DECISIONS RELATING TO PATENTS. Supreme Court of the United States

PEARCE vs. MULFORD et al.

Appeal from the Circuit Court of the United States for the Southern District of New York.

- 1. Reissued patent No. 5,774 to Shubael Cottle, February 24, 1874, for improvement in chains for necklaces, declared void, the first claim, if not for want of novelty, for want of patentability, and the second for want of novelty.
- 2. Neither the tubing, nor the open spiral link formed of tubing, nor the process of making either the open or the in a chain, was invented by the patentee.
- 3. All improvement is not invention and entitled to protection as such. Thus to entitle it it must be the product of some exercise of the inventive faculties, and it must involve something more than what is obvious to persons skilled in the art to which it relates.

The decree of the circuit court is therefore reversed, and it is ordered that the bill be dismissed.

By the Commissioner of Patents.

DICKSON vs. KINSMAN. -INTERFERENCE. -TELEPHONE. The subject matter of the interference is defined in the preliminary declaration thereof as follows:

The combination in one instrument of a transmitting telephone and a receiving telephone, so arranged that when the mouthpiece of the speaking or transmitting telephone is aptelephone will be applied to his ear.

- 1. While it is true that the unsupported allegations of an inventor, that he conceived an invention at a certain date, are not sufficient to establish such fact, the testimony of a party that he constructed and used a device at a certain time is admissible.
- 2. Abandonment is an ill-favored finding, which cannot be presumed, but must be conclusively proven.

The decision of the Board of Examiners-in-Chief is reversed, and priority awarded to Dickson.

Characteristics of Arctic Winter.

Lieutenant Schwatka, whose recent return from a successful expedition in search of the remains of Sir John Fanklin's ill-fated company, combats the prevalent opinion that the Arctic winter, especially in the higher latitudes, is a period of dreary darkness.

In latitude 83° 20' 20" N., the highest point ever reached by man, there are four hours and forty-two minutes of twilight on December 22, the shortest day in the year, in the northern hemisphere. In latitude 82° 27' N., the highest point where white men have wintered, there are six hours and two minutes in the shortest day; and latitude 84° 32' N., 172 geographical miles nearer the North Pole than Markham reached, and 328 geographical miles from that point, must yet be attained before the true Plutonic zone, or that one in which there is no twilight whatsoever, even upon the shortest day of the year, can be said to have been entered by man. Of course, about the beginning and ending of this twilight, it is very feeble and easily extinguished by even the slightest mists, but nevertheless it exists, and is quite appreciable on clear cold days, or nights, properly speaking. The North Pole itself is only shrouded in perfect blackness from November 13 to January 29, a period of seventy-seven days. Supposing that the sun has set (supposing a circumpolar sea or body of water unlimited to vision) on September 24, not to rise until March 18, for that particular point, giving a period of about fifty days of uniformly varying twilight, the pole has about 188 days of continuous daylight, 100 days of varying twilight, and 77 of perfect inky darkness (save when the moon has a northern declination) in the period of a typical year. During the period of a little over four days, the sun shines continuously on both the North and South Poles at the same time, owing to refraction parallax, semi-diameter, and dip of the horizou.

The Collins Line of Steamers.

The breaking up of the Baltic, the last of the famous Collins line of steamships, calls out a number of interesting facts with regard to the history of the several vessels of that fleet. There were five in all, the Adriatic, Atlantic, Pacific, Arctic, and Baltic. They were built and equipped in New York. Their dimensions were: Length, 290 feet; beam, 45 feet; of hold, 311/2 feet; capacity, 2,860 tons; machinery, 1,000 horse power. In size, speed, and appointments they surpassed any steamers then afloat, and they obtained a fair share of the passenger traffic. A fortune was expended in decorating the saloons. The entire cost of each steamer was not less than \$600,000, and notwithstanding their quick passages, the subsidy received, and the high rates of freight paid, the steamers ran for six years at great loss, and finally the company became bankrupt.

