

(26) H. B. asks: 1. Through what process is paper passed that it may resist the influence of water and fire? A. For processes of waterproofing paper, consult SCIENTIFIC AMERICAN SUPPLEMENT No. 96. A saturated aqueous solution of sodium tungstate may be used to render paper unflammable. 2. What chemicals are used in the manufacture of lumber from paper? A. Usually a concentrated aqueous solution (hot) of zinc chloride.

(27) J. T. G. asks how to remove the paper patterns from scroll work. A. Moisten it and scrape it off. It is better to trace the pattern than to paste it on the work. It is a good plan to paste the pattern on a piece of veneer and preserve the whole as a pattern after sawing.

(28) P. B. C. writes: 1. I have a well, 14 rods from house, at 26 feet rise from well to house. I have common force pump, 1 1/4 inch diameter by 4 inches stroke. Will the pump force water through a 3/8 inch pipe to the house? A. Do not use less than 3/4 inch pipe. 2. Will an air chamber on the pipe help it any? A. Yes. 3. How large a windmill will it take to drive the pump? A. 8 feet.

(29) J. M. H. asks for dimensions for a pleasure skiff twenty feet long. A. 20 feet long, 3 feet 3 inches wide at bottom and 4 feet at top, and 18 inches deep, 7 inches shear forward and 4 inches aft; stern 2 feet 10 inches wide.

(30) G. L. W. asks: 1. What would be the power of an engine 8 inches by 10 inches stroke, with 100 lbs. steam pressure, making 100 revolutions per minute? A. See page 267 (4), current volume of the SCIENTIFIC AMERICAN. 2. What is meant by mean effective pressure? A. Average pressure on the steam side of the piston, greater than the retarding pressure on the exhaust side.

(31) "Subscriber" writes: 1. We have a line of steam pipe, one hundred and twenty-one feet long, and have some difficulty in keeping our union joints tight. Would we gain anything by putting expansion joint in the line, and if so, would one be sufficient? A. Certainly, put in an expansion joint, or else suspend the pipe so that it can expand and contract freely. 2. Will asbestos cement rust steam pipe or a boiler? A. We think not.

(32) H. F. asks: Is there any astronomical reason known why the earth, one of the smaller planets, was selected by the Almighty to be the habitation of man? A. Neither known nor possible to be known. It does not fall within the province of astronomy to discover the motives of the Almighty in ordering things as they are. Science endeavors to discover the conditions of phenomena; it has no business with the infinite why of existence.

(33) C. P. M. writes: I have made a phonograph from drawings in SCIENTIFIC AMERICAN SUPPLEMENT No. 133, but fail to make it work. I have followed directions implicitly, and I thought perhaps you might give me some light as to some essential part that I had overlooked. The needle makes the groove all right, but does not seem to make any dots if I speak into it, nor does it reproduce sound when turned back. A. It may be that your diaphragm is too thick or too heavily damped, or it may be that your mouth piece is not tight. You should also bear in mind that it is necessary to speak quite loudly and clearly to the instrument.

(34) J. J. B. H. asks for the meaning of the term "angular aperture," as applied to microscopical objectives. A. The angular breadth of the cone of light which a microscope receives from an object, and transmits to the eye, is called its angular aperture.

(35) T. E. W. writes: If a hole were made through the earth, passing through the center, and a bullet dropped into the hole, would the bullet stop at the center, or pass through nearly to the other side, oscillating to and fro, losing a little distance each time, until it finally settled at the center? I hold that it would not pass the center; that at the center the weight would be nothing, the attraction nothing (or balanced), and the velocity nothing. My friend holds that it would reach the center with enormous velocity, and be carried through to the other side. Please say which is right. A. We think your friend is right. The bullet, upon arriving at the center of the earth, would have an amount of accumulated energy (so to speak) or momentum, that would be expended by passing beyond the center against the action of gravitation, then would return again under the action of gravitation.

