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.

Notes & 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 this office. Price 10 cents each.

(1) W. R. E. inquires: Is there any process whereby we can recover the hydrochloric acid from a solution of chloride of zinc which we have as a by product in the manufacture of one of our colors? I can recover the acid from chloride of barium, by the use of sulphuric acid, but sulphate of zinc, being a soluble salt, does not precipitate in the same manner as sulphate of barium. A. We fear that there is no method short of an expensive and complex series of reactions and decompositions by which the hydrochloric acid could be recovered, and which would necessarily be too expensive to be profitable. From the fact that a solution of chloride of zinc possesses the property of rapidly decomposing sulphide of ammonium and the organic matter of miasmata which convey disease, it forms a valuable disinfectant and deodorizer, and we suggest the desirableness of the waste product alluded to being turned to account in this direction. Its value as a disinfectant has been thoroughly established.

(2) T. R. writes: In making a curve on a railroad, which rail is the highest, the inside one or the outside? Is it not the outside one that is raised, and the inside rail left level? A. Generally the outer rail is raised, but engineers differ somewhat in their practice. 2. Is it necessary to raise either where the speed is not over three miles an hour? A. No.

(3) G. E. P. asks: 1. What is the best cheap protection for rough wood work against fire (sparks and light flame inside of building)? A. Saturate the wood with a strong aqueous solution of tungstate of soda. 2. Which is the best, something applied like paint directly to the wood, or sheathing the same with sheet tin? A. The tin or sheet iron.

(4) C. D. A. asks: Is there any way to extract a portion of a glass stopper which has been broken off down in the neck of the bottle? A. Repair the broken glass by means of a little Armenian cement or stratena. (See SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.) Then heat the neck of the bottle quickly but moderately, so as not to heat the stopper. The heat will expand the neck of the bottle so as to loosen the stopper, which may then be removed.

(5) J. H. P. writes: My neighbor has a medium sized hot air furnace with indirect draught, which he controls by check draught in smoke pipe, by slide in door at bottom of furnace, which when open admits air through the fire, and he also opens a space in feed door equal to four square inches, admitting air over the fire, which he claims is necessary to supply oxygen for the combustion of the coal gas. I claim that so much cold air passing over the fire is not only unnecessary, but to the expense of fuel, as in heating, cools the fire and the radiating surface of the furnace, lessens the degree of heat in the hot air chamber, and then passes through the flues into the chimney. I also claim that, as furnaces are commonly fitted, a closer approximate to the necessary amount of oxygen required for the combustion of the coal gas can be obtained through an opening to the fire from below, together with that passing to the fire through the joints to doors, than would result from opening a space to admit air directly to and above the fire. A. If the draught is good the introduction of a small amount of air over the fire may effect a saving in fuel, without decreasing the heat. With thick fires burned slowly, much carbonic oxide (CO)—a combustible gas is formed by the partial decomposition of the carbonic acid (CO_2), formed near the grate, in its passage through the body of fuel. If air is not admitted above the fire much of this gaseous fuel may escape unburned up the chimney. Your neighbor may therefore be correct.

(6) C. C. writes: The SCIENTIFIC AMERICAN SUPPLEMENT No. 253, contains a rule for estimating the horse power of a high pressure engine, by a practical engineer. But he does not give the *modus operandi* of obtaining the average pressure from expansion (except by the indicator). A. If you have no indicator, you can get the average pressure approximately by assuming that the entering steam has a pressure of 3 to 6 lb. less than the boiler pressure, and that this is the pressure in the cylinder until cut off; the terminal pressure will depend on the point of cut-off—that is, if cut off at one half the terminal pressure will be one-half the entering pressure—if cut off at one-third, one-third, etc. For example, suppose the boiler pressure 63 lb., then the initial cylinder pressure would be 60 lb.; and if cut off at one-half the terminal pressure, would be 30 lb.; and if cut off at one-third, 20 lb. Next add together the initial and the terminal pressures and divide by 2 the quotient is the approximate average pressure, $60+30=\frac{90}{2}=45$ lb. average and $60+20=\frac{80}{2}=40$ lb. average.

(7) C. D. N. writes: I made a copying pad after receipt in SUPPLEMENT, No. 225, using 18 ounces of glycerine and 3 ounces of gelatine, and maintaining the heat for about four hours, and in making the ink I used half an ounce aniline, half an ounce alcohol, and 3½ ounces of water, and I cannot take over 3 or 4 copies. What is the matter? A. Try an ink with less alcohol and more aniline violet. See that the latter is pure, not mixed with dextrine, as is very frequently the case.