The Atlantic was the pioneer steamship of the line. She sailed from New York April 27, 1849, and arrived in the Mersey May 10, thus making the passage in about thirteen days, two of which were lost in repairing the machinery; the speed was reduced in order to prevent the floats from being torn from the paddle-wheels. The average time of the lords desired, and desire, to stop by crippling them." forty two westward trips in the early days of the line was 11 days 10 hours and 26 minutes, against the average of the 26 minutes. In February, 1852, the Arctic made the pass-

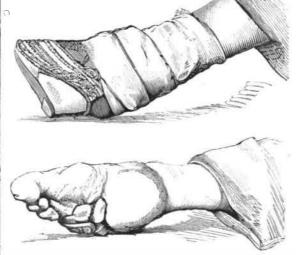
The Arctic was afterward run into by a French vessel at sea and only a few of her passengers were saved. The Pacific was never heard from after sailing from Liverpool, and all the persons on board were lost. The Atlantic, after rotting and rusting at her wharf, was deprived of her machinery and converted into a sailing vessel, and was broken up in New York last year. The Adriatic, the "queen of the fleet," made less than a half dozen voyages, was sold to the Galway Company, and is now used in the Western Islands as a coal hulk by an English company.

The Baltic was in the government service during the war closed link, nor the junction of closed and open spiral links as a supply vessel, and was afterward sold at auction; her machinery was removed and sold as old iron. She was then converted into a sailing ship, and of late years has been used as a grain carrying vessel between San Francisco and Great Britain. On a recent voyage to Boston she was strained to such an extent as to be made unseaworthy, and for that reason is to be broken up,

One cannot but remark in this connection how small has from his premise. been the advance in steamship building during the quarter century since the Collins line was in its glory.

CHINESE WOMEN'S FEET.

An American missionary, Miss Norwood, of Swatow, recently described in a Times paragraph how the size of the is not begun till the child has learnt to walk. The bandages are specially manufactured, and are about two inches wide plied to the mouth of a person, the orifice of the receiving and two yards long for the first year, five yards long for subsequent years. The end of the strip is laid on the inside of



CHINESE WOMEN'S FEET.

the foot at the instep, then carried over the toes, under the foot, and round the heel, the toes being thus drawn toward and over the sole, while a bulge is produced on the instep, and a deep indentation in the sole. Successive layers of bandages are used till the strip is all used, and the end is then sewn tightly down. The foot is so squeezed upward that, in walking, only the ball of the great toe touches the ground. After a mouth the foot is put in hot water to soak some time; then the bandage is carefully un wound, much dead cuticle coming off with it. Frequently, too, one or two toes may even drop off, in which case the woman feels afterward repaid by having smaller and more delicate feet. Each time the bandage is taken off, the foot is kneaded to make the joints more flexible, and is then bound up again as quickly as possible with a fresh bandage, which is drawn up more tightly. During the first year the pain is so intense that the sufferer can do nothing, and for about two years the foot aches continually, and is the seat of a pain which is like the pricking of sharp needles. With continued rigorous binding the foot in two years becomes dead and ceases to ache, and the whole leg, from the knee downward, becomes shrunk, so as to be little more than skin and bone. once formed, the "golden lily," as the Chinese lady calls her delicate little foot, can never recover its original shape.

Our illustrations show the foot both bandaged and unbandaged, and are from photographs kindly forwarded by Mr. J. W. Bennington, R. N., who writes: "It is an error to suppose, as many do, that it is only the Upper Ten among the daughters of China that indulgein the luxury of 'golden lilies, as it is extremely common among every class, even to the very poorest—notably the poor sewing women one sees in every Chinese city and town, who can barely manage to hobble from house to house seeking work. The pain endured while under the operation is so severe and continuous that the poor girls never sleep for long periods without the aid of strong narcotics, and then only but fitfully; and it is from this constant suffering that the peculiar sullen or stolid look so often seen on the woman's face is derived. The origin of this custom is involved in mystery to the Westerns. Some say that the strong-minded among the ladies wanted to interfere in politics, and that there is a general liking for visiting, chattering, and gossip (and China women can chatter and gossip), both and all of which inclinations their

To the alteration and metamorphism of rocks by the infilage from New York to Liverpool in 9 days and 17 hours. many hitherto unexplained phenomena in geology.

Correspondence.

lce at High Temperatures.

