

directly to the malleable iron frame, without a connecting piece of iron, will it answer as well, the malleable iron acting as the connecting piece? A. Yes. Which is cheaper, to cast small articles in brass, or to cut them with dies? A. Castings will probably be found cheaper.

(35) W. P. E. asks: 1. Have you any knowledge of a speed of 25,000 revolutions per minute having been obtained by a single motion, without gearing of any kind? A. We do not remember having seen or heard of such a device. 2. Could such a speed be advantageously applied, for instance in blowing a steam fog horn for the Signal Service, or for other purposes, provided the machine giving the motion was not too expensive? A. It might be usefully applied to numerous cases, if cheap, simple, and powerful.

(36) A. M. W. says, in reply to D. W.'s query as to his singular phenomenon: This does not appear to me at all singular. It is very evident that the bearing, or step, had become dry. It is a common occurrence, where steel runs in or on steel, that the bearing will, if allowed to get dry, become heated to such a degree that the temper is lost, and the surfaces get to cutting and almost weld together. The statement that the plate was bent by the hammer shows that the plate was soft then, even if it had once been hardened. D. W. says that sufficient oil was found above the plate collar, but he does not say that there was oil on the plate where it was most needed. In my experience, I have never known hardened steel to cut or grind together when properly lubricated, and I think it impossible to produce that effect except by a pressure that would expel every particle of the lubricant. Two hardened steel surfaces may be ground together when dry without losing the temper; but they would not adhere with the tenacity that D. W. describes. It is possible that the time taken to raise both stones gave the spindle and plate opportunity to give off the heat to the cast foot and bed. In my opinion, the construction of the oval end spindle would have a tendency to run dry even under common lubrication, as it would only bear on a small part of the end, which might, with the weight of the stone, force it dry. Hardened steel bearings do not often give any notice of being dry, except by refusing to do duty, a very few revolutions being sufficient to announce the fact and ruin the bearing. I would suggest to D. W. that he make his spindle so that its end rests its whole surface on the step with a hole in the latter opposite the center of the spindle. The spindle should be made like a cup, so as to form a reservoir for the oil, and so deep that the end of the spindle shall be immersed.

(37) J. S. B. says: I have found a specimen of tantalite. Can you tell me anything about this rare mineral? It is said to consist of tantalum acid and iron, and is valuable, especially when found in crystallized forms. May we expect to find it in veins or beds, or on high or low lands? A. Tantalite is Fe O, Mn O, TaO<sub>5</sub>, with sometimes oxide of tin replacing part of the ferrous oxide. Some specimens are nearly destitute of manganese and some contain oxide of copper and lime. Its luster is nearly pure metallic, somewhat adamantine; its color is iron black, and streak reddish brown to black. It is opaque and brittle, and its hardness varies from 6 to 6.5. Its specific gravity is from 7 to 8. It is confined mostly to albite or oligoclase granite, and is usually associated with beryl. It is also found associated with giantolite in albitic granite, and with lepidolite, black tourmaline, and colorless beryl. The name is usually extended to the American mineral columbite, the average analysis of which gives Si O<sub>2</sub> (80.60), Fe O (15.57), Mn O (5.0), Sn O<sub>2</sub> (a trace).

(38) T. McC. says: 1. I am building a small horizontal steam engine, with 2 inches bore and 4 inches stroke. What size of boiler would I need for it, and what should be the thickness of the iron? A. Make it 15 inches in diameter, 24 inches high, of 1/4 inch iron, for 60 lbs. pressure. 2. What would be the best speed to run it at in order to get the most power? A. You may run it at 250 revolutions a minute. 3. Could I make a cylinder of an engine with 2 inches bore and 4 inches stroke with Babbitt metal, that would stand the steam pressure as well as brass or iron? A. No.

(39) H. P. S. says, in reply to A. B.'s questions as to the violin: There are two or three different tools with which the grooves are cut. One of the best I ever used or saw, I constructed myself; but it cannot well be described in a limited space or without illustrations. With it a perfect groove can be cut around a violin plate in half an hour. A perfect groove cannot be made without a tool well adapted to the purpose. The threads mentioned by A. B. are known as purfling, and consist of a thin slip of white holly wood between two similar slips of ebony, and are glued into the groove before the plate receives its final finish. Staining is, in most cases, done upon the wood, with thin, transparent dyes of different composition, and varnish laid on over that in the ordinary manner; but the technicalities of this portion of the subject are too numerous for treatment in brief space. See Business and Personal column of this issue.