(8) H. S. asks: 1. Why do engineers say 28 or 30 inches vacuum instead of pounds? A. 28 or 30 inches of mercury is only equal to 14 or 15 lb. Vacuum gauges are usually marked in inches. 2. Where is the most pressure in a boiler? A. The pressure at the bottom of legs is as much greater than that in the steam chamber as is due to the head of water. 3. Why are all gauges tapped into the drum? A. Gauges are usually located where most convenient for engineers.

(9) J. S. M. asks how to proceed to wear the inside of a steam cylinder smooth after it has become cut by running dry or from other cause. A. You can restore the surface by grinding out the cylinder with a true segment of lead and sand or emery, but great care must be taken that it is so done as to leave the cylinder true.

(10) E. F. R. writes: 1. I am building the hand power electric machine described in SUPPLEMENT, No. 161. Please tell me about how much No. 16 cotton covered wire it will take to wind the electromagnets. A. It will take about 1 lb. to each arm of the magnet. 2. What is meant by a resistance of two or three ohms? A. An ohm is the unit of electrical resistance, and is about equal to that of a pure copper wire one-twentieth of an inch in diameter and 250 feet long. 3. How are wires connected to the binding posts, etc., under the base? A. A screw provided with a copper washer passes upward through the base into the binding post, and clamps the wire between the washer and the underside of the base. 4. In making the induction coil in SUPPLEMENT, No. 160, shall I need 40 square feet of tin foil or 20 ditto; or, in other words, in counting the surface do you count both sides of a sheet? A. One side only is counted. Use 40 square feet.

(11) J. M. H. writes: 1. I wish to construct a telephone line of about one mile in length. Will the telephone as illustrated in Figs. 2 and 3, SUPPLEMENT, No. 142, work successfully on a line of that length. A. Yes. 2. What kind of wire will be the best to use for the line; will No. 14 galvanized telephone wire do? A. No. 14 will answer, but No. 12 would be better. 3. How is the silk covered wire fastened to the binding screws? A. The end is stripped and soldered to the heavy wire which is clamped between the shoulder of the binding post and the wood of the telephone handle. 4. Will the plate such as is used by artists for tin types do for the diaphragm. A. Yes. 5. Should the wire as used for the line be attached direct to the telephone? A. Yes. 6. Is the coil in the connecting wire, as shown in the engraving, necessary? A. No. 7. Must the spool be of the same size and dimensions as in the engraving? A. The size is correct, but may be varied somewhat without seriously affecting the working of the instrument. 8. Will it answer to attach the ground wire to an iron pipe that runs into a well, and how should it be attached? A. It would probably answer. Solder the wire to the pipe. 9. Would a bar magnet 9 inches long and weighing 15 oz., threaded at one end, answer any better in place of the horseshoe magnets and the iron core? A. No; the telephone with the three-eighths bar magnet is the best of the two forms shown.

(12) H. W. L. asks how to burn crude petroleum. Is it burnt in the same manner as kerosene, if not, how? A. Petroleum is a mixture of a large number of hydrocarbons, some very light, some heavy, all combustible. It is neither safe nor economical to burn the crude oil in a lamp or with a wick. For heating purposes the best results are obtained by the use of some form of injector which delivers the oil in a spray mixed with a large volume of atmospheric oxygen. Under such circumstances the combustion is nearly perfect, and the heat is intense.

(13) A. F. S. asks: What coloring matter is best for making transfer paper that will show plainly on black walnut? A. Try chrome yellow, or a yellow lake, made up with a sufficient quantity of melted lard and a little wax.

(14) A. T. G. asks how to make printer's rollers. A. 1. Glue, 8 lb.; molasses, 7 lb.; soften the glue by soaking it in cold rain water for 24 hours; then melt over the water bath and stir in the molasses previously heated, moderately. Heat gently for half an hour, with occasional stirring, let stand to cool somewhat and pour into oiled moulds. Requires from 8 to 10 hours in winter, and longer in summer, to harden. 2. Best white glue and glycerine, equal weights; soften the glue in cold water over night, then melt it over the water bath and gradually stir in the hot glycerine; continue the heat for seven hours, with occasional stirring, to drive off all the water absorbed by the glue. Let cool somewhat, skim and pour into well oiled brass moulds in the center of which the spindle is properly adjusted. Let it stand ten hours to harden before attempting to remove it. Large rollers require longer to harden than small ones.

