

revelations of the examination as to the small amount of wages earned by immensely long hours of work are very sad. It is published by the State, and it would be well if its contents were read and studied by all who have a direct or indirect interest in the cause of the many.

THE CHEMICAL ANALYSIS OF IRON. A complete account of all the best known methods for the analysis of iron, steel, pig iron, iron ore, limestone, slag, clay, sand, coal, coke, and furnace and producer gases. By Andrew Alexander Blair. Philadelphia: J. B. Lippincott Co. 1888. Pp. 282. Price \$4.

This excellent treatise is devoted primarily to the analysis of metallic iron; this is given in detail with all the determinations and the different methods of effecting them. The analysis of iron ores is treated in a special chapter, and then the analysis of allied substances is spoken of, such as limestone, clay, slags, fire sands, coal, and coke, and furnace gases. A chapter of tables giving atomic weights, factors, etc., concludes the work. It is very well illustrated by nearly 100 cuts of apparatus, and a satisfactory index is given. It can be recommended, not only on account of its author's high reputation, but also on account of its contents, to all chemists interested in the analyses of blast furnace and rolling mill and steel works material.

THE LIXIVIATION OF SILVER ORES WITH SPECIAL REFERENCE TO THE RUSSELL PROCESS. By Carl A. Stetfeldt. New York: Published by the author, 18 Broadway. Pp. xx, 234.

The title of this book discloses its nature. It is in effect a very extensive and elaborate monograph, and one which will undoubtedly be of value to all who are specially interested in this process. It is illustrated by a number of cuts showing the different apparatus employed in the process treated of, while many figures, tables of results, etc., contained throughout the work add largely to its value. It is indexed, and the cuts already alluded to—thirty in number—embodied in the text are supplemented by several folding sheets showing the arrangement of different portions of the lixiviation plant treated of in the work.

RAILROADS AND ROLLING STOCK. A catalogue giving cost of plant and material for portable, light, and main lines, to which is added a chapter on river steamers and light craft, also dredging plant. Prepared by John Birch & Co., engineers and merchants, Liverpool. Pp. 232.

All that can be said of this catalogue is that it describes, notes, or illustrates almost everything that can be thought of under its title. Although a trade catalogue, it forms a very convenient and attractive manual for those interested in railroad and machine engineering.

Notes & Queries

HINTS TO CORRESPONDENTS. Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn. Special Written Information on matters of personal rather than general interest cannot be expected without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Books referred to promptly supplied on receipt of price. Minerals sent for examination should be distinctly marked or labeled.

(1) G. F. asks how to make a good flash light for photographic purposes. A. Purchase one ounce of magnesium powder and one ounce of negative gun cotton from dealers in photographic materials. Place on a dust pan enough cotton, when pulled out, to measure about 3 1/2 inches in diameter. Sprinkle it over with twenty grains of magnesium powder to form a thin, even film. Lay over the magnesium thus arranged a very thin layer of gun cotton. Connect to the bunch of cotton a small fuse of twisted cotton about six inches long, so that it will extend to the side of the dust pan. Then set the pan on a step ladder near the object, and when ready, light the gun cotton fuse with a match, when instantly a brilliant flash will ensue. There are several ready prepared magnesium compounds now sold with special devices and lamps to fire them.

(2) J. C. asks for a receipt for removing mildew from white silk. A. Perhaps naphtha will do it. Take to dye house, or try following: Dip a piece of flannel in alcohol and water, and well rub the place; iron on wrong side, putting a piece of damp cotton cloth between the iron and the silk.

(3) E. F. Co. write: We recently noticed an article in SCIENTIFIC AMERICAN upon the subject of size of fire box under boilers to give best results, and stating that the fire boxes are usually too large. We have suspected that we used too much fuel, and want to ascertain what size our grate between door and bridge wall ought to be under our boiler, 13 feet 6 inches long, 5 ft. diam., 84 tubes 2 1/2 inches, steam pressure required 80 pounds. A. The amount of grate surface required for your boiler is dependent upon the amount of steam required, which you do not mention. The article in question alludes to the construction of boilers of full capacity for the work to be done. If a boiler with large grate surface can only keep up the steam required by strong firing, there is nothing gained