(40) D. H. M. says, in reply to D. W.'s query as to the welding of his mill spindle: I suggest that the mill had been in use long enough to wear the lower end of the spindle to such a nice fit on the step that no oil could get under it, which caused friction sufficient to produce heat enough to weld it, and as it was done suddenly, the heat did not extend far in either direction, and the cold metal in connection with it soon cooled it down again. While the oil that it was covered with answered in the place of borax or other welding preparation, and at the same time excluded the atmosphere so that no change of color of the heated parts took place. I have seen a hardened steel gudgeon that was in the lower end of a water wheel shaft welded to the step when it was three feet under water. The force of the wheel twisted it off a little above where it was welded; and when it was taken out the piece could not be knocked off the step with a sledge hammer.

(41) R. L. C. says, in reply to D. W.'s query as to the millstone spindle and step: I have repaired two mill spindles that have had their points ground or welded to the steel plates upon which they run. In one case the steel point was 1 1/2 inches in diameter, and projected from the spindle (which was 4 inches

in diameter) about 3/4 inches. It was twisted off about 1 1/2 inches from the end, and the parts were to all appearance thoroughly welded together. In the second case, the point was of about the same dimensions as the first; but instead of twisting the point off, it turned in the spindle (which of course cut it badly), where it stuck to the plate. After considerable hammering, they were broken apart, but not where they were welded, as part of the plate came away with the point when they separated. I account for it in this way: As long as two metal surfaces that are intended to run together are properly lubricated, we have no grinding or welding if they are proportioned to the work they have to do. In the above cases, the person in charge of them said there was plenty of oil in the pots. It often happens that the passage ways get stopped up and the oil fails to reach the parts, and the result is that they grind together almost instantly.

(42) M. D. L. says: We desire to manufacture for our own use in large quantities, carbon plates for batteries, and carbons for electric lamps, of larger size and greater length than we can find in the market. What mixture of materials secures best results? What degree of compression is required? How is compression applied? Should the mixture be heated while under compression? What kind of mould is used? How can we prevent the carbon from adhering to sides of mould? A. In his work on "Electricity and the Electric Telegraph," Prescott says: "The fine dust of coke and coking coal is first put into a close iron mould of the shape required for the carbon and exposed to the heat of the furnace. When taken out, the burned mass is porous and unfit for use, but by repeatedly soaking it in thick syrup of gas tar and reheating it, it at length acquires the necessary solidity and conducting power."

(43) R. J. J. asks: How can I make a galvanic machine for giving shocks from the wire of the telegraph sounder? A. You can get a pretty strong shock from an ordinary telegraph relay, if you have one, and do not want to incur the expense of a special apparatus. The connections are made in the following manner: The relay is joined up in circuit with a battery and mechanical vibrator for interrupting the circuit, and two wires with handles, to be held when taking the shock, are connected to the binding screws of the relay's helices, one wire to each screw.

(44) H. A. H. says: I have a glass jar, about two feet of insulated wire, some blue vitriol and some sulphate of zinc. Please tell me what more I want to make a battery with? A. Get a copper plate, attach the wire to it, and place it on the bottom of the jar with the wire sticking out. Fill the jar about two thirds full with a weak solution of sulphate of zinc and water, and suspend a zinc casting, provided with a terminal wire, from the top of the jar; let the zinc just dip below the surface of the solution. Now drop a few crystals of blue vitriol on the copper plate and join the wires for a short time, when the battery will be ready for action.

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

Will J. M. P. send us a specimen of the residue from his limestone water?—G. S. A.—The piece of rock contains titaniferous iron. It would require a quantitative analysis to determine all of the other constituents. It also contains a little arkanosite—titanic acid. The pieces of metal consist apparently of the iron from your ladle, together with some titanic acid.—J. Z.—So far as we can discover, the segar contains only very strong tobacco. The odor is due to certain essential oils peculiar to tobacco, and cannot well be imitated.—G. H. P.—It is a variety of mica called muscovite, consisting of potash, alumina, and silicic acid. It is not valuable.—B. F. C.—It consists principally of carbonate of soda. We do not see that it would be likely to prove very efficacious as a scale preventive. It will not injure the iron.—We have received some minerals in a small pasteboard box without a name on it. No. 1 is chlorite, composed of oxide of iron, magnesia, alumina, and silica. No. 2 is chondrodite—a silicate and fluoride of magnesium. No. 3 is spinel—magnesia and alumina.