(15) S. M. asks (1) for the name of a work treating on air pumps. A. There is a good article on the subject in Knight's "Mechanical Dictionary." 2. I desire to make bicarbonate of soda, and would like to get acid from my boiler fire, and think I might draw it by connecting a tight cylinder by a pipe with the fire and allow the carbonic acid to enter at top of cylinder and go to bottom of, say, four feet of water, and by pumping the air out of top of cylinder creating a vacuum, and thus causing the carbonic acid to flow in and wash it in passing through the water. A. The carbonic acid from the combustion of coal under an ordinary boiler contains much sulphurous acid and various hydrocarbons, beside this difficulty, the solution of soda must be kept cool to admit of the absorption of the gas to form the hydro (bi) carbonate.

(16) G. H. A. asks: 1. Would an ordinary oil stove furnish enough heat for a boiler large enough to supply with steam an engine large enough to run a steam carriage that would carry two persons on good roads? A. No. 5. How large an engine would be necessary? A. Probably 3 inch cylinder and 6 inch to 12 inch stroke, depending upon whether geared or not. 3. Would not a boiler built in the sectional plan be better (make more steam with less heat, and be safer) than an ordinary tubular boiler? A. Yes.

(17) W. H. C. asks for a recipe for an invisible ink so that it will only show when heated. A. Dilute a strong aqueous solution of pure chloride of cobalt with water, until, when written with, the characters are invisible after drying at ordinary temperatures. Heat develops a dark blue or purple color. Use a clean pen and sheet of blotting paper.

(18) C. G. asks: 1. Is it possible for feed water to enter a boiler too hot? A. No. 2. Since using a new system of heating feed water, we have been troubled with constant foaming of the boilers, and a gauge cock which is located in the side of mud drum shows at all times half water and half steam. We use river water, and clean out regularly, and until inauguration of heating water by this new system never had any trouble. The water is quite at 200° on entering the force pump. We enter at mud drum. What would be the effect of putting feed water in at water line or above? Give us your views, and tell us the cause of our trouble. A. We think that if you enter the feed water into the body of the boiler nearer the surface of the water you would be relieved of your trouble.

(19) C. D. R. asks: Will a boiler made from galvanized iron be strong enough to run an engine one inch bore by 3 inch stroke, for experiment? A. Yes, if the iron is of proper thickness; but galvanized iron is very poor stuff for the purpose, and should be thicker than if vulcanized.

(20) J. L. asks: What is the simplest way to find out the distance the tail piece on a lathe should be removed from its central position to turn a given taper? Supposing I have a piece of steel one foot long, taper required one-tenth of one inch to every inch, how far would I have to remove the center from its central position? A. Set over the tail center one-half the total taper in the whole length; if it is one-sixteenth of an inch difference of diameter in a piece twelve inches in length, set over the tail center half of twelve-sixteenths or three-eighths of an inch.

(21) C. J. H. writes: In making quantitative blowpipe assay of gold and silver ores, charcoal is

recommended for a support in the first fusion of the assay. It is often quite difficult to procure good coals for the purpose, especially when on a prospecting trip. Is there not some kind of material from which small capsules can be made for the purpose, which can be used an indefinite number of times, and which would be equally as good as charcoal? A. We know of no support that will serve as a good substitute for the coal. A small bone ash cupel will answer in some cases.

(22) R. G. asks: 1. What is the weight of a foot of water in pipes from one-sixteenth of an inch to one inch in diameter? A. The weight of one cubic foot of fresh water is 62½ lb. and from this you can estimate the weight of water of any diameter and length of pipe. 2. What is smallest water meter under a 20 foot head that it would be possible to drive a sewing machine with at the usual rate of speed? A. You should apply to a maker of turbine wheels. The size depends upon the construction of the wheel and the manner in which the water is applied.

(23) A. W. C. writes: I have a coil of half inch steam pipe (iron) to be used for a boiler which opened in two places in the weld in coiling. Can you tell me how to repair it? A. Either braze up the opening in the pipe, or close it up as close as possible with a hammer and bolt a sleeve around it, with cement for a joint.

(24) L. K. S. asks: When were ships first copper bottomed? A. Fincham's history states that it was in the year 1553 that metal sheathing was first applied.

(25) C. D. W. asks in what cities on this continent other than horse power is used on street railways, also what power is used in cities you may name, whether steam, electrical, or compressed air? A. Compressed air engines have been tried in this city, but we believe they are not now in practical operation. At New Orleans, steam produced from highly heated water carried in tanks or fireless boilers is used. In San Francisco cars are drawn by endless ropes drawn by stationary engines, and we understand that Cincinnati is about to apply the same principle. In Philadelphia and in Brooklyn on many of the streets of the outskirts cars are drawn by steam locomotives of peculiar construction.