To the Editor of the Scientific American:

Your issues of October 23 and 30 contain some remarkable articles under the heading of "Ice at High Temperatures."

Prof. Carnelley says: "In order to convert a solid into a liquid, the pressure must be above a certain point, otherwise no amount of heat will melt the substance," as it passes at once from the sold state into the state of gas, subliming away without previous melting. And, "having come to this conclusion, it was easily foreseen that it would be possible to have solid ice at temperatures far above the ordinary melting point."

The first conclusion of the professor is correct, but not new. The second conclusion is new, but very doubtful as to its correctness, and certainly does not follow as a sequence

If we try to heat ice in a vacuum, we cannot apply any heat to the ice direct, but only to the vessel containing the ice. The vessel may be much heated; but whether it will convey heat to the ice quick enough to heat it over 32°, and whether at all it can be heated over 32°, this is a question of a different nature. Before crediting such a conclusion we foot is reduced in Chinese women. The binding of the feet must know more of the details of the experiments which the professor made in order to verify its correctness. When saying that "on one occasion a small quantity of water was frozen in a glass vessel which was so hot that it could not be touched by the hand without burning it," he evidently assumes that if the vessel is hot, the ice inside must be equally so; but this assumption is erroneous. Faraday has made water to freeze in a red hot platina pot; the ice thus formed was not red hot like the platina, but was below the freezing point. Just so with Professor Carnelley's glass vessel; the vessel was hot, but the ice inside no doubt was "ice cold." If the professor would surround a thermometer bulb with ice and then make the mercury rise above the freezing point, we would believe in "hot ice;" not before. Until he does, we prefer to believe that the heat conveyed through the vessel to the ice is all absorbed in vaporizing the ice, and not in raising its temperature above 32°.

Professor Carnelley's further statement, apparently proving his theory, that the ice at once liquefies as soon as pressure is admitted (say by admitting air), is readily accounted for by the phenomena connected with the "Leydenfrost Drop." Water in a red hot vessel will vaporize off much slower than in a vessel heated a little above the boiling point, from the reason that in the red hot vessel no real contact takes place between the vessel and the water. At the place where the two ought to touch, steam is formed quicker than it can escape, which steam prevents the contact between vessel and water; therefore, as no real contact takes place, the heat from the vessel can pass into the water but slowly, viz., in the proportion as it works itself through the layer of steam, which in itself is a bad conductor. Just so in Prof. Carnelley's experiment: The heated glass vessel will convey heat to the ice only at those points where it touches the ice; at those points at once a formation of vapor takes place, which prevents an intimate contact between the glass and the ice, so that they do not really touch each other, consequently the heat can pass into the ice but slowly, having to work its way through the thin layer of rarefied vapor between the two. As soon as pressure is admitted by admitting atmospheric air, vapors can no longer form; an intimate contact will take place between the glass and the ice, and consequently the heat be conveyed over quick enough to make the ice melt away rapidly.

The professor's experiments, therefore, so far as published, do not prove anything to justify his strange conclusion. It is perfectly true that in a vacuum of less than 4.6 mm. mercury pressure, no amount of heat will melt ice, all heat that can be conveyed to the ice being absorbed by vaporization. But before crediting the professor's further conclusion, that ice can be heated much above the freezing point, he must actually produce "hot ice," not only a hot vessel containing ice.

Brooklyn, N. Y., October 25, 1880.

Schools of Invention.

The school of invention has not yet been established, but its germ is growing in the mechanical schools. This school, according to Hon. W. H. Ruffner, in Va. Ed. Journal, will educate men, and women too, for the special venting new things. Why not? We already have something closely analogous in schools of design, where the pupil is trained to invent new forms or patterns, chiefly of an artistic or decorative character. The same idea will be applied to the invention of machinery, or improvements in machinery, or the adaptation of machinery to the accomplishment of special ends. Inventions usually spring from individuals striving to lighten their own labor, or from some idea entering the brain of a genius. But we shall have professional inventors who will be called on to contrive original devices, and his success will depend on the sound and practical character of his prescriptions.

Proposed Exhibition of Bathing Appliances.