D. F. H. asks: How is the tubing of brass band instruments formed, and how are the dents removed from the same?—D. S. says: I have made a few wooden organ pipes, but they do not give more than a whistling sound. Can any one give me the proportions for a middle C?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

- On Spiral Springs. By J. T. G.
On Man's History. By J. E. W.
On Mechanical Science. By E. B.
On Kerosene Oil for the Hair. By G. H. S.
On the Origin of Solar Light. By G. P. H.
On Canceling Postage Stamps. By H. D. M.
Also inquiries and answers from the following:
H. P. G.—S.—T. A.—G. H.—W. B.—P. M. G.—J. M.—X. Y. Z.—J. D. H.—W. W.—F. C.—H. R.—G. McC.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells square lenses for magic lanterns? Who sells telegraph instruments for learners? Who is the best theodolite? Who sells the best aniline dyes? Why do not makers of steam plows advertise in the SCIENTIFIC AMERICAN?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

OFFICIAL.
INDEX OF INVENTIONS
FOR WHICH
Letters Patent of the United States were
Granted in the Week Ending
April 10, 1877,
AND EACH BEARING THAT DATE.
[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, 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.

Table listing inventions with patent numbers and names of inventors. Includes items like Amalgamating ores, Animal trap, Anti-friction bearing, Anvil, blacksmith's, Axle box, D. Dalzell, Bale band tightener, J. L. Sheppard, Bale ties, etc., cutting, J. R. Tobin, Barrels, etc., lining, M. Ladin, Barrels compressing, O. D. Goodell, Bed bottom, spring, F. B. Franklin (r), Bed bottom, spring, J. H. Palmer, Bedstead, wardrobe, M. Crosby, Beer, ale, etc., cooler for, F. V. Baudelot, Beer cooler, F. V. Baudelot, Belt fastener, P. Lyons, Bench plane, L. Bailey, Bench plane, G. Gocher, Bevel, J. F. Klinglesmith, Blackboard, Kinsley & Packard, Boiler tube stop plug, M. Coryell, Boot and shoe, J. M. Bibbins, Boot and shoe, J. Fleming, Boot and shoe heel, M. A. Myers, Boot and shoe last, Batley, Keats & Neil, Boot jack, J. Buzzell, Boot safety sole, Watson & Crane, Breech loading ordnance, F. M. Swallow, Bride attachment, S. S. Cummings, Broiler, C. D. Symonds, Butter and fruit jar, C. A. Sanaes, Button fastening, G. W. Beoley, Car brake, L. T. Hay, Car coupling, A. T. Bigalow, Car coupling, J. B. Zink, Car starter, R. Hermance, Carbureter, J. J. Paquette, Carriage top and seat rail, J. W. Post, Casting pipes, core for, J. Pennycook, Chandelier, F. S. Shirley, Chuck for pipe fittings, J. Flower, Churn dasher, F. M. Johnson, Churn dasher, J. L. Maxwell, Clasp for skirt