(26) E. H. A. asks: What is the weight of a blow given on a pile from a hammer weighing 1,700 lb. and falling 24 feet? A. 29·8 tons.

(27) "Cameo" asks whether a cameo is any kind of stone, cut in relief, or whether it is necessarily a precious stone. A. "A precious stone carved in relief."—Webster. "A precious stone or shell having an imitative design engraved upon it in bass relief, or figures raised above the surface."—Worcester.

(28) C. G. A. writes: I am about to construct some wooden trays with perforated bottoms, to hold fish eggs. They are to be placed in a tall pile, one over the other in the air, and be supplied with water in small quantity, which shall dip down through the whole series. I want a varnish or other preparation which shall be proof against the action of the water, and shall protect the wood from it and also prevent the wood exuding any hurtful juices. Is there any better mode than to varnish well with asphaltum? A. Give several flowing coats of good asphaltum varnish thinned with oil of tupentine somewhat and let them dry thoroughly before wetting.

(29) W. H. P. asks: 1. Can the electric light and other phenomena produced by a current from a Gramme machine be produced by the current of one or more induction coils? A. No. 2. If not, why not? A. Because the secondary current is of necessity intermittent and of very high tension. The machine referred to produces a quantity current which is requisite for the electric light.

(30) B. R. D. asks (1) how to proceed in the manufacture of aluminum. A. Alum is dissolved in hot water, a certain proportion of carbonate of soda is added, and the whole evaporated to dryness. In the manufacture of aluminum alloys this preparation is simply added to the metals—copper, tin, zinc, nickel, etc., fused in a covered crucible, and vigorously stirred in while the heat is continued, with care to exclude the air as much as possible. For gold colored aluminum bronze: 2 lb. copper is melted, and to it is added 1 lb. of the soda alum mixture and 6 oz. oxide of zinc. Cover, stir, and heat for about 15 minutes. 2. A foreign journal says: "1 oz. of charcoal, 3 oz. of salt, and 1 lb. of the oxide of aluminum put in a covered crucible and kept in the fire from 15 to 25 minutes at about 700° Fah." I wanted some to-day for an experiment, and failed. I inclose a sample of what I got. A. Too large a quantity of charcoal powder or too small a quantity of aluminum oxide (calcined) was used in your experiment. Reduce the materials to a powder that will all pass through a 90-mesh sieve, first having dried all thoroughly. Mix thoroughly, cover well in the crucible, and give a better heat. 3. Have I the right to make for an experiment? A. Yes. 4. What is the lifting power of the magnets in the best electric machines per horse power? A. Probably 200 lb. There is no fixed limit.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

S. H. H.—Chrome iron ore, worth ass aying.—A. F. B.—Nickeliferous pyrites—of some value.—T. P. C.—1. Lead sulphide (galena), argentiferous, in quartz and limestone. 2. Galena in limestone. 3. Pectolite—a lime potash soda silicate with a little galena. 4. Magnetic iron oxide—magnetite or loadstone. 5. Traprock. 6. Clay. 7. Quartzite.—F. B. M.—Sandstone—no value.—T. S. B.—Ferruginous sandstone—contains nothing of value.—G. M. W. and G. M. D.—An impure ocher. If ground and calcined would make a cheap pigment.—W. K.—1. Quartz carrying a small quantity of argentiferous sulphurets. 2. Gold quartz. 3. Quartz, gypsum, and iron sulphuret. 4. Micaceous and garnetiferous quartz. It carries a small quantity of copper and iron sulphurets, and some of it may be argentiferous. 5. Quartz, fluorite, and zinc oxide.

NEW BOOKS AND PUBLICATIONS.

AYER'S ALMANAC FOR 1881. IN ENGLISH, GERMAN, DUTCH, NORWEGIAN, SWEDISH, FRENCH, SPANISH, PORTUGUESE, AND BOHEMIAN. Published by Dr. J. C. Ayer & Co. Lowell, Mass.

We are in receipt of a neatly bound set of the various editions of Ayer's Almanac, as above, containing not only specimens of the languages above named, but also some pages of Turkish, Armenian, Greek, Bulgarian, and Chinese. The collection before us is a literary curiosity, and a remarkable example of enterprise and liberality. The annual edition is from ten to eleven millions, for free circulation.

SEWING MACHINERY. By J. W. Urquhart. London: Crosby, Lockwood & Co.

Gives a brief history of the principal sewing machine inventions, with details of construction and directions for adjusting the leading machines of the several types.

THE STATELY HOMES OF ENGLAND. By Llewellynn Jewitt and S. C. Hall. Two series in one volume. 8vo, pp. 399 and 360. New York: R. Worthington.