by reducing the grate and urging a still stronger fire. It is where the boiler is of larger capacity than the steam requirement that the gain is made by reducing the normal grate surface to the proportions mentioned in the article alluded to. Really, the great economy is made in having the boiler at least 50 per cent larger than the steaming capacity required, as usually computed. Then with a reduced grate surface and quick fire the utmost economy will result. The whole gist of steam economy is in saving the waste heat of the chimney and the exhaust. Of course proper care must be taken to prevent loss of heat from exposure of steam-heated surfaces around boiler, pipes, and cylinder. Before we can advise a reduction in your grate, we should know the temperature of the gases of combustion as they leave the heating surface. The difference between this temperature and the temperature of the steam will indicate the waste. Also, we should know if the present firing is strong or dull; it being a most important factor in making a change foreconomy to know the relative proportion of heating surface in the boiler to the amount of steam produced or work done. It is a most common practice to urge a boiler to excessive duty and then complain of excessive coal consumption. We can only advise that, if you desire to make an experiment of any real value, you accurately weigh the fuel used for a day, or better for a week. Then put a row of fire brick on each side of the grate, three or four bricks high, making your actual grate surface 9 inches narrower. By urging the fire with the fuel weighed as before for a definite time—a day or preferably a week if you can—you may have an absolute test of the economy of the change in your case. If you succeed, your boiler is large enough for your wants. If not, the conclusion is that for economy you should have a larger boiler. The art of firing is an essential feature in steam economy, too often overlooked in the complaints as to fuel consumption. A difference of ten per cent or more may be made by variation in the management of doors and dampers.

(4) P. I. J. asks: 1. Can a wine artificial in its make-up, or that has been colored or improved by others, be easily distinguished from a natural wine? A. It is sometimes very difficult to do. The aniline colors are tested for, and special tests applied for suspected adulterants. 2. Where may a full account of the various fruit ethers be obtained? A. These have to be studied in chemical treatises. There is no work devoted exclusively to them. 3. In making a vanilla extract, difficulty in completely pounding the bean to a pulp in a mortar is experienced. Can you tell an efficacious method? A. Add white sand, and pulverize sand and beans together. 4. Are there any special colognes that are made, usually by simple solution of the oils in the cologne spirits, that would be improved on distillation? A. We know of none. 5. Which would make the best emulsion of wax—Castile soap or caustic potash? A. Neither will answer. Try dissolving the wax in oil and making an emulsion of the product with water and gum tragacanth.

(5) G. A. J. asks: 1. What is used for a gold bronze for wood, and how applied? A. The preparation is sold as a powder, and is applied mixed with a suitable varnish, or the surface is first varnished and the powder applied with a pad while the varnish is still tacky. 2. Does the use of mica oil in boilers lessen the heating capacity? The oil is used for the prevention of scale, etc. A. Not to any appreciable extent, unless used in large quantities. The boiler should be blown off from time to time. There is some danger of corrosion. 3. How to sugar-cure beef. A. Cure for 10 or 12 days with dry salt to which a little saltpeter has been added, along with some sugar and black pepper. It is then hung up until required. Folded in dry paper and hung in a dry place, it will keep two or three months. 4. Is there any way to temper brass wire after it has been hot? A. Light hammering, redrawing to a slightly smaller size, heating followed by a very slow cooling, all tend to harden brass. 5. What is the price of platinum, such as used in wire, etc.? Is it used as coin in some countries? A. \$900 an ounce. It has been used in Russia for coinage.

(6) C. G. H., of Wallingford, Conn., sends two worms found on a snowball bush. When they touch the hand, he says, it is badly nettled and inflamed for a few days. What is it? A. Professor C. V. Riley says they are larvae known commonly as saddle-backed caterpillars. They are the larvae of a moth known as Empretia stimulea, which is comparatively common almost all over the country. The larvae feed upon a great variety of plants, but are perhaps found more often upon corn than upon anything else. They belong to the group of stinging caterpillars, and the effect of their spines upon the skin is similar to that of a nettle.