supporters, E. C. Fales, Coffin handle, F. X. Gartland, Coin, box for holding, C. E. McConnell, Coloring matters from aniline, Wolf & Betley, Cooking utensil, S. Spoor (r), Corn harvester, W. H. & J. L. Cox, Corn planter, J. Leitch, Corset, M. Cohn (r), Corset, I. D. V. Warner, Cotton chopper, J. B. Eaves, Cotton picker, O. R. Smith, Crayon for marking glass, etc., B. J. Clarke, Crockery, ornamenting, E. J. Gerard, Cultivator, J. C. Stevens, Cylinders, etc., polishing, M. H. McNair, Dental engine, G. W. Tripp, Dental engine, B. M. Wilkerson, Dish warmer, J. H. Wright, Ditching machine, S. P. Evans, Ditching machine, T. F. Fleener, Ditching machine, Slaton & Wadlington, Door bell, W. E. Sparks, Door bolt, R. Eichmuller, Drawbridge, R. C. Moundson, Eave trough cover, J. R. Creighton, Electroplating wire, Wallace & Smith, Engraved plates, etc., polishing, R. Neale, Exercising machine, Hansom & Russell, Exercising machine, G. W. Wood, Eyeglass, J. S. Spencer, Fan attachment, Thompson & Bergstrom, Fats, rendering, W. E. Andrew, Feed cutter, J. R. Whittemore (r), Fence, iron, Root & Strickland, Fence, iron, J. H. Van Dorn, Fence post, W. B. Markham, Filter, liquid, M. Lansburgh, Fire arms, lock for, I. Robbins, Fire arms, wiper for, J. T. Hamilton, Fire kindler, C. H. Hayden, Flour cupboard and knead board, F. M. Mahan, Fly fan, J. F. McMillen, Fly fan, G. W. J. Woltz, Fly wheels, etc., balancing, C. Seymour, Fruit arrier, J. M. Keeler, Fruit jar, J. L. Mason, Fuel, artificial, J. Q. A. Ziegler, Furnace, heating gas, P. W. Mackenzie, Gaiter, C. Libby, Gas meter, register, etc., J. J. Squire (r), Gate, automatic, T. E. Breakey, Glassware manufacture of, W. Fox, Grain drill, C. E. Patric, Grinding hollow ware, etc., W. Scully, Grinding machine, S. Bevan (r), Grinding mill, J. Mellinger, Hammer, riveting, E. Wright, Handles, attaching, F. G. & W. F. Neidringhaus, Harness breast collar, W. Gibbs, Harness pad, M. V. Longworth, Hides and skins, treating, N. Wilson, Hitching, post, W. N. Hutchinson, Hop drier, C. A. Sanaes, Hop press, J. Jakel, Horse hay rake, L. Myers (r), Horse power, traction, D. T. Gillis, Horse protector, W. S. Marsh, Horseshoe machine, W. Roberts, Hose nozzle, J. H. Stump, Hot water apparatus, E. Lawler, Hub cap and axle nut, A. R. Cushman, Hub, elastic, G. W. Hayes, Hub, elastic, Sammis & Hayes, Hub, metallic, C. E. Owen, Hub runner, G. F. Kimball, Hydraulic elevator, E. Brewer, Hydraulic engine, C. D. Page, Hydrocarbon burner, J. Bishop, Ice ax, W. H. Coleman, Ice machine, S. Tragheim, Key and knob fastener, W. Neracher (r), Key for locks, J. Schade, Key for locks, W. H. Taylor