Thirty-one of the more notable of the historic castles, halls, and other "stately homes" of England are here pleasantly described and pictured by means of three hundred and eighty engravings on wood. The text is uncommonly good for a work of this class. The homes portrayed are rich in historic interest, many being ancient and all the seats of history-making families. The sketches were originally prepared for the pages of the *Art Journal*, but have since been considerably enlarged.

TOMLINSON'S HANDY BOOK FOR THE OFFICE AND HOME. Chicago: John H. Tomlinson. 8vo, paper.

The author has compiled from various sources a considerable amount of information and practical advice touching business affairs, social conduct, and so on.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. New York: Bicknell & Comstock. Price $3.

Embraces plates 17–24. Low priced Queen Anne cottages, summer houses, and sea shore houses, with elevations, framing plans, exterior and interior details, and window sash.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

January 11, 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.

Aerial navigation, machine for, E. A. Pearse..... 236,619
Air compressor, J. H. Quinn..... 236,455
Animal matter, process of and apparatus for treating, A. & E. Lister..... 236,600
Animal trap, G. W. Reagan..... 236,456
Anvil and vise, combined, A. L. Adams..... 236,526
Apple corer and cutter, E. D. Baldwin..... 236,477
Areas, vaults, etc., covering, lighting, and ventilating, T. Hyatt (r)..... 9,534
Auger lip, detachable, Adams & Robertson..... 236,401
Bag lock, A. Bratt..... 236,413
Bale ejector for presses, L. Miller..... 236,609
Bed bottom frame, spring, W. T. Hayhurst..... 236,584
Bed bottom, spring, E. W. Hunt..... 236,593
Bell, D. Torrey..... 236,652
Bells, individual attachment for electric, A. S. Hibbard..... 236,431
Bellows, S. G. Reed..... 236,626
Berth, self-leveling, T. O. L. Schrader..... 236,514
Blind, rolling and flexible, J. G. Wilson..... 236,651
Blowpipe revolving furnace, G. Duryee..... 236,561
Bluing, granulated laundry, H. Sawyer..... 236,634
Boneblack furnace, discharging apparatus for, E. K. Richards..... 236,458
Book, account, W. C. Lovell..... 236,602
Boot and shoe bottoms, mechanism for finishing, J. A. & A. C. Ambler..... 236,475
Boot and shoe heel, T. Smith..... 236,464
Boot and shoe nailing machine, H. P. Fairfield..... 236,568
Boots and shoes of leather and for vulcanizing India-rubber boots and shoes, mechanism for treeing, J. A. Ambler..... 236,406
Bottle fitting, nursing, H. H. Hayes..... 236,583
Bottles, drop attachment for, R. Bravais..... 236,538
Bracelet, A. E. Codding..... 236,552
Broom, E. Dillingham..... 236,418
Broom, C. Wilson..... 236,658
Buckle loop, J. C. Hyde..... 236,436
Buffing cone, W. C. Woodland..... 236,472
Bug catcher, potato, T. Robinson..... 236,631
Butter substitute, O. Boysen..... 236,483
Button, etc., collar, G. E. Adams..... 236,402
Button or stud, sleeve, S. Adlam, Jr..... 236,403
Buttons, decorating, C. G. Dobbs..... 236,419
Car coupling, M. F. McKirahan..... 236,447
Car coupling, D. P. Prescott..... 236,625
Car coupling, J. T. Todd..... 236,649
Car coupling, B. J. Upson..... 236,468
Car, sleeping, C. E. Lucas..... 236,445
Car wheel, J. Absterdam..... 236,525
Carbureter, J. W. Hoard..... 236,433
Carbureting apparatus, A. Henning..... 236,586
Carding machine, G. Bernhart..... 236,408
Carding machine, D. Moulton..... 236,450
Carpet stretcher, F. M. Draper..... 236,421
Carriage seat, extra, C. Hall..... 236,428
Cartridge shells, apparatus for resizing, uncapping, and capping, R. Morris..... 236,611
Cartridge shells, tool for extracting, A. Paul..... 236,617
Centrifugal ventilator or pump, E. D. Farcot..... 236,423
Chain conveyer, P. Keene..... 236,438