(36) "Student" writes: 1. I have an engine, 8 inches diameter and 12 inches stroke. Purchased it for 15 horse power, but with 100 lbs. steam and 100 revolutions per minute, I calculate 2450 by your rule, allowing 1-5 for friction. 1. Am I correct? A. Yes; but have you sufficient boiler? It is a badly proportioned engine to get that amount of power from. 2. Have I sufficient power to run a 56 inch circular saw in heavy pine timber and 3 wood turning lathes at the same time? A. Not at proper speed. 3. Can I run a 24 inch burr corn mill and 70 saw cotton gin at once? A. We think not, to their full capacity. 4. What rate per minute must I run my saw and grist mill in order to obtain the best results? A. Consult a good millwright, as it depends upon the kind of work your mills are to do. 5. Is a 5 foot driving wheel too large for 12 inch stroke? A. No.

(37) A. B. B. writes: I have a mercurial barometer from which some of the mercury has been spilled. Will it indicate the changes in the weather correctly? A. No, it should be refilled. This you may do by inverting it, pouring in mercury, and jarring it to remove every particle of air.

(38) T. A. S. asks: 1. Would it not increase the power of an electro-magnet if, with a given battery power, I connected ground wires; connecting the - pole directly with the earth by one wire, and running the current from + pole to another ground wire after passing around the magnet? A. No. 2. Would a magnet made of 3/8 inch iron, the poles 3 1/2 inches long, wound with Nos. 20 or 21 wire, and connected with two cells Calladu battery, attract with much force at 3/8 inch from the

poles? A. No; magnetic attraction is inversely as the square of the distance.

(39) F. A. S. asks: 1. Will several magnets in close proximity, if insulated, retain each their separate power? A. No. The magnets will mutually enfeeble each other. 2. Does pointing a magnet concentrate its power at the points? A. Yes, to some extent. 3. How near the neutral line on a magnet can the coil be placed, and still have its effect in the telephone? A. The coil of a telephone should be near the end of the magnet. We do not think the telephone would work at all with the coil near the mean line of the magnet; that is if the magnet were of any considerable length.

(40) J. M. S. writes: Suppose we place 3 wheels on the axle of a locomotive secure, and let the outside wheels be twice as large as the center one, and then we raise the track for the middle wheel so that they may all have an equal bearing on the tracks. Now in traveling a certain distance of course it does not take as many revolutions of the large wheels as of the small one, but as they are all fast to the same axle, one cannot make more revolutions than the other. How is the distance gained by the small wheel, and does it slip on the track? A. As you have two large wheels and but one small one, and the same weight supposed to be resting on each, the small one must slip.

(41) G. W. E. asks: If you take two cog wheels of the same diameter, the same number of cogs etc., place one of them stationary and revolve the one around the other, how many revolutions will the movable one make passing once around the other? A. Two.

(42) E. F. writes: I would like to know if there is anything made so as to filter the water before entering boiler, and is now in successful operation, and where it can be seen or had; or is there any composition or liquid, when mixed with the water, would precipitate the sediment to the bottom as in a tank. A. If you are troubled with a lime deposit, there are various feed water heaters that will relieve your trouble, as they are arranged so as to deposit most of the lime in the heater. Various materials are used to aid in the removal of deposits, but an analysis of the water should be made before proper advice could be given.

(43) C. C. S. asks (1) whether two lubricated hard substances will wear longer together than one hard and one soft. A. Yes. 2. Would the result be the same where there is no lubricator used? A. Yes, that is, the hard surfaces would wear the longest.

(44) J. O. H. asks: Can you give me a remedy for excitability, while reading or speaking before a school? A. Force of will and practice are the best remedies. It is said that a momentary inhalation of the vapor of ether will quiet the nerves and give a feeling of confidence, but we should greatly prefer the other remedies.

(45) T. S. V. asks: How hard or how soft will cast steel require to be before it is tempered? I claim that it is tempered when it is extremely hard, or when it is annealed very soft. Am I correct? A. Tempering is reducing the hardness of a piece of steel to any degree short of the softness produced by annealing by the application of heat. The operation of hardening does not properly include tempering.