Table listing inventions with patent numbers and names of inventors. Includes items like Keys, stock for the manufacture of, W. H. Taylor, Knitting needles, L. E. Salisbury, Lamp burner, Hallas & Weedon, Lamp chimney, H. L. Ives, Lamp extinguisher, E. C. Blakeslee, Lamp, fountain, E. J. Stearns, Lamp, street and park, J. Stimpson, Lamps, lighting night, J. R. Rowlands, Leather cutting die, A. Warren, Life boat, sectional, G. Bates, Lifting jack, A. R. Hurst, Lifting jack, V. Johnson, Lightning rod coupling, L. Bradley, Lightning rods for oil tanks, J. A. Sherriff, Liquid measure, S. R. Dummer, Lock for sliding doors, etc., J. W. Schoonmaker, Lock, strap, B. Kane, Loom, circular, J. E. Gillespie, Loom, gimp, R. Stone, Lumber dryer, J. J. Curran, Magazine cane gun, M. Daigle, Milk cooler, B. D. Miller, Moistening pad, C. E. Stocker, Monument, A. Smith, Music, electro-pneumatic, W. F. Schmoele et al., Nail plates, pile for, W. H. Powell, Nozzle and sprinkler, N. Malmquist, Nutmeg grater, J. Meyer, Oven, portable, E. V. Van De Mark, Packing semijohns, etc., G. W. Peck, Pantaloon, shaping, E. B. Viets, Paper bag, A. S. Dennison, Paper box, A. Goldback, Pavement, stone, B. F. Camp, Pen, fountain, A. T. Cross, Petroleum products, etc., H. W. C. Tweedle, Photographic burnisher, J. H. Ferguson, Pianos, hollow support for, J. Fairman, Pipe coupling, S. Lightburne, Jr., Plow, D. P. Ferguson, Plow, J. C. Jenkins, Plow, J. Reich, Printing press, J. Wade, Pump, W. S. Davis, Pump bucket, chain, W. Cooper, Pump, steam, C. Ahrens, Pump, suction and force, T. B. Swan, Pump pipe joint, etc., J. B. Eads, Railway gate, Fox & Vorwald, Railway joint, Palm & Fitzgerald, Railway rails, bending, W. R. Jones, Reverberatory furnace, J. Morrison, Revolving firearm, O. Jones, Road scraper, P. Schneider, Sr., Safety pin shield, W. A. Butler, Sapsout, E. Willis, Sash balance, B. S. McCune, Saw grinder, E. P. Terrell, Saw gulpe, adjustable, G. W. Baker, Saw mills, log turner for, J. Orm, Saw, scroll, J. A. House, Saw sharpener, J. Walsh, Sawing machine, M. Rose, Sawing machine, scroll, G. H. Truxell, Scales, platform, H. T. Lawton, Scrubbing machine, P. Byrne, Jr., Seed planter, J. Wafer, Seeder and cultivator, W. A. Van Brunt (r), Seeder and fertilizer, O. Stone, Sewing machine shuttle, W. Bown, Sewing extension table, H. G. Crawford, Sewing machine take-up, J. L. Follett, Shavings, grinding, I. & A. G. Tompkins, Shell, B. B. Hotchkiss, Shot cartridge, H. H. Barnard, Show case, W. T. Sherer, Skate, roller, R. Gibson, Spelling, teaching, D. A. Willbanks, Steam pipe covering, P. Carey, Steam radiator, R. S. Gillespie, Steam tank for cooking in cans, F. M. Warren, Steaming fabrics, etc., W. Mather, Still, T. Gaff, Stirrup, H. H. Knight, Stop cock lock, H. C. Meyer & Co. (r), Stove caster frame, E. M. Voorhees, Stove drum, Vosburgh & Van Slyck, Stoves, zinc board for, E. Jones, Sugar, clarifying, J. Schwartz, Suspenders, J. R. Pollock, Suspenders, A. Shenfeld, Target, W. H. H. Norcross, Target, spherical glass, A. H. Bogardus, Tea kettle, J. Reinig, Telescopic ballast tube, A. Berghold, Thrashing machine, concave, J. H. Sharp, Three horse equalizer, E. B. Decker, Tobacco stem fatter, F. A. Braymer, Jr., Tobacco pipe flattener, N. H. Borgfeldt, Toe calks, making, H. C. Field, Trunk, etc., H. F. Worthington, Turbine, Osborn & Lybarger, Tuxere machine, J. E. Atwood, Umbrella runner, T. G. Hojer, Valve, balanced, W. Stephens, Valve, circular, H. L. Tully, Valve, steam pump, J. W. Mathieson, Valve, safety, I. M. Phelps, Vehicle hub and box, G. W. Eldridge, Vehicle hubs, cap for, E. G. Edgley, Vehicle spring, J. W. Groat, Vehicle wheel, J. McGowan, Ventilator, Harrold & Satterlee, Ventilator, P. Mihan, Vessels, construction of, N. G. Herreshoff, Wagon bed, R. R. Hunt, Wagon box strap bolt, J. Jensen, Wagon tongue support, R. Dudley, Washer and amalgamator, B. Tyson, Washing machine, S. L. Denney, Washing machine, E. McBride, Washing machine, D. Miller, Watch roller actuator, B. Freese, Weed hider, McDonel, Thorn & Ewing, Wheel tire, I. N. Pyle, Whiffletree attachment, J. D. Lane, Windmill, G. R. Comstock, Window sash, J. Petri, Wire fabric, H. R. Van Eps, Wooden rods, etc., making, Smith & Saltar, Wrench, J. B. Fox, Wrench, J. D. Lovell, administrator of A. G. Coes.

DESIGNS PATENTED.
9,892.—CASSIMERES.—F. S. Bosworth, Providence R. I.
9,893.—CARPETS.—J. H. Bromley, Philadelphia, Pa.
9,894.—CARPETS.—H. F. Goetz, Boston, Mass.
9,895.—CASSIMERES.—T. Holmes, Brooklyn, N. Y.
9,896.—SASH HOLDER.—T. Overton, Rockport, Texas.
9,897.—SIGNS.—A. D. Smith, Cincinnati, Ohio.
9,898.—CASSIMERES.—W. A. Walton, Providence, R. I.
9,899.—TOWEL BORDERS, ETC.—R. T. Webb, Randalstown, Ireland.