Check row lines, anchor for, G. D. Haworth..... 236,590
Check row lines, anchor for, G. D. & L. L. Haworth 236,581
Chimney, etc., P. Mihan..... 236,507
Churn, rotary, Kinyon & Brown..... 236,500
Cider press, E. G. Hoyt..... 236,592
Cider press, H. S. Tompkins..... 236,467
Cigarettes, tobacco form for, M. Pacholder..... 236,510
Cock, stop, J. & J. Broughton, Jr..... 236,543
Collars, machine for pressing unstarched, I. P. Turner..... 236,653
Collars, shaper for horse, W. H. Bustin..... 236,547
Convertible chair and hammock, S. R. Robinson..... 236,630
Corset, J. H. Foy..... 236,571
Corset steel fastening, P. Laffin..... 236,441
Cotton gin, E. C. Horne..... 236,591
Cotton gin, M. E. Pratt..... 236,623
Cradle, oscillating, F. H. Brown..... 236,545
Culinary boiler, T. L. Miller..... 236,448
Cultivator and horse hoe, J. Forbes (r)..... 9,530
Curtain fixture, G. W. Bennum..... 236,409
Curtain pole ring, J. Day..... 236,486, 236,487
Cutter head, G. J. & S. J. Shimer..... 236,636
Cylinder, steam, J. H. Allen..... 236,405
Dampers, etc., apparatus for regulating, G. Westinghouse, Jr..... 236,520
Doors, hanging and fastening, E. N. Earl..... 9,533
Drawers, G. F. Ordway..... 236,509
Eggs, preserving, C. H. Kirkham..... 236,598
Electric currents, automatic regulator for, W. E. & W. Sawyer..... 236,460
Electric currents by means of secondary batteries, equalizing dynamo, S. D. Field..... 236,569
Electrical carbonizing apparatus, Ball & Guest..... 236,478
Elevator, C. H. Smith..... 236,607
Extension table, library double top, A. K. Hoffmeier..... 236,589
Fence, T. Rogers..... 236,632
Fence, flood, W. Matthews..... 236,446
Filter, J. Howes..... 236,496
Filter for vessels, H. C. Rice..... 236,628
Fire escape, E. T. McKean..... 236,605
Fireproof structures, such as safes, chests, bank vaults, and doors, compound filling for, W. B. Marvin..... 236,506
Fish plate joint, W. Shortlo..... 236,637
Flood gate, D. M. Hemingway..... 236,585
Furnace for burning cane trash, Spreckels & Moore..... 236,465
Game of pin pool, T. H. Bradley..... 236,537
Gas regulating burner, J. N. Chamberlain..... 236,551
Gas tubing, compound for manufacture of, S. Barr 236,480
Gases, apparatus for the manufacture of heating and illuminating, W. Harkness..... 236,491
Gems, method of and device for connecting, A. Schaffer..... 236,513
Glasses, mechanism for grinding bands upon the surfaces of wine, J. B. Higbee..... 236,432
Grain binding machine, J. H. Gordon..... 236,576
Grain separator, O. K. & A. G. H. Wood..... 236,659
Grass cutter, L. Holmes..... 236,590
Grinding mill, J. Stevens..... 236,643
Hair crimper, E. Wilson..... 236,522
Harness fastening or coupling, R. Hudie..... 236,435
Harvester, J. L. Abell..... 236,400
Harvester, S. D. Locke..... 236,503
Harvester rake, S. D. Bates..... 236,533
Harvester, self-binding, G. F. Green..... 236,577
Harvesting machine, R. Eickemeyer..... 236,564
Hay rake, horse, H. H. Hagerman..... 236,578
Heel trimming and polishing machine, H. A. Henderson..... 236,494
Horse detacher, J. F. Richardson..... 236,512
Hubs, machine for setting boxes in, Haupt & Dawson..... 236,429
Huller knife, F. A. Wells..... 236,470
Hydrant, J. Broughton..... 236,542
Hydraulic jack coupling, M. J. Walsh..... 236,519
Hydrocarbon engine generator, I. R. Blumenberg 236,411
Ice making machine, F. Windhausen..... 236,471
Ice, mould for the formation of, Z. T. Sweeney... 236,647
Iron bars, machine for bending, H. Kenney..... 236,597
Journal bearing, B. J. Downs..... 236,560
Journal box, anti-friction, W. W. Vaughn..... 236,517
Kitchen dresser, A. K. Hoffmeier..... 236,495
Lamp, center, W. H. Smith..... 236,638
Lamp chimney, T. B. Knowles..... 236,440
Lamp safety valve, A. P. Odell..... 236,614
Lasting tool, C. M. Hayden..... 236,430
Lathe for turning irregular forms, R. Eickemeyer 236,422