The Board of Health of this city has recently been notified that a Balneological Exhibition, to illustrate the various systhen so called fastest line of steamers. 12 days 19 hours and tration of rain and other meteoric waters, M. De Koninck, of tems of bathing, bath appliances, and kindred matters, is to the Belgian Academy of Sciences, assigns the cause of be held in Frankfort on-Main, Germany, next summer. The exhibition will last from May to September, 1881.

H. H. Heinrich, No. 41 Maiden Lane, New York, In. ventor. Patentee, and Sole Manufacturer of the Self-Adjusting Chronometer Balance, which is not affected extremes of high and low temperatures, as fully demonstrated by a six months' test at the Naval Observatory at Washington, D. C., showing results in temperatures from 134° down to 18°, of 5-10 of a second only. unparalleled in the history of horology and certified to by Theo. F. Kone. Esq., Commander U. S. N. in charge of the Observatory. Mr. Heinrich is a practical working mechanic and adjuster of marine and pocket chro-nometers to positions and temperatures, and is now prepared to apply his new balance wheel to any fine timekeeping instrument, either for public or private use also repairs marine and pocket chronometers, as well as all kinds of complicated watches, broken or lost parts made new and adjusted. Mr. Heinrich was connected for many years with the principal manufacturers of England, Geneva and Locle, Switzerland, and for the last fifteen years in the United States, and very recently with Messrs. Tiffany & Co.. of Union Square. New York. Shipowners, captains naval and army officers railroad and telegraph officials, physicians and horsemen, and all others wanting true time should send to him. Fine watches of the principal manufacturers, for whom he is their agent, constantly on hand. His office is connected by electric wires with the Naval Observatory's astronomical clock, through the Western Union Telegraph, thus giving him daily New York's mean time. Many years ago the British Government made an offer of £6,000 for a chronometer for her navy, keeping better time than the ones in use, but no European horologist ever discovered the sequel, which Mr. Heinrich has now worked out to perfection, overcoming the extremes, as stated above With him is connected Mr. John F. Krugler, for thirty years connected with the trade as salesman.-Adv.

Toope's Felt and Asbestos Covering for Steam Pipes and other surfaces, illustrated on page 357, present volume, received a Medal of Excellence at the late American Institute Fair. See advertisement on another page.

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. The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every

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Chard's Anti-Corrosive Cylinder Oil.

Chard's Patent Lubricene and Gear Grease

R. J. Chard. Sole Proprietor. 6 Burling Slip, New York. Wanted-Superintendent for six thousand spindle cotton yarn mill. State salary and references. Rosalie Yarn Mills, Natchez, Miss.

Use Vacuum Oil Co.'s Lubricating Oil, Rochester, N.Y. 50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

Interesting to Manufacturers and Others.-The worldvide reputation of Asbestos Liquid Paints, Roofing, Roof Paints, Steam Pipe, Boiler Coverings, etc., has induced unscrupulous persons to sell and apply worthless articles, representing them as being made of Asbestos. The use of Asbestos in these and other materials for structural and mechanical purposes is patented, and th ine are manufactured only by the H.W. Johns M'f'g Co., 87 Maiden Lune, New York.

Three requisites-pens, pins, and needles. The two latter you can get of any make, but when you want a good pen get one of Esterbrook's.

For Heavy Punches, etc., see illustrated advertise ment of Hilles & Jones, on page 380.

Frank's Wood Working Mach'y. See illus. adv., p. 382. Painters' list of 65 good recipes. J.J.Callow, Clevel'd, O.

Improved Speed Indicator. Accurate, reliable, and of \dagger convenient size. Sent by mail on receipt of \$1.50. E. H. Gilman, 21 Doane St., Boston, Mass

Astronomical Telescopes, first quality & low prices. Eve Pieces, Micrometers, etc. W. T. Gregg, 75 Fulton St., N.Y.

Engines. Geo. F. Shedd, Waltham, Mass.

The Mackinnon Pen or Fluid Pencil. The commercial pen of the age. The only successful reservoir pen in the market. The only pen in the world with a diamond circle around the point. The only reservoir pen supplied with a gravitating valve; others substitute a spring, which soon gets out of order. The only pen accompanied by a written guarantee from the manufac-turers. The only pen that will stand the test of time. A history of the Mackinnon Pen: its uses, prices, etc., free. Mackinnon Pen Co. 200 Broadway, New York.

