave, the superstructure had been removed and the face of the wall rebuilt; but the architect was of the opinion that "immediate and very extensive repairs and restorations were urgently needed for the whole of the masonry of these clear stories." The conclusion was the same regarding the flying buttresses supporting the clear story walls, which in some places are dangerous and in others so decayed that pieces of stone are constantly falling from them upon the lead roofs. In regard to the south side of the nave, over the cloister roof, the report says:

"Large pieces of stone are continually falling, being detached by the rusting of the iron clamps with which the masonry was thoughtlessly put together. Very considerable damage has from this cause been done to the western towers, the whole surface of which is disfigured by the bursting off of triangular and other shaped pieces of stone; these heavy pieces fall not infrequently, and do much damage."

The transept on the south side has been recently restored, and the porch of the north transept is also new, but above the porch the masonry is in places very loose and unsafe, and demands complete and extensive repairs. The stone of the clear story of Henry VII.'s chapel, of the flying buttresses, and of the pinnacles is also badly decayed.

It is estimated that the cost of the restorations will be from £60,000 to £80,000, and the *Times* asks the pertinent question: "By what means may future generations be spared the periodical scandal of discovering that this great historical church has fallen into decay?" Judging from the rapid rate at which disintegration is now going on upon some of the buildings in this city, it will be but a few years before the above question may be applied to many of our finest edifices.

### To Prevent Railroad Accidents.

Railroad spikes pull out of ties by the spring of the rails under the weight and pressure of engines and trains. The spreading of rails, for this reason, is one of the principal causes of railroad accidents. General Manager F. K. Hain is putting in "interlocking bolts" on the curves, switches, and frogs of the elevated roads, where the greatest danger is encountered, as a protection against accidents. These are the device of Capt. Thomas J. Bush, of Lexington, Ky., and are without heads. They are put in from the upper side of the tie. Holes are bored vertically on either side of the rail in the places where the spikes would go. They cross under the rail, forming the letter X. The bolts have threads turned on the upper ends, which are bent so as to cause the nuts, when the bolts are inserted at angles, to come squarely down on the flange of the rail. A slot is cut in the side of one bolt, which is inserted first. The side of the other bolt is beveled up to a point where a notch is cut on the under side to come squarely against the shoulder and in the slot of the first bolt, and in that way the two lock. The nuts are then screwed down, and the rail is held as if in a vise. The pressure against the side of the rail, tending to turn it over, is resisted by the lower part of the X-like adjustment of the bolts, and nothing but the tearing out of the solid wood will release the rail. The device is expected to greatly deaden the sound, and in case a rail should break it would still be held in place. A number of roads are experimenting with the bolts, among them the New York Central, the Pennsylvania, the Erie, the West Shore, and the New York City and Northern, and Elevated Railroad.

### Glue, Paste, or Mucilage.

Lehner publishes the following formula for making a liquid paste or glue from starch and acid. Place 5 pounds of potato starch in 6 pounds (3 quarts) of water, and add one-quarter pound of pure nitric acid. Keep it in a warm place, stirring frequently for 48 hours. Then boil the mixture until it forms a thick and translucent substance. Dilute with water, if necessary, and filter through a thick cloth.

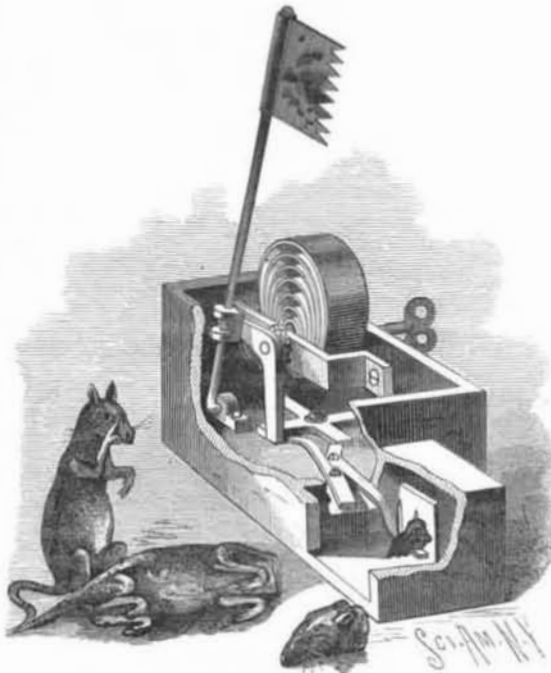
At the same time another paste is made from sugar and gum arabic. Dissolve 5 pounds gum arabic and 1 pound sugar in 5 pounds of water, and add 1 ounce of nitric acid and heat to boiling. Then mix the above with the starch paste. The resultant paste is liquid, does not mould, and dries on paper with a gloss.