Lime kiln, T. M. Ullery..... 236,516
Lock, J. W. Post..... 236,660
Lock and dam, J. DuBois..... 236,488
Lock nut, O. Stoddard..... 236,644
Lubricator, H. C. Hodges..... 236,434
Lubricator, C. H. Parshall..... 236,452
Lubricator, Yule & Boyden..... 236,473
Map case, H. E. Moon..... 236,610
Meat cutting machine, Zimmerman & Alford..... 236,524
Mechanical device, C. A. Bentzen..... 236,410
Mechanical motor, L. H. Conner..... 236,485
Metallurgic furnace, G. Duryee..... 236,562
Middlings purifier, H. T. Case..... 236,549
Milk cooler, A. S. Benner..... 236,481
Moulders' flasks, clamping device for, G. E. Smith 236,462
Motor, M. M. Conger..... 236,555
Musical instrument, mechanical, Kelly & Matthews (r)..... 9,532
Nozzle and rose sprinkler, J. Broughton..... 236,541
Ore crushing and pulverizing machine, W. H. Howland..... 236,497
Ore furnace, rotating, J. M. Thompson..... 236,648
Ore separator, W. O. Bourne..... 236,416
Ore separator, T. Brown..... 236,544
Ore, treating, H. W. Faucett..... 236,424
Packing box, G. C. Briggs..... 236,414
Packing pox, C. Moulton..... 236,612
Paper bag, M. C. Ruthenburg..... 236,459
Paper bag machine, M. C. Ruthenburg..... 236,633
Paper feeding machine, Griffith & Byrne..... 236,427
Peel, H. Leix..... 236,501
Permutation lock, B. F. Kelly..... 236,596
Planter and guano distributer, seed, J. P. Allen.. 236,528
Planter, cotton and seed, S. R. McAlexander..... 236,603
Plow, G. E. Smith..... 236,463
Plow, planter, and cultivator, gang, R. J. Bowman 236,536
Plow, sulky, B. F. Litzenberg..... 236,601
Pocket light, T. Remus..... 236,627
Post hole digger, G. B. Van Vleet..... 236,655
Pottery shape for fireproof floors, M. F. Lyons.... 236,504
Precious stones, coating real and imitation, F. E. Meyer..... 236,608
Preserving compound, J. Wickersheimer..... 236,521
Printing machine inking apparatus, R. Engels.... 236,566
Pump, fountain, A. Toellner..... 236,650
Pumping mechanism for gas apparatus, S. H. Pincus..... 236,622
Punch, J. W. Doubleday..... 236,490
Quilting fabrics, machine for, J. Thomas..... 236,466
Railway rail, P. Bargion..... 236,530
Railway ship, J. B. Eads..... 236,563
Railway signal, electrical, Hayes & Gray..... 236,483
Receptacle, A. Vivarttas..... 236,518
Refrigerator, Axt & Gentzsch..... 236,476
Rifle, mining, W. H. Howland..... 236,498
Roof grating and surfaces constructed therefrom, illuminating, T. Hyatt (r)..... 9,535
Roofing bracket, H. M. Hoerner..... 236,587
Rope clamp, J. C. Covert..... 236,557
Rope fastener, A. Zimmerer..... 236,523
Ruching pressing machine, neck, C. McQueed..... 236,606
Saddle, harness, W. R. Coe..... 236,553
Saddle, harness, N. G. Hayden..... 236,582
Sash fastening, A. Barton..... 236,531
Scaffold clamp, adjustable, E. S. Palmer..... 236,616
Scarf, neck, J. H. Fleisch..... 236,570
Screw patterns from the mould, device for drawing, W. A. Ingalls..... 236,594
Seal and tag, E. J. Brooks..... 236,539
Seams of sheet metal cans, rotary machine for closing the, E. Jordan..... 236,499
Seed drill, side draught, D. C. & A. N. Norris..... 236,508
Sewing machine flywheels and shafts, device for connecting and disconnecting, J. H. Anthony.. 236,407
Sewing machine spring motor, J. Schreiber..... 236,635
Sewing machine shuttle, J. Larson..... 236,442
Sewing machines, clutch for loose pulleys on, L. A. Warren..... 236,656
Shafting coupling, T. R. Almond..... 236,474
Sheet metal notching machine, C. R. Nelson..... 236,613
Shingle sawing machine, W. J. Perkins..... 236,620
Shirt and drawers, combined, G. Jaeger..... 236,595
Shutter ventilator, fireproof, G. Bassett..... 236,532
Shuttle, F. A. Lockwood..... 236,444
Sirups, etc., concentrating, J. Weibel..... 236,657
Skate, J. M. Cornell..... 236,556
Slate, pencil holding, W. G. Reimer..... 236,457
Sleigh, A. A. Link..... 236,502