(46) J. R. B. asks: Can you give me any receipt for bending white oak save the ordinary way by steaming? Is there any composition used? A. We do not know of any composition for this purpose. Boiling the wood in water is sometimes preferred to steaming.

(47) F. P. asks how much and what size wire he should use on electro-magnet, with core 7-16 inch diameter and 2 1/2 inches long, to be operated by one or two cells Grove's battery. A. You do not mention the purpose for which you intend using the magnet. Supposing you intend it merely for experiment, we suggest winding each core with 8 or 10 layers of No. 28 wire.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated: J. C. McL.—It is a fine sample of asbestos.

COMMUNICATIONS RECEIVED. On a Solution of the Convict Labor Question. By D. D. S. On Solar Circulation: Heat and Light. By E. F. D. On Rotary Motion. By H. J. M. M.

OFFICIAL.

INDEX OF INVENTIONS FOR WHICH Letters Patent of the United States were Granted in the Week Ending May 6, 1879, AND EACH BEARING THAT DATE.

Table listing inventions granted in the week ending May 6, 1879. Includes items like Animal trap, Annunciator, Axle box, Bag fastener, Band cutter, Basket, Bed bottom, Bed, crib, Bostwick & Riblet, Beadstead, Billiard cue tip, Boot and shoe edge trimmer, Boot and shoe heel stiffener, Boot and shoe nailer, Boot strap, Boots and shoes, Boots and shoes, making, Bottle stopper and fastener, Bottle stopper, internal, Box fastener, Brazing, process of, Bretzel machine, Broom handle stripper, Brush, Button, Calendar.