Among the numerous Mowing Machines now in use, none ranks so high as the Eureka. It does perfect work, catalogue to Rowley & Hermance, Williamsport, Pa. and gives universal satisfaction. Farmers in want of a mowing machine will consult their best interests by sending for illustrated circular, to Eureka Mower Company, Towanda, Pa.

Peck's Patent Drop Press. See adv., page 333.

The Inventors Institute, Cooper Union Building, New York. Sales of patent rights negotiated and inventions exhibited for subscribers. Send for circular,

Fragrant Vanity Fair Tobacco and Cigarettes. 7 First Prize Medals-Vienna, 1878; Philadelphia. 1876; Paris, 1878; Sydney, 1879-awarded Wm. S. Kimball & Co. Rochester, N. Y.

Superior Malleable Castings at moderate rates of Richard P. Pim, Wilmington, Del.

Wood Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

The E. Stebbins Manuf'g Co. (Brightwood, P. O.) Springfield, Mass., are prepared to furnish all kinds of Brass and Composition Castings at short notice; also given this foundry its high reputation. All work

The "1880" Lace Cutter by mail for 50 cts.; discount to the trade. Sterling Elliott, 262 Dover St., Boston, Mass.

The Tools, Fixtures, and Patterns of the Taunton Foundry and Machine Company for sale, by the George Toy money box, J. E. Walter, New York city, Place Machinery Agency, 121 Chambers St., New York.

Improved Rock Drills and Air Compressors. Illustrated catalogues and information gladly furnished Address Ingersoll Rock Drill Co., 11/2 Park Place, N. Y.

Mineral Lands Prospected, Artesian Wells Bored, by Pa Diamond Drill Co. Box 423, Pottsville, Pa. See p. 349. Experts in Patent Causes and Mechanical Counsel. Park Benjamin & Bro., 50 Astor liouse, New York.

Corrugated Wrought Iron for Tires on Traction Engines, etc. Sole mfrs. H. Lloyd, Son & Co., Pittsb'g, Pa. Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, limited, Erie, Pa.

Power, Foot, and Hand Presses for Metal Workers Lowest prices. Peerless Punch & Shear Co. 52 Dey St., N.Y, Recipes and Information on all Industrial Processe Park Benjamin's Expert Office, 50 Astor House, N. Y.

For the best Stave, Barrel, Keg, and Hogshead Ma chinery, address H. A. Crossley, Cleveland, Ohio.

National Steel Tube Cleaner for boiler tubes. Adjustable, durable. Chalmers-Spence Co., 40 John St., N. Y. For Mill Mach'y & Mill Furnishing, see illus. adv. p.349. The Brown Automatic Cut-off Engine; unexcelled for workmanship, economy, and durability. Write for in-

formation. C. H. Brown & Co., Fitchburg, Mass. Gun Powder Pile Drivers. Thos. Shaw, 915 Ridge Avenue, Philadelphia, Pa.

For Separators, Farm & Vertical Engines, see adv.p.349. For Patent Shapers and Planers, see ills. adv. p. 349. Best Oak Tanned Leather Belting. Wm. F. Fore-

paugh,Jr., & Bros., 531 Jefferson St., Phi'adelphia, Pa. Stave, Barrel. Keg, and Hogshead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

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

C. B. Rogers & Co., Norwich, Conn., Wood Working Machinery of every kind. See adv., page 348.

National Institute of Steam and Mechanical Engineering, Bridgeport, Conn. Blast Furnace Construction and Management. The metallurgy of iron and steel. Practical Instruction in Steam Engineering, and a good situation when competent. Send for pamphlet.

Reed's Sectional Covering for steam surfaces; any injury. J. A. Locke, Agt., 32 Cortlandt St., N. Y.

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For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 349.