Snow from streets, apparatus for removing, F. F. Bioren..... 236,534
Soldering can tops, machine for, W. D. Brooks... 236,484
Sower, broadcast, S. S. Speicher..... 236,640
Spading machine, H. H. Spencer..... 236,641
Spark arrester, J. D. Brown..... 236,415
Spark arrester, J. J. Kean..... 236,437
Speculums from celluloid and other compounds of pyroxyline, manufacture of surgical, G. Otto 236,615
Spike, J. P. Perkins..... 236,511
Spinning and twisting machines, spindle bolster for, J. R. Berry..... 236,482
Spring washer, D. R. Pratt..... 236,624
Square and bevel surface gauge, C. D. Walters ... 236,469
Stamp, hand, Adlington & Webster..... 236,404
Stanchion, cattle, M. H. Barnard..... 236,479
Station indicator, electro-magnetic, P. C. Ricketts 236,629
Steam generator, J. E. Culver..... 236,558
Stone breaker, C. G. Buchanan..... 236,548
Stove, cooking, G. F. Filley..... 236,425
Stove leg fastening, G. C. Kniffin..... 236,439
Strap attachment, T. J. Christy..... 236,417
Straw cutter, J. L. Paynter..... 236,618
Street washer connections, service cocks, and hydrants, casing for, J. Broughton..... 236,540
Table, desk, and toilet stand, combined, A. K. Hoffmeier..... 236,588
Tag machine, J. H. Shearn..... 236,461
Tanning hides, R. F. & I. Dobson..... 236,559
Textile and other materials, machine for cutting, M. A. Adler..... 236,527
Theaters, ventilator for foot lights of, M. H. Mallory..... 236,505
Thill coupling, W. H. Brace..... 236,412
Tire lifter, A. A. Linthicum..... 236,443
Tobacco, apparatus for weighing and packing, O. S. Harmon..... 236,579
Toy cap exploder, Kyser & Rex..... 236,599
Trace, wire harness, H. Temple..... 236,515
Traction engine, J. H. Elward..... 236,565
Traction wheel, J. M. Stuart..... 236,646
Trash gatherer, F. Girtanner..... 236,574
Trunk, J. A. Eno..... 236,567
Tuyere, J. W. McCorkle..... 236,604
Valves on steam boilers, device for operating, G. W. Storer..... 236,645
Vehicle seat pocket, J. N. Brown..... 236,546
Velocipede, W. W. Giles..... 236,572, 236,573
Velocipede, J. Pullen..... 236,454
Ventilator, W. H. Smith..... 236,639
Violin bow, I. C. Monroe..... 236,449
Vise, saw, S. O. Parker..... 236,451
Wall paper exhibitor, F. Van Duzer..... 236,654
Washing machine, W. T. Fuson..... 236,426
Washing machine, A. R. Steelsmith..... 236,642
Watch case, J. C. Cashman..... 236,550
Water cooler, E. L. Barber..... 236,529
Water motor, H. M. Colton..... 236,554
Waterproofing materials, apparatus for treating, fabrics, etc., with, S. Garrett..... 236,489
Well boring and drilling machine, C. Harmon..... 236,492
Wells, agitator and paraffine extractor for oil, H. C. Gaskill..... 236,490
Wheelbarrow, L. H. Goodwin..... 236,575
Wind engine, F. Boots..... 236,535
Wire, apparatus for finishing zinc-coated, E. H. Hill (r)..... 9,531
Wire barking machine, M. A. Penney..... 236,453
Wood feathers, machine for cutting, J. W. Pettengill..... 236,621

DESIGNS.

Carpet, T. J. Stearns..... 12,112
Clock case, E. L. Morris..... 12,110
Coffin handle socket, W. M. Smith..... 12,122
Oil cloth, C. T. & V. E. Meyer..... 12,114 to 12,119
Sewing machine table, leg of a, J. E. Donovan..... 12,113
Spoons and forks, L. S. White..... 12,124
Stove, Bascom, Hodges, & Heister..... 12,109
Stove, Bascom & Heister..... 12,108
Stove, heating, C. H. Buck, Jr..... 12,107
Type, font of printing, J. K. Rogers...12,111, 12,120, 12,121
Types, movable, J. A. St. John..... 12,123

TRADE MARKS.

Boots, Buckingham & Hecht..... 8,145
Cigars, J. W. Love..... 8,146

English Patents Issued to Americans.

From January 7 to January 11, 1881, inclusive.

Car wheel, J. Rigby, Rutland, Vt.
Casting metals, S. L. Clemens *et al.*, Hartford, Conn.
Cloth lentering machines, G. P. Wood, Johnston, R. I.
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