(7) A. S. E. asks (1) how to deodorize wood alcohol to fit it for burning? A. No efficient and cheap way is known. 2. What cement will secure wood firmly to glass, same carried by wheel applied to one side. A. Use bicycle tire cement, or dissolve 1 part India rubber in 12 parts benzine and add 20 parts of shellac and carefully heat until benzine is expelled. There is much danger of the benzine igniting. 3. How to make the aniline colors, getting them in the crystal forms. A. You can buy aniline colors from the dealers in chemicals.

(8) W. B. K.—The terms "cold-blooded" and "warm-blooded," as applied to human beings, refer principally to the excitability or non-excitability of the individual, and not really to any difference in the heat of the blood. The temperature of the heart circulation in all persons in health is about 98° Fah.

(9) I. A. C. desires a receipt to make marking ink, black and red, either or both, to mark cotton bales and sacks. It must be cheap, as we sell by the barrel. A. Take of shellac 2 parts, borax 2 parts, water 25 parts, gum arabic 2 parts, and of either lamp-black, Venetian red, or ultramarine a sufficiency. Boil the borax and shellac in water till they are dissolved, and withdraw from the fire. When the solution has become cool, complete 25 parts with water and add the coloring matter to bring the ink to suitable consistency. When it is to be used with a stencil, it must be made thicker than when it is to be applied with a brush.

(10) T. R. M. asks a formula for charging Babcock's fire extinguisher. A. The extinguisher is charged with a solution of bicarbonate of soda in water and sulphuric acid in a glass bottle, the latter, when required for use, being crushed with a screw, spilling the acid into the charge of soda and water. Carbonic acid gas is instantly generated, by which a pressure is obtained sufficient for throwing the whole contents of the apparatus with much force through a nozzle for fire-extinguishing purposes.

(11) J. E. L. Co. asks how to cleanse sponges of the sand and white particles found in them as they are sold by the trade. A. Shake and wash, with a little hydrochloric acid in one of the wash waters.

(12) C. W. B. asks the quickest and cheapest way of putting a fine polish on light-colored woods, such as white holly, etc. A. Rub paraffine on and polish with a white woolen cloth. Mastic varnish is suitable for white holly. Also, bleached shellac makes a good varnish, using 95 per cent alcohol for solution.

(13) D. N. desires a receipt for making mocking bird food. A. Mix together 2 parts corn meal, 2 parts pea meal, and 1 part moss meal (made by drying and grinding the imported German moss seed), add a little melted lard, but not sufficient to make the mixture too greasy, and sweeten with molasses. Fry in a pan for 1/2 hour, stirring constantly, and taking care not to let it burn; this makes it keep well.

(14) G. H. P. and others.—When a locomotive is drawing a train around a curve, the outside drivers slip backward. When running by momentum only, the slip may be on either side, depending upon the surface condition of tracks or treads, and also upon excess of weight thrown on outer wheels by centrifugal force due to velocity and smallness of curve. When braking up or with reverse steam on curves, the slip is forward on the inner wheels.

(15) J. M. B. asks: Is there any method of giving to the surface of an iron stove a copper or bronze luster that will not be destroyed by the heat, or that could be cheaply renewed from time to time? A. There is nothing in the paint or polish line but plumbago stove polish that will stand the heat. Nickel plating is much used now for ornamenting stoves.

TO INVENTORS. An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

INDEX OF INVENTIONS For which Letters Patent of the United States were Granted October 2, 1888, AND EACH BEARING THAT DATE.