Nickel Plating.-Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Condit. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Sheet Metal Presses. Ferracute Co., Bridgeton, N. J. off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Solo-man's Parallel Vise, Taylor. Stiles & Co., Riegelsville.N.J. Rollstone Mac, Co,'s Wood Working Mach'y ad. p. 366. Silent Injector, Blower, and Exhauster. See adv. p. 380. Fire Brick, Tile, and Clay Retorts, all shapes. Borgner

& O'Brien, M'f'rs, 23d St., above Race, Phila,, Pa. Clark Rubber Wheels adv. See page 381.

Diamond Saws. J. Dickinson, 64 Nassau St., N. Y. Steam Hammers, Improved Hydraulic Jacks. and Tube Expanders. R. Dudgeon, 24 Columbia St., New York. Eclipse Portable Engine. See illustrated adv., p. 382. Peerless Colors-For coloring mortar. French, Rich-

ards & Co., 410 Callowhill St., Philadelphia, Pa Tight and Slack Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p.380. Elevators, Freight and Passenger, Shafting, Pulleys

and Hangers. L. S. Graves & Son, Rochester, N. Y. Steam Engines; Eclipse Safety Sectional Boiler. Lam bertville Iron Works, Lambertville, N. J. See ad. p. 349. Magic Lanterns, Stereopticons, and Views of all kinds and prices for public exhibitions. A profitable business for a person with small capital. Also lanterns for home

amusement, etc. Send stamp for 116 page catalogue to

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For best low price Planer and Matcher, and latest improved Sash, Door, and Blin 1 Machinery, Send for

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher. Schumm & Co., Philadelphia, Pa. Send for circular.

Penfield (Pulley) Blocks, Lockport NY. See ad. p. 381 4 to 40 H P. Steam Engines. See adv. p. 381,

Tyson Vase Engine, small motor, 1-33 H. P.: efficient ind non-explosive: price \$50. See illus. adv., page 380. For Yale Mills and Engines, see page 381.

Lightning Screw Plates and Labor-saving Tools p. 333.

English Patents Issued to Americans. From November 9 to November 12, 1880, inclusive.

Book binding, L. Finger, Boston, Mass. Draining and sewerage, G. E. Waring Newport, R. I. Electric gas lighter, G. D. Bancroft, Boston, Mass Electric signal. E H Johnson et al., Menlo Park, N. J. Horse nail manufacture, S. S. Putnam. Boston, Mass. The quality of the work is what has | Hygienic confection, T. S. Lambertet al., New York city. Looms, F. O. Tucker, Hartford, Conn. Reflectors for lamps. J. S. Goldsmith, New York city Railroad vehicles, E. R. Esmond et al. New York city. Sewing machine, G. F. Newell, Greenfield. Mass. Steam boilers, D. Sutton, Cincinnati. Ohio. Steam boilers, W. D. Dickey, New York city.

Trucks, hand, E. J. Lyburn, Fredericksburg, U. S. A.



HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless ccompanied with the full name and address at 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 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 Supple-ENT referred to in these columns may be had at this office. Price 10 cents each.

(1) L. L. asks: 1. How can I grind and polish quartz and agate rock, and what kind of grinding and polishing material should I use? A. Quartz and agate are slit with a thin iron disk supplied with diamond dust moistened with brick oil. The rough grinding is done on a lead wheel supplied with coarse emery and water. The smoothing is done with a lead lap and fine emery, and the polishing may be accomplished by means of a lead lap, whose surface is hacked and supplied with rottenstone and water. 2. What is the best method of polishing steel? A. The usual method is to grind first on a coarse wet stone then on a fine wet stone then finally polish on a buff wheel supplied with dry crocus and revolving rather slowly.

(2) R. L J. asks how to make copying black and red inks. A. 1. Bruised Aleppo nutgalls, 2 lb.; water, 1 gallon; boil in a copper vessel for an hour, adding water to make up for that lost by evaporation; strain and again boil the galls with a gallon of water and strain; mix the liquors, and add immediately 10 oz. of copperas in coarse powder and 8 oz. of gum arabic; agitate until solution of these latter is effected, add a few drops of solution of potassium permanganate strain through a piece of hair cloth, and after permitting to settle, bottle, The addition of a little extract of logwood will render the ink blacker when first written with. Half an ounce of sugar to the gallon will render it a good copyingink. 2. Shellac, 4 oz .; borax, 2 oz.; water, 1 quart; boil till dissolved, and add 2 oz. of gumarabic dissolved in a little hot water; boil and add enough of a well triturated mixture of equal parts indigo and lampblack to produce the proper color; after standing several hours draw off and bottle. 3. Wright's Patent Steam Engine, with automatic cut Half a drachm of powdered drop lake and 18 grains of powdered gum arabic dissolved in 3 oz. of ammonia water constitute one of the finest red or carmine inks.