It is useful for labels, wrappers, and fine bookbinder's use.

Dry pocket glue is made from 12 parts of glue and 5 parts of sugar. The glue is boiled until entirely dissolved, the sugar dissolved in the hot glue, and the mass evaporated until it hardens on cooling. The hard substance dissolves rapidly in lukewarm water, and is an excellent glue for use on paper.—*P. Notiz.*

### ANIMAL TRAP.

A powerful coiled spring surrounds a shaft, on one end of which is mounted a ratchet wheel with which a pawl, pivoted on a loosely mounted elbow lever, engages. The bent end of a rod is journaled in bearings secured to the base plate in such a manner that the rod can swing in a vertical plane parallel with that of the spring. Upon the free end of the rod is a serrated knife. The rod passes loosely through the jaws of a U-shaped piece pivoted to the end of one arm of



HALL'S ANIMAL TRAP.

the elbow lever. The other end of the lever rests against one arm of a cross-shaped piece centrally pivoted to the base. A bent lever is pivoted to the base in such a manner that the arms of the cross can rest against the bent section. On the other end of the lever are a plate and two prongs for holding the bait—this end of the lever being in a separate compartment of the trap. Pressing against the side of this lever is a second one. A mouse nibbling at the bait would pull the lever forward, thereby freeing the cross-shaped piece and allowing the shaft to make a complete revolution, during which the knife would descend, decapitate the animal, and ascend to its normal position. The mechanism will continue this operation until the spring has been uncoiled.

This invention has been patented by Mr. Charles Hall, of Changewater, N. J., and further information may be obtained from Messrs. J. Hill, Jr., and V. Castner, of same place.

### FIRE ESCAPE.

On a truck formed as shown in the engraving is an up-



LETTON'S FIRE ESCAPE.

right frame to which is connected, at each side near the end, a lazy tongs extension frame—one of the bars of a

joint being pivoted to the frame. The other bar of the joint has a bar connected to it, which extends downward over the drum of a windlass, to which it is connected by a chain or rope. At the junction of these two bars is a friction roller that rolls along the side brace for support. The two extension frames are connected together by rods forming the pivots of each joint; to each alternate rod is connected the upper end of a short ladder, the lower end of the lowest ladder resting on the drum, and the lower ends of the others resting on the next ladder below. When a hand crank shaft, with which the drum is geared, is turned so as to wind the chains upon the drum, the extension frames will be projected upward; by unwinding the chains the frames and ladders will be lowered and folded down on the truck.

The bars pivoted to the upright frame are placed between disks provided with stops, to arrest the extension frames when elevated to the desired extent; when the windlass is strained up and made fast, the bars will be held firmly between the bearings thus formed, holding the frames rigidly in their working position. To the upper connecting rod of the frames is attached a pulley block and rope carrying a basket, which can be used for letting down persons or goods. Detachable braces stay the platform laterally, and pivoted bars swung down to the ground prevent the truck from rolling on the wheels. The device can be used from stationary platforms, awnings, etc.

This invention has been patented by Mr. T. P. Letton, and further particulars may be obtained by addressing Mr. F. M. Curtis, Ottawa, Kansas.

### The Cost of Running a Train.

As the passenger sits at a car window and sees the mile posts whirl past, he seldom stops to reflect what it has cost the company to pull the train a mile. A party of gentlemen, some of them experienced business men, sat in the lobby of the Kennard House yesterday, when the question as to the cost of running an ordinarily heavy passenger train was raised. Several of them made estimates, but every one of them was far below the amount. The average cost of running an ordinary passenger train of from six to ten coaches is from \$1 to \$1.25 a mile. This may seem large at first, but when the several items are taken into account one will suspect, after all, that the estimate is too small. One of the principal items is the running of the locomotive. It has been the study of master mechanics to reduce the cost of running an engine, and each claims to be a little closer in his calculations than the other. The average cost during January of running the engines on the Bee Line, for example, was 15.77 cents per mile. Freight engines run at a cost per mile of 17.73 cents. Passenger engines cost less, viz., 17.24 cents per mile; while switch engines, which are credited with so much mileage per day, regardless of the distances run, are run at so low a cost as to reduce the average to 15.77 cents per mile. The engines ran 34.63 miles to a ton of coal, and 16.38 miles to a pint of oil.