Main table of inventions and their inventors. Includes items like Car brake, Car coupling, Car door, Car door, freight, Car, dumping, Car seat, Car, stock, Car, street, Carbureter, Carriage top iron, Chain, driving, Chain or scarf, fastening for a guard, Check hook, Cheese box, Chicken brooder, Churn, W. H. Lightcap, Churn dasher, Churn power, Cloek, ship's bell indicating, Clothes horse, Clothes pounder, Clothes pounder, D. Squire, Clothes wringer, Coal breaking cylinders, Coal washer, Coffin, Collar fastener, Conductor, Convertible chair, Copper, refining, Corpse cooler, Cotton press, Counting register, Cultivator, Currycomb, Damper, Draught regulating, Dental engine, Dentist's chair, Derrick stake, Drill hole, self-adjusting, Drying apparatus, Explosive compound, Fare register, Feather renovator, Fence, Filter press, Fire escape, Fire kindler, Fire place, Fish trap, Fluting machine, Folding chair, Gases, process and apparatus for generating compound, Gasoline burner, Governor regulator, Grain binder, Grain binder, Baker & Withington, Grain drying kiln, Grain from cars, unloading, Grain meter, Grain separator, Grinding mill, maddings, Gun lock, Flame fastening, Harvester, Harvester, G. H. Spaulding, Hat bodies, etc., Hat sweat lining, Hay feeder, Hoe, Hoisting machine, Holdback, Horse rake, Horseshoe calk, Hot air furnace, Hub, vehicle wheel, Hydrant, Ice planer, Injector and ejector, Jewelry, manufacture of, Key board instrument, self-playing attachment for, King bolts, series of dies for forming the heads of, Kitchen cabinet, Knife grinder, Knitting machine, Ladder and ironing table, combined step, Lantern, Leather working, edging tool for, Lightning rod maker, Mandrel, saw, Mash tub, Measuring machine, rope, Simms & Porter, Medical compound, Metallic can, Micrometer gauge, Mining, placer, Motor for sewing machines, Musical box, Muzzle, horse, Nail feeding machine, Nails and shoe rivets, making wire, Nailing machine, Non-conducting platform design, Nozzle, variable exhaust, Congdon & Wood, Outlet pipe for sinks, etc., Oven, baker's, Packing ring for piston heads, Painting wire cloth, machine for, Paper bag holder, Paper boxes, construction of, Paper feeding machine, Paper machine for making wood pulp for, Paper sheets, machine for feeding, Pianoforte graffe, Picture frame, Picture nail head, Pipe coupling, W. J. Coler, Pipe beam, Potato digger, Printed fabric steamer, Printing press, oscillating, Projectile, Pulley, loose, Pump, direct-acting, Pump, double-acting, Pump, double-acting, Seymour & Chamberlain, Pump force, Pump rods, adjustable clamp for, Pumps, waste valve for, Rack for supporting articles over lamps for heating, Railway rails, roll for utilizing the fag ends of steel, Railway, street, Railway track, Railway switch mechanism, Reconciliation regulator, automatic, Rein guide, check, Rock drill, Rock drills, sliding valve for, Rubber, coating metallic articles with vulcanized, Saw, fire wood drag, Sowers, etc., trap for, Sewing machine, C. B. True, Sewing machine, truck marker, Shingle machine, Shoe soles, etc., composition for waterproofing and lubricating, Sifter, ash, Skate roller, Slate, C. C. Shepherd, Spinning machine, Spinning mules, automatic clearer for, Spools, tool for turning the ends of, Spring clasp, Stamp battery for quartz mills, Stamp hand, Stamp mill, Stamp protector and wing retainer, Steam and hot air kiln for drying lumber, Steam boilers, surface blow-off for, Stovepipe thimble, Stoves, means for attaching urns to, Tap wrench, Target and target stand, Target ball, Telegraph box, fire, Telegraph key and switch, Tent, Testing machine, hydraulic, Thrashing machine, Thrashing machines, grain feeder and band cutter for, Toy, candy, Track cleaner, Trap for waste pipes from wash basins, Truck, bay, Trunk bolt or catch, Trunk, electro-magnetic burglar alarm, Turnstile register, Type writing machine, P. Deering, Type writing machine, F. F. Warner, Valve attachment, safety, Valve, slide and steam, Valve, vent and check, Vapor and gas burner, Vehicle spring, Vehicle seat back and shifting rail, Veneer, wood, Vessel for preventing the shifting of cargoes, marine, Violin, Wagon body, Washing machine, Waste pipe attachment, Water cooler, Weather vane, Weir or caisson, floating, Wells, tube clamp for oil, Wheel supporting device, automatic, Whiffletree, D. Foley, Whiffletree, S. Loomer, Whirlingig, Wind wheel, Windmill, Window ventilator, Window washer, Wrench, J. G. & G. Johnson.

TRADE MARKS.

Table listing trade marks and their owners. Includes items like Artificial precious stones, Baking powder, Bitters, Sieger & Hijos, Cigars, B. Leidersdorf & Co., Cigars, Krohn, Feiss & Co., Cigarettes and chewing tobacco, Crackers, biscuits, etc., Hats, R. Dunlop, Lamp chimneys and shades, Medicinal pad or cushion, Medicinal compound for the cure of scrofula and the like diseases, Medicinal compound for the cure of pain and inflammation, Recd organs, Shirt waists and drawers, Soap, Whisky, Whisky.

DESIGNS.

Table listing designs and their owners. Includes items like Badge, L. J. Churchill, Clock fronts, Dress trimming, Fireman's hats, Font of printing types, Font of printing types, J. M. Conner, Group of statuary, Trimming, Toy wheelbarrow frame, Umbrella tip cup.

English Patents Issued to Americans.

Table listing English patents issued to Americans. Includes items like Boot nailing machine, Checks, preventing alteration of, Clothes hanger, Exchange, New York city, Firearms, Furnace for steam boilers, Gun barrels, Lubricating machinery, Railways, Refrigerating apparatus, Rotary engines, Sewer connections, Steam engine lubricator, Water meters.