> (3) X. inquires: What is the rule for aking a counterbalanced face wheel for engines? A. It is a common practice to place the counter weight directly opposite the crank, with its center of gravity at the same distance from the center of the shaft as center of the crank pin, making its weight equal to weight of piston, piston rod, crosshead, and crank pin, plus half the weight of the connecting rod.

> (4) A. R. asks: What is the best way to or particle of dust or dirt without inflaming the eye.

> (5) D. F. H. asks: Can I move a piston in a half inch glass tube by the expansion of mercury? A. Yes, but you will require a long tube to get any appreciable motion of the piston.

(6) J. W. asks: What size of a bore and what length of a stroke I would want for a rocking valve engine of half a horse power? A. About 2 inches cylinder and 3 inch stroke, depending upon pressure and

(7) R. W. H. writes: In a recent discussion on hot air and steam portable engines it was decided to ask your opinion, which should be final. Water is scarce, though enough to use steam is easily procured. The country is hilly, so that lightness is desirable. The power wanted is 6 horse, and movable, that is, on wheels. Which will be best, hot air engine or steam engine? Which consumes most coal for a given power? Which layers of wire, and the size used for the primary of the will be cheapest in above case? A. For small powers induction coil in the Blake transmitter, and as near as the hot air engine is most economical, but we do not think it adapted to your purpose. We would recom- use three layers of No. 20 magnet wire, and for the mend the steam engine for a portable power.

for supplying my boiler, which is made of No. 22 galvanized iron; size 30 inches by 9 feet 4 inches. How many years will the tank wear under favorable circum-strong solution of chloride of cobalt in water. stances, using well water? A. Depends upon the care

sound

(10) G. H. asks: How can I mount photos photograph on paper, and saturate it from the back steam at 60 lb. per square inch, fall 15 feet? A. If your excess from the surface after obtaining thorough transat any convenient place in your boiler below the water parency. Take a piece of glass an inch larger all round line. If you go into the feed pipe, have your connecthan the print, pour upon it dilute gelatin, and then | tion inside all other valves.

" squeegee" the print and glass together. Allow it to dry, and then work in artists' oil colors from the back until you get the proper effect from the front. Both landscapes and portraits can be effectively colored by the above method without any great skill being required.

(11) C. W. S. asks: 1. Is there any practical and effective method known for cutting screws by connecting the slide rest with the mandrel of the lathe by gears or otherwise? A. This can be done in this way; attach a spur wheel to the back of the face plate. Mount a similar wheel on a short hotlow shaft, and support the shaft by an arm bolted to the lathe bed so that the two spur wheels will mesh together. Fit right and left hand leading screws to the hollow shaft of the second spur wheel, and drill a hole through them as well as through the hollow shaft to receive the fastening pin. Now remove the longitudinal feed screw of the slide rest and attach to one side of the carriage an adjustable socket for receiving nuts filled to the leading screws The number of leading screws required will depend of course on the variety of threads it is desired to cut. unless a change of gear is provided. 2. A writer in a foreign journal claims to make slides, r V-shaped pieces for slide rests, eccentric chucks, etc., on his lathe. Is any such process known here, or any process within the capabilities of an amateur mechanic by which the planing machine can be dispensed with? A. For small work held between the lathe centers a milling device fitted to the slide rest in place of the tool post will answer an excellent purpose. This device consists of a mandrel carrying at one end the cutter and at the other end a large pulley. This mandrel is journaled in a hinged frame supported by a block replacing the tool post, and is adjusted as to height by a screw passing through an arm projecting from the supporting block. The direction of the belt is adapted to this de vice by means of pulleys.