(See note at end of list about copies of these patents.) Abdominal supporter, L. B. Craig 390,570 Addressing machine, Mace & Jackson 390,392 Advertising device, automatic, E. C. Magnus 390,383 Advertising frame, G. G. Green 390,473 Alloy of copper, nickel, and lead, G. F. Pottle 390,251 Armature core for dynamos, W. S. Hill 390,701 Axle, vehicle, S. J. Kurtz 390,482 Badge, H. R. Hansen 390,593 Bag. See Paper bag. Bale cover, cotton, A. J. McGehee 390,499 Bale cover, cotton, A. S. Ranlett 390,519 Balling twine, etc., machine for, J. Good 390,361 Band cutter and feeder, W. S. Nichols 390,509 Basket handle, W. J. Van Deusen 390,536 Bath tub seat, G. B. Sloat 390,407 Batteries, porous cup for galvanic, E. M. Hewett 390,597 Batteries, system of utilizing secondary, H. Edmunds 390,464 Bearing, anti-friction, M. R. Wood 390,424 Bed stay, C. Bethea 390,346 Belt fastener, I. Jackson 390,233 Belts, device for stretching and tightening elevator, J. J. Dougherty 390,213 Bicycle attachment, H. H. Holtkamp 390,368 Bit. See Bridge bit. Block. See Hat block. Pulley block. Board. See Drawing board. Plow mould board. Boat launching carriage, H. J. Woods 390,543 Boiler. See Steam boiler. Bolt, G. P. Erhard 390,466 Bolt. See Latch bolt. Bolts, mesh clearer for, W. H. George 390,359 Bolting machine, T. W. Graham 390,225 Book, G. D. Barnard 390,197 Book copying, E. R. Soliday 390,526 Book covers, sheath for, C. H. Caryl 390,449 Book holder, F. P. Harbaugh 390,363 Boor, H. L. Benson 390,552 Boot or shoe sole edge trimming machine, V. Beaufort 10,990 Boots, machine for manufacturing congress, C. W. Shippee 390,263 Bottle, perfumery, W. W. Stewart 390,317 Bottle stopper, G. A. Fullerton 390,586 Box. See Folded box. Box, H. S. Munson 390,307 Box and drawer corner, J. B. West 390,421 Boxes, machine for manufacturing wooden, E. W. Locke 390,493 Bracket, T. Koehler 390,302 Brake. See Car brake. Brake, E. R. Snyder 390,316 Bridge gate, swinging, C. Ross 390,621 Bridle bit, E. R. Cahoon 390,567 Buckle, suspender, A. F. R. Arndt 390,432 Buckle, suspender, J. T. Budd 390,280