Added to the expense of motive power is the outlay for wear and tear of cars; it is estimated that it costs 3 cents a mile to keep a sleeping car running, and the wages of train hands, etc. The expense from the item of wear and tear is increased by an increase of the speed of a train. The special trains on the Lake Shore, running at a speed of about forty miles an hour, and the fast mail, at about thirty-seven miles, are the most expensive trains on that line. It is not generally known what the Government pays the Lake Shore people for running the fast mail from New York to Chicago, but it ought to receive at least \$800 to fully compensate it. Another little item of railway operation is the expense of stopping and starting a train, which an experienced railroad man said yesterday could not be effected at a less expense than from 18 to 25 cents at each stop.—*Cleveland Herald.*

### Analyses of Dry Wood, and the Relation of Composition to Heat of Combustion.

Ernst Gottlieb has been investigating the elementary composition of wood dried at 115° C. (239° Fahr.), and the amount of heat that each is capable of yielding when burned. The carbon and hydrogen were determined directly by combustion, weighing the carbonic acid and water produced. The remainder, after deducting ash, represents the total oxygen and nitrogen. The actual quantity of the latter was determined only in a part of the samples.

|               | Oak.  | Ash.  | Yoke elm. | Beech | Birch | Fir.  | Pine. |
|---------------|-------|-------|-----------|-------|-------|-------|-------|
| Carbon.....   | 50.16 | 49.18 | 48.99     | 49.06 | 48.88 | 50.36 | 50.31 |
| Hydrogen..... | 6.02  | 6.27  | 6.20      | 6.11  | 6.06  | 6.92  | 6.20  |
| Oxygen.....   | 43.45 | 43.98 | 44.31     | 44.17 | 44.67 | 43.39 | 43.08 |
| Nitrogen..... |       |       |           | 0.09  | 0.10  | 0.05  | 0.04  |
| Ash.....      | 0.37  | 0.57  | 0.50      | 0.57  | 0.33  | 0.28  | 0.37  |

(It will be noticed that in no case is there sufficient oxygen to combine with all the hydrogen, hence a portion of the latter must exist in the form of a hydrocarbon.)

For the determination of the heat of combustion, the author constructed a particular form of calorimeter, described in *Journal für Prakt. Chemie*, in which the wood was burned in pure oxygen gas. The operation required but three minutes.

The results were higher than those calculated by Dulong's formula for the same composition. Wood containing 49.03 per cent of carbon, 6.06 of hydrogen, gave out 4,785 calories, whereas the amount calculated would be 4,139, if carbon gives 8,080, and hydrogen 34,130 units of heat.



## ENGINEERING INVENTIONS.

A combined feed pump and condensing apparatus for engines has been patented by Mr. John Houpt, of Springtown, Penn. This invention relates to features of two former patents issued to the same patentee, and the combined apparatus covers a primary condenser, by which the exhaust steam is cooled to a temperature a little below that of boiling water, under a partial vacuum, a secondary condenser, operating to produce a good vacuum in front of the piston, and to keep a higher temperature in the cylinder than in ordinary condensing engines.

## MECHANICAL INVENTIONS.

A slide rest, for use on turning lathes, to guide the tool in forming the work, has been patented by Mr. Jacob Fitz, of Hanover, Pa. The invention consists in a sliding block and a guiding form interposed between the usual longitudinally sliding carriage and the tool rest carried thereby.

An automatic felt guide for paper machines has been patented by Mr. Benjamin A. Schubiger, of Montoursville, Pa. The guide roll and cone guides are mounted on a supporting bar with a center pivot, and there are carrying rolls on the opposite ends of the bar for supporting the ends, so that the felts may be automatically corrected when tending to run sidewise or out of line, from the tension of the web varying by the stretching of some parts more than others.

## MISCELLANEOUS INVENTIONS.

A flower pot has been patented by Mr. Daniel O. Martin, of Marshall, Ill. It is so constructed that a quantity of water will be retained in the lower part of the pot and at the same time air will have access to and can circulate around the roots of the plant, thereby promoting rapid growth.

A wire crimper has been patented by Mr. Matthew M. Jones, of Kokomo, Ind. A box with its front end closed and perforated for the free passage of wire has a transverse bar in combination with a hinged or pivoted lever handle, combined with other devices, for crimping wire in constructing picket and other fences.

Improved barbed metallic fencing forms the subject of a patent issued to Mr. Albert Potts, of Philadelphia, Pa. The metallic fencing strip, notched upon its edges, is combined with pointed wire staples, the staples being fixed in place in the notches by twisting their pointed ends together so barbs are formed upon the strips.

A sample trunk or case has been patented by Mr. Henry W. Mattoni, of New York city. It is made with stop springs interposed between the ends and sides and the ends and sides of its trays, so the latter will be kept in place and protected against sudden jars, arched metal springs and re-enforcing rubber springs being used.

A pump has been patented by Mr. Orlin W. Hammond, of Belmont, N. Y. It is an improved lift and force pump for adaptation to small bored wells, and has an air chamber attachment to the rod for working the piston, the rod being hollow and forming the water conductor for the delivery of the water from the pump.

A coal dumper has been patented by Mr. Thomas Wallwork, of Litchfield, Ill. The invention consists in the combination, with a frame, of a box hinged therein at one end, the frame being provided at one end with gates hinged to the top and bottom, the gates so connected that they open and close together automatically.

A caster wheel and die for making it have been patented by Mr. Walter S. Ravenscroft, of Parkersburg, W. Va. The caster wheel is made of woody fiber or wood or paper pulp, and has its central portion additionally compressed, for which purpose the dies have plungers operated by eccentrics, so rotated as to give any desired pressure.

A washer for vehicle wheels has been patented by Mr. Bartholomew Masterson, of Milford, Mass. The washer is jointed or hinged, so it can be secured on a spoke very easily and rapidly, without the felly being removed, it being passed around the spoke above the shoulder, where it will prevent any longitudinal movement of the spoke.

A door check has been patented by Mr. Frank M. Sears, of East Saginaw, Mich. Combined with a stud projecting from the door is a block with a transverse and a vertical aperture, a pin or bolt being held in the latter, and resting on a spring adjustable by a screw, making a convenient device for holding a door open, and preventing it from being opened too far.

An improved sleeve for coats and other like garments has been patented by Mr. Charles F. Butterworth, of Troy, N. Y. The object is to make an elastic, warm fit about the wrist, for which purpose is provided a hollow annular fur band, and a spring within it, and a securing strip, with one edge secured to the wristlet and its other edge interposed between the turned in portion of the sleeve and its lining.

A ball trap, for throwing targets, has been patented by Mr. Charles F. Stock, of Peoria, Ill. This invention relates to certain improvements formerly patented by the same inventor, and covers an improved clamp for holding the target, while a rear weight with a lip or projection is substituted for the rear extension of the arm and stud for suddenly stopping the swing of the arm.

A baling press has been patented by Mr. Andrew Johnson, of Greensborough, Ala. It has slotted ends, with ratchet bars at the sides of the slots, and fulcrum bars suspended near the ends, the press box being provided with a follower strengthened by a truss, and carrying spring-held catch bars to engage with the ratchet bars, with other details of special device, to facilitate the baling of cotton, hay, etc.

An improved sewing machine has been patented by Mr. George A. Annett, of Sutherlands Corners, Ontario, Canada. The invention relates especially to

the needle and take-up mechanism, which is so combined as to accomplish by one movement the work of two essential parts, and they are so arranged that the thread will be slackened as the eye of the needle enters the goods, whether they be thick or thin.

A folding box has been patented by Mr. Henry Krog, Sr., of Washington, Mo. In combination with the bottom section and cover are removable sides and ends, a chain, screw bolt, and nut for pressing the bottom and cover against the bottom and top, edges of the sides and ends, and a fastening device in the end pieces of the bottom section, for holding the lower end of the chain.

A traveling brick machine has been patented by Mr. Henry Stelzmann, of Leech Lake, Minn. A locomotive machine is contrived to feed the clay from a tank it carries into a device for working preparatory to pressing, when it is passed through a press, and delivered in properly formed brick upon the surface of the drying yard, all by the automatic action of the machinery geared with the propelling engine, the only hand labor being that of substituting full for empty clay tanks.

## Business and Personal.

*The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.*

Wanted.—To sell State or county rights for the Folding Adjustable Climax Ironing Stand or Table. Patented Feb. 27, 1883, and Jan. 8, 1884. Patented in Canada Feb. 28, 1884. Canada patent for sale cheap; best selling article out. Send for circular. N. Scholl, Lock Box 1204, Chillicothe, Ohio.

The best Piston Rod Packing for steam or water is the Selden patent "Rubber Core" Packing, manufactured in all sizes by Randolph Brandt, 38 Cortlandt Street, New York.

Munson's Improved Portable Mills, Utica, N. Y.

Roller Velocipede. Circular free. O. T. Gleason, Temple, Me.

In the pipe Blackwell's Durham Long Cut Tobacco is even more luxurious than in the cigarette, for then it is a fuller smoke, its flavors are longer drawn, and its fragrances play around you like odors in a garden of lilies.

Drop Forgings. Billings & Spencer Co., Hartford, Conn.

Nickel Emery. We are selling pure Nickel and Emery at largely reduced rates. Greene, Tweed & Co., New York.

All Books on Electricity, cheap. School Electricity, N. Y.

Wanted.—Patented articles or machinery to make and introduce. Gaynor & Fitzgerald, Lexington, Ky.

Sewing machine, water closet, & other light castings made to order. Lehigh Stove & Mfg. Co., Lehigh, Pa.

"How to Keep Boilers Clean." Book sent free by James F. Hotchkiss, 86 John St., New York.

Stationary, Marine, Portable, and Locomotive Boilers a specialty. Lake Erie Boiler Works, Buffalo, N. Y.

Railway and Machine Shop Equipment.

Send for Monthly Machinery List to the George Place Machinery Company, 121 Chambers and 103 Reade Streets, New York.

The Hyatt filters and methods guaranteed to render all kinds of turbid water pure and sparkling, at economical cost. The Newark Filtering Co., Newark, N. J.

If you want the best cushioned Helve Hammer in the world, send to Bradley & Company, Syracuse, N. Y.

Iron and Steel Drop Forgings of every description. R. A. Belden & Co., Danbury, Ct.

"The Sweetland Chuck." See ad. p. 252.

Hoisting Engines for Mines, Quarries, Bridge Builders, Railroad Construction, etc. Send for catalogue. Copeland & Bacon, New York.

Iron Planer, Lathe, Drill, and other machine tools of modern design. New Haven Mfg. Co., New Haven, Conn. Pumps—Hand & Power, Boiler Pumps. The Goulds Mfg. Co., Seneca Falls, N. Y., & 15 Park Place, New York.

For Freight and Passenger Elevators send to L. S. Graves & Son, Rochester, N. Y.

Best Squaring Shears, Tinner's, and Cannery Tools at Niagara Stamping and Tool Company, Buffalo, N. Y.

Lathes 14 in. swing, with and without back gears and screw. J. Birkenhead, Mansfield, Mass.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, \$40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN Patent Agency, 261 Broadway, New York.

Guild & Garrison's Steam Pump Works, Brooklyn, N. Y. Steam Pumping Machinery of every description. Send for catalogue.

For Power & Economy, Alcott's Turbine, Mt. Holly, N. J.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Cotton Belting, three, four, five, and six ply, for driving belts. Greene, Tweed & Co., New York.

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Curtis Pressure Regulator and Steam Trap. Seep. 222. Woodwork's Mach'y. Rollstone Mach. Co. Adv., p. 222.

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 221.

Ajax Metal Company, Phila. Clamer's Ajax Metals for railroad, rolling mill, engine bearings, cocks, and valves.

Job lots in Rubber Belting, Packing, Tubing, and Hose. 75 per cent off belting. John W. Buckley, 156 South Street, New York.

We are sole manufacturers of the Fibrous Asbestos Removable Pipe and Boiler Coverings. We make pure asbestos goods of all kinds. The Chalmers-Spence Co., 419 East 8th Street, New York.

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Hoisting Engines. Friction Clutch Pulleys, Cut-off Couplings. D. Frisbie & Co., Philadelphia, Pa.

Barrel, Keg, Hogshead, Stave Mach'y. See adv. p. 238.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 237.

Hand and Power Bolt Cutters, Screw Plates, Taps in great variety. The Pratt & Whitney Co., Hartford, Ct.

For best low price Planer and Matchers, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hierman, Williamsport, Pa.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co., 430 Washington Ave., Phil. Pa. Stephens Bench Vises are the best in use. See ad. p. 237.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Gears.—Grant, 4 Alden St., Boston.—Water motors.

## NEW BOOKS AND PUBLICATIONS.

THROUGH SPAIN ON DONKEY BACK. Drawings by W. Parker Bodfish. Boston: D. Lothrop & Co., Publishers. Quarto, unique binding, \$1.50.

This is an entirely unique volume. Its illustrations are novel and numerous, and its letter press remarkably sprightly. To see any country "on donkey back" is to meet with surprising adventures, and see much more than the ordinary traveler sees. It introduces us to the homes of the people. It takes us into out-of-the-way places and among out-of-the-way people. We learn their ways and amusements, their weakness and strength; we meet noblemen and peasants, priests and beggars, soldiers and citizens, women and children, people of fashion and husbandmen, dancers and singers, watersellers and herdsmen, shoemakers and fruiters.

BERLY'S UNIVERSAL ELECTRICAL DIRECTORY. A reference book for industries connected with Electricity and Magnetism. Wm. Dawson & Sons, London: Cumming & Brinkerhoff, New York.

This book is a comprehensive directory for the use of all engaged, experimentally or practically, in any of the numerous applications of electricity to the arts and sciences. With much valuable information as to the present state of our knowledge in this department, it gives classified lists of manufacturers and dealers in articles required for every use to which electricity has thus far been put, in America, in Great Britain, and on the Continent of Europe. The mere enumeration of the articles now called for in this line would make an extended catalogue. The kinds of wire alone afford an immense variety of brass, copper, iron, galvanized iron, German silver, phosphor-bronze, steel, insulated in various ways, or with different coverings; then there are all kinds of telegraph and telephone materials, electric light and dynamo machine appliances, chemicals for use in batteries, etc., and this book gives the buyer the means of reaching first hands through all this field. It also gives the officers and 1,111 members of the London Society of Telegraph Engineers and Electricians, with statistics about the telegraph, telephone, cable, and electric light companies of the world.

FOUNDATIONS AND FOUNDATION WALLS. By George T. Powell. William T. Comstock, New York. Price \$2.00.

This is a revised and enlarged edition of a book which has already met with a large degree of public approval. It treats particularly of pile driving, building stones, and bricks, as well as of mortars, limes, cements, and concretes, gives tables of weight of materials, and practical explanations of the various methods of building foundation walls for all kinds of buildings.

## Notes &amp; Queries

## HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) M. D. D. asks: Is there any difference in the manufacturing of silver steel and ordinary cast steel? Are circular and cross cut saws made of silver steel better than those made of the ordinary cast steel? A. Alloys of steel with less than one five-hundredth of silver have been made in England for fine cutting instruments, but not known to have come into trade use. Cutlery has been imported from England, and

probably made here, under the name of silver steel. The silver part had more relation to the high luster of its finish than to its composition. There are quite a number of grades of cast steel suitable for the various kinds of tool making. Saws are not made of the highest grade, as they require to be tough and elastic.

(2) W. M. asks: Can the bone of an ox be softened to such a degree by boiling with steam of high pressure that it may be crumbled by the thumb and finger like a boiled mealy potato? If so, please state how great the pressure must be, what the temperature must be, and how long must it be used. Please inform me of the best cement for cementing a patch on a rubber boot? A. By using superheated steam at a temperature at which the bones will not become charred or burnt, you can accomplish your purpose. See article on page 71 of SCIENTIFIC AMERICAN for Feb. 2, 1884, on "Two New Processes for Making Artificial Ivory." For cement see rubber cements, on p. 2510 of SCIENTIFIC AMERICAN SUPPLEMENT, No 158.

(3) J. S. writes: An expert in this city claims that a copper ball perfectly air tight, used as a float in hot water, will in time fill with water and sink, and still be air tight or not leak. Some of us can't see it; won't you give us light? A. Floats that are called air tight are not always tight, especially if there is any pressure upon them. Thus floats have been used in steam boilers, and are now occasionally used in France for low water detectors. They are not reliable. They may be absolutely tight when first put in, but do not stay so. The hot water and steam has a disintegrating effect upon the joints, and the pressure in time fills the float with water. If there is no pressure, as in a hot water tank, the heat of the water expands the air upon the inside of the float, producing pressure, which will let out the air through a leak that does not otherwise show. When the water is cold, there is a corresponding pressure inward which carries in a little water. Repetition of this process soon fills the ball.

(4) C. L. B. writes: 1. I wish a power for a small mill, and I would ask if it is advisable to run it by sand power? A. We do not think that sand storage power is as yet practicable. 2. Which is the best—the vertical or horizontal flouring mills? A. The horizontal mills are considered best. 3. Which is the best—an upper or under running stone (I mean portable mills)? A. The under running stone is considered the best. 4. Should cogged gearing be greased or run dry, such as a thrashing machine horse power? A. All quick running gearing runs better and lasts longer if greased.

(5) D. R. W. & Co. write: Can you furnish us with information for building oven for japanning iron castings? If there is any work in print treating on the subject, please let us know, and we will send price. A. We know of no practical work devoted to the subject of japanning. For japanning you will require, from 240° to 260° temperature. The ovens are usually made of brick for safety, and heated by an iron flue or stove pipe passing around the room, the fire being upon the outside. Some place a heater (such as is used for dwellings or stores) in a chamber below the drying room, arranged to let the hot air pass up into the drying room. There should be no communication between the hot air chamber and the open fire that could possibly admit the vapor of the varnish to the fire. Steam is also used in coils of iron pipe laid around the room. It needs a pressure of from 60 to 80 pounds in the coils to make a useful temperature.

(6) L. F. writes: I have been trying to make butter color, according to the receipts you give in SUPPLEMENT, No. 316. After carefully following your direction I have been able to impart but a slight tinge to the olive oil I have been using. Can you suggest any improvement in the process, and thus help me out? A. We are unable to assist you in your difficulty. Both the annatto and turmeric are substances capable of imparting their color to oils and butter, when treated in the manner as described, and we fail to comprehend why they do not act in your hands. Perhaps, by using a larger quantity, the desired result will be accomplished, or it may be that the heat is not continued for a sufficient length of time.

(7) H. G. K. writes: I have bought two lenses, with which I wish to make a telescope. They are a double convex lens for object glass, about one and three-eighths inch diameter with focus of about 72 inches, and a plano concave lens for an eye piece about five-eighths inch diameter and 1.1 inch focus. 1. How far should I arrange the lenses from each other? A. Place the concave lens the distance of its own focus within the focal point of the convex or object lens. 2. What will be the magnifying power? A. The power will be the focal length of the object lens in inches divided by the focal length of the eye lens in inches, or 65 times. 3. Does not the concave eye piece make the object smaller, and as I have a double convex eye piece yet of about one inch focus, would it not be better to use that? A. You can use the double convex eye piece by placing it its own focal length beyond the focal point of the object glass. 4. What would be the magnifying power then? A. Power as above, or 72 times. 5. When it is said that a telescope magnifies 100 times, does it mean that it makes the object ten times higher and ten times wider? A. The magnifying power means diameters, or 100 times wider and 100 times higher.

(8) C. S. H. writes: 1. We have a phrenological bust that has become much soiled from dust, etc.; the faculties are all labeled. How can I cleanse it? A. Of stearine and Venetian soap, each two parts; pearl ash, one part; the stearine and soap cut small and mixed with 30 parts of solution of caustic potash, boiled for half an hour, stirring continually. Add the pearl ash dissolved in a little rain water and boil a few minutes; stir until cold and mix with more lye until it is quite liquid; keep well covered up. Remove all dust and stains from the plaster, and apply the wash as long as it is absorbed. 2. Some old putty has discolored my new nickel plated irons. How can I remove the color? A. Polish the nickel with a little rouge; first however apply alcohol or ether to remove the oil contained in the putty stain. 3. Can cider be kept in glass cans or jars, if put in when cider is new, and kept well sealed? A. If hermetically sealed, cider will keep. The addition of pepper seed and other spices is sometimes desirable.