(12) J. E. B. asks: 1. What is the best turbine water wheel now in use? A. There are several wheels in market that seem equally good. You bould on a lead lap supplied with fine emery and oil, and examine all of them and decide from your own observation which is best. 2. Whatis the rule for finding the horse power of water acting through a turbine wheel which utilizes 80 per cent of the water? A. Finding the weight of water falling over the dam and its velocity in feet per minute, multiply the weight in pounds by the velocity, and the result is foot pounds, divided by 33,000. the quotient is theoretical horse power; if your wheel gives out 80 per cent, then 80 per cent of that result is the horse power of the wheel. 3. How can I calculate the capacity of a belt? A. You will find an exhaustive article on the subject of belts on pp. 101, 102, Vol. 42, Scientific American, which contains the inormation you desire. 4. What machine now in use is the best, all things considered, for the manufacture of ground wood pulp? Where are they manufactured? A. This information can probably be obtained by inserting an advertisement in the Business and Personal column of this paper.

(13) C. A. R. writes: Wishing to renew my Leclanche batteries, which were giving out, I bought some new empty porous cells. Please give the following information: 1. Can I use the carbon plates of the old elements over again? If so, do they need to undergo any washing or soaking; or are they as good as ever? Yes. Soak them for a few hours in warm water. 2. is there anything I must add to the granular manganese with which I fill the cells, in order to obtain maximum power and endurance? Some makers add pulverized or even coarsely broken carbon. Is it an advantage? A. It is an advantage to add granulated carbon to the manganese. Use equal parts of each. 3. What is the exact composition of the curdy mass which forms around and especially underneath the zincs of newly mounted and old gravity batteries. Is this substance formed natuve cinders from the eye? A. A small camel's hair rally, or is it the result of using poor zinc or supphate of brush dipped in water and passed over the ball of the copper? A. It is copper, and should be removed, for it eye on raising the lid. The operation requires no skill, weakens the battery. It is the result of placing the takes but a moment, and instantly removes any cinder zinc in the sulphate of copper solution. 4. Is there any real advantage in amalgamating the zincs of the above batteries? A. No. 5. Is there a speedy way of cleaning them when coated with this substance? A. They can be cleaned by scraping. 6. At certain occasions my electric bells began ringing without anybody apparently closing the circuit. I often notice that if I unjoin the batteries and let them remain thus for a few hours, on reconnecting them the bells would work all right for a week, sometimes a fortnight, when the same trouble would again occur. Can you in any way explain this phenomenon? The batteries are not placed in a very dry part of the house, but the wires, which run pretty closely together, are nearly all exposed, so that I can control the slightest corrosion or uncovering of the conductors. A. There must be some accidental closing of the circuit. We could not explain the action of your line without seeing it.

(14) J. E. E. asks: What is the number of you can the amount used for secondary? A. For primary, secondary use twelve or fourteen layers of No. 36 gills (8) J. C. T. writes: 1. I have a water tank covered copper wire. The resistance of the secondary wire should be from 100 to 150 ohms.

(15) J. M. l. asks how to make a baromemany gallons willit hold? A. 342 gallons. 2. Will it ter by coloring ribbon, so that they will change color, be better to have it painted inside? A. Yes. 3. How indicating weather changes. A. Use a moderately

(16) O. C. H. writes: In reply to R. A. R., question 22, in Scientific American, December 4, (9) W. H. C. asks: Is there any way of I will say that some months ago I was engaged in rundeadening the noise of machinery overhead from the ning a saw mill, lathe, and shingle factory; was troubled engine room below? The noise comes from machinery in with two hot boxes, and frequently had to stop and the weave room of an alpaca mill. A. This is generally apply ice. Seeing in the Scientific American a refer accomplished by setting the legs of the machines on ence to the use of plumbago, I sent for some, and after thick pieces of India-rubber or other non-conductor of three or four applications was troubled no more with hot boxes

(17) F. W. asks: What is the best way for on glass and color them? A. Take a strongly printed return pipe to go into the boiler from radiatorswith a rag dipped in castor oil. Carefully rub off all job is properly piped you can bring your return pipe in