Bucksaw frame, J. W. Thompson 390,416 Burner. See Gas burner. Butter package, D. W. Miller 390,368 Butter worker, J. W. Button 390,565 Button, F. B. Crooks 390,309 Button setting machine, A. M. English 390,214 Cake dropping machine, P. F. Carroll 390,302 Camphor, refining, M. J. Schreiter 390,523 Candle, sulphur, C. H. Shaw 390,314 Cane shredder, S. Fiske 390,580 Car brake, H. Ottenhouse 390,513 Car coupling, J. W. Chisholm 390,345 Car coupling, S. J. Freeman 390,471 Car coupling, L. E. Hunt 390,682 Car coupling, J. S. Miller 390,369 Car coupling, D. N. Tarbox 390,411 Car dumping device, D. T. Denton 390,350 Car rutter, J. H. Cook 390,283 Car starter, C. H. Brown 390,443 Cars, feed trough for stock, G. D. Burton 390,584 Carbon filaments, making, T. A. Edison 390,423 Carpet, G. J. Bicknell 390,455 Carriage top, F. R. Merrell 390,387 Carrier. See Cash and parcel carrier. Cart, road, N. H. Hill 390,586 Cartridge, accelerating, H. P. Hurst 390,282 Carving fork, W. W. Lee 390,489 Case. See Show case. Cash and parcel carrier, D. Lipsey 390,378 Cash and parcel carriers, railway for, G. F. Green 390,233 Casting metal ingots, apparatus for, W. Huffelmann 390,371 Cattle guard, J. T. Hall 390,592 Cattle, head frame for, J. O. Dorris 390,257 Chair. See Reclining chair. Chairs, foot rest for, J. Hogan 390,477 Check hook, C. C. Lovejoy 390,380 Chill, W. Fawcett 390,230 Chill mould apparatus, W. Fawcett 390,455 Chimney, ventilating, L. Boutin 390,337 Cigar bunching machine, A. C. Schutz 390,258 Cleaning apparatus, magnetic, A. Hempel 390,229 Clock, synchronizing apparatus, C. E. Hoefling 390,230 Closet. See Water closet. Coat or hat lock, Young & McCrea 390,530 Coin operated lock for receptacles, L. M. Ryfenburgh 390,622 Comb. See Curry comb. Compound engine, Berwick & Sellers 390,434 Condensing apparatus, J. U. Lloyd 390,243 Coop, chicken, Booth & Dawson 390,557 Cotton gin rib, O. Washburne 390,321 Counter skiving machine, E. F. Belding 390,551 Coupling. See Car coupling. Pipe coupling. Shaft and pulley coupling. Thill coupling. Crackers, show box for, L. J. Anker 390,548 Cuff holder, C. R. Hart 390,476 Cultivator, C. E. Morton 390,506 Cultivator, orchard and vineyard, J. Morgan 390,305 Cultivator shovel, reversible, J. A. Johnson 390,479 Cultivators, spring tooth attachment for, J. R. Young 390,276 Curry comb, H. W. Lawrence 390,484 Curve scriber, E. A. Gleseler 390,380 Cuspldor, D. H. Murphy 390,614 Cutter. See Band cutter. Feed cutter. Keyseat cutter. Paper cutter. Sod cutter. Cutter and cutter bar, Morton & Brown 390,506 Decoy duck, C. D. Gammon 390,587 Dental work opening forceps, F. H. Brown 390,523 Dental tool, G. Evans 390,576 Dentures, removable bridge for artificial, C. M. Richmond 390,521 Digger. See Potato digger. Door check, E. Wicks 390,274 Draught equalizer, S. Case 390,450 Draught regulator, P. W. Cornwell 390,284 Drawbars, check plate for, W. H. Hovey 390,231 Drawing board, geometrical, J. M. Pringle 390,387 Drawings, duplicating architectural and similar, J. M. Ewen 390,577 Drill. See Rock drill. Seed drill. Drills, machine for cutting twist, J. Gaslorowski 390,223 Drilling machine, center, F. H. Richards 390,520 Drum tug, Foley & Wilbur 390,469 Dust collector, J. S. Smith 390,524 Dynamo, alternate current, E. Thomson 390,318 Electric circuit controller, A. F. L. Willatowsky 390,320 Electric conductors, device for protecting, E. G. Acheson 390,196 Electric light circuit cut-off switch, W. A. Johnson 390,481 Electric machine, dynamo, C. S. Bradley 390,459 Electric machine, dynamo, N. Tesla 390,414 Electric machine or motor, dynamo, N. Tesla 390,415 Electrical distribution, system of, N. Tesla 390,413 Electrical testing apparatus, J. W. Packard 390,510 Electricity for lighting, distribution and control of, H. Edmunds 390,463 Electrode, therapeutic, J. H. Woodward 390,514 Elevator, D. P. Van Court 390,535 End gate, wagon, E. & J. P. Reichart 390,253 Engine. See Compound engine. Eraser, slate, G. Wilkening 390,541 Etching and producing inextinguishable metallic deposits upon bright metal surfaces, E. Niensstaedt 390,391 Excavator and conveyer, J. Cable 390,201 Eye bars, machine for upsetting, Cooke & Carlough 390,456 Fans, spring motor for, G. W. Houston 390,369 Feed cutter, J. O. Holtzman 390,621 Feed rack, D. F. Schwartz 390,259 Feed water heater, E. F. Luthy 390,608 Feed water heater, W. Webster 390,537 Felting, preparing animal hairs for, M. J. A. Darvelos 390,348 Fence, W. M. Tipton 390,268 Fence machine, A. J. Neff 390,309 Fence making, tension device for use in wire, A. Richardson 390,617 Fence post, N. Emsminger 390,216 Fence post, Maddis & Watson 390,495 Fence wire, B. Scarles 390,257 Fence wire stretcher, J. F. Warner 390,272 Fetter lock, W. Moran 390,504 File, paper, L. E. Heitling 390,596 Filter press, Brock & Minton 390,558 Firearms, set trigger for, W. H. Davenport 390,286 Fire escape, W. Bruce 390,445, 390,446 Fire escape, J. M. Murphy 390,308 Fireproof safe, A. J. Campbell 390,282 Flatiron heater, A. L. Howell 390,478 Flour safe and sifter, H. Foster, Sr. 390,219 Flue, hot air, T. J. Bradbeer 390,438 Folded box or pall, C. W. Struble 390,295 Folding seat, H. L. Andrews 390,421 Folding table, A. T. H. Brower 390,240 Fork. See Carving fork. Frame. See Advertising frame. Bucksaw frame